EXECUTIVE CHAMBERS

HONOLULU

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JOHN WAIHEE
GOVERNOR

January 28, 1987

Honorable John C. Lewin
Director
Department of Health
1250 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Lewin:

Based on the recommendation of your office, I am pleased to accept the environmental impact statement for the eradication of marijuana on state-owned and managed conservation district lands on the islands of Hawaii, Maui, and Molokai, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under applicable laws and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the proposing agency to weigh carefully whether the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and, together with the comments made by reviewers, provide a useful analysis to the proposed action.

With kindest regards,

Sincerely,

JOHN WAIHEE

cc: Honorable William Paty

FINAL

ENVIRONMENTAL IMPACT STATEMENT

FILE COPY

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE OF HAWAII

ERADICATION OF MARIJUANA ON STATE-OWNED AND MANAGED CONSERVATION DISTRICT LANDS ISLANDS OF HAWAII, MAUI AND MOLOKAI

Libert K. Landgraf
Administrator, Division of Forestry and Wildlife
Department of Land and Natural Resources

December 1986

Prepared by

KRP INFORMATION SERVICES

Honolulu, Hawaii

PROJECT:	ERADICATION OF MARIJUANA
LOCATION:	CONSERVATION DISTRICT LANDS OWNED AND MANAGED BY THE STATE OF HAWAII ISLANDS OF HAWAII, MAUI & MOLOKAI
APPLICANT:	DIVISION OF FORESTRY AND WILDLIFE DEPARTMENT OF LAND AND NATURAL RESOURCES P. O. BOX 621 HONOLULU, HAWAII 96809
APPROVING AGENCY:	BOARD OF LAND AND NATURAL RESOURCES P. O. BOX 621 HONOLULU, HAWAII 96809
ACCEPTING AUTHORITY:	THE HONORABLE GEORGE R. ARIYOSHI GOVERNOR, STATE OF HAWAII
CONTACT:	LIBERT K. LANDGRAF, ADMINISTRATOR DIVISION OF FORESTRY AND WILDLIFE DEPARTMENT OF LAND AND NATURAL RESOURCES 1151 Punchbowl Street HONOLULU, HAWAII 96813 PHONE: (808) 548 2861
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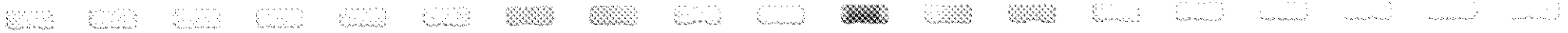


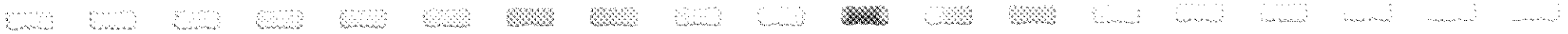
CHANGES MADE AS THE RESULT OF COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The herbicide proposed to be used in the eradication program will be limited to Weed Oil. Glyphosate will be used only if Weed Oil becomes unavailable, and only after field tests in Hawaiian forest areas. Diesel oil will not be used in the foreseeable future.

Minor corrections have been made throughout the text to clarify meaning or correct errors.

A new appendix has been added on invertebrates proposed for listing as endangered and threatened species.

Comment letters on the draft EIS and response to them are reproduced in Appendix E, part 2.



PREFACE

The Board of Land and Natural Resources, approving agency for the applicant action, has determined that the proposed action, which will include the use of chemicals for the eradication of marijuana growing on state-owned and managed Conservation District lands on the islands of Hawaii, Maui, and Molokai, will require an environmental impact statement (EIS) under Chapter 343, Hawaii Revised Statutes, Section 343-5, and the Environmental Impact Statement Rules, Chapter 200, Title 11, Administrative Rules, for the following reasons:

1. The proposed use is a conditional use in the Conservation District; and
2. The proposed use meets significance criteria defined in Section 11-200-12 of the EIS regulations.

The proposed eradication program will be very similar to that approved for the Island of Kauai in 1985. In 1984, the Department determined that the use of chemicals in the eradication of marijuana growing on State-owned and managed lands in a Conservation District would require a Conservation District Use Permit (CDUA) from the Board of Land and Natural Resources. The Department also determined that the action could have a significant environmental impact, and that an environmental impact statement would be prepared as part of the application. The application and the EIS that were prepared addresses Conservation District lands owned and managed by the State of Hawaii on the island of Kauai. The Department now intends to expand the eradication program to the islands of Hawaii, Maui, and Molokai.

The EIS for Kauai, which was accepted by the Governor on August 19, 1985, identifies the potential adverse environmental impacts of the action and proposes a number of measures to mitigate these potential effects. These mitigatory measures were incorporated as conditions to the Conservation District Use Permit that was approved by the Board on August 23, 1985. The Board also directed that a Department operations plan be prepared. This operations plan was developed in January, 1986. It provides specific guidelines for site selection, field operations and monitoring for the eradication program.

There are also two Federal EIS's that address chemical eradication of marijuana. The U.S. Drug Enforcement Administration (DEA) has prepared two programmatic EIS's.

One evaluates actions on Federal lands in the Continental United States (July 1985); the other evaluates actions on non-Federal lands in the contiguous United States and Hawaii (May 1986).

Much of the information in this document is taken from these previously published and approved State and Federal EIS's, and the Operation Plan for Kauai.

This report is being prepared to accomplish the following:

1. To comply with Chapter 343, Hawaii Revised Statutes;
2. To inform the public of the proposed action and methods for the eradication of marijuana on Conservation District lands and to obtain public response to the proposed action;
3. To assess the environmental setting of the areas where this action is to occur;
4. To assess the possible environmental impacts of the proposed action;
5. To set forth measures that can mitigate the potentially harmful environmental consequences of the proposed action; and,
6. To evaluate alternatives to the proposed action and assess possible impacts of these alternatives.

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ACRONYMS AND ABBREVIATIONS

BLNR	Board of Land and Natural Resources, State of Hawaii
DEA	U.S. Drug Enforcement Administration
DLNR	Department of Land and Natural Resources, State of Hawaii
DOA	Department of Agriculture, State of Hawaii
DOCARE	Division of Conservation and Resources Enforcement, DLNR
DOFAW	Division of Forestry and Wildlife, DLNR
DPED	Department of Planning and Economic Development
EPA	U.S. Environmental Protection Agency
HSPA	Hawaiian Sugar Planters' Association
SCS	U.S. Soil Conservation Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

SUMMARY

BACKGROUND

The proposed eradication program will take place on state-owned and managed Conservation District lands on the islands of Hawaii, Maui and Molokai. The target vegetation is the cannabis plant, commonly know as marijuana or hemp. In Hawaii, it is also called pakalolo.

According to the 1984 Annual Report of the Select Committee on Narcotics Abuse and Control of the Ninety-Eighth Congress, marijuana is considered to be the number one drug problem in Hawaii. It has also become a problem of public safety and danger to the environment.

Because cannabis cultivation is illegal, most sites chosen for cultivation are in areas remote enough to avoid detection by the general public, but accessible enough to carry in heavy gardening equipment In Hawaii, law enforcement officials estimate that 10% of the marijuana is grown in small private backyard settings, 10 to 20% on sugarcane lands, and 70 to 80% in forested areas. The great majority of cannabis cultivation sites occur in the more remote portions of forested or agricultural areas.

Marijuana growing is harmful to sensitive environmental areas. Cultivation of marijuana for sale is an intensive agricultural operation. Growers destroy native vegetation in the process of cultivation, including felling trees to provide more sunlight to their crops, and use herbicides, snail and slug pellets, mouse and rat poison, and commercial chemical fertilizers.

Marijuana growers also employ a number of methods to protect their crops from intruders, including booby traps, making some areas of state-owned and managed Conservation District lands dangerous for legitimate users, such as hikers and hunters. Law enforcement officials use a variety of programs in their efforts to control marijuana. These include interception of marijuana shipments, including the highly successful "Operation Pele" which has concentrated on the U.S. mails; enforcement actions against both sellers and buyers; and eradication of marijuana by both mechanical and chemical means.

Local law enforcement officials have had great difficulty in keeping up with the great increase in marijuana growing, even though the numbers of persons arrested and the amounts of marijuana confiscated and eradicated are considerable. Despite massive efforts, law enforcement officials acknowledge that there is still a great deal of marijuana being grown and shipped out of Hawaii.

Marijuana eradication has been accomplished by "Operation Green Harvest." The traditional Green Harvest operations utilize helicopters to spot marijuana patches from the air. Enforcement officers rappel to the ground, cut the marijuana plants, load the plants into slings to be carried away by helicopter, and are picked up by rope by the helicopter at the end of the operation.

Because the Green Harvest operations are expensive, dangerous, and require considerable personnel, law enforcement officials have sought alternative methods of eradication. In 1984, owners and managers of sugarcane plantations on the island of Hawaii requested police assistance in eradicating marijuana grown in the cane fields. Landowners conferred with the Hawaiian Sugar Planters' Association and Hawaii County Police, looking for something that would destroy the marijuana without damaging the sugarcane. Their proposal was to spray an emulsion of diesel oil and water on the plants. The first "Operation Wilt" took place on the Big Island in May, 1984. Law enforcement officers reported that they destroyed 43,349 plants in six operations. On Kauai, 12,189 plants were destroyed in three days. In both counties all of these operations were on private lands at the request of and with the permission of landowners.

The success of chemical eradication programs on plantation lands led the Department of Land and Natural Resources to consider a similar program for state-owned and managed lands in the Conservation District on Kauai in 1985. Successful eradication efforts on Kauai utilizing weed oil have led, in turn, to the proposed expansion of the program to state-owned and managed Conservation District lands on Hawaii, Maui and Molokai.

OBJECTIVES

The objective of the eradication program is to preserve the character and resources of the state-owned and managed Conservation District lands in order to

make these areas safe for public recreation and other uses, and to protect native plant and animal habitats from further destruction by people engaged in the cultivation of marijuana. The state also has the duty and responsibility to stop illegal activities and eradicate contraband on its lands. An additional objective of the proposed eradication program is to put potential growers on notice that they will be risking much time and effort, with little chance of securing a harvest, if they plant on state-owned and managed Conservation District lands.

THE PROPOSED ACTION

Alternative methods of eradication being proposed include both manual removal and chemical spraying. Alternate disposal methods include either hauling the marijuana away for disposal or leaving it on the site (for chemical eradication methods only). At present, only manual methods of eradication and physical removal are being used. The proposed action will add chemical eradication methods and on-site disposal to current practices.

Spot applications of chemicals will be made by ground crews with knapsack sprayers or by a helicopter equipped with a modified-hose sprayer. In places where the spraying of chemicals would not be prudent, marijuana will be removed by hand or mechanical means. The spraying will target individual plants. There will be no broadcast-spraying over a general area.

The chemicals that will be used are weed oil, a commercial preparation similar to diesel oil, and glyphosate, sold commercially as Roundup. If permission can be obtained from the U.S. Environmental Protection Agency (EPA) and the Hawaii State Department of Agriculture, diesel oil may also be utilized. (Although oils are commonly used in conjunction with pesticides as wetting agents, diesel oil by itself cannot be sold for use as an herbicide for marijuana eradication because it is not registered for that use with EPA.) **Paraquat will not be used.**

Because it cannot be predicted where marijuana plants would be found and because swift follow up is necessary for the success of the program, eradication would be approved on a case-by-case basis by the Chairperson of the Board of Land and Natural Resources (BLNR) or his designated representative.

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATORY MEASURES

The major concern relating to the use of chemicals in the eradication of marijuana plants is the potential impact on plant and wildlife habitats; soils and groundwater resources; fresh water resources and aquatic creatures; and human health. The method of application is critical. Broadcast spraying by fixed-wing aircraft has the potential of being extremely destructive and therefore will **not** be done. All application will be either by helicopter with a modified-hose sprayer or by ground crews using knapsack sprayers. Even these measures will have some adverse and unavoidable impacts.

Before any spraying is undertaken, an operations plan will be developed for each island to provide guidelines for the field operations program. The Operations Plan for marijuana eradication prepared by DLNR for Kauai specifies the procedures to be followed for both manual and chemical eradication operations. For chemical eradication, it provides specifications for: Training; Chemical Mixing, Equipment Calibration and Chemical Application; Weather Conditions; Public Notification; Personal Health and Safety; Spills and Other Emergencies; Record Keeping; and Monitoring. These specifications are presented in Table V-3 at the end of Part V and will be part of similar operations plans for Hawaii, Maui and Molokai.

Chemical spraying will be carefully controlled, following the mitigatory measures identified in this report and summarized in Table V-3. It is expected that these measures will form the basis for conditions of approval of the state-owned and managed Conservation District Use permits, as was the case for the Kauai application.

Records will be kept on chemical spraying activities and a monitoring program will be established. Results of the monitoring program will be evaluated and changes in eradication methods made, if necessary.

DLNR will consult with the U.S. Fish and Wildlife Service and others to identify essential habitats and other sensitive areas. They will determine the areas where:

1. Spraying by helicopter would be allowed;
2. Spraying by portable knapsack units would be allowed;
3. Only manual eradication methods would be allowed.

No chemical spraying will be done until this process has been completed and approved by the BLNR-designated authority.

FIGURE I–1

HAWAII

STATE–OWNED CONSERVATION DISTRICT LANDS

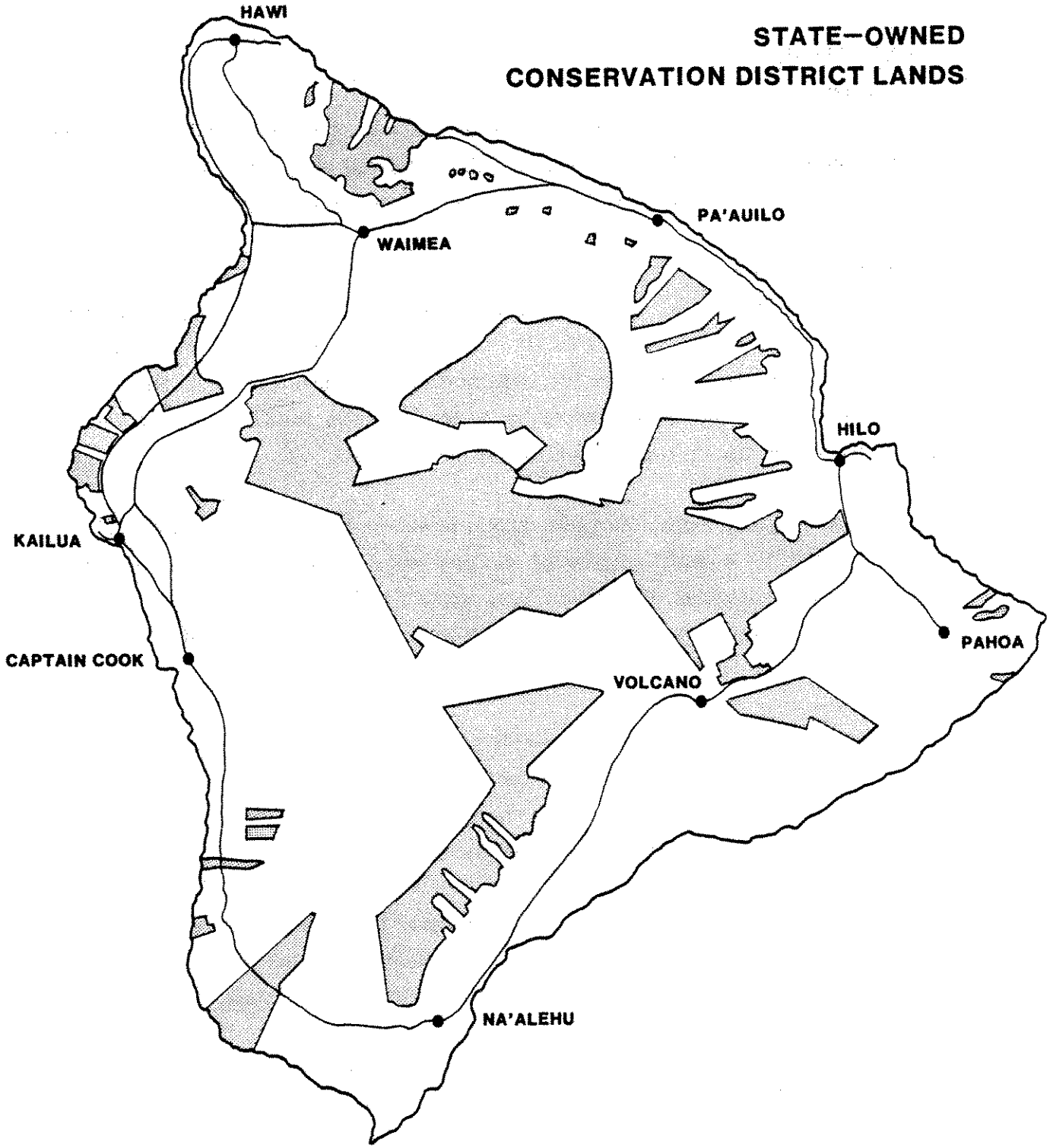

FIGURE I–2

MAUI

STATE–OWNED CONSERVATION DISTRICT LANDS

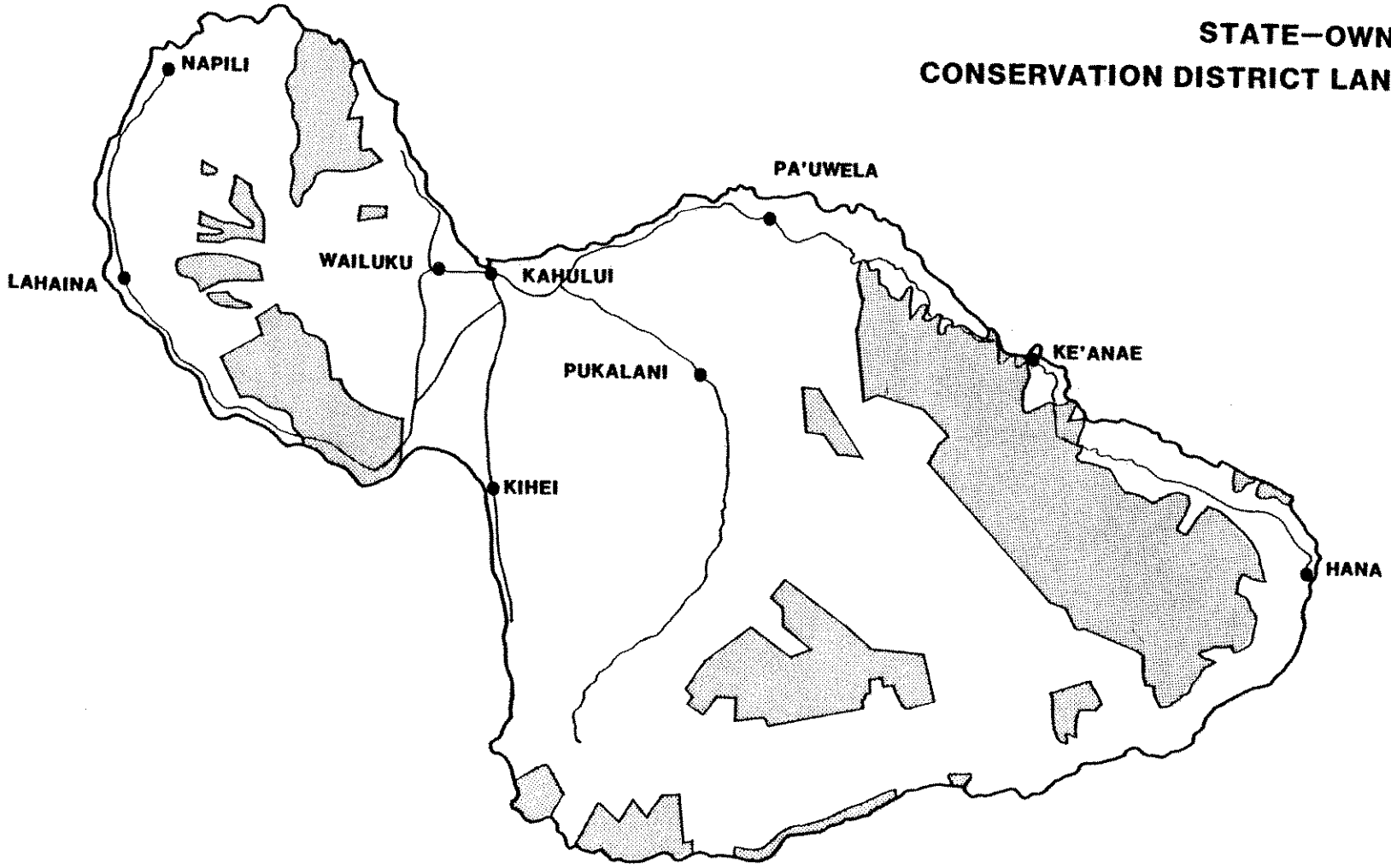

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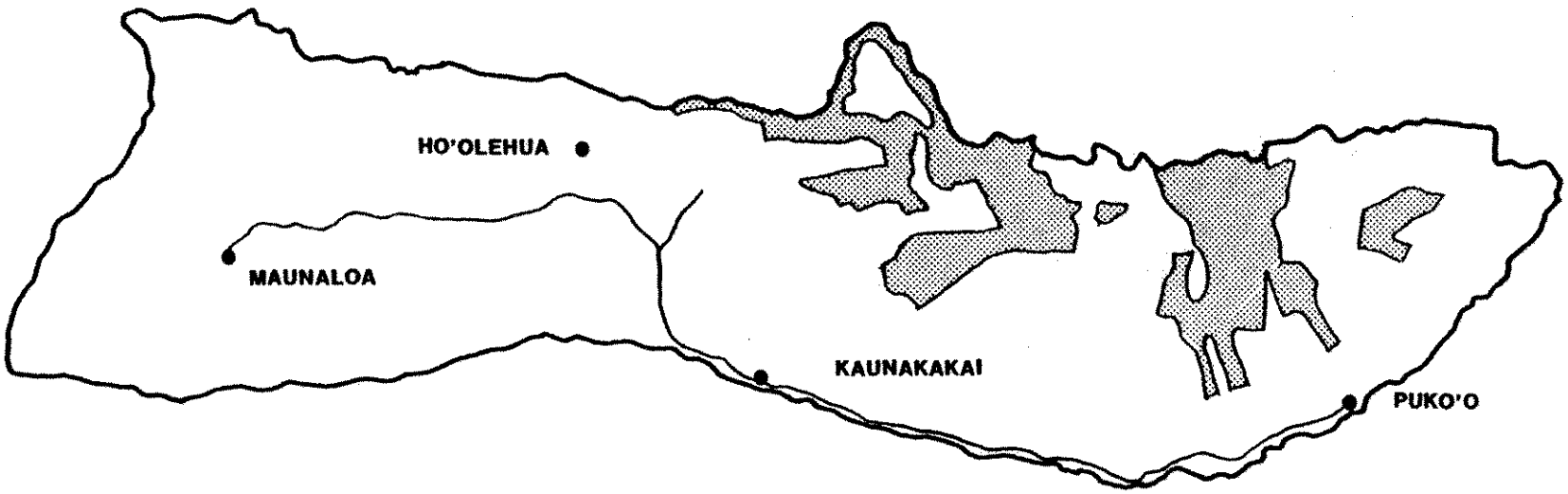
FIGURE I–3

MOLOKAI

STATE–OWNED CONSERVATION DISTRICT LANDS



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Extent of Problem

According to the 1984 Annual Report of the Select Committee on Narcotics Abuse and Control of the Ninety-Eighth Congress, marijuana is considered to be the number one drug problem in Hawaii. It has also become a problem of public safety and danger to the environment.

Because cannabis cultivation is illegal, most sites chosen for cultivation are in areas remote enough to avoid detection by the general public, but accessible enough to carry in heavy gardening supplies and equipment. In Hawaii, law enforcement officials estimate that 10% of the marijuana is grown in small private backyard settings, 10 to 20% on sugarcane lands, and 70 to 80% in forested areas. The great majority of cannabis cultivation sites occur in the more remote portions of forested or agricultural areas.

Marijuana growing is harmful to sensitive environmental areas. Cultivation of marijuana for sale is an intensive agricultural operation. Growers destroy native vegetation in the process of cultivation, including felling trees to provide more sunlight to their crops, and use herbicides, snail and slug pellets, mouse and rat poison, and commercial fertilizers. Officials of The Nature Conservancy of Hawaii, the group who manages the 5,320-acre Waikamoi Preserve on Maui, report that illegal farming activites in the area have become a threat to the rare birds that live there. They note that growers have chopped down large ohia tress and cleared other valuable foliage, inviting destructive weeds and spoiling birds' habitats (Maui News, 8/13/86).

Marijuana growers also employ a number of methods to protect their crops from intruders, including booby traps, making some areas of state-owned and managed Conservation District lands dangerous for legitimate users, such as hikers and hunters. The manager and other workers at the Waikamoi preserve have been threatened. The threats are so serious that the Conservancy has stopped allowing the public to go into the western area of the preserve (Honolulu Advertiser 8/12/86).

Law enforcement officials use a variety of programs in their efforts to control marijuana. These include interception of marijuana shipments, including the highly

successful "Operation Pele" which has concentrated on the U.S. mails; enforcement actions against both sellers and buyers; and eradication of marijuana by both mechanical and chemical means.

Local law enforcement officials have had great difficulty in keeping up with the great increase in marijuana growing, even though the numbers of persons arrested and the amounts of marijuana confiscated are considerable. Big Island Police Chief Guy Paul is quoted in a Honolulul Advertiser article of October 7, 1986, as stating that there have been 431 arrests, including shippers and growers, for marijuana over the six months from January to June of 1986, and that many of these were multiple offenders.

Eradication efforts are also extensive. DEA statistics published in the DEA 1986 EIS indicate that 447,778 plants were eradicated in Hawaii in 1984, an amount larger than in California and second only to Indiana for cultivated plants. Almost 65% of the plants seized were sinsemilla. In 1985, a record 563,621 plants were eradicated in Hawaii County alone (Honolulu Advertiser, 9/16/86). Maui County police have conducted nearly a dozen raids, of two to three days each, during the first nine months of 1986 using National Guard helicopters. The harvest has netted 88,815 plants (Honolulu Advertiser, 10/7/86).

One 4-day effort on the Big Island in September, 1986, netted 122,500 marijuana plants, estimated to weigh 20 tons, and involving 95 acres of land (Honolulu Advertiser, 9/16/86). The article notes that if the 122,500 marijuana plants had been planted in open fields, like a legal crop, they would have covered an area about the size of Waikiki.

Despite these massive efforts, law enforcement officials acknowledge that there is still a great deal of marijuana being grown and shipped out of Hawaii.

Marijuana eradication has been accomplished by "Operation Green Harvest." The traditional Green Harvest operations utilize helicopters to spot marijuana patches from the air. Enforcement officers rappel to the ground, cut the marijuana plants, load the plants into slings to be carried away by helicopter, and then picked up by rope by the helicopter at the end of the operation.

Because the Green Harvest operations are expensive, dangerous, and require considerable personnel, law enforcement officials have sought alternative methods of eradication. In 1984, owners and managers of sugarcane plantations on the island of Hawaii requested police assistance in eradicating marijuana grown in the cane fields. Landowners conferred with the Hawaiian Sugar Planters' Association and Hawaii County Police, looking for something that would destroy the marijuana without damaging the sugarcane. Their proposal was to spray an emulsion of diesel oil and water on the plants. The first "Operation Wilt" took place on the Big Island in May, 1984. Law enforcement officers reported that they destroyed 43,349 plants in six operations. On Kauai, 12,189 plants were destroyed in three days. In both counties all of these operations were on private lands at the request of and with the permission of landowners.

The success of chemical eradication programs on plantation lands led DLNR to consider a similar program for state-owned and managed lands in the Conservation District on Kauai in 1985. Successful eradication efforts on Kauai utilizing weed oil have led, in turn, to the proposed expansion of the program to state-owned and managed Conservation District lands on Hawaii, Maui and Molokai.

OBJECTIVES

The objective of the eradication program is to preserve the character and resources of the state-owned and managed Conservation District lands in order to make these areas safe for public recreation and other uses, and to protect native plant and animal habitats from further destruction by people engaged in the cultivation of marijuana. The state also has the duty and responsibility to stop illegal activities and eradicate contraband on its lands. An additional objective of the proposed eradication program is to put potential growers on notice that they will be risking much time and effort, with little chance of securing a harvest, if they plant on state-owned and managed Conservation District lands.

THE PROPOSED ACTION

Although DOFAW is the applicant in the proposed action, actual eradication operations will be undertaken by DLNR's Division of Conservation and Resources Enforcement (DOCARE) in cooperation with the county police departments and DEA.

Spot applications of chemicals will be made by ground crews with knapsack sprayers or by helicopters equipped with boom sprayers. In places where the spraying of chemicals would not be prudent, marijuana will be removed by hand or mechanical means. The spraying will target individual plants. There will be no broadcast-spraying over a general area.

The chemicals that will be used are weed oil, a commercial preparation similar to diesel oil, and glyphosate, sold commercially as Roundup. If permission can be obtained from the U.S. Environmental Protection Agency (EPA) and the Hawaii State Department of Agriculture, diesel oil may also be utilized. (Although oils are commonly used in conjunction with pesticides as wetting agents, diesel oil by itself cannot be sold for use as an herbicide for marijuana eradication because it is not registered for that use with EPA.) **Paraquat will not be used.**

Weed oil has been selected as the principal chemical to be used because of the successful application of diesel oil on sugarcane lands by the police departments of both Kauai and Hawaii counties described earlier. (Note: the diesel oil used in this experiment was taken from stocks on hand and was neither sold nor purchased for use as an herbicide.) In these applications, oil was mixed with water in a concentration of 35 to 40 percent oil plus one quart of a surfactant or sticking agent. This mixture of oil and water was sprayed at low altitude from a helicopter through an extended boom. The marijuana plants died within a few hours, compared to several days or a week for other herbicides. The combination of large droplets and precision spraying results in very little drift, and has been very effective in eradicating marijuana without causing injury to the cane. A similar operation, using weed oil, has been used in the eradication of marijuana growing on state-owned and managed Conservation District lands on Kauai. This operation is described in more detail in Part V of this report.

Under certain circumstances, glyphosate will be utilized. Glyphosate is highly effective, has short persistence in soil and water environments, and very low toxicity to animals.

Because it cannot be predicted where marijuana plants would be found and because swift follow up is necessary for the success of the program, eradication would be

approved on a case-by-case basis by the Chairperson of the BLNR or his designated representative. The following information will be provided:

1. Exact location of target site.
2. "Name and distance of nearest town or landmark." (A requirement for filing a CDUA application.)
3. "Area (size) of proposed use." (A requirement for filing a CDUA application.)
4. Type of treatments; i.e., chemical or physical means, and air or ground application.
5. Type and formulation of chemicals along with the manufacturer's directions for use.
6. Weather conditions under which chemicals would not be used.
7. Time period to carry out the operation.

Before any spraying is undertaken, an Operations Plan will be developed for each island to provide guidelines for the field operations program. DLNR will consult with the U.S. Fish and Wildlife Service and the other agencies listed in Item 1. on page V-2 to identify essential habitats and other sensitive areas. They will determine the areas where:

1. Spraying by helicopter would be allowed;
2. Spraying by portable knapsack units would be allowed;
3. Only manual eradication methods would be allowed.

No chemical spraying will be done until this process has been completed and approved by the BLNR-designated authority.

Chemical spraying will be carefully controlled, following the mitigatory measures identified in this report and summarized in Table V-3. It is expected that these measures will form the basis for conditions of approval of the Conservation District Use permits, as was the case for the Kauai application.

Records will be kept on chemical spraying activities. A monitoring program will be established to determine:

1. The effectiveness of the marijuana eradication program.
2. The effects on soils, groundwater, wildlife, and non-target vegetation.

Results of the monitoring program will be evaluated and changes in eradication methods made, if necessary.

Alternative methods of eradication being proposed include both manual removal and chemical spraying. Alternate disposal methods include either hauling the marijuana away for disposal or leaving it on the site (for chemical eradication methods only). At present, only manual methods of eradication and physical removal are being used. The proposed action will add chemical eradication methods and on-site disposal to current practices.

A description of alternative methods of eradication and the chemicals proposed to be used follows.

Eradication Methods

Physical

Manual Methods. Manual eradication involves the use of hand and portable power tools to cut down marijuana plants. The most common method is to uproot small plants; larger plants are cut down with hoes, axes, machetes, weedeaters, and both mechanized and hand saws. The advantages of this method include the low cost of equipment and the high degree of selectivity. For larger plots, however, the labor and time requirements of manual eradication are greater than for other methods of eradication. Figure I-4 illustrates the manual method of eradication.

The use of manual methods is also constrained by the time and effort required for the workers to reach the site. The distance and the nature of the terrain and its vegetation are key factors. In remote areas, helicopters are used to transport law enforcement officers to the sites.

Mechanical Methods. Mechanical eradication methods use self-propelled machinery to destroy the marijuana plants. Mowers, reapers, or bush hogs with high-speed rotary blades may be used to cut, shop, flail, or shred the plants. This process is nonselective in that all plants on the site are cut down when the

equipment is used. Most mechanical equipment is not safe to operate on slopes of more than 30 to 35 degrees. Mechanical methods also are constrained in areas where soil is highly susceptible to compaction or erosion. In addition, site obstacles such as logs, stumps, and rocks reduce efficiency. Accessibility of the site and the availability of the equipment are other important considerations.

Chemical

Chemical eradication methods involve the application of herbicides or other chemicals to destroy the marijuana plants. A wide variety of chemicals are available for controlling annual broadleaf weeds such as marijuana. The chemicals that are effective in destroying cultivated plants and that are under consideration for use in eradicating marijuana from state-owned lands are glyphosate and weed oil. Diesel oil may also be used if permissions can be obtained from EPA and the State Department of Agriculture (DOA). Two delivery methods are proposed: ground spot application and aerial spot application by helicopter.

Ground Spot Application. Ground spot application involves the localized application of chemicals by portable spray units to individual plants or small clumps of plants. This is illustrated in Figure I-5. Treatment effectiveness depends on the rate of application and the coverage on the marijuana plants. The advantage of this technique is that non-target plants are easily avoided. It has essentially the same disadvantages as the manual eradication methods. This method is more labor-intensive and time-consuming than aerial broadcast application.

Aerial Spot Application. Aerial spot application involves the application of chemicals by aerial spraying a plot or a number of plots. This method is proposed for use in areas that are remote or not readily accessible by surface means. It is less costly than other methods because relatively few people are needed to treat large areas. Topography and accessibility are also less constraining for aerial applications than for ground spot application or for manual methods.

Aerial spraying will only be done from helicopters because they are more maneuverable and can offer greater accuracy. Chemicals are sprayed on target crops using a specially designed modified-hose sprayer that effectively reduces

Figure I-4 (above)

Manual Eradication of Marijuana

Figure I-5 (left)

Spot Application on the Ground

drift onto offsite or nontarget areas. The spray is controlled by the pilot. The system is designed to create a minimum of air turbulence in the vicinity of the nozzle orifices to maintain a uniformly large droplet size and to prevent creation of aerosols. The bulk of the herbicide spray droplets produced by this system are quite large, in the range of 400 to 1,200 microns (in contrast to insecticide droplets, which are in the range of 20 to 300 microns), so little of the herbicide drifts outside of the buffer zones around the target areas.

Aerial application of herbicides is done by specially trained and licensed aircraft pilots. Spray equipment must meet rigorous spray delivery specifications. The system must have an automatic vacuum shutoff to prevent overspraying. The delivery system must be calibrated to ensure delivery of the proper droplet size and distribution.

Weather conditions and spray delivery performance are monitored by onsite inspectors to minimize the chance of off-target drift, volatilization, runoff, or leaching of applied herbicides. (Assignment of responsibility for ensuring compliance with spray delivery specifications and for monitoring activities is made by site-specific analyses on a case-by-case basis.) Offsite drift can be a problem when winds exceed 8 mph, when the humidity is low, or when the temperature is high enough to reduce the size of the droplets. Applying the herbicide when it is raining or when rain is imminent could contribute to runoff or dilution of herbicide and leaching through the soil. Therefore, spraying is allowed only under favorable weather conditions. (Part IV describes the mitigatory measures that apply to aerial application methods.)

Three major factors were considered in the design of the spray system.

1. Drift and Overspray: this occurs as a result of the air currents generated by "prop-wash." A pressure regulator is used to maintain a low pressure system to avoid aerosol effect. An adjustable nozzle is used to control spray patterns and assist in controlling the aerosol effect.
2. Dripping: positive shut-off valving is located at the nozzle and to minimize dripping while the system is off.

3. Site-specific Application: a system design allows the spray nozzle to be manipulated directly over the target vegetation.

The spray apparatus is powered with a hydraulic pump which is controlled with a pressure regulator to eliminate high pressure aerosol effects. The spray solution is contained in a 55-gallon drum within the helicopter and is routed through a hydraulic hose approximately 100 feet in length which is suspended beneath the aircraft.

At the end of the hose, there is a nozzle and an electrically activated valve which is controlled by the pilot. The nozzle and valve is contained within a metal tube with sufficient weight to stabilize the hose and nozzle as it is suspended. This tube also protects the nozzle orifice and valve body from being damaged when contact is made with the ground or trees as it is maneuvered into position for spraying.

This system allows the spray to be released directly over the target vegetation and away from the effects of "prop-wash." The location of the valve minimizes dripping and allows instant activation and shut-off.

The photographs on the following pages were taken of an actual spraying operation on Kauai. Figures I-6 and I-7 show typical marijuana patches in the forest. These are quite small, ranging in size from 5 feet across to narrow strips not more than 10 or 12 feet long. Figure I-8 shows the spray apparatus. The helicopter in action is shown in Figure I-9. The vertical dark line on the left side of the picture is the hose line. The spraying is very precise, as can be seen in Figures I-10 and I-11. The final photos, Figures I-12 and I-13, show the area one month later. The marijuana is completely dead. However, other vegetation has already begun to reappear.

Enforcement officers will undergo training in cooperation with the Cooperative Extension Service's Pesticide Applicator Training Program or other agencies to receive proper instruction in plant identification and the safe handling of the chemicals to be used.

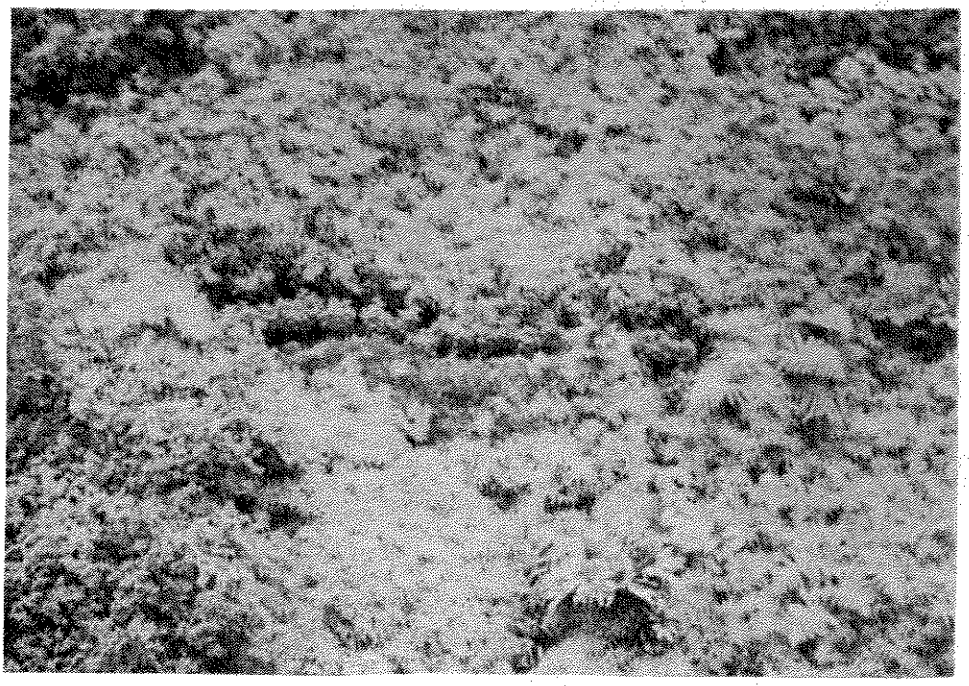

Figure I-6

Helicopter Views of Marijuana Patches in Forested Mountain Area.

Figure I-7

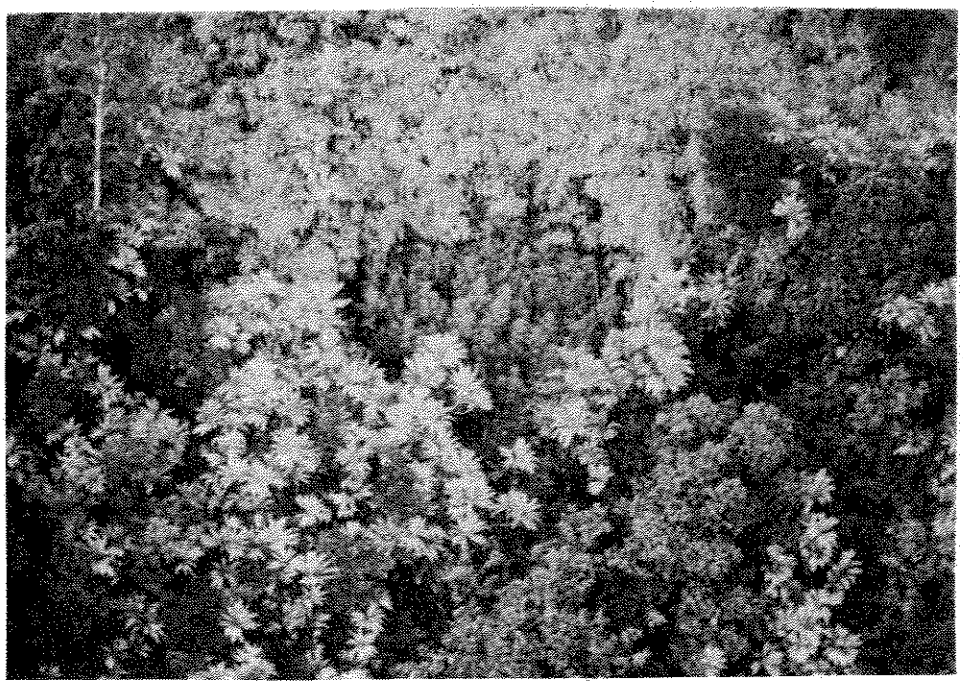

Figure I-8 Helicopter Spraying Apparatus

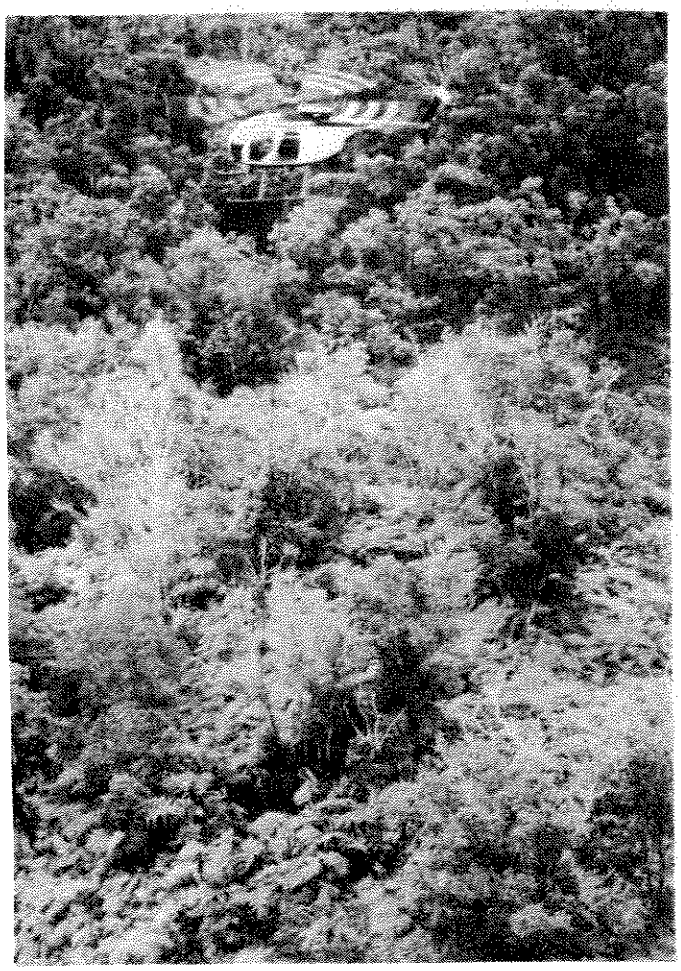

Figure I-9

Helicopter in Operation. The straight vertical line on the left side of the picture is the hoseline. The spray nozzle is below the tree canopy.

Figure I-10

Figure I-11

Figure I-10 (above) and Figure I-11 (left) show the spray apparatus in use. Notice that there is very little drift.

Figure I-12

Figures I-12 and I-13 are photos taken approximately one month after spraying. Notice the revegetation in Figure I-13 below.

Figure I-13

Chemicals Proposed to be Used

Paraquat will not be used. The principal chemical that will be used is an oil and water emulsion. Either diesel oil or weed oil, a commercial preparation similar to diesel oil, will be used. Under certain circumstances, glyphosate, sold commercially as Roundup or Rodeo, will be utilized.

Glyphosate

The following description of glyphosate is taken from the DEA 1986 EIS and Monsanto's Material Safety Data (see Appendix B).

Glyphosate is the common name for N-(phosphonomethyl) glycine. Herbicidal formulations of the isopropylamine salt of glyphosate are manufactured under the trade names Roundup and Rodeo, registered trademarks of the Monsanto Chemical Company. Roundup is a general purpose herbicide while Rodeo is designed for aquatic vegetation management. The following discussion presents information on the parent chemical, glyphosate. It can be assumed that Roundup is characterized by the same properties unless otherwise noted.

Glyphosate is a white, odorless solid with a negligible vapor pressure and a solubility of 1.2% in water at 25°C. Roundup is a viscous liquid that is completely soluble in water. Glyphosate is a broad-spectrum, nonselective herbicide applied as a solution in water to the foliage of target plants. It is effective on deep-rooted perennial species and on annual and biennial species of grasses, sedges, and broadleaf weeds.

The exact mechanism by which glyphosate kills plants is not known. However, it has been postulated that glyphosate interferes with the biosynthesis of phenylalanine. Glyphosate is absorbed readily by plant foliage and is translocated to underground roots or rhizomes. Plants die slowly; wilting and yellowing of annuals may not appear for two to four days.

Glyphosate is a relatively new herbicide. The environmental fate and potential ecological effects of the use of glyphosate in forests have yet to be studied extensively. The limited data currently available are almost entirely from greenhouse and laboratory studies of agricultural systems and laboratory animals

and have been generated largely by the manufacturer. These data indicate high effectiveness, short persistence in soil and water environments, and very low toxicity to animals.

The following information on weed oil and diesel oil is taken from Chevron's Material Information Bulletins. (See Appendix B)

Weed Oil

Weed oil is a light-bodied highly aromatic petroleum oil manufactured by various companies. Its typical composition is paraffin (including naphthenes) approximately 55%, aromatics (C_8+) approximately 45% and emulsifier or surfactant 0.03%. It is miscible with hydrocarbon solvents and emulsifiers in water.

Weed oil is typically diluted with two parts water. The label states that it is good for general control of most annual and many perennial weeds. Best results are obtained by spraying weeds when they are small. Spray should be sufficient to cover weeds with a thin film of oil. Sprayed plants wilt and die within a few hours.

The label notes that weed oil will damage or kill all green plant growth. It should also be kept out of lakes, streams and ponds or fish and other aquatic life may be killed.

The Chevron Materials Information Bulletin on Chevron Weed Oil states that it is expected to cause no more than minor eye irritation and no more than minor skin irritation following prolonged or repeated contact. Breathing the vapors at concentrations above the exposure standard can cause central nervous system depression. It is not expected to be acutely toxic by ingestion. However, ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

The major hazard associated with weed oil as with other volatile petroleum products is that of fire. The liquid evaporates and forms vapors (fumes) which can burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and

switches. The fire hazard is greater as liquid temperature rises above 85 degrees Fahrenheit.

Diesel Oil

There are two kinds of diesel oil sold in Hawaii--Diesel Oil #1 and Diesel Oil #2. The bulk of the oil sold is Diesel Oil #2 because it is less expensive. According to Chevron Hawaii, Diesel Oil #2 is used mostly for tunnel work because it has less fumes.

In oils, the greater the aromatic proportions, the higher the toxicity and the longer that residues will be present. Diesel Oil #1 is more toxic than Diesel Oil #2, however, weed oil is more toxic than either of these (Personal Communication, Hilton, HSPA). The typical composition of Diesel Oil #1 is as follows:

Paraffins (incl. naphthenes)	74-88%
Aromatics:	
C_8^+	12-20%
Olefins	0-3%
Naphthalenes	0-3%

Eradication Alternatives

Three marijuana eradication methods--manual, chemical, and a combination of manual and chemical methods are being proposed.

Alternative 1 - Manual Eradication Method Alone

This alternative results in "no change" from current management direction or level of management intensity. Enforcement officials will continue using manual eradication techniques to eliminate illegal marijuana cultivation on state-owned and managed Conservation District lands on Hawaii, Maui and Molokai. Applicable mitigatory measures, described in Part V, will be followed.

Alternative 2 - Chemical Eradication Method Alone

Under this alternative both ground and aerial application methods will be used. All mitigatory measures, as described in Part V for chemical methods, will be followed. Only trained personnel will be allowed to conduct chemical eradication activities. The operation will be conducted to maximize the safety of both law

enforcement officers the public. Applicators will use respirators, rubber gloves, loose trousers, and safety boots, as appropriate.

Alternative 3 - Operations Flexibility (Preferred Alternative)

This alternative permits use of the full range of eradication methods, based on site-specific criteria. Manual methods and both ground and aerial spot chemical application methods will be used. Selection of the specific eradication method used will be based on a number of environmental factors including:

1. Proximity to water bodies.
2. Proximity to human habitation and developed recreation areas.
3. Topography.
4. Soil type.
5. Presence of unique resources, such as endangered or threatened plants or significant cultural resources.

Marijuana Disposal Alternatives

Alternative 1 - Haul Marijuana Out After Manual Eradication Operations and Burn/Bury

This alternative emphasizes traditional disposal methods such as removing marijuana by backpack, helicopter, or trucks and taking it to an incinerator, where it can be burned safely, or to a landfill for burial.

Alternative 2 - Leave Marijuana on Site After Chemical Eradication Operations

Under this alternative, the action of the chemical itself will be the disposal method. Notification that the area will be sprayed will be posted at all major points of access to the area. Additional notification and posting requirements are described in Part V.

Alternative 3 - Operations Flexibility (Preferred Alternative)

Under this alternative, all methods for disposal of eradicated marijuana will be available, including haul and burn, haul and bury, or posting of the area. Disposal methods are based on site-specific and situation-specific conditions.

Mitigatory Measures

Mitigatory measures are taken to avoid, compensate for, rectify, or reduce the identified adverse impacts of a proposed action. A number of measures to mitigate potential impacts of marijuana eradication efforts have been incorporated as operational features in the alternative eradication methods described. In addition, other mitigatory measures to further reduce the likelihood of adverse impacts have been identified in Part V.

PART II

ALTERNATIVES TO THE PROPOSED ACTION

A number of alternative methods for control of marijuana grown on state-owned and managed Conservation District lands have been considered in the preparation of this report. These are as follows:

NO ACTION

Under the No Action alternative, marijuana growers will continue their illegal activities on state-owned and managed Conservation District lands on Hawaii, Maui and Molokai. They will continue to clear land and use pesticides. The area will continue to be unsafe for other uses and an illegal activity will be, in effect, condoned by the State. This is an unacceptable alternative because this illegal activity interferes with the public's use of the state-owned and managed lands and DLNR's obligation to enforce the laws of the State of Hawaii and the United States.

CONTINUE CURRENT MANUAL ERADICATION PROGRAM

Marijuana grown on state-owned and managed Conservation District land is usually in remote areas, several miles from a roadway, in difficult terrain. The current method of eradication involves flying in personnel by helicopter and lowering them to the ground via rope ladders. The marijuana plants are then cut down manually, using knives, machetes, chain saws, and other hand-operated tools. Both the enforcement officers and the killed plants are then removed by helicopter. The process is difficult, dangerous, and expensive. A number of personnel have received serious injuries during these "Green Harvest" operations. It is also slow and time consuming work, involving many helicopter trips, making it an expensive, as well as difficult, operation. There is also evidence that the transport of marijuana plants by helicopter results in some scattering of seeds that later root and produce more plants. Manual eradication will continue to be used in some areas, for example, near streams and/or critical habitats.

CHEMICAL ERADICATION METHODS

Chemicals under consideration for spray application are diesel oil, weed oil, and glyphosate, sold as Roundup. Diesel oil is quick-acting, effective, and inexpensive.

Weed oil has the same effectiveness but is more expensive and more hazardous to applicators. Glyphosate is effective but slow-acting. It is also more expensive than diesel oil.

CHEMICAL ERADICATION COMBINED WITH MANUAL ERADICATION.

This method takes advantage of the effectiveness of chemical spraying for most applications and utilizes manual means where spraying might have adverse impacts on essential habitats or waterways or where chemical spraying might be inappropriate for other reasons, e.g., rainy weather or isolated patches. The number of personnel and consequently the risks to health and safety will be reduced considerably by the use of chemicals on marijuana plants. If the proposed action is not adopted, the high risks and costs will continue to hamper successful accomplishment of an eradication program.

LEGALIZING THE USE OF MARIJUANA

Legalization has been suggested as an alternative to eradication. Neither Congress nor the Hawaii State Legislature has shown any indication that this would be a realistic alternative. (Although bills to legalize marijuana were introduced in the 1985 session in Hawaii, none was reported out of committee.) Further, as a signatory to the Single Convention on Narcotic Drugs, 1961, the United States is required to prohibit or control the domestic production of marijuana; to take appropriate measures to prevent illicit drug trafficking; and to seize and destroy illicitly cultivated marijuana.

If the State of Hawaii should legalize marijuana usage, it is unlikely that the Legislature would authorize growing it for sale on state Conservation District lands. And, even if it did, growing of marijuana on state-owned and managed lands would be illegal until the proper permits were obtained from the BLNR.

Even if this were to be considered a viable alternative, it would undoubtedly take several years before a law takes effect during which time present activities would continue to be illegal.

EXPANDING/INTENSIFYING ENFORCEMENT PROGRAMS

It has been suggested that an expanded and vigorous program of apprehending and prosecuting marijuana growers similar to the successful program in operation on National Park lands would provide more of a deterrent than crop loss, and might result in the long-term reduction of illegal cultivation on state-owned and managed lands. Also suggested was an increased inspection and monitoring program of postal parcels leaving the state.

It should be noted that the federal program for national parks has more trained law enforcement people per acre of responsibility. Further, enforcement programs at all levels of government have intensified.

In Hawaii in 1986 several dozen exporters have been caught using airlines and post offices to ship marijuana. Prosecution has increased and sentences have become increasingly more severe, with more jail time and longer terms. Law enforcement agencies are confiscating land, money and vehicles (Honolulu Advertiser, 10/7/86).

It is the intention of law enforcement officials to continue and expand apprehension and prosecution programs in conjunction with a vigorous eradication program.

BIOLOGICAL CONTROL METHOD

Biological control is the management of a pest using natural enemies. This alternative is attractive. However, it is a lengthy process to begin. There have been some efforts in this area but much more research is required. According to the DEA 1986 EIS, there has been some investigation of the use of a naturally occurring fungus, Fusarium oxysporum f. cannabis, identified after the fungus severely infected an Italian hemp crop in 1959. It has substantially reduced the area devoted to the cultivation of hemp in Italy. There appears to be little research being conducted on the consequences of using a naturally occurring fungus on marijuana in the United States.

Even if a highly specific agent is found, extensive testing would be necessary before it would be available for use. Risks to Hawaii's endemic species need to be

considered. A fungicide could also be applied by the growers to reduce the effectiveness of this method.

PRESCRIBED BURNING METHOD

Prescribed burning is the use of fire under specified conditions to obtain a management objective. Marijuana plants have a high moisture content and would be difficult to burn, therefore requiring added fuel, such as gelled gasoline. Given the location of the marijuana plots and the danger to native forests and wildlife, including the possibility of a widespread forest fire, the negative aspects of this alternative outweigh any possible benefits.

USE OF CHEMICALS OTHER THAN GLYPHOSATE, WEED OIL, AND DIESEL OIL

The herbicide selected for use are considered to be the least toxic and persistent of those available. Therefore, DLNR is not considering the use of 2,4-D, paraquat, or any other herbicide as a matter of policy.

PART III

DESCRIPTIONS OF THE ENVIRONMENTAL, SOCIAL, CULTURAL AND ECONOMIC ELEMENTS

ISLAND OF HAWAII

GENERAL DESCRIPTION

The island of Hawaii, largest of the Hawaiian chain, has a total area of 4,038 square miles. Five large shield volcanoes form its land mass; the highest is Mauna kea, which rises to an elevation of 13,796 feet. The other volcanoes are Mauna Loa (13,677 feet), Hualalai (8,271 feet), Kohala (5,480 feet), and Kilauea (4,093 feet) (Atlas of Hawaii). The island has an extensive length and width of 93 and 76 miles, respectively.

Sixty-eight percent of the land area is 2000 feet or higher in elevation, with 20 percent between 500 feet and 2000 feet, and 12% less than 500 feet. The population of the island of Hawaii was 106,403 as of July 1, 1984 (Data Book 1985).

CONSERVATION DISTRICT LANDS

As of early 1985, 1,303,016 of the total 2,581,888 acres (or 50.6%) of land on Hawaii was classified as Conservation District (Data Book, 1985). According to the Land Management Division at DLNR, there are 508,490 acres of state-owned lands on Hawaii in the Conservation District. These are shown in Figure I-1.

DESCRIPTION OF THE EXISTING ENVIRONMENT

Climate and Weather

Average monthly temperatures on Hawaii vary greatly. In coastal areas, temperatures range from 75.8°F at the Hilo airport to 79.8°F at Kawaihae during the warmest month. At higher elevations, temperatures range from 63.2°F at Volcano, 66.8°F at Waimea, to 42.5°F at the summit of Mauna Kea. The summit of Mauna Kea has the lowest monthly average minimum temperature in the state of 23.5°F, along with the lowest monthly average daily temperature of 31.3°F (both for the month of February). Kawaihae, on the leeward coast, has the highest statewide monthly average maximum temperature of 91.9°F and the highest monthly average daily temperature of 80.8°F (both for the month of September).

The average annual precipitation for various sites on Hawaii range from 127 inches at the Hilo airport, 103 inches at the Volcanoes National Park, 40 inches at Waimea, to a low of 8 inches at the summit of Mauna Kea.

Landforms, Soils and Vegetation

The island of Hawaii is the largest of the Hawaiian islands. It has the only active volcanoes (Kilauea and Mauna Loa) in the state. Its lush, green rain forests, warm sunny coastal areas, and snow-covered mountain peaks provide a variety of scenery and climate.

The U.S. Soil Conservation Service has identified a number of soil types associated with the Conservation District areas. These soils and their natural vegetation are described generally as follows:

Lava Flows Association: This association consists of excessively drained, nearly barren lava flows and somewhat excessively drained and well drained, coarse-textured and medium-textured soils that formed in volcanic ash pumice and cinders. These soils are on mountains at an elevation ranging from near sea level to 13,000 feet. The natural vegetation includes, but is not limited to lichen, moss, ohia, amaumau fern, mamane, naio, Kentucky bluegrass, and sweet vernal. This soil association makes up about 50% of the island area.

Akaka-Honokaa-Kaiwiki Association: This soil association consists of moderately fine textured soils that formed in volcanic ash. These soils are on mountains at an elevation ranging from near sea level to 6,000 feet. The natural vegetation is primarily ohia lehua, tree fern, koa, and false staghorn fern. The total area of this association is about 11% of the island.

Kekaka-Keei-Kiloa Association: This association consists of well-drained, very shallow soils that formed in organic matter over pahoehoe lava or fragmental aa lava. These soils are on mountains at an elevation ranging from near sea level to 7,000 feet. The natural vegetation includes ohia, tree fern, koa, guava, and Christmas berry. The total area of this association is about 21% of the island.

Amalu-Kahua-Kehena Association: This association consists of moderately fine textured soils that formed in volcanic ash. These soils are on the Kohala Mountains at an elevation ranging from near sea level to 5,500 feet. The natural vegetation includes kikuyugrass, hilograss, sedges, ohia, and guava. This association makes up about 2% of the island.

Hanipoe-Maile-Puu Oo Association: In this soil association are medium-textured to moderately fine textured soils that formed in volcanic ash. These soils have a dark surface layer that is high in organic matter content. They are on mountains at an elevation ranging from 2,500 to 8,000 feet. The natural vegetation includes ohia, koa, naio, mamane, tall fern, rattail, brome, kikuyugrass, and orchardgrass. The total area of this association is about 6% of the island.

Wildlife

Seabirds found on Hawaii include the Townsend's (Newell's) Shearwater ('A'o), Hawaiian Petrel ('Ua'u), Bulwer Petrel ('Ou), Hawaiian Noddy (Noio), and the White-tailed Tropicbird ((Koa'e-kea). There are eight migratory shorebirds: the Bristle-thighed Curlew (Kioea), Pectoral Sandpiper, Ruddy Turnstone ('Akekeke), Wandering Tattler ('Ulili), American Golden Plover (Kolea), Black-bellied Plover, Sharp-tailed Sandpiper, and the Sanderling (Huna-kai).

Migratory waterfowl include the Pintail (Koloa-mapu), Green-winged Teal, American Wigeon, and the Northern Shoveler (Koloa-moha). Hawaii's resident waterfowl include the Hawaiian Goose (Nene) and the Hawaiian Duck (Koloa). Water Birds include the Hawaiian Coot ('Alae-ke'oke'o), Cattle Egret, Black-crowned Night Heron ('Auku), and the Hawaiian Stilt (Ae'o).

The island is abundant with forest bird species. These include the Hawaiian Crow ('Alala), Japanese White-eye, Hwa-mei (Melodious Laughingthrush, Chinese Thrush), Red-billed Leiothrix (Japanese Hill Robin), Hawaii Thrush ('Oma'o), Hawaii 'Elepaio ('Elepaio), Hawaii Amakihi ('Amakihi), Hawaii Creeper, Hawaii 'Akepa ('Akepa), 'Akiapola'au, 'O'u, Palila, 'Apapane, and the 'Tiwi.

Field birds include the Mockingbird, Lavender Fire-Finch, Warbling Silverbill, Skylark, Spotted Munia, Northern Cardinal, Black-headed Munia, Saffron Finch and the Yellow-billed Cardinal.

Hawaii's birds of prey include all three species known to the Hawaiian islands; the Hawaiian Hawk ('Io), Barn Owl and Hawaiian Owl (Pueo). There are also numerous exotic game birds including 12 types of quail and pheasant and the turkey (Pelehu).

The only endemic mammal on Hawaii is the Hoary Bat (Pe'a, 'Ope'ape'a). Other mammals include the feral pig, mouflon, feral sheep and goat, feral dog, feral cat, wild cattle, Small Indian Mongoose ('Iole-manakuke), and Norway (Brown) and Polynesian rats.

Endangered and Threatened Species

Hawaii is the home of 13 species of bird that are on the endangered or threatened list. The only bird considered to be threatened is the Townsend's (Newell's) Shearwater. The endangered species include the Hawaii Creeper, Hawaii 'Akepa, Hawaiian Petrel, Hawaiian Goose, Hawaiian Duck, Hawaiian Coot, Hawaiian Stilt, Hawaiian Crow, Akiapola'au, O'u, Palila and the Hawaiian Hawk. The endemic Hoary Bat is also endangered. A number of invertebrates have been proposed for listing as endangered or threatened species (see Appendix C).

Endangered plants include the Vicia menziesii Spreng, Haplostachys haplostachya, Stenogyne angustifoloa Gray var. angustifolia, Lipochaeta venosa Sherff, Kokia drynarioides (Seem.) Lewt., Gardenia brighamii Mann, Argyroxiphium sandwicense DC. var. sandwicense, Scaevola coriacea Nutt., Abutilon menziesii Seem., and Mezoneuron Kavaiense (Mann). There are an additional 165 plants currently under review for threatened and endangered status (see Appendix D).

Water Quality and Aquatic Systems

With its vast watershed areas and forest reserves, the island of Hawaii has water resources nearly equaling the total of Hawaii's other principal islands. The Big Island receives a daily rainfall of 14,100 million gallons, or about 5,146 billion gallons a year. The Wailuku River near Hilo is one of the only two rivers in the State that have an average discharge reaching 150 to 185 million gallons per day, according to the 1983 Atlas of Hawaii. Perennial streams on Hawaii constitute about 75% of the state's total (Data Book 1985).

A large percentage of Hawaii's landmass is underlain by fresh basal water. According to Thomas Arizumi, Supervisor of the Department of Health's Drinking

Water Program, "all basal aquifer waters of the Hawaiian Islands have been recognized as having a pristine quality." Dike-confined water is present at the highest elevations of all the major mountains on the island, and significant sources of perched water are located in the Ka'u and Hamakua areas.

Important watershed areas on the island include the Piihonua and Waiakea Uka Watersheds in the Hilo area, the Kohala Mountain Watershed above Waimea, and the Haao Spring Watershed in Ka'u.

Surface water sources in each of these areas are utilized for domestic purposes and should be strictly protected against any form of contamination.

The U.S. Geological Service and the State Department of Health both provide services which provide baseline data and/or water quality analyses. Both agencies report that the water quality of groundwater and surface water sources is excellent. According to Gary Kawasaka, Head of the Engineering Division for the Hawaii County Department of Water Supply, "Hawaii has not experienced any major water contamination problems and all domestic water supplies meet nationwide primary water requirements."

Biological collections from stream surveys on Hawaii found 11 species of fishes and crustaceans. The collections, taken from two altered and six unaltered streams, found no significant difference in the number of species present in the two stream types. However, the population density of stream macrofauna was higher in unaltered streams. Endemic freshwater snails (Lymnaea Spp and Newtonia Spp.) are also found in streams. The endemic hihiwai (Neritina granosa) is often gathered for food.

Native crustacea species found in Hawaii streams are the mountain opae, Atya bisuloata and the prawn, Macrobrachium grandimanus. The large freshwater prawn, Macrobrachium lar is the only exotic crustacea species.

Native fish species include o'opu naniha (Awaous genivittatus), nakea (Awaous stamineus, akupa (Eleotris sandwicensis), aholehole (Kuhlia sandvicensis), o'opu alamo'o (Lentipes concolor), and nopili, (Sicydium stimpsoni). Exotic fishes include mosquito fish (Gambusia affinis), guppy or molly (Poecilia Spp.), and swordtail (Xithophorus Spp.).

Air Quality

Air quality in the forests and mountains of Hawaii is generally excellent. Air sampling in selected areas around the state indicates that Hilo has the lowest average of total suspended particulates (15) of all locations tested. Major factors contributing to the level of air pollutants are internal combustion engines related to transportation, industrial and agricultural activity. In addition, agricultural burning constitutes nearly 20% of air pollutant emissions (Data Book 1985).

Cultural Resources

Archaeological remains of the ancient Hawaiian culture provide significant insights into the past. State and County ordinances provide for historical preservation of significant sites. Eighty-seven historic sites on Hawaii are presently listed on the National and State Historic Registers (Data Book, 1985).

Hawaii is particulary important in historic sites by nature of its link between ancient and modern Hawaiian culture. As the birthplace of Kamehameha the Great, it played a paramount role in the transition of the Hawaiian Islands after western contact. It is likely that the sites presently inventoried represent but a fraction of the island's potential historical resources.

Special Areas

DLNR maintains and manages a number of state parks on Hawaii. These include:

Hapuna Beach State Recreation Area
Lapakahi State Historical Park
Kilauea State Recreation Area
Mackenzie State Recreation Area
Lava Tree State Monument
Wailoa River State Recreation Area
Wailuku River State Park
Akaka Falls State Park
Mauna Kea State Recreation Area
Kalopa State Recreation Area
Kamehameha I Birthsite State Monument
Kealakekua Bay State Historical Park
Manuka State Wayside
Mookini Heiau State Monument
Old Kona Airport State Recreation Area

Lands on Hawaii that are part of the Hawaii Natural Area Reserves System include:

Puu O Umi in the Kohala Mountains
Mauna Kea Ice Age on Mauna Kea
Laupahoehoe in the North Hilo District
Waiakea 1942 Lava Flow in the South Hilo District
Puu Makaala north of Kilauea Crater
Kehaualea in the Puna Area
Kipahoehoe in the South Kona District
Manuka in the Ka'u District

The Nature Conservancy of Hawaii currently manages the 3,300 acre Hakalau Preserve on the windward slopes of Mauna Kea. Management of the site is to be transferred to the USFWS in the near future.

The higher elevations of all mountains on Hawaii provide a habitat for a number of endangered forest bird species. The largest area on Hawaii encompasses the windward areas of both Mauna Kea and Mauna Loa, and the southern and western flanks of Mauna Kea. Other critical areas are located in the Ka'u District, the South Kona District, and at the summit of Hualalai in North Kona.

Visual Resources

The scenic beauty of Hawaii's largest mountains, Mauna Kea and Mauna Loa, coupled with the majesty of the Kohala mountains and Hualalai create a vista unequaled in the Hawaiian Islands.

Frequent volcanic activity on the Kilauea flank and summit can be seen from many areas of the Hilo and Puna districts. In addition, coastal views from many of the mountain areas remain as popular visitor attractions. Views of Maui from North and South Kohala also bring visitors to those areas of the Big Island.

Noise

On Hawaii, urban centers are scattered around the island. These areas, along with the Pohakuloa military training area, are the only significant sources of noise. The mountains and forest reserves provide a quiet setting that is an attractive component of their value as visitor destination areas.

ISLAND OF MAUI

GENERAL DESCRIPTION

The island of Maui is the second largest of the Hawaiian Islands. Two shield volcanoes with a connecting isthmus make up Maui, which has a total of 728.8 square miles. The older of the two volcanoes is now the West Maui Mountains. The highest point is Puu Kukui, at 5,788 feet. The second volcano, Haleakala, reaches an elevation of 10,023 feet at the Haleakala National Park Visitors Center Lookout at Puu Ulanula. Forty-one percent of the island is above 2,000 feet elevation, 34 percent lies between 500 and 2,000 fee, and 25% is less than 500 feet. According to the 1985 Data Book, the island of Maui had an estimated population of 74,571 as of July 1, 1984.

CONSERVATION DISTRICT LANDS

As of early 1985, 193,679 of the total 465,800 acres, or 41.5% of land on Maui was classified as Conservation District (Data Book, 1985). According to the Land Management Division at DLNR, the state owns a total of 76,306 acres of land on Maui in the Conservation District. These are shown in Figure I-2.

DESCRIPTION OF THE EXISTING ENVIRONMENT

Climate and Weather

Average monthly temperatures on Maui in the coastal areas range from 71°F in February and March to 79°F in August and September. Average temperatures at the summit of Haleakala, the island's highest elevation range from an average low of 42°F to an average high of 50°F. The highest temperature of record is 98°F at Kihei, and the lowest is 14°F at the summit of Haleakala. Rainfall varies significantly depending upon location: average annual precipitation in inches varies from 13.79 at Kihei to 70.65 at Hana (Data Book 1985).

Landforms, Soils and Vegetation

Maui was formed through the merging of the East Maui and West Maui volcanoes. It is divided into three main areas — West Maui, East Maui and Central Maui. West Maui is the older of the two volcanic areas, which is evidenced by its deeply dissected valleys. Central Maui, the isthmus that connects East and West Maui is smooth and nearly level. It is mainly used for sugarcane culture.

The U.S. Soil Conservation Service has identified a number of soil types associated with the Conservation District areas. The soil and natural vegetation are described generally as follows:

Hydrandepts-Tropaquods Association: This association consists of well drained to poorly drained soils on the intermediate and high uplands of East and West Maui. They developed in material weathered from volcanic ash, cinders, and basic igneous rock. The soils are gently sloping to steep. Elevations range from 1,000 to 6,000 feet. Natural vegetation includes ape, clubmoss, eucalyptus, guava, koa, lalapapa, ohelo, ohia lehua, pamakani, ricegrass, false staghornfern, treefern, and sedges. This association makes up about 10% of the island.

Rock Land-Rough Mountainous Land Association: This association consists of very shallow soils on intermediate and high uplands on East and West Maui. These soils are steep and very steep. Elevations range from sea level to 10,000 feet. Natural vegetation on Rock land includes kiawe, klu, piligrass, and ilima in the higher wetter areas. Rough mountainous land is thickly vegetated with ferns, guava, hilograss, kukui, and ohia lehua. This association makes up about 41% of the island.

Hana-Makaalae-Kailua Association: This association consists of well-drained, moderately fine textured and fine textured soils on the intermediate uplands of East Maui. They developed in material weathered from volcanic ash. These soils are gently sloping to steep. Elevation ranges from near sea level to 2,500 feet. Natural vegetation includes Christmas berry, ferns, guava, guineagrass, hilograss, Kaikiclover, and kikuyugrass. The association makes up about 7% of the island.

Honolua-Olelo Association: This association consists of well drained, fine textured soils on the intermediate uplands of West Maui. They developed in material weathered from basic igneous rock. These soils are gently sloping to moderately steep. Elevations range from 500 to 3,500 feet. The natural vegetation includes guava, ferns, hilograss, koa, lantana, ohia lehua, and pukiawe. This association makes up about 1% of the island.

Kamaole-Oanapuka Association: This association consists of well-drained, very stony and extremely stony, moderately fine textured and medium-textured soils on

the low and intermediate uplands of East Maui. They developed in material weathered from volcanic ash. These soils are gently sloping to moderately steep. Elevations range from 100 to 2,300 feet. Natural vegetation is bermudagrass, feather fingergrass, ilima, kiawe, koa haole, and Natal redtop. The association makes up about 3% of the island.

Wildlife

Seabirds found on Maui include the Wedge-tailed Shearwater ('Ua'u-kani), Great Frigatebird ('Iwa), Hawaiian Noddy (Noio), Hawaiian Petrel ('Ua'u), Bulwer Petral ('Ou, 'Ou'ou), White-tailed Tropicbird (Koa'e-'kea), and the Brown Noddy (Noio-koha).

Migratory shorebirds on Maui include the Sanderling (Hunakai), Pectoral Sandpiper, Sharp-tailed Sandpiper, Ruddy Turnstone, Wandering Tattler (Ulili), American Golden Plover (Kolea), and the Black-bellied Plover. There are a number of migratory waterfowl which include the Mallard, Pintail (Koloa-mapu), Green-winged Teal, American Wigeon, Northern Shoveler (Koloa-moha), and the Lesser Scaup.

There is only one resident waterfowl, the Hawaiian Goose (Nene). Water birds include the Hawaiian Stilt (Ae'o), Cattle Egret, Black-crowned Night Heron, and the Hawaiian Coot ('Alae-ke'oke'o).

There are a variety of forest birds on Maui. These include the Hwa-mei (Melodious Laughingthrush, Chinese Thrush), Japanese White-eye, Red-billed Leiothrix (Japanese Hill Robin), Maui 'Amakihi, Maui Creeper ('Alauwahio), Maui Akepa ('Akepeu'ie), Po'ouli (Masked Honeycreeper), Maui Nuku-pu'u, Maui parrotbill, 'Apapane, Crested Honeycreeper ('Akohekohe), I'iwi, and the Japanese Bush-warbler. There are five field birds on Maui: the Mockingbird, Skylark, Spotted Munia, Northern Cardinal, and the Warbling Silverbill.

Birds of prey include occasional sightings of the Hawaiian Hawk ('Io) and the Hawaiian Owl (Pueo). There are also numerous game birds.

Mammals which populate the island include the feral pig (Pua'a), Axis deer (Kia), wild cattle, feral goat, feral dog (Ilio), Small Indian Mongoose ('Iole-manakuke), Norway (Brown) and Polynesian rat ('Iole). The Hoary Bat (Pe'a, 'Ope'ape'a) is occasionally reported on Maui, but it is unknown whether they reside on the island or migrate among the islands (Atlas of Hawaii, 1983).

Endangered and Threatened Species

Maui is the home of one threatened species of bird, the Townsend's (Newell's) Shearwater, and 11 endangered species of birds. These include the Hawaiian Dark-rumped Petrel, Hawaiian Goose, Hawaiian Coot, Hawaiian Stilt, Maui Creeper, Maui Akepa, Maui Parrotbill, O'u, Nukupuu, Po'ouli and Crested Honeycreeper. A number of invertebrates have been proposed for listing as endangered or threatened species (see Appendix C).

Plants considered to be endangered include Gouania hillerbrandii Oliver, Nanu (Gardenia brighamii Mann), Dwarf naupaka (Scaevola coriacea Nutt), Ko'oloa'ula (Abutilon menziesii Seem), and the Uhiuhi (Mezoneuron kavaiense Mann). There are presently 164 additional plants under consideration for threatened and endangered status (see Appendix D).

Water Quality and Aquatic Systems

Maui has adequate water resources to meet its future needs. The average daily rainfall is 2,820 million gallons. Major streams on the island include Honokohau, Kahauloa, Iao, Waikamoi and Palikea.

Two large basal aquifers underlie the West Maui and East Maui mountain areas. According to Thomas Arizumi, Supervisor of the Department of Health's Drinking Water Program, "all basal aquifer waters of the Hawaiian Islands have been recognized as having a pristine quality." Dike-confined water is present at the highest elevations of each of the major mountain areas, and significant sources of perched water are located in the Makawao, Nahiku and Kaupo hydrographic areas.

Important watershed areas on the island include the Piiholo, Waiakamoi, Awalau and Wailua Watersheds in East Maui Mountains, and the Honokohau and Kahana Watersheds in the West Maui Mountains. Surface water sources in both of these areas are utilized for domestic purposes and should be strictly protected against

any form of contamination. In fact, all of the domestic water on the "up-country" slopes of Haleakala is provided by surface water sources, primarily from the Waiakamoi Watershed. Since the Waiakamoi Watershed has been noted as a major site of marijuana growing, special care should be given to this area.

The U.S. Geological Service and the State Department of Health both provide services which supply baseline data and/or water quality analyses for all islands. Both agencies report that the water quality of groundwater and surface water sources is excellent. According to Vince Bagoyo, Director for the Maui County Department of Water Supply, one well in the Paia area was recently closed due to contamination problems. No similar problems have been found in other wells.

Biological collections from stream surveys on Maui found 13 species of fishes and crustaceans. The collections indicated a higher number of species found in unaltered streams as opposed to those that had been altered, a condition with varies from other islands. Furthermore, population densities of native species were higher in East Maui streams than those in West Maui. Endemic freshwater snails (Lymnaea Spp and Newtonia Spp.) are also found in streams. The endemic hihiwai (Neritina granosa) is often gathered for food.

Native crustacea species found in Maui streams are the mountain opae, Atya bisuloata and the prawn, Macrobrachium grandimanus. The large freshwater prawn, Macrobrachium lar and crayfish, (Procambus Clarkii) are the only exotic crustacea species.

Native fish species include o'opu naniha (Awaous genivittatus), nakea (Awaous stamineus, akupa (Eleotris sandwicensis), aholehole (Kuhlia sandvicensis), o'opu alamo'o (Lentipes concolor), and nopili, (Sicydium stimpsoni). Exotic fishes include Chinese catfish (Clarius fuscus), tliapia (Sarothenobon Mossambica) and guppy or molly (Poecilia Spp.).

Air Quality

Air quality in the forest reserve areas is generally excellent. Atmospheric pollutants are associated with intensely urbanized areas. Recent sampling indicates, for instance, that the annual range for total suspended particulates at Kahalui is 24 to 121 micrograms per cubic meter, the highest range in the state (Data Book, 1985).

Cultural Resources

Historic and archaeological sites of importance continue to be discovered throughout the Hawaiian Islands. State law, as well as County ordinances, require newly discovered sites to be properly identified, and if found to be significant, preserved. Hawaiian fishponds such as Loko-Nui and Loko-Iki represent valuable links to the past.

Special Areas

The state manages and maintains ten parks on Maui. These include:

Halekii-Pihana Heiaus State Monument
Iao Valley State Monument
Kaumahina State Wayside
Launiupoko State Wayside
Papalaua State Wayside
Polipoli Spring State Recreation Area
Puaa Kaa State Wayside
Wahikuli State Wayside
Waianapanapa State Park
Wailua Valley State Wayside

There are six sites on Maui listed on the Hawaii Natural Area Reserves System. These are:

Hanawi in the Hana District
Ahihi-Kinau near La Perouse Bay
Kahakuloa in West Maui
Honokowai in West Maui
Panaewa in West Maui
Lihau in West Maui

The Nature Conservancy of Hawaii manages the 5,230 acre Waikamoi Preserve on the windward slopes of Haleakala. Any eradication efforts in the preserve would be coordinated through the State and individuals from the Conservancy.

The higher elevations on the windward slopes of Haleakala have been noted as areas which provide a critical habitat for known endangered forest bird species on Maui.

Visual Resources

The scenic beauty of Maui's forest reserves and mountains is a major visitor attraction. Areas of particular importance include views of Haleakala's summit, the 55 mile Hana coastline and the Iao Valley area. A variety of topography,

ranging from the lush rainforests of Hana to the barren gullies of West Maui create an abundance of scenic views.

Noise

Because Maui's population is relatively concentrated in the areas of Kahului, Wailuku, Lahaina and Kaanapali, high ambient noise levels are restricted to those areas. The peaceful solitude of many of Maui's forest and mountain regions are a particular attraction to the island's visitors and resident population.

ISLAND OF MOLOKAI

GENERAL DESCRIPTION

The island of Molokai, fifth largest in th State, has a total of 261 square miles. The island is made up of two geologically distinct areas. East Molokai, characterized by its rugged montainous topography, reaches a maximum elevation of 4,970 feet. West Molokai, which rises to only 1,381 feet, is much drier and consists mostly of rolling hills and plateaus. Late in the geological history of the island, a small volcano emerged to form what is now Kalaupapa Peninsula, which is separated from the rest of the island by near perpendicular cliffs (Atlas of Hawaii). The island's extreme length is 38 miles, with an extreme width of 10 miles. As of July 1, 1984, Molokai had a population of 6,215 (Data Book 1985).

CONSERVATION DISTRICT LANDS

As of early 1985, 49,768 of the total 165,800 acres (30%) of land on Molokai was classified as Conservation District (Data Book, 1985). According to the Land Management Division at DLNR, there are 14,445 acres of state-owned lands on Molokai in the Conservation District. These are shown in Figure I-3.

DESCRIPTION OF THE EXISTING ENVIRONMENT

Climate and Weather

Average temperatures on Molokai range from 70.2°F in February and March to 77.6°F in August and September. The highest temperature of record is 90°F and the lowest is 48°F, both measured at the Molokai Airport. Measurements of average

annual precipitation range from 14 inches at Kaunakakai to 29 inches at the Molokai Airport.

Landforms, Soils and Vegetation

Molokai's two geologically distinct areas display a variety of landforms. West Molokai, which makes up about 50% of the total land area, provides an excellent environment for the production of many agricultural products. The area is largely used for pasture, pineapple, and diversified agriculture cultivation. East Molokai is mostly mountainous the contains numerous lush valleys. This area provides the water supply on Molokai and is a hunting ground for a number of isle residents.

The U.S. Soil Conservation Service has identified a number of soil types associated with the Conservation District areas. These soils and their natural vegetation are described generally as follows:

Rough Mountainous Land-Amalu-Olokui Association: This association consists of very steep gulches and valleys and gently sloping to hilly, poorly drained upland soils. The soils formed in material weathered from basic igneous rock and are high in organic-matter content. Elevations range from near sea level to 5,000 feet. The natural vegetation is of the rain forest type. This includes treefern, ohia lehua, false staghornfern, lapalapa, and sedges. This association makes up about 20% of the island.

Kahanui-Kalae-Kanepuu Association: This association consists of well-drained, fine textured and moderately fine textured soils on the uplands on the island of Molokai. They developed in volcanic ash and in material weathered from basic igneous rock. These soils are gently sloping to moderately steep. Elevations range from 500 to 3,750 feet. The natural vegetation includes guava, hilograss, Christmas berry, and yellow foxtail. At the higher elevations ohia lehua, sweet vernal and pukiawe are common. The association makes up less than 5% of the island.

Very Stony Land-Rock Land Association: This association consists of gently sloping to very steep stony and rocky land on upland and in gulches and valleys on the island of Molokai. Elevations range from near sea level to 3,000 feet. The natural

vegetation includes mainly kiawe, piligrass, Japanese tea, klu, and Natal redtop. The association makes up less than 30% of the island.

Wildlife

The Wedge-tailed Shearwater ('Ua'u-kani) and the Hawaiian Noddy (Noio) are the only seabirds found on Molokai. Migratory shorebirds include the Bristle-thighed Curlew (Kioea), American Golden Plover (Kolea), Black-bellied plover, Wandering Tattler ('Ulili), Sharp-tailed Sandpiper, Pectoral Sandpiper, and the Ruddy Turnstone ('Akekeke). Molokai also has a variety of migratory waterfowl including the Pintail (Koloa-mapu), Green-winged Teal, American Wigeon, and the Northern Shoveler (Koloa-moha). The Hawaiian Stilt (Ae'o), Hawaiian Coot (Alae-keokeo), Cattle Egret, and Black-crowned Night Heron represent the islands's species of water birds.

Forest birds include the Hwa-mei (Melodious Laughingthrush, Chinese Thrush), Japanese White-eye, Red-billed Leiothrix (Japanese Hill Robin), Molokai Thrush (Oloma'o), Maui 'Amakihi ('Amakihi), Molokai Creeper ('Kaka-wahie), 'Apapane ('Apapane), 'Iiwi ('Iiwi), and Japanese Bush warbler. The Mockingbird, Skylark, Spotted Munia, Northern Cardinal, and the Warbling Silverbill are field birds found on Molokai.

Birds of prey include the Barn Owl and the Hawaiian Owl (Pueo). There are also numerous exotic game birds.

Mammals on Molokai include the feral pig, goat and dog, Axis deer (Kia), wild cattle, Small Indian Mongoose ('Iole-manakuke), and the Norway (Brown) and Polynesian Rat ('Iole).

Endangered and Threatened Species

Molokai has four endangered species of bird: the Hawaiian Coot, the Hawaiian Stilt, the Molokai Thrush, and the Molokai Creeper. The Townsend's (Newell's) Shearwater is the island's only threatened species of bird. A number of invertebrates have been proposed for listing as endangered or threatened species (see Appendix C).

Endangered plants on the island include Kokia cookei Deg., Gardenia brighamii Mann, and Scaevola coriacea Nutt. There are an additional 100 plants currently under review for threatened and endangered status (see Appendix C).

Water Quality and Aquatic Systems

Rainfall on Molokai averages 565 million gallons per day (mgd). Ground water resources are estimated to be 63 mgd in sustainable yield with actual use of less than 1 mgd. Estimated sustainable yield of surface water is 52 mgd with 2 mgd of use.

The mountainous landmass in East Molokai is underlain by fresh basal water. According to Thomas Arizumi, Supervisor of the Department of Health's Drinking Water Program, "all basal aquifer waters of the Hawaiian Islands have been recognized as having a pristine quality." Dike-confined water is present at the highest elevations of the island, and perched water sources are located in the uplands in the area stretching from Kaunakakai to Kamalo.

The East Molokai Mountains supply the entire island with fresh water. According to Vince Bagoyo, Director for the Maui County Department of Water Supply, Molokai has not experienced any major water contamination problems and all domestic water supplies have an excellent quality.

Biological collections from stream surveys on Molokai found 9 species of fishes and crustaceans. Native crustacea species include the mountain opae, Atya bisuloata and the prawn, Macrobrachium grandimanus. The large freshwater prawn, Macrobrachium lar is the only exotic crustacea species.

Native fish species include Native fish species include o'opu naniha (Awaous genivittatus), nakea (Awaous stamineus, akupa (Eleotris sandwicensis), aholehole (Kuhlia sandvicensis), o'opu alamo'o (Lentipes concolor), and nopili, (Sicydium stimpsoni). There are no exotic fishes species on Molokai.

Air Quality

With its relatively small population and lack of industrial activity, Molokai's general air quality is excellent.

Cultural Resources

Until the recent development of the Kalua Koi Resort on the western shore of Molokai, the island has not been subjected to any significant development. Consequently, the island's shoreline has been preserved. Today, unlike other islands, its southern coast is lined with historic fishponds. These ponds exist as reminders of the relationship the Hawaiian held with the sea for hundreds of years prior to Western "discovery." Following is a listing of the fishponds and their approximate acreage:

Kupeke	30 acres
Niauhala	34 acres
Kaopeahina	19 acres
Ualapue	22 acres
Pahiomu	20 acres
Kipapa	10 acres
Kanoa	50 acres
Alii	27 acres
Kalokoeli	28 acres

If the preservation of these fishponds provides any indication of the richness of culture on Molokai, future historical and archaeological sites may be expected. To date, 55 national and state historic sites on Molokai have been registered (Data Book, 1985).

Special Areas

DLNR maintains and manages only one state park, the Palaau State Park, on the island of Molokai. Two sites, Olokui and Puu Alii, located in the mountain region of East Molokai, are listed on the Hawaii Natural Area Reserves System. The 2,774 acre Kamakou Preserve, also located in East Molokai, is managed by The Nature Conservancy of Hawaii. This preserve site and additional lands to the east are considered to be vital habitats for endangered forest bird species on Molokai.

Visual Resources

Visual resources on the island include Halawa Valley on the island's east end and the rugged coastline of Molokai's north shore, stretching from Kalaupapa to Pelekunu Valley. The relatively pristine character of these areas, has in recent

years, attracted more and more visitors, especially those willing to risk the overland hike to the remote areas.

Noise

With no significant industry or extensive population, noise levels, even in urban areas, are not significant.

ECONOMIC AND SOCIAL ELEMENTS

ECONOMIC CONSIDERATIONS

The DEA EIS on marijuana eradication on non-Federal lands (May 1986) states that:

> Approximately 15 percent of the marijuana available in the United States is domestically grown. Approximately 87 percent of this domestically grown marijuana is found on State, private, or Indian lands, and the remainder on Federal lands (GAO, 1984). Much of this domestically cultivated marijuana is of the highly potent sinsemilla variety. Because of its higher potency, sinsemilla commands a higher price on the illicit drug market, ranging from $1,200 to $2,600 per pound as opposed to $700 to $800 per pound for Colombian marijuana (GAO, 1984).

The DEA estimates that a single sinsemilla plant yields on average approximately 1 pound of marketable product. DEA Eradication/Suppression Program statistics, shown in Table III-I, report that 447,778 marijuana plants were eradicated in the State of Hawaii in 1984, of which 289,357 were sinsemilla (the largest number of any state, surpassing even California). Following the formula used by DEA of $1000 per plant, the value of just the sinsemilla plants seized and destroyed equaled $289,357,000.

The value of just the plants reported in the newspaper articles in 1986 cited in Part I equals $211,315,000 for Maui and for Hawaii.

Because growing marijuana is illegal, no reliable statistics exist on its relative value to the economy. However, the DEA has estimated that if all the cannabis eradicated in the United States had reached the street, the revenues to growers of domestically produced marijuana would certainly have exceeded $1 billion. Given the estimated value of $289 million for just the confiscated sinsemilla plants in Hawaii, it is obvious that the value of the total crop is substantial. It should be

TABLE III-1

1984 Domestic Cannabis Eradication/Suppression Program Statistics
(from DEA Headquarters data)

State	Plots Sighted	Plots Eradicated	Plants Eradicated	Average Plants Per Plot	Number of Sinsemilla	Percentage of Sinsemilla	Number of Green-houses	Number of Arrests	Number of Firearms Seized
Alabama	950	935	110,098	118	4,687	4	10	278	9
Alaska	58	11	909	83	280	31	11	4	0
Arizona	50	50	5,611	112	2,558	46	10	68	4
Arkansas	803	803	87,727	109	35,090	40	6	236	45
California	2,682	2,002	256,976	128	224,022	87	62	477	645
Colorado	53	53	22,639	427	627	3	18	35	5
Connecticut	3	3	620	207	0	0	0	4	1
Delaware	16	16	665	42	330	50	0	6	0
Florida	810	810	102,802	78	0	0	2	381	40
Georgia	319	319	124,537	390	36,724	29	2	71	0
Hawaii	7,371	7,028	447,778	64	289,357	65	54	729	72
Idaho	46	34	4,649	137	1,875	40	29	75	2
Illinois	801	169	68,890 298,160[a]	407	3,749	5	2	66	22
Indiana	155	155	565,495 4,134,505[a]	3,648	387	0	0	15	2
Iowa	25	18	12,585	699	0	0	0	10	0
Kansas	93	89	247,003	2,575	13,166	5	5	36	8
Kentucky	862	862	300,798	349	159,423	53	7	298	22
Louisiana	81	81	4,514	56	0	0	0	8	0
Maine	32	31	3,100	100	160	5	3	9	2
Maryland	36	29	1,086	37	2	1	1	20	1
Massachusetts	9	9	1,258	140	56	4	0	4	0
Michigan	182	180	89,286	496	400	1	1	47	18
Minnesota	39	26	4,104 3,935,000[a]	158	2,413	59	9	14	11
Mississippi	374	374	106,799	286	2,006	2	1	58	15
Missouri	296	296	68,911	233	19,981	29	3	186	28
Montana	7	7	1,685	241	1,088	65	3	8	0
Nebraska	37	34	4,479	141	350	1	0	51	35
Nevada	27	27	456	17	61	13	1	5	0
New Hampshire	16	16	2,590	162	2,590	100	2	4	6
New Jersey	8	8	168	21	0	0	0	0	0
New Mexico	33	33	3,844 202,000[a]	116	95	2	4	33	0
New York	38	38	3,080	81	0	0	2	12	0
North Carolina	733	733	100,540	137	3,852	4	7	132	2
North Dakota	11	9	1,022	114	409	40	0	1.	8

TABLE III–1 (CONTINUED)

Ohio	318	318	21,111	66	9,060	43	3	27	7
Oklahoma	269	269	405,746 608,618[a]	1,508	0	0	0	47	9
Oregon	1,013	1,013	45,049	44	29,729	66	133	297	156
Pennsylvania	376	376	24,018	64	12,000	50	6	92	13
Rhode Island	0	0	0	0	0	0	0	0	0
South Carolina	192	185	25,218	136	0	0	0	155	0
South Dakota	9	5	1,070	214	40	4	0	2	2
Tennessee	539	489	362,796	742	158,072	44	7	219	4
Texas	138	133	10,956	82	707	7	1	59	19
Utah	87	49	3,684	75	0	0	7	70	2
Vermont	11	11	7,122	647	2,492	35	0	49	6
Virginia	493	493	26,006	53	385	2	8	134	29
Washington	329	329	31,987	97	10,468	33	186	283	164
West Virginia	164	164	15,739	96	12,591	80	8	78	2
Wisconsin	42	42	65,070	1,549	1,500	2	0	18	0
Wyoming	39	35	351	10	351	100	35	30	8
Total	21,075	19,199	3,802,927	[b]	1,043,133	27	649	4,941	1,424
Total[a]			9,178,283[a]						
Grand Total All Plants			12,981,210						

Note: These statistics do not reflect the total number of plots or plants under cultivation in the United States; no correlation should be attempted.

[a]Plants eradicated not under cultivation, that is, wild growth or ditch weed.
[b]Median number of plants per plot: 128.

Source: 1984 Domestic Cannabis Eradication/Suppression Program: Final Report. U.S. Department of Justice, Drug Enforcement Administration, Cannabis Investigations Section. December 1984.

noted that not all marijuana enters the market place; some is consumed by the growers and their associates.

SOCIAL CONSIDERATIONS

The socioeconomic groups affected by the eradication of marijuana on state-owned and managed Conservation District lands consists of the general public and four specific subgroups: state land users, state land managers, marijuana growers and marijuana users.

General public. Policies affecting state-owned lands concern all residents of the State of Hawaii, since they are all potential users of state-owned lands and all share in the ownership of these resources and their revenues. Use of state-owned lands for growing marijuana results in the destruction of wildlife habitats and other resources. The DEA 1985 EIS cites a 1982 poll by Newsweek Magazine indicating that the majority of Americans (77%) do not favor legalizing marijuana consumption. It notes that:

> Even many of those who are tolerant of moderate marijuana use are opposed to drug dealing. That same Newsweek poll reported that 85 percent of the population think that growing marijuana for sale to others should be treated as a criminal offense, and many who would tolerate the cultivation of cannabis on private lands are probably opposed to growing it on Federal lands. Nearly all Americans seem to oppose cannabis cultivation on public lands for private profit.

State land users. State land users include all those who use state lands for legitimate economic, cultural, scientific and recreational purposes. The actions of marijuana growers interfere with these uses. There have been many reports of booby traps and shootings in areas of marijuana plots. Even if persons are not directly affected, they are reluctant to use remote trails for fear of being harmed.

State land managers. State employees are subject to essentially the same risk as the state land users. However, they are not as free to avoid dangerous areas because of their duties.

Marijuana users. There have been a number of studies conducted and reports published on the adverse and potentially dangerous effects of smoking marijuana. Although there has been disagreement and controversy over some of the

conclusions of these reports, there is strong evidence that continued use of marijuana may have detrimental effects to the health of users.

Marijuana growers. The impact of eradication programs on marijuana growers will be principally loss of income. This may have social ramifications, such as an increase in state welfare case loads or even diversion of their efforts to other criminal activity. Because of the nature of the problem, any analysis of effects would be purely speculative and is outside the scope of this document.

PART IV

THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS FOR THE PROJECT AREA

STATE PLANS AND POLICIES

The use policies of state-owned and managed Conservation District lands are in the jurisdiction of the Board of Land and Natural Resources (BLNR). Both the Hawaii State Plan and the State Conservation Lands Functional Plan adopted by the BLNR set forth objectives, policies, and implementing actions to guide the management of all Conservation District lands, including those privately owned. The BLNR has also adopted a number of different regulations to enable it to carry out its mission. The proposed marijuana eradication program is consistent with these adopted objectives, policies and implementing actions in that it is designed to stop an illegal activity that is harmful to native ecosystems with a minimum negative impact on the environment.

Hawaii State Plan

The Hawaii State Plan is the guiding document for all state agencies. A number of objectives and policies in the plan are relevant to the proposed marijuana eradication project. These are to be found in several sections, including three relating to the physical environment, Sections 11, 12, and 13, and in Section 26 relating to public safety.

The particularly relevant environmental objectives and policies are as follows:

Section 11:

(a) Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed at achievement of the following objectives:
  (1) Prudent use of Hawaii's land-based, shoreline, and marine resources.
  (2) Effective protection of Hawaii's unique and fragile environmental resources.

(b) To achieve the land-based shoreline, and marine objectives, it shall be the policy of this State to:
  (4) Encourage the beneficial use of statewide forest resources without generating costly or irreparable environmental damage.
  (6) Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii.

Section 12:

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources:

(b) To achieve the scenic, natural beauty, and historic objective, it shall be the policy of this State to:

(1) Promote the preservation and restoration of significant natural and historic resources.

Section 13:

(a) Planning for the State's physical environment with regard to land, air, and water quality shall be directed at achievement of the following objectives:

(1) Maintenance and pursuit of improved quality in Hawaii's land, air, and water resources.

(2) Greater public awareness and appreciation of Hawaii's environmental resources.

(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

(2) Promote the proper management of Hawaii's land and water resources.

(3) Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters.

(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawaii's people.

(8) Foster recognition of the importance and value of the land, air, and water resources to Hawaii's people and their cultures.

Section 26:

(a) Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:

(1) Assurance of public safety and adequate protection of life and property for all people.

(b) To achieve the public safety objectives, it shall be the policy of this State to:

(1) Support law enforcement programs aimed at curtailing criminal activities.

(2) Develop coordinated management programs for public safety and criminal justice throughout the State.

State Conservation Lands Functional Plan

Relevant objectives, polices and implementing actions in the State Conservation Lands Functional Plan include the following:

Policy A(1). Exercise an overall conservation ethic in the use of Hawaii's resources by protecting, preserving, and conserving the critical

and significant natural resources of the State of Hawaii and controlling use of hazardous areas.

Implementing Action A(1)(d). Provide for effective enforcement of rules and regulations and permit system applicable to the Conservation District.

Policy C(3). Protect and manage the lands with historic or natural resources value.

Implementing Action C(3)(c). Establish criteria and evaluate areas of public land with historic or natural resource value and establish management practices to ensure the protection of areas from further degradation.

Policy C(4). Provide opportunities and facilities to meet public needs for a wide range of recreational and educational activities within Conservation lands.

Implementing Action C(4)(a). Where possible, make available areas of unique biota or geology for public appreciation and enjoyment.

Implementing Action C(4)(b). Provide opportunities and access to use forest lands for outdoor recreation and education by constructing and maintaining facilities for hiking, hunting, camping, nature walks, viewing scenery, and horseback and trail bike riding.

DOFAW RULES FOR FOREST RESERVES

The DLNR has adopted rules regulating activities within forest reserve areas, Title 13, Administrative Rules, Chapter 104. These rules provide for the preservation of public property and resources. These rules are included in Appendix A.

PART V

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATORY MEASURES

INTRODUCTION

The major concern relating to the use of chemicals in the eradication of marijuana plants is the potential impact on plant and wildlife habitats; soils and groundwater resources; fresh water resources and aquatic creatures; and human health. The method of application is critical. Broadcast spraying by fixed-wing aircraft has the potential of being extremely destructive and therefore will **not** be done. All application will be either by helicopter with a modified-hose sprayer or by ground crews using knapsack sprayers. Even these measures will have some adverse and unavoidable impacts.

The Operations Plan for marijuana eradication prepared by DLNR for Kauai describes the procedures to be followed for both manual and chemical eradication operations. For chemical eradication, it provides specifications for: Training; Chemical Mixing, Equipment Calibration and Chemical Application; Weather Conditions; Public Notification; Personal Health and Safety; Spills and Other Emergencies; Record Keeping; and Monitoring. These procedures are presented in Table V-3 at the end of Part V and will be used as guidelines for similar operations plans for Hawaii, Maui and Molokai.

Although it is unlikely that herbicides applied by a helicopter with a modified-hose sprayer or by ground crews using knapsack sprayers would affect any endangered or threatened species because of the small size of the plots on which the marijuana is grown, additional precautions will be taken to increase the certainty that there will be no adverse impacts on critical areas. These steps are described in the Operations Plan which establishes a process to delineate treatment areas to ensure that especially sensitive areas are not harmed. The major areas of concern are those containing habitats essential for endangered and threatened species, areas containing plants and insects that are candidates for listing as endangered or threatened species, surface water sources, and areas with highly permeable soils that are existing or planned sources of potable water.

The Operations Plan establishes the following procedure to ensure protection of these areas:

1. The Chairperson shall establish a panel to prepare a sensitive-areas map. Three types of areas shall be identified on the map: (1) spraying by helicopter allowed; (2) spraying by portable knapsack units allowed; and (3) only manual eradication measures allowed. The panel should include representatives of the Forestry and Wildlife Division, Water and Land Development Division, Aquatic Resources Division, State Parks and Historic Sites Division, Natural Area Reserves Office, U.S. Fish and Wildlife Service, the Drinking Water Program of the Department of Health, and the County Department of Water Supply.
2. The panel will prepare a map identifying essential habitats and other sensitive areas where no spraying by helicopter will be allowed and other areas where spraying may take place under special conditions
3. The map will be drawn at a scale large enough and with sufficient descriptions of landmarks that it can be used by enforcement officers to select the appropriate eradication method when marijuana is discovered in any particular place.
4. The map shall not be made public because of the confidential nature of the eradication program. One copy shall be held by the Chairperson and another by the implementing entity.
5. The panel will also establish a monitoring program to determine the effects of the marijuana eradication program on soils, groundwater, surface water, wildlife, and non-target vegetation. Results of the monitoring program shall be evaluated by the panel, and changes in eradication methods made, if necessary.

A special field test to monitor the effects of spraying weed oil by helicopter on soils and the degree of drift to nearby vegetation is being undertaken by DLNR. The results of the tests will be made available to interested parties when completed.

LANDFORMS, SOILS AND VEGETATIVE COVER

Cultivation of marijuana involves disturbance of the soil similar to that of other agricultural operations. When compared to the impact of cultivation of marijuana, the impacts of eradication measures are slight.

General cultivation practices include the use of soil additives, such as lime and fertilizer, that are required to make the normally acid, low-nutrient forest soils more productive. The soil water regime is affected by irrigation from streams and gravity-fed or pump storage reservoirs made from portable swimming pools. In addition, poisons such as arsenic, which are used to control rodents that eat the plants, may leach into the soil.

Cultivation practices also may limit or disrupt soil organisms. Populations of soil microorganisms existing under cultivation conditions are probably quite different in number and species composition than those of the soils surrounding the marijuana site because of soil disturbance and compaction and the various chemical fertilizers and rodenticides. Soil macroorganism populations (for example, burrowing rodents, earthworms, and insects) may be absent or limited due to weeding, animal trapping, and soil compaction.

Potential soil impacts from marijuana eradication include soil disturbance and compaction due to foot and vehicular traffic; soil drying and erosion due to plant removal and increased sunlight and rainfall penetration; and impacts on soil organisms such as bacteria, fungi, insects, and burrowing animals, caused by soil disturbance or by herbicides. Herbicides may also affect the speed of vegetation of the site.

When compared to the impacts of cultivation practices discussed above, soil impacts of marijuana eradication are not likely to be significant. Most marijuana cultivation sites will revegetate during the next growing season. On intensively cultivated sites, soil moisture and nutrient conditions that are maintained at artificially high levels by irrigation and fertilizers should provide ideal conditions for natural plant succes sion. Nontarget herbaceous vegetation already existing on the site will provide the first stage of secondary succession.

Manual Eradication Operations

Soil impacts that may result from the foot traffic of ground crews involved in manual eradication operations are not likely to be significant. Any onsite nontarget vegetation will remain onsite after manual eradication to mitigate soil drying and erosion potential. Any vehicles involved in the operations onsite may cause slight soil impacts.

Chemical Eradication Operations

Site Revegetation. Indirect impacts on the soil resulting from the removal of protective plant cover and the resultant soil desiccation or susceptibility to erosion are possible under chemical eradication methods. Where marijuana is the only vegetation onsite, herbicide treatment will kill all plant cover regardless of the herbicide used. Where considerable nontarget vegetation exists onsite other than annual, broadleaf weeds, impacts on that vegetation and the resulting speed of site revegetation depend on the mode of action, selectivity, and persistence of the herbicide used.

The eradication of marijuana will allow whatever grew there before to reemerge. On Kauai, new vegetation was apparent a month after spraying. This could be native vegetation or it could be one or more exotic species or noxious weeds. Since marijuana is itself an exotic species, there would not necessarily be an increase in exotic species in the area. However, if the previous vegetation cover consisted of a mixture of native plants and exotic species, it could be expected that the more aggressive exotic species would dominate in the revegative process.

Populations of soil microorganisms may be affected by the alternative herbicides. However, those effects are not likely to be significant in magnitude or duration at the application rates recommended for marijuana eradication.

Glyphosate is adsorbed very rapidly and strongly by soil clays and organic matter. It degrades relatively rapidly in soil. This degradation takes place microbiologically. Experimental evidence shows glyphosate to have little or no effect on soil microflora. Therefore, it is unlikely that soil microfauna would be affected since there will be no reduction in their food supply (DEA, 1986)

The volatile components of weed oil evaporate rapidly. A study conducted in California to determine the air pollution impacts of oil sprays concluded that 90% of foliage surface residues of weed oil evaporated in 26 to 45 minutes after application (Woodrow, 1986).

Weed oil and diesel oil spraying should have little or no adverse environmental impact because bacterial microbes in the soil cause a breakdown of oil molecules.

In Introduction to Soil Microbiology, (Alexander, 1977) the author describes this process as follows:

> The microflora responds to the addition to soil of paraffin, petroleum, petroleum products, and other aliphatic hydrocarbons, and the resultant community causes the added substrate to disappear. These transformations are of great significance in the terrestrial cycle of carbon because waxes and other constituents of plant tissue contain aliphatic hydrocarbons. It has been estimated that approximately 0.02 percent of plant tissues may be considered as hydrocarbon or hydrocarbonlike in structure. Another source of supply is the soil microflora itself that can synthesize a variety of hydrocarbons or hydrocarbonlike molecules; for example, some species of bacteria and algae and the spores of fungi contain either aliphatic hydrocarbons or materials structurally similar to hydrocarbons. Hydrocarbon oxidizers also probably metabolize the oils used as carriers for pesticide sprays, which, even when applied to the foliage, ultimately reach the soil. In addition, the soil under asphalt-paved highways possesses a large bacterial flora capable of utilizing the asphalt.
>
> The short persistence of hydrocarbons of many types is indicative of vigorous populations, and counts in excess of 10^5 per gram have been recorded when paraffin is used as the growth substrate. Among the substances used by the flora are paraffin, kerosene, gasoline, mineral and lubricating oils, asphalts, tars, and natural and synthetic rubbers. Methane, ethane, propane, butane, pentane, hexane, and many other aliphatic hydrocarbons of the type structure C_nH_{2n+2} are decomposed as well. . . [p. 208]

The effectiveness of microbes in degrading oils is being utilized for pollution control. A feature article on hazardous waste management in the March 1985 issue of the National Geographic Magazine describes how oily wastes from petroleum refining at Chevron's El Segundo, California facility are "attacked by hydrocarbon-hungry bacteria, naturally occurring in the soil. The bugs convert the hydrocarbons into harmless carbon dioxide and water."

Limiting factors to microbiological activity are temperature, moisture and acidity of the soils. In warm, moist forest soils, only acidity would appear to be an inhibiting factor. Alexander notes that "many of the strains are sensitive to acidity and frequently show little growth below pH 5." Although much of the soil in Hawaii's forested areas could be expected to be acidic, marijuana does not do well in these acid soils. For marijuana to be present, either the soils will be naturally neutral or will have been treated with lime or some other substance. At a neutral pH level, microbes would be expected to highly active.

Intense repeated spraying or an accidental spill could cause adverse impacts. Chevron warns that "complete soil saturation may leave area bare or sterile." Under a worst-case accident scenario, soils could become saturated as a result of an accidental spill of the full 55 gallons of the mixture of chemicals used for aerial spraying or that a helicopter carrying this full load could crash. Under this worst-case scenario, it must be assumed that in the area immediately surrounding the initial spill that all vegetation would be destroyed and soils would be saturated. Under the crash scenario, there would also likely to be a fire, causing additional damage. Recovery would be slow, but eventually the area would revegetate.

Precautions to be taken if materials are accidentally released or spilled are specified for each chemical in Appendix B. For the oils, it is advised that open flames in the vicinity of a spill or release be eliminated. Spills should be cleaned up as quickly as possible. Large spills should be absorbed with absorbent clay, diatomaceous earth, or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquid; they will not absorb vapor. Contaminated materials should be placed in dispoable containers and buried at an approved disposal area.

For glyphosate, spills should be scooped or swept up and disposed of at a landfill. Large spills should be contained where possible and picked up by suction or vacuum truck and disposed of by incineration or in an approved landfill.

Given the methods that will be employed and the likely infrequency of disasters or repeated application in the same spot, soil saturation appears unlikely. Further, experience in the use of oil for weed eradication and the Kauai operation indicates

that vegetation reappears in a fairly short time after spraying. This may also mean regrowth of marijuana plants, and subsequently the need to respray the area. However, it appears unlikely that intense cultivation efforts by growers will resume since they will know their plots are known to law enforcement officials.

Oil sprays kill broadleaf plants within a few hours. Glyphosate causes complete plant kill in approximately 4 to 10 days at the 1.5 power active ingredient per acre application rate (DEA, 1986).

Marijuana cultivation sites vary in the amount of non-target vegetation present. Most have considerable peripheral vegetation. Impacts on onsite nontarget vegetation that may result from marijuana eradication operations include direct effects, that is, killing of nontarget plants by cutting, mowing, trampling, or herbicides, and indirect effects, such as those stemming from soil impacts that may retard natural vegetation of the site. The amount of nontarget vegetation present, the size of the marijuana cultivation site, and the method of marijuana removal will determine the impacts on onsite nontarget plant species and the speed and pattern of site revegetation. Impacts on offsite plants, particularly those trees, shrubs, and herbaceous plants along the edges of the site, will result principally from herbicide drift. Manual methods would not affect offsite vegetation. Once marijuana is removed, increased sunlight penetration should lead to site revegetation and increased production of ecotone (edge) vegetation.

Ground spot application methods would remove only the target species from a site. There should be little impact on any non-target plants, although both onsite target plants and plants immediately surrounding individual marijuana plants may be damaged by drift.

Aerial spot application methods would remove all target and some non-target plants growing on a site. Particular impacts on non-target plants depend on the herbicide's selectivity, persistence, and mode of action as previously discussed.

With aerial application of herbicides, a portion of the peripheral understory vegetation may be defoliated or killed. Trees defoliated in the spray operation will

be affected to the extent they are already stressed or diseased. It is unlikely that healthy trees will be killed, even though substantial defoliation occurs.

Temporary leaf brownout could occur in a narrow band approximately 5 to 25 feet wide for understory vegetation, narrower for canopy trees (DEA, 1986). Spotting of foliage could occur over a wider band, depending on the vegetation and type of herbicide applied. Because of the strict meteorological and operational constraints that apply to aerial applications (see Table V-3), offsite spray deposition should be minimal—even over short distances.

Agricultural crops grown in the vicinity of marijuana cultivation sites could experience slight impacts, such as leaf-spotting from herbicide drift. Mitigatory measures described in Table V-3 specify precautions that minimize offsite drift.

On sites where non-target plants grow interspersed with the marijuana, aerial techniques using glyphosate would kill or suppress all the onsite vegetation. However, revegetation from seeds should occur quite rapidly because both herbicides are inactivated in most forest soils. Where oils are used, leaf-browning may occur depending on the susceptibility of the non-target plants. However, a number of non-target plants may remain alive.

Spraying of herbicides to eradicate marijuana involves the risk of injury to sensitive plants, particularly endemic species. The degree of risk depends on the proximity of the sensitive plants to the marijuana cultivation sites, the amount of herbicide that moves offsite, and the distance it travels.

Standard application practices and mitigatory measures described in Table V-3 are employed to minimize offsite herbicide drift. They include:

1. Use of a nozzle that produces a relatively uniform distribution of large droplet sizes under low pressure. Large droplets have a far lower tendency to drift than smaller droplets.
2. Careful monitoring of weather so that adverse conditions such as windspeeds greater than 8 miles per hour, thermal inversions, unstable air, and the combination of high temperature and low humidity may be avoided.

3. Observance of buffer distances to avoid drift to sensitive habitats such as streams.

No negative impacts to onsite non-target vegetation would result from strictly controlled manual eradication. Removal of marijuana will result in invasion of the site by non-target plants and reversion to a revegetation cover. With manual eradication impacts to offsite vegetation would be minimized.

Herbicide impacts on nontarget vegetation depend on the herbicide's selectivity, mode of action, and persistence of residues in soil.

Glyphosate is listed as a very broad spectrum herbicide effective on deep-rooted perennial species and on annual and biennial species of grasses, sedges, and broadleaf weeds. Unlike the contact, desiccant action of paraquat, glyphosate's action is systemic. It is quickly adsorbed through leaf surfaces and translocated to all plant parts. Root uptake, however, is precluded by rapid soil inactivation of glyphosate. Glyphosate is very effective in preventing sprouting from perennial species. Glyphosate has little residual action outside the treated plants because of its rapid inactivation by soil adsorption and rapid microbial breakdown. Therefore, site revegetation should occur almost immediately from seed stored in the soil (DEA, 1986).

The oil sprays kill by contact and are not persistent. As noted earlier, areas sprayed with oil emulsions revegetate in a fairly short time.

The proposed methods of application, through precision spraying via a modified hose-sprayer lowered by helicopter, or by individuals using knapsack sprayers, are designed to ensure that the spray reaches only the targeted plants. In addition, spraying will be done during hours of low wind, less than 8 mph. Inversion conditions will be avoided to minimize the possibility of drift. Removal of the marijuana plants will allow revegetation. In essential habitat areas, only manual methods of eradication will be used.

WILDLIFE

The impact of marijuana eradication on wildlife will vary depending on the type of cultivation site. In general, because marijuana cultivation sites tend to be small and widely dispersed and because growers go to great lengths to discourage all wildlife, no additional significant impacts are likely to occur to any wildlife species population from any of the eradication alternatives.

Manual Eradication Operations

Impacts from manual eradication operations on wildlife should be similar to those from any brush clearing activities. Beneficial wildlife impacts may result from manual eradication of marijuana. Removing marijuana eliminates the need for growers to use wildlife deterrents and opens up the area for revegetation by nontarget herbaceous and woody plants that are beneficial to a wide variety of wildlife species.

While manual eradication operations may cause wildlife to flee the area temporarily, no direct injury or fatality to any individual animals is likely to occur. However, marijuana removal may affect the survival of one or more individuals, particularly if ground-nesting birds or small mammals are living on or immediately adjacent to the site itself.

No impacts on large mammals, peripheral canopy-nesting birds, or amphibians are anticipated using manual eradication methods.

Chemical Eradication Operations

Although relatively few data exist on the toxic effects of glyphosate to wildlife species, glyphosate is generally recognized to be a chemical of low toxicity in the environment. Glyphosate has negligible volatility and a low order of acute toxicity. Animal feeding studies with glyphosate have indicated low toxicity to rats, mallard ducks, and quail and little or no potential for bioaccumulation. Teratogenicity was not detected at test dosages. The oil sprays would be expected to affect wildlife much the same as humans--minor eye irritation, minor skin irritation, and headache and nausea from inhalation.

A negative impact associated with both manual eradication and spraying is that caused by the use of helicopters. The downwash and noise could disturb and disrupt birds nesting and interfere with reproduction.

A direct hit with oil spray will harm any insect on or near marijuana plants and could result in additional disruption of habitats of other creatures. Destruction of bird nests or small mammals may also occur. Birds may also ingest seeds from plants that have been sprayed. It is unlikely that either of these alternative eradication methods would affect any endangered or threatened species because of the small size of the plots on which the marijuana is grown. However, steps have been proposed that should increase the certainty that there will be no impacts to endangered or threatened species. These steps include the following:

1. Before any herbicidal eradication efforts are undertaken, qualified personnel will delineate areas where those endangered and threatened species are found or are likely to be found. No herbicides will be used in areas where an impact on state or federally designated endangered or threatened species is likely to occur.
2. In cases where eradication must be undertaken in known or suspected endangered or threatened species habitat, qualified personnel will conduct a site-specific assessment of the presence and distribution of the species and recommend the use of an eradication method that would not affect the species.
3. In no case where there is a reasonable likelihood of an endangered or threatened species being adversely affected by an eradication operation will that operation be undertaken.

Under a worst-case accident scenario, all wildlife in the immediate area could be killed or injured as a result of an accidental spill of 55 gallons of the mixture of chemicals used for aerial spraying or a helicopter crash. In the case of a crash, fire would also be likely, possibly causing a forest fire. Under this worst-case scenario, it must be assumed that in the area immediately surrounding the initial spill that both animals and their habitats would be seriously harmed. Downstream fauna could also be injured or killed. Recovery would be slow, but eventually the area would revegetate. Only in the unlikely event that the accident occurred at a

spot where the last members of an endangered species were found would there be serious, permanent damage.

WATER RESOURCES AND AQUATIC SYSTEMS

In remote areas, the marijuana plots would be expected to be located in areas with adequate water supplies, such as near mountain streams. The possible effects on water quality and aquatic systems resulting from marijuana eradication by manual methods and chemical spraying include sedimentation from runoff and herbicide contamination. Sedimentation occurs when significant amounts of vegetation cover are removed so that the soil is transported during the rainstorms. Herbicide contamination can result from drift, from failure to follow established procedures, or from accidents. Because of the small size and widely scattered distribution of marijuana plots on state lands, these effects are expected to be slight and of localized nature and short duration.

Manual Eradication Operations

No impacts on water quality and aquatic systems are anticipated as a result of manual eradication techniques. The size of most cultivated marijuana sites is insignificant compared to the total surface area of even a small watershed.

Chemical Eradication Operations

Herbicide contamination of surface water is of concern to the public, especially when water is diverted to irrigation or domestic use downstream of the application site, or when the water supports native species.

Small amounts of herbicide could reach aquatic systems from drift from aerial applications or from accidental application. Guidelines and standards for herbicide application minimize the probability of direct application of herbicides to water surfaces. (See Table V-3.) Special equipment is used to produce large droplets and to minimize offtarget movement of drift. In addition, streamside cover will intercept a portion of the spray drift. These factors, however, do not eliminate the potential for direct contact with water surfaces because very small streams, ephemeral stream beds, and seep areas may be hidden from view, especially during aerial application.

Indirect routes of contamination include runoff from rainfall occurring immediately after an herbicide application or from contaminated sediment reaching the system in small amounts over time. The magnitude of contamination from indirect routes is influenced by soil type and topography. Coarse, rocky soils with low clay content have low water-retention capability and are more readily leached. Steep slopes increase the quantity of surface runoff and decrease retention time, thereby concentrating any sediment or chemical runoff into a shorter time span. In contrast, a soil matrix with organic matter or clay typically binds many chemical compounds, preventing the movement of chemicals away from application sites. Continuous ground cover of vegetation and plant litter minimizes surface runoff, and high aeration of soil and high organic matter content foster growth of soil microbes and fungi, which can biodegrade chemicals. Direct application and drift to surface waters or ephemeral stream channels are the most important routes of herbicidal contamination of water bodies.

If a stream is contaminated with herbicide, the risk for aquatic organisms is dependent on the concentration of the herbicide in the stream and on the duration of exposure. The concentration in the stream is dependent on how much enters the stream, as well as on how fast it is adsorbed, degraded, or diluted. Stream sediments and organic detrital matter provide sites for adsorption, which can reduce the effective concentration in the water. Adsorbed molecules are not biologically available. The temperature, chemistry, and oxygen content of the stream affects the rate of biodegradation of the chemical. The velocity and mixing properties of a stream determine the duration of exposure to the critical concentration.

The DEA 1986 EIS cites a study on the pattern of glyphosate behavior in water which indicates that concentrations in a forest stream diminished rapidly, partially through adsorption to bottom sediments, where extensive microbial breakdown occurred. After aerial application of 2.9 pounds per acre to an open stream, maximum concentrations were 0.2 parts per million (ppm) in a beaver pond, 0.08 ppm within six hours, and 0.005 ppm by day three. The study concluded that concentrations of glyphosate observed in streams were at no time high enough to cause injury to aquatic organisms.

Ground Spot Application Methods. When herbicides are applied directly to individual target plants, they are unlikely to drift or fall directly onto surface water. Because of the adsorptive capacity of soils, the small numbers of plants likely to be sprayed, and the unlikely occurrence of marijuana plants close enough to water to enable a direct application to a water body, the use of spot application equipment is unlikely to result in any measurable contamination of water bodies.

Aerial Spot Application Methods. Under a worst-case accident scenario, 55 gallons of the mixture of herbicide used for aerial spraying are dumped completely into a stream. Under this worst-case scenario, it must be assumed that in the area immediately surrounding the initial spill there will be fish kills. Aquatic vegetation will adsorb herbicides, reducing the concentrations in the water column, but this vegetation could die in the process. This may reduce water quality depending on the rate of subsequent decomposition of the flora and will affect the levels of aquatic invertebrates that depend on the flora for substrate. Other invertebrates such as aquatic insects may also be killed. At worst, what could result is a localized zone of measurable, and probably visible, disturbance. However, these effects will be reversible and will not have a measurable impact on the total stream community since most streams depend primarily on vegetation that has fallen into the stream for their energy supplies.

Since both glyphosate and the oil sprays are biodegradable, there should be no long-term adverse effects to either aquatic habitats or potable water supplies.

Another concern is the possibility of groundwater contamination. The important factors in determining pollution potential are groundwater occurrence and movement and the type and permeability of soils.

Glyphosate has little potential for groundwater contamination because of its strong adsorption to soils. This strong adsorption accounts for the observed lack of mobility and low leaching tendency of glyphosate in soil (DEA, 1986).

In a special study on weed oil and diesel oil conducted by the consultants to DEA in 1984, the authors point out that, at normal application rates:

> . . . neither product is likely to move down through the soil below the top inch unless rain follows immediately after spraying. Therefore, groundwater contamination immediately following a spray operation is not likely to occur. . . . there is a long-term possibility of groundwater contamination, particularly if an area is sprayed repeatedly. Areas most susceptible to groundwater contamination would be those with low porosity soils (gravels and sands), high water tables (i.e., close to the soil surface), and low populations of oil-degrading organisms (Scerzenie, et al. 1984).

The field tests being made by DLNR described earlier will provide specific data on the persistence of Weed Oil in soils. The appropriate mitigatory measures listed in Table V-3 will be followed.

AIR QUALITY

The use of helicopters and diesel oil spray will add hydrocarbons to the air. However, these added amounts of hydrocarbons will be negligible on other than a local, immediate basis. According to Monsanto, glyphosate will not vaporize. This reduces the likelihood of vapor inhalation by applicators or nearby animals, as well as vapor drift to adjacent non-target vegetation. More information on risks from herbicide drift is contained in other sections of this document.

VISUAL RESOURCES

The eradication efforts are likely to have only minimal, short-term impacts on visual resources. As noted earlier, the cultivation sites are located in remote areas and are difficult to find. Some visual impacts may result from leaf browning on the periphery of treated marijuana sites.

NOISE

There will be some unavoidable noise impacts from the helicopter operations. Low-flying helicopters can be annoying and distressing, particularly to those seeking a quiet wilderness experience.

Most of the complaints about helicopter noise are directed at sight-seeing tour operations. Because there are many companies providing these services, flights are a frequent and regular occurrence in some areas.

The eradication operations will not take place on a regular basis. They can be expected to be concentrated during the months of the harvest season. They will

also fly at higher altitudes until they reach the areas where marijuana is grown which, as noted earlier, are generally away from locations used by the public. The impacts should therefore be short term and localized.

HISTORIC AND ARCHAEOLOGICAL SITES

None of the alternatives is likely to seriously harm any historic or archaeological resources. The location of known archaeological sites will be made available to law enforcement officials. The forest areas were generally utilized as resource areas by the Hawaiians, but agricultural areas and habitation sites may potentially exist on other state-owned and managed Conservation District lands.

One concern is the accidental spraying of archaeological sites with herbicides. Chemical sprays could interfere with the radiocarbon dating of artifacts. The radiocarbon dating techniques measure the ratio of elements left in the artifact to determine its age. The application of herbicides alone would affect only the surface of the object and would not impair the dating process which involves the subsurface portions of artifacts. However, oil products would seep below the surface. As long as archaeologists are alerted to the fact that an artifact may have been contaminated with oil, organic solvents can be used to remove the material. However, it is then difficult to get all the solvent out of the material and the solvent itself may contain carbon 14 which can interfere with the dating process (Pers. comm., Labat-Anderson, Inc. 1985).

The chemical eradication program will likely have no effect on historic sites other than on potential radiocarbon samples. In fact, manual eradication which uproots plants is more likely to disturb archaeological deposits, if by chance plants are growing in significant sites. The chemical eradication program, by greatly reducing manual eradication, will likely greatly reduce any possibility of adverse effect to significant sites.

PUBLIC HEALTH AND OCCUPATIONAL SAFETY

There are two health concerns. One is the risk to law enforcement officers and individuals who may inadvertently be exposed to herbicides. The other is the risk to someone who might intentionally or inadvertently smoke marijuana that has been sprayed.

Risk is a product of three factors: the probability of injury, the potential severity of the injury, and duration and frequency of exposure to the individual. The probability of injury depends on the inherent dangers present at cultivation sites and the characteristics of the tools or herbicides being used. Severity depends on the potential damage that booby traps, tools, or herbicides could cause on or off the site. The exposure depends on the amount of time an individual is exposed to these hazards.

In general, the greatest risk associated with marijuana cultivation and eradication operations is the risk to law enforcement personnel securing the site and checking for booby traps and to the public encountering "protected" marijuana cultivation sites on public lands.

The risk to law enforcement personnel from booby traps is assumed to be the same for all alternatives except aerial spraying. A goal of all the alternative eradication methods is to reduce the risk that marijuana cultivation operations pose to the public.

There are a number of risks to enforcement officers applying chemicals. These include flying at low levels in a helicopter, rappelling down from (and returning to) the helicopter for backpack spraying application, and risk of exposure to chemicals. There is no question that helicopter operations of this kind are risky. There have been serious injuries to personnel involved in "Green Harvest" operations. However, police officers note that the "Green Harvest" methods of manual eradication involve a much larger number of personnel for much longer periods of time than "Operation Wilt" and that the overall risk is thereby much reduced. Applicators wear protective clothing and follow standard safety procedures. Hearing protection devices are provided to helicopter operators and passengers.

The amount of risk to individuals who may be exposed to the herbicides depends on the toxicity of the chemical used and the amount and length of time of exposure. Herbicides are generally less toxic than insecticides to humans and other animals because of basic biological and physiological differences between plants and animals. Herbicides are designed to interfere with vital plant processes such as seed germination, hormone (auxin)-mediated growth and development, and photosynthesis, which are processes that do not occur in animals. Nevertheless,

like all chemicals, herbicides are toxic at some levels. Persons who are immunologically sensitive to chemicals would be at greater risk.

A risk analysis for herbicide eradication methods was conducted for the DEA EIS's. The conclusions for glyphosate are as follows:

Glyphosate has generally low toxicity to mammals, as reflected in its acute LD_{50} values of 5,400 mg/kg body weight in rats and 3,800 mg/kg in rabbits. It is only slightly irritating to the skin and eyes, and there is no evidence of any pulmonary toxicity. A 2-year chronic feeding study did not indicate any oncogenic or other chronic effects at the highest dose tested (31 mg/kg/day). Studies have also shown that glyphosate is neither teratogenic nor mutagenc, and a recent 3-generation reproductive study reviewed by EPA set a no-observed-effect level (NOEL) of 10 mg/kg/day.

In a review of preliminary data from cancer studies using mice and rats, EPA found one study to be positive for cancer. However, in these cancer studies on both sexes of two species of test animals, the incidence of only one tumor type in one sex of one species was found to increase in relation to treatment with glyphosate. This increase in tumors occurred only at very high exposure levels (much higher than usual in long-term studies of pesticides) and the positive findings depended upon the presence of tumors in only 4 of 149 treated animals. To the extent that it is actually an oncogen, EPA has stated that these results indicate that glyphosate is likely to have only a weak oncogenic effect. More recently, EPA's FIFRA Scientific Advisory Panel found that the data on glyphosate's oncogenic potential are inconclusive. The panel proposed that glyphosate not be classified until a data call-in for further studies in rats and/or mice provides clarification of unresolved questions. Based on the information currently available, EPA has indicated that it does not expect any significant risk from the level of gyphosate to which humans are likely to be exposed in cannabis eradication acitivies (DEA, 1986).

The retesting referred to by DEA has now been completed and is going through EPA's review process. The data have indicated nothing out of the ordinary and no change in registration is anticipated (Personal communication, Adamczyk, EPA, 1986).

As noted earlier, the major risk from the oil sprays is from dermal contact, inhalation of vapors, and accidental ingestion. There would be a serious health risk only if the exposed person vomited and aspirated the oil mixture into his lungs. Studies have indicated that long-term exposure to certain petroleum products is related to various cancers, such as skin cancer (from dermal contacts) and lung cancer (from extended breathing of the fumes). Since contact with the oil sprays by both law enforcement officers and other individuals (growers or legitimate state land users) would be of short duration, the level of exposure would be relatively insignificant.

The risk of someone smoking the marijuana after it has been sprayed and the potential health effects of such an action are difficult to assess. The probability of someone harvesting the marijuana sprayed with oil appears to be extremely low. The plant dies very quickly, turning brown within a few hours; it is therefore unappealing for consumption and has an unpleasant odor. This contrasts to the effects of glyphosate or paraquat where the plant reacts at a slower rate. After several hours the plant loses the odor; during this time the toxic residues on the plant also are degrading and the plant turns brown and wilted.

Most of the information on the effects of diesel oil relate to direct breathing of fumes, rather than from inhaling smoke resulting from burning. However, breathing of combusted diesel oil fumes is common; it has had widespread use as a stove fuel, and almost every city-dweller has had the unpleasant experience of being stuck in traffic behind a diesel oil-burning bus or truck.

The risk associated with glyphosate is very low. A risk analysis on the effect of smoking glyphosate-contaminated cigarettes assumed that a heavy marijuana user smoked 5 marijuana cigarettes per day every day for 30 years (54,750 cigarettes) and that 10 percent of these cigarettes are contaminated with one of the herbicides. The explanation of how the dose from each cigarette was estimated is presented in the section of the federal EIS on Analysis of Risk to Marijuana Smokers. The risk from glyphosate is less than one in a million (DEA, 1986).

ECONOMIC ELEMENTS

The use of oil sprays has already been demonstrated to be cost-effective by the counties of Hawaii and Kauai and state enforcement officials. Impacts of eradication of marijuana on state and county economies should be directly related to the effectiveness of the operation. It is difficult to predict the economic effect, due to the unreliability of existing data. If the state and county law enforcement programs are successful in reducing the amount of marijuana available to potential consumers, it can be expected that the laws of supply and demand will continue to apply and the price of marijuana will go up accordingly. The diminished supply may command such a high price that it will offset the economic loss to growers and/or alternate methods of marijuana cultivation may be developed. On the other hand, increased community educational efforts on prevention of drug abuse may result in a reduced demand accompanying the diminished supply. An effective eradication program on state-owned and managed Conservation District lands may result in growers moving their operations to private lands on Hawaii, Maui and Molokai, or indoors under artificial lights.

SOCIAL ELEMENTS

Marijuana eradication efforts will be perceived differently by various social groups constituting the general public. Some people strongly oppose marijuana use and will support any eradication method. Others support total legalization of marijuana and would oppose any eradication effort. Still others oppose marijuana but also oppose any use of herbicides. Hikers, hunters, and other people who use public lands for recreation are expected to respond positively to the improved safety conditions that will result from a successful eradication program. The majority of people could be expected to support eradication of marijuana grown on state-owned lands if it is done sensitively and does not appreciably harm the environment.

CUMULATIVE IMPACTS

Cumulative impacts are those impacts on the environment that occur from individually minor but collectively significant actions taking place over a period of time. One type of cumulative impact is geographical. Given the small size of most marijuana plots and their wide dispersement, there is unlikely to be any significant cumulative impact. While it is possible certain sites may have to be

revisited for eradication, it is more likely that growers will either discontinue operations or move to new sites.

Another possible cumulative impact is that of actions by other agencies or individuals in conjunction with the state eradication program. For example, an area where marijuana is grown on state-owned and managed Conservation District lands near agricultural lands may receive a larger application of herbicide because of spraying activities on both parcels.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The relationship between short-term uses of man's environment and the maintenance of long-term productivity depends upon site-specific information. Glyphosate persists in soil, but becomes biologically unavailable relatively rapidly. The hydrocarbon in the oils are broken down by soil microbes. Removal of the plant cover and resultant soil desiccation or susceptibility to erosion are possible under chemical eradication methods. However, none of these activities are expected to result in long-term effects on the soil's productivity. The preferred alternative of operational flexibility allows DLNR to choose from a full range of eradication and disposal methods based on the sensitivities of each site.

To the extent that marijuana cultivation may restrict natural regeneration of vegetative growth in the forest, clearcuts, or natural clearings, eradication activities could serve to free the site from an artificially maintained agricultural situation, thus enhancing long-term productivity.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The time, manpower, and cost spent on the eradication of marijuana represent an irreversible and irretrievable commitment of government resources. From an environmental standpoint, it is not expected that any of the eradication methods will irreversibly or irretrievably commit resources.

PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The temporary brownout of vegetation that occurs under the herbicide alternative and the noise associated with all eradication methods are temporary adverse effects. The worst-case accident scenario described represents the most probable adverse effects, and adherence to the mitigatory measures and operational features built into the alternatives should minimize these adverse effects. The potential for, degree, and severity of any adverse effects will be examined in site-specific analyses as well before eradication operations are undertaken.

AN INDICATION OF WHAT OTHER INTERESTS AND CONSIDERATIONS OF GOVERNMENTAL POLICIES ARE THOUGHT TO OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION

The DLNR is obligated to enforce laws on state property. The use of public lands for private cultivation of marijuana is in violation of the law. Further, these activities interfere with the use and enjoyment of state-owned lands by residents of and visitors to Hawaii, Maui and Molokai. The activities of the marijuana growers are destructive to the environment, and their efforts to protect their plots, such as using booby traps and other weapons, endanger innocent citizens. Although some environmental damage may ensue from eradication of marijuana crops, it will be offset by the improvement in the environment upon removal of this exotic vegetation and accompanying chemicals used in its cultivation, and by the improvements in public safety.

TABLE V-1
SUMMARY OF IMPACTS ON NATURAL ELEMENTS

Effectors	Soils and Water	Vegetation	Wildlife
Marijuana Cultivation	Growers amend or even replace the local soils. They add lime and fertilizers; they plow, plant, and weed; they mound soil around plants; and they compact the soil between rows, along their trails, and at their campsites.	Growers remove some or all of the vegetation from their plots. They use herbicides and cultivation techniques to reduce competition from other plants. Effects on native vegetation from unrestricted use of pesticides could be significant.	By clearing the plots, the growers may destroy existing nests and habitats. To keep wildlife away, they use fences, repellents, traps, and poisons. Most cultivation sites are not attractive to wildlife.
Eradication Alternatives			
Manual	The soil would be compacted slightly by the workers' footsteps. If they uprooted the marijuana plants, clumps of soil would be disturbed. Removal of marijuana cover increases penetration of (1) sunlight, which makes the soil drier, and (2) rainfall, which increases the danger of erosion.	There would be increased sunlight and decreased competition for soil nutrients and moisture. Eradication under any method will usually result in the reversion of the site to typical forest vegetation.	If wildlife are present at the plot, as the workers move through the plot, the birds would fly away, the larger animals would leave the area and enter the nearest protective cover, and the smaller animals would head for cover in the ground, under logs, or in trees. After the workers left, the animals would eventually return or would move to a satisfactory habitat nearby. Under any of the alternatives, removing the marijuana opens the area for the return of plant species that are beneficial to a variety of wildlife species.

TABLE V-1 (Cont.)

Effectors	Soils and Water	Vegetation	Wildlife
Eradication Alternatives (cont.)			
Chemical	None of the three chemicals under consideration would have any direct effect on any of the physical properties of the soils. With aerial application, no compaction would occur. With ground spot application, compaction would be greater than manual but less than mechanical. There could be slight increases in soil drying and erosion, depending on the selectivity of the chemical.	All the vegetation in the plot would be killed or injured depending on the selectivity of the chemical, application method, and the type of vegetation. With aerial application, there may be temporary brownout of peripheral vegetation. Healthy trees may be partially defoliated, but none should be killed. Spot application should result in no or slight impact on non-target plants. The affected area should return to its natural first stage cover within six months.	The chemicals may be sprayed on birds or animals and they may breathe the spray or eat leaves, berries, or seeds that are still damp with the spray. Mitigatory measures call for using manual eradication methods when adverse impacts to state and federally designated threatened and endangered species are likely. Normal operations should not affect aquatic systems. Under a worst-case extraordinary situation, the dumping of 55 gallons of any of the chemicals into a stream would result in a localized fish kill.
Weed Oil	Hydrocarbons will adsorb to soil; soluble aromatics may leach to groundwater.	All broad-leaf vegetation sprayed would be killed.	Small mammals and birds may be killed or have reduced reproductive success. Accidental application to open water will result in localized fish kills.
Diesel Oil	Similar to Weed Oil, but with a lesser toxicity proportionately less hazardous.	Same as for Weed Oil.	Same as for Weed Oil.

TABLE V-1 (Cont.)

Effectors	Soils and Water	Vegetation	Wildlife
Eradication Alternatives (cont.)			
Glyphosate	Glyphosate is rapidly inactivated by soil adsorption and microbial breakdown. No impacts to water systems are likely to occur if they receive drifted spray or a direct hit.	Glyphosate kills even deep-rooted perennials as well as annuals. It kills grasses, sedges, and broad-leaf plants.	Glyphosate is relatively harmless to wildlife, including aquatic organisms.
Disposal			
Haul Away and Burn or Bury	Slight soil compaction from loading operations.	Slight damage to nontarget plants may result from the use of heavy machinery.	Similar to effects of manual or mechanical eradication (noise and activity may cause wildlife to temporarily leave the site).
Leave Standing	None.	Revegetation should occur within one growing season.	The birds and animals (if any) that had been living on the site would be able to return.

Table modified and adapted from similar table in the **Final Environmental Impact Statement on Cannabis Eradication on Non-Federal and Indian Lands in the Contiguous United States and Hawaii.** U.S. Department of Justice, Drug Enforcement Administration. May 1986. Washington, D.C. Information on diesel oil and Weed Oil from **Diesel Oil and Weed Oil: Issues in Their Use for Marijuana Eradication.** Paper prepared by P. J. Scerzenie, T. J. Vigerstad and A. M. Myslicki. July 1984.

TABLE V-2

SUMMARY OF IMPACTS ON PEOPLE

Effectors	Workers	General Public	Marijuana Users
Marijuana Cultivation	The growers use active and passive measures (for example, pot shots and booby traps) to intimidate and injure the workers.	Conservation District land users face the same risks associated with booby traps and protective measures as workers.	Growing marijuana on Conservation District lands would probably have some incremental impacts on supply and price of marijuana.
Eradication Alternatives			
Manual	Potential impacts include site hazards such as steep slopes and poisonous vegetation and injuries from misuse or failure of tools and equipment.	Noise from equipment could have temporary adverse effect on recreationists. Removal of booby traps will increase public safety. Under any eradication alternative, lands previously appropriated by growers will be restored to multiple-use potential.	Eradication of marijuana on Conservation District lands would probably have some incremental impacts on supply and price of marijuana.
Chemicals	If the mitigatory measures are followed properly, no effects should occur under normal operating conditions. However, those transporting, mixing, spraying the chemicals or even observing the operation may be exposed to them through equipment malfunction. Since weed oil and diesel oil are highly imflammable, misuse may result in a	Under normal conditions, no one offsite should suffer any ill effects. Hikers receiving a direct hit would be discomforted but suffer no adverse health effects. Fruits and berries sprayed with the oils have a strong repulsive odor and wilt quickly. Even eating berries	Same as Manual above

TABLE V-2 (Cont.)

Effectors	Workers	General Public	Marijuana Users
Chemical (cont.)	fire. Weed oil and diesel oil may cause minor eye and minor skin irritation following prolonged or repeated contact. Inhalation of vapors may cause central nervous system depression. Ingestion or subsequent vomiting of Weed Oil or diesel oil can result in aspiration of light hydrocarbon liquid which can cause pneumonitis, a severe lung inflammation. In a worst-case accident situation, a worker exposed to 1/2 liter of glyphosate spray mix over the upper half of the body, the reproductive toxicity estimated safe dose for humans could be exceeded. This risk would be reduced if women of reproductive age wore protective clothing.	and game birds contaminated with glyphosate should not result in any ill effects.	
Disposal			
Haul Away and Burn or Bury	Whether the marijuana is treated with chemicals or not, loading and hauling provide additional opportunities for accidents associated with site hazards and operation of equipment. Handling combustible agents and potential smoke inhalation are risks faced by workers when marijuana is burned in an open field.	Marijuana burned in open fields has the potential to burn adjacent areas, if not properly controlled.	Same as Manual above.

TABLE V-2 (Cont.)

Effectors	Workers	General Public	Marijuana Users
Disposal (cont.)			
Leave Standing	None.	There is a remote possibilty that a hiker might wander into the area sometime after spraying is completed and might be dermally exposed to the chemical by brushing against contaminated marijuana. No serious adverse effect would be experienced if this were to happen.	There is a small possibility that marijuana that has been sprayed with glyphosate could reach consumers. In the event that marijuana sprayed with glyphosate reaches consumers, marijuana smokers should not experience any adverse health effects resulting from the chemical. For marijuana contaminated with glyphosate, smokers could smoke one gram cigarettes a day without exceeding the estimated safe dose.

Table modified and adapted from similar table in the **Final Environmental Impact Statement on Cannabis Eradication on Non-Federal and Indian Lands in the Contiguous United States and Hawaii.** U.S. Department of Justice, Drug Enforcement Administration. May 1986. Washington, D.C. Information on diesel oil and Weed Oil from **Diesel Oil and Weed Oil: Issues in Their Use for Marijuana Eradication.** Paper prepared by P. J. Scerzenie, T. J. Vigerstad and A. M. Myslicki. July 1984.

TABLE V-3

MITIGATORY MEASURES AND OPERATIONAL FEATURES

ALL METHODS

1. Follow all applicable federal, state, and local laws and regulations in conducting operations.

2. Coordinate with land managers to establish notification procedures for eradication operations when they occur in proximity to recreation areas or areas of high public use. (See section on chemical methods for more detailed notification procedures to be followed for chemical treatment.)

3. Record all data necessary to document operations (for example, treatment site location; control method; weather conditions; unusual conditions).

4. Instruct workers on use of equipment, materials, and procedures and supervise to ensure the procedures are followed properly.

5. Use manual eradication methods in sensitive areas where adverse impacts on endangered or threatened plant or animal species are likely.

CHEMICAL MIXING, EQUIPMENT CALIBRATION, AND CHEMICAL APPLICATION.

Aerial and Ground

1. Follow all applicable federal, state, and local laws and regulations in conducting eradication operations.

2. Strictly observe all label instructions for handling, storage, and disposal of chemicals and chemical containers.

3. Mix all chemicals away from water bodies to minimize risks of inadvertent environmental contamination.

4. Use lowest application rate possible for effective kill. Spray coverage should be uniform and complete.

5. Spray on sunny days for optimum efficiency.

6. Observe buffer distances to avoid drift to sensitive habitats such as streams.

TABLE V-3 (Cont'd)

Aerial and Ground (continued)

7. Avoid applications to roads and trails.

8. Do not wash out spray tanks in or near any streams. Dispose of chemical containers at State-approved sites.

9. When glyphosate is used, destroy berries, fruits and other food items that may have been accidentally sprayed to prevent inadvertent human consumption.

10. The following minimum widths (measured laterally) shall be maintained as buffer zones:

Application Method	From Bodies of Water or Wetlands	From Inhabited Dwellings	From Agricultural Areas
Ground	25'	100'	50'
Aerial	100'	500'	200'

Aerial

1. Make pre-spray reconnaissance flights to orient pilot with project area boundaries, buffer zones, and sensitive areas such as agricultural lands, streams, residences, and reservoirs that are close by.

2. Plan helicopter ferrying routes between staging area and spray area to avoid overflights of aquatic systems and dwellings.

3. Use a sprayer that will produce a relatively uniform distribution of large droplet sizes under low pressure.

4. Use no-drip nozzles that use a vacuum or syphon automatic shutoff system or ball-check valve that will draw the chemical back when not spraying.

Aerial (continued)

5. If sites require multiple swaths, turn spray off at the end of spray runs and during the time when a turn is being made to start another spray run. Initial spray swaths along buffer strips or areas to be protected will be made parallel to these areas and before spraying commences on the rest of the project. To ensure aerial application remains onsite, require shutoff of spray delivery system 50 feet from the edge of the buffer zone. (Spray delivery specifications allow 50 feet for system to achieve dripless shutoff.)

6. Helicopters shall be required to spray at an air speed of no greater than 25 miles per hour. The nozzle shall be positioned as low as possible. Spray pressure at the nozzle shall be 20 to 35 pounds per square inch. Maximum drift reduction with normal spray formulations and application equipment shall be used.

7. Maintain a radio network that links all parts of the project. Direct radio communications between spray aircraft and ground crews shall be established.

Weather Conditions

1. Monitor weather conditions (that is, wind speed, precipitation, precipitation probability, temperature, temperature inversions, atmospheric stability, humidity) before and during application of chemicals to prevent drift, volatilization, leaching, or surface runoff.

2. Measure weather conditions at spray sites before and during application. Take additional measurements anytime it appears that a weather change may be taking place that could jeopardize safe placement of the spray on the target area.

3. To minimize drift and volatilization, do not use aerial spraying when any of the following conditions exists on the spray areas:

   wind velocity exceeds 8 miles per hour.
   raining or rain imminent.
   foggy weather.
   low relative humidity, and temperature exceeds 95 degrees Fahrenheit (applies to water-based sprays only).
   air turbulence (thermal updrafts, etc.) is so great as to seriously affect the normal spray pattern.
   temperature inversions are present which could lead to offsite movement of the spray.

Public Notification Procedures

1. Coordinate with land managers to establish notification procedures for eradication operations when they occur in proximity to recreation areas or areas of high public use.

2. Install temporary project area signs at points of common public access that identify the chemical used, date applied, purpose, and telephone number of the local enforcement office.

3. Before spraying, inspect the site to disclose the presence of people (for example, hunters, hikers, berrypickers). Take all reasonable steps to notify everyone (including residents) before spraying.

4. Keep people off treated areas during spray operations until spray solution has dried.

Personal Health and Safety

1. Workers shall be provided:

   Instructions on the proper use of equipment and supervised to ensure the procedures are followed properly.
   Protective clothing, rubber gloves, hearing protection devices, and other protective items as appropriate.
   Regular medical checkups.

Spills and Other Emergencies

1. Follow all label instructions to prevent exposure in handling chemicals.

2. If accidental exposure occurs, follow label instructions. For eye and skin exposure, usual procedures are to wash immediately. Adequate supplies of fresh water should be available at all times for this purpose.

3. Have transportation available to take any affected individual to physician for treatment.

4. If materials are accidentally released or spilled follow precautions specified on the labels of each chemical. For the oils, open flames in the vicinity of a spill or release be eliminated. Spills should be cleaned up as quickly as possible. Large spills should be scooped or swept up and disposed of at a landfill.

TABLE V-3 (Cont'd)

Record Keeping

1. Record all data necessary to document operations. This shall include:

   treatment site location
   name and distance of nearest town or landmark
   description of site (size of area treated and nontarget vegetation)
   control method
   type and formulation of chemicals used
   time period to carry out operation
   weather conditions
   unusual conditions

2. Upon completion of a chemical spraying operation, a report documenting the operation shall be filed with the Chairperson.

Monitoring

1. Develop a monitoring program to identify patterns of persistence and mobility. Special attention shall be paid to the following:

   regrowth rate of vegetation after spraying
   effects on wildlife
   chemical residues in soil
   chemical residues in ground and surface water
   effects of drift or overspray

Table modified and adapted from similar table in the **Final Environmental Impact Statement on Cannabis Eradication on Non-Federal and Indian Lands in the Contiguous United States and Hawaii.** U.S. Department of Justice, Drug Enforcement Administration. May 1986. Washington, D.C.

PART VI

LIST OF NECESSARY APPROVALS

APPROVAL NEEDED	APPROVING AGENCY OR BODY
Federal	
Clearance under Section 7 of the Endangered Species Act, as applicable	U.S. Fish & Wildlife Service
State	
Conservation District Use Permit	Board of Land & Natural Resources
Experimental Use Permit for diesel oil	Department of Agriculture U.S. Environmental Protection Agency

PART VII

UNRESOLVED ISSUES

The three chemicals that are proposed to be used in the eradication of marijuana are glyphosate, Weed Oil and diesel oil. Glyphosate and Weed Oil are registered by the U.S. Environmental Protection Agency and licensed by the Hawaii State Department of Agriculture. Since diesel oil is not registered, clearance is being sought from EPA and DOA for its use in this program.

There is a lack of empirical data on Weed Oil because it was registered with EPA before the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was passed and on diesel oil because it has never been sold as an herbicide and thus has not previously been regulated under FIFRA. Monitoring programs that are undertaken as part of the marijuana eradication program will provide data for further evaluation of the safety and efficacy of these chemicals.

PART VIII

AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONTACTED

The following list includes those agencies, organizations, and individuals to whom copies of the EIS Notice of Preparation were sent, who provided comments, and/or who were consulted during the preparation of this report. An asterisk indicates those from whom a written communication was received. The letters and the corresponding responses are contained in Appendix E in the order of the list presented below.

FEDERAL

Department of Agriculture
- *Soil Conservation Service
- *U.S. Forest Service - Pacific Islands Forester
  - Institute of Pacific Islands Forestry

Department of the Interior
- *Fish and Wildlife Service
- National Parks Service
- *Geological Survey

Department of Justice
- Drug Enforcement Administration

Environmental Protection Agency

STATE OF HAWAII

*Department of Agriculture
Department of Hawaiian Home Lands
*Department of Defense
*Department of Health
Department of Planning and Economic Development
Department of Transportation
Department of Land and Natural Resources
- Animal Species Advisory Committee

Office of Environmental Quality Control
Office of Hawaiian Affairs
*University of Hawaii Environmental Center
*University of Hawaii Dept. of Agricultural Biochemistry

Libraries

Hamilton Library, University of Hawaii at Manoa
University of Hawaii at Hilo Campus Library
Maui Community College Library

State Legislature

Honorable Mark Andrews, Chairman
- House Committee on Planning, Energy, Ecology and Environmental Protection

Honorable Bertrand Kobayashi, Chairman
- Senate Committee on Health

Honorable Richard Henderson
Honorable Herbert J. Honda

Honorable Virginia Isbel
Honorable Andrew Levin
Honorable Robert K. Lindsey
Honorable Gerald K. Machida
Honorable Richard Matsuura
Honorable Wayne Metcalf
Honorable Bill Pfeil
Honorable Malama Solomon
Honorable Joseph M. Souki
Honorable Harvey Tajiri
Honorable Dwight Takamine
Honorable Mamoru Yamasaki

COUNTY OF HAWAII

*Office of the Mayor
*County Council
Planning Department
*Police Department
*Public Works Department
*Water Department

COUNTY OF MAUI

*Office of the Mayor
*County Council
*Planning Department
Police Department
Public Works Department
*Water Department

CITY & COUNTY OF HONOLULU

Police Department

COUNTY OF KAUAI

Police Department

ORGANIZATIONS AND INDIVIDUALS

American Lung Association of Hawaii
American Lung Association of Hawaii, Hawaii Council
American Lung Association of Hawaii, Maui Council
*Karen Anna
*Kelly Arbor
Bernice P. Bishop Museum
*Ronnie Bressler
Conservation Council of Hawaii
Conservation Council of Hawaii, Hawaii Island Chapter
Conservation Council of Hawaii, Maui Chapter
East Maui Irrigation District
Environmental Law Center of the Pacific
*F. E. Cameron
*Tom Cobian
*Joseph Eloheim
*Carol Fenn
*Constance H. Gaffney
Haleakala Ranch
Hana Ranch, Inc.

*Hawaii Audubon Society
Hawaii Island Chamber of Commerce
Hawaii Beekeepers Association
*Hawaii Medical Association
Hawaii's Thousand Friends
Hawaiian Botanical Society
*Hawaiian Entomological Society
Hawaiian Malacological Society
Hawaiian Sugar Planters' Association
Hawaiian Trail and Mountain Club
*John R. Henderson
*Sunny Holmes
Hunters' Association
Maria Hustace
*Susan Marie Lutich
*Bruce Jacobs/Dolores Slater
*Martin Jenson
Kaupo Ranch
Life of the Land
*Maui Chamber of Commerce
Maui Sportsmen Club
Molokai Chamber of Commerce
Molokai Ranch, Ltd.
The Nature Conservancy
*B. Nickels
*Jacque Prell
*Mark Sheehan
Sierra Club, Hawaii Chapter
Sierra Club, Maui Group
Sierra Club, Moku Loa Group
*Jette Slater
*Steve Slater
*Statton
Ulupalakua Ranch
*Elaine S. Wender
The Wildlife Society, Hawaii Chapter
Hawaiian Electric Company

INDIVIDUALS CONSULTED

Thomas Adamczyk, Environmental Protection Agency
Thomas Arizumi, Department of Health
Vince Bagoyo, Jr., Maui County Department of Water Supply
Selwyn Chinn, U.S. Geological Survey
Guy Kawasaki, Hawaii County Department of Water Supply
Po Yung Lai, Department of Agriculture

PART IX

EIS DISTRIBUTION LIST

The following is a list of agencies, organizations, and individuals to whom a copy of the draft EIS was sent.

FEDERAL

- Department of Agriculture
  - Soil Conservation Service
  - U.S. Forest Service - Pacific Islands Forester
    - Institute of Pacific Islands Forestry
- Department of the Interior
  - Fish and Wildlife Service
  - National Parks Service
    - Honolulu Office
    - Haleakala National Park
    - Hawaii Volcanoes National Park
  - Geological Survey
- Department of Justice
  - Drug Enforcement Administration
- Environmental Protection Agency
- U.S. Army-DAFE (Facilities Eng.-USACH)
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Navy

STATE OF HAWAII

- Department of Agriculture
- Department of Accounting & General Services
- Department of Hawaiian Home Lands
- Department of Defense
- Department of Health
- Department of Planning and Economic Development
- DPED Library
- Department of Social Services and Housing
- Department of Transportation
- Department of Land and Natural Resources
  - Animal Species Advisory Committee
  - State Historic Preservation Office
- Office of Environmental Quality Control
- Office of Hawaiian Affairs
- State Archives
- State Energy Office

UNIVERITY OF HAWAII

- Environmental Center
- Department of Agricultural Biochemistry
- Water Resources Research Center

STATE LEGISLATURE

Honorable Mark Andrews, Chairman
House Committee on Planning, Energy, Ecology and Environmental Protection
Honorable Bertrand Kobayashi, Chairman
Senate Committee on Health
Honorable Richard Henderson
Honorable Herbert J. Honda
Honorable Virginia Isbel
Honorable Andrew Levin
Honorable Robert K. Lindsey
Honorable Gerald K. Machida
Honorable Richard Matsuura
Honorable Wayne Metcalf
Honorable Bill Pfeil
Honorable Malama Solomon
Honorable Joseph M. Souki
Honorable Harvey Tajiri
Honorable Dwight Takamine
Honorable Mamoru Yamasaki

LIBRARIES

State Main Library
Hamilton Library, University of Hawaii at Manoa
Legislative Reference Bureau

Regionals

Kaimuki Regional Library
Kaneohe Regional Library
Pearl City Regional Library
Hilo Regional Library
Lihue Regional Library
Wailuku Regional Library

Hawaii

University of Hawaii at Hilo Campus Library
Bond Memorial (Kohala) Library
Holualoa Library
Honokaa Library
Kailua-Kona Library
Keaau Community-School Library
Kealakekua Library
Laupahoehoe Community-School Library
Mountain View Community-School Library
Pahala Community-School Library
Pahoa Community-School Library
Thelma Parker Memorial Library/Waimea Area Library

Maui

Maui Community College Library
Kahului Library
Lahaina Library
Makawao Library

Molokai
Molokai Library

COUNTY OF HAWAII
Office of the Mayor
County Council
Police Department
Department of Parks & Recreation
Department of Planning
Department of Public Works
Department of Research & Development
Department of Water Supply

COUNTY OF MAUI
Office of the Mayor
County Council
Police Department
Department of Parks & Recreation
Department of Planning
Department of Public Works
Department of Water Supply
Economic Development Agency

CITY & COUNTY OF HONOLULU
Police Department

COUNTY OF KAUAI
Police Department

MEDIA
Honolulu Star Bulletin
Honolulu Advertiser
Sun Press
Hawaii Tribune Herald
West Hawaii Today - Kona
Maui News
Ka Molokai

ORGANIZATIONS
American Lung Association of Hawaii
American Lung Association of Hawaii, Hawaii Council
American Lung Association of Hawaii, Maui Council
Bernice P. Bishop Museum
Conservation Council of Hawaii
Conservation Council of Hawaii, Hawaii Island Chapter
Conservation Council of Hawaii, Maui Chapter
East Maui Irrigation District
Environmental Law Center of the Pacific
Haleakala Ranch
Hana Ranch, Inc.
Hawaii Audubon Society
Hawaii Island Archery Club
Hawaii Island Chamber of Commerce
Hawaii Beekeepers Association
Hawaii Medical Association

Hawaii's Thousand Friends
Hawaiian Botanical Society
Hawaiian Electric Company
Hawaiian Entomological Society
Hawaiian Malacological Society
Hawaiian Sugar Planters' Association
Hawaiian Trail and Mountain Club
Hunters' Association
Kaupo Ranch
Keanae-Wailua Nui Commenity Association
Life of the Land
Maui Chamber of Commerce
Maui Hunt Club
Maui Sportsmen Club
Molokai Chamber of Commerce
Molokai Ranch, Ltd.
Safe Solutions
The Nature Conservancy
Sierra Club, Hawaii Chapter
Sierra Club, Maui Group
Sierra Club, Moku Loa Group
Sportsmen of Hawaii
Ulupaluakua Ranch
The Wildlife Society, Hawaii Chapter

INDIVIDUALS

Karen Anna
Kelly Arbor
Steve Blake
Ronnie Bressler
F. E. Cameron
Eve Clute
Tom Cobian
Dechen Dronkar
Joseph Eloheim
Carol Fenn
Constance H. Gaffney
Michael Glaze
John R. Henderson
Sunny Holmes
Maria Hustace
Margaret Kelleher
Gladys Kanoa
Susan Marie Lutich
Bruce Jacobs/Dolores Slater
Martin Jenson
Attwood Makanani
John Mitchell
Yanzoh Molem
B. Nickels
Jacque Prell
Mark Sheehan
Jette Slater
Steve Slater
Statton
Elaine S. Wender

PART X

COMMENTS AND RESPONSES ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

The following agencies, organizations, and individuals reviewed and commented on the draft Environmental Impact Statement. Those who made substantive comments concerning the proposed action received written responses to their concerns. They are indicated by an asterisk (*) in the following list. All of the letters received, together with the responses to all substantive questions, are reproduced in Appendix E, following the comments on the EIS Preparation Notice..

FEDERAL AGENCIES
Department of Agriculture, Soil Conservation Service
Department of the Interior
Fish and Wildlife Service
*National Parks Service, Hawaii Volcanoes National Park
*Department of Justice, Drug Enforcement Administration
U.S. Army Corps of Engineers (telephoned response)
U.S. Coast Guard
U.S. Navy

STATE OF HAWAII
Department of Accounting & General Services
Department of Defense
*Department of Health
*Department of Planning and Economic Development
Department of Social Services and Housing, Hawaii Housing Authority
Department of Transportation
State Energy Office

UNIVERITY OF HAWAII
*Environmental Center
*Water Resources Research Center

STATE LEGISLATURE
*Bill Pfeil, Representative

COUNTY OF HAWAII
*County Council
*Police Department
Department of Parks & Recreation
*Department of Planning
Department of Public Works

COUNTY OF MAUI
*Mayor Tavares
*County Council
Department of Public Works
*Office of Economic Development

CITY & COUNTY OF HONOLULU
*Police Department

ORGANIZATIONS
*Center for World Peace
*East Maui Irrigation District
*Hawaii Audubon Society
Hawaiian Electric Light Company
*Hawaiian Malacological Society
*Keanae-Wailuanui Community Association
*Life of the Land
*Molokai Ranch, Ltd.
*The Nature Conservancy
*Safe Solutions
*Sierra Club, Maui Group
*Sierra Club, Moku Loa Group

INDIVIDUALS
*Lehua Altemus
*Kelly Arbor
*Doobie Basztura
*Ronnie Bressler
*Steven Broos
*Eve Clute
*Diana Dahl
*Patricia Dillberg
*Bonnie Fish
*Michael L. Glaze
*David & Lori Grace-Cherry
*William Graham
*Mary K. Groode
*Margaret Kelleher
*Caitlin LaBoyteaux
*James McCall
Kathleen W. Moser
*Jan Newhouse
*Roz Ritter
*Jack Schweigert
*Jette Slater
*Steve Slater
*Julianne Sutton
*Niles Szwed
*Aerie Waters
*Jae Webster
*Elaine S. Wender
*Elizabeth Wertheim, et al.

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APPENDIX A

DIVISION OF FORESTRY
AND WILDLIFE

RULES FOR FOREST
RESERVES

TITLE 13

DEPARTMENT OF LAND AND NATURAL RESOURCES

SUBTITLE 5 FORESTRY AND WILDLIFE

PART 1 FORESTRY

CHAPTER 104

RULES REGULATING ACTIVITIES WITHIN FOREST RESERVES

Subchapter 1 General Provisions

§13-104-1 Purpose and applicability
§13-104-2 Definitions
§13-104-3 Penalty

Subchapter 2 Public Use

§13-104-4 Preservation of public property and resources
§13-104-5 Litter and sanitation
§13-104-6 Report of injury or damage
§13-104-7 Fire use restrictions
§13-104-8 Hunting and fishing
§13-104-9 Firearms or other weapons
§13-104-10 Swimming and bathing
§13-104-11 Vehicles and transportation
§13-104-12 Animals
§13-104-13 Audio devices and noise
§13-104-14 Explosives
§13-104-15 Disorderly conduct
§13-104-16 Residence on forest reserve land
§13-104-17 Compliance with laws

Subchapter 3 Permits

§13-104-18 General provisions for permits
§13-104-19 Camping permits
§13-104-20 Special use permits
§13-104-21 Collecting permits
§13-104-22 Commercial harvest permits
§13-104-23 Access permits

Historical Note: Chapter 104 of Title 13, Administrative Rules, is based substantially upon Regulation 1 [Eff. 12/9/43; am 8/12/76] and Regulation 10 [Eff. 12/12/59] of the Division of Fores-

try, Department of Land and Natural Resources. [R SEP 2 8 1981]

Subchapter 1 General Provisions

§13-104-1 Purpose and applicability. (a) The purpose of these rules is to regulate activity within forest reserves established pursuant to sections 183-11 and 183-15, Hawaii Revised Statutes.

(b) These rules shall apply to all persons entering the boundaries of a forest reserve. [Eff. SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-2 Definitions. As used in these rules, unless context requires otherwise:

"Administrator" means the administrator of the division of forestry and wildlife.

"Authorized representative" means the administrator, foresters, conservation enforcement officers, and other persons authorized by the board of land and natural resources to act for the board.

"Board" means the board of land and natural resources.

"Division" means the division of forestry and wildlife.

"Department" means the department of land and natural resources.

"Forest reserve" means those lands designated as forest reserves by the department pursuant to sections 183-11 and 183-15, Hawaii Revised Statutes, and other lands for plant sanctuaries and baseyards under the custody and control of the division.

§13-104-3 Penalty. Any person violating any of the provisions of these rules shall be penalized as provided in sections 183-4 and 183-18, Hawaii Revised Statutes. [Eff. SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §§183-4, 183-18)

Subchapter 2 Public Use

§13-104-4 Preservation of public property and resources. The following activities are prohibited within a forest reserve:

(1) To remove, injure, or kill any form of plant or animal life, either in whole or in part, except as authorized by the board or its authorized representative;
(2) To remove, damage, or disturb any natural feature or natural resource (e.g. natural stream beds) except as authorized by the board or its authorized representative;
(3) To remove, damage, or disturb any historic or prehistoric remains;
(4) To remove, damage, or disturb any notice, marker, or structure;
(5) To enter, occupy, or use any building, structure, facility, motorized vehicle, machine, equipment, or tool within or on the forest reserve except as authorized by the board or its authorized representative;
(6) To engage in any construction or improvement except as authorized by the board.
(7) To sell, peddle, solicit, or offer for sale any merchandise or service except with written authorization from the board.
(8) To distribute or post handbills, circulars, or other notices. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §§183-2, 183-17)

§13-104-5 Litter and sanitation. The following acts are prohibited within a forest reserve:
(1) To drain, dump, or leave any litter, animal waste or remains, or any other material which pollutes or is likely to cause pollution in the forest reserve including streams and other water sources;
(2) To deposit any body waste in areas without comfort stations without digging a hole and covering all signs of the waste;
(3) To deposit any body waste within 150 feet of a spring, stream, lake, or reservoir; and
(4) To dump or leave a derelict or abandoned vehicle or any other large refuse such as refrigerators and stoves. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-6 Report of injury or damage. All incidents resulting in injury or death to persons or damage to property shall be reported by the person or persons involved as soon as possible to the board or its authorized representative. This report does not

relieve persons from the responsibility of making any other accident reports which may be required under federal, state, or county statutes, ordinances, and rules. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-7 Fire use restrictions. The following acts are prohibited within a forest reserve:

(1) To build any fire on the ground;
(2) To build any fire without a portable stove or other self-contained unit;
(3) To build a fire against any structure, large hollow log, tree, stump, or in any area of plant life where the fire may be difficult to extinguish;
(4) To leave a fire unattended without extinguishing all traces of heat;
(5) To deposit or discard any potential fire producing material such as embers, coals, or ashes that are too hot to touch;
(6) To set on fire or cause to be set on fire any grass, brush, or tree, except for department fire control measures;
(7) To start a fire in windy conditions in a place or manner that is likely to cause grass, brush, or trees to be set on fire; and
(8) To use any motor vehicle, motorized equipment, or other machine powered by steam engines, internal combustion engines, or electric motors unless equipped with efficiently operating fire or spark arresting equipment. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §§183-2, 185-1)

§13-104-8 Hunting and fishing. The hunting, fishing, trapping, or disturbing of any fish, animal, or bird is prohibited except as permitted by department hunting or fishing rules. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2

§13-104-9 Firearms or other weapons. Firearms including air or gas operated, bow and arrow and other weapons are prohibited except as permitted by department hunting rules and are subject to all applicable federal, state, and county statutes, ordinances, and rules. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-10 Swimming and bathing. Swimming and bathing in all waters within a forest reserve are permitted at an individual's own risk, except in waters and at times where the activities are prohibited by the board or its authorized representative in the interest of public health and safety. The excepted waters and times shall be designated by posted signs. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-11 Vehicles and transportation. (a) The following acts are prohibited within a forest reserve:

(1) To drive, operate, or use any motorized ground vehicle, glider, hang glider, aircraft, balloon, or parachute carelessly and without due caution for the rights or safety of others and in a manner that endangers any person or property;
(2) To launch or land airplanes, gliders, helicopters, balloons, parachutes, or other similar means of transportation without a special use permit from the board or its authorized representative; provided, however, that landing is authorized without a permit in case of an emergency;
(3) To drive, operate, or use any motorized ground vehicle, including recreational off-road vehicles, in areas and on roads or trails not designated for that purpose;
(4) To park any motorized ground vehicle or trailer except in designated areas;
(5) To drive or ride a horse, mule, or other animal in areas and on roads or trails that are posted against such activity; and
(6) To drive, operate, or use any motorized ground vehicle without a functioning street legal muffler.

(b) Any vehicle or property left unattended within a forest reserve for longer than seventy-two hours without prior written permission from the board or its authorized representative shall be considered abandoned. Any abandoned vehicle or property may be impounded or towed away by the board or its authorized representative at the expense of the owner. [Eff: SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-12 Animals. (a) Dogs, cats, and other animals are prohibited within a forest reserve unless

crated, caged, on a leash, or otherwise under restrictive control at all times except for hunting dogs when permitted by chapters 122 and 123, Administrative Rules.

(b) All dogs used for hunting shall be crated, caged, leashed, or otherwise under restrictive control during transportation to and from hunting areas within the forest reserve.

(c) Dogs, cats, or other domestic animals, observed by an authorized representative of the board to be running at large or in the act of killing, injuring, or molesting humans, wildlife, or property, may be disposed of in the interest of public safety and the protection of the forest reserve. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-13 Audio devices and noise. Creating noise or sound within a forest reserve, either vocally or otherwise (i.e. public address systems, radios, television sets, musical instruments) or use of any noise producing devices (i.e. electric generating plants or other equipment driven by motors or engines) in a manner and at times which creates a nuisance is prohibited. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-14 Explosives. The use or possession of fireworks, firecrackers, or explosive devices within a forest reserve is prohibited. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-15 Disorderly conduct. Disorderly conduct, as defined in section 711-1101, Hawaii Revised Statutes, is prohibited within a forest reserve. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §§183-2, 711-1101)

§13-104-16 Residence on forest reserve lands. Residing within a forest reserve is prohibited except with written permission from the board. [Eff. SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-17 Compliance with laws. All persons entering the boundaries of a forest reserve shall comply with all federal, state, and county laws,

ordinances, and rules. [Eff. SEP 28 1981]
(Auth. HRS §183-2) (Imp: HRS §183-2)

Subchapter 3 Permits

§13-104-18 General provisions for permits.
(a) The board or its authorized representative may issue the following types of permits:
(1) Camping;
(2) Special use;
(3) Collecting;
(4) Commerical harvest; and
(5) Access.
(b) All permits are subject to the following provisions:
(1) Permits are subject to denial, cancellation, or termination at any time by the board or its authorized representative upon violation of these rules or any conditions of the permit or any federal, state, or county statutes, ordinances, and rules or for danger to the public or because of natural causes.
(2) Permits shall not be transferable.
(3) Persons or organizations to whom permits are issued shall be held responsible for all conditions stipulated on the permit.
(4) All persons eighteen years of age or older shall be eligible to secure a permit and all minors shall be allowed use of the premises provided that they are under the direct supervision of one adult for every ten minors.
(5) The size of groups as well as the length of time any permit may be in effect may be limited by the board or its authorized representative.
(6) The board or its authorized representative may require the permittee, at the permittee's own cost, to provide police protection in the interest of the public safety and welfare and for the protection of property when the number of persons using the forest reserve is one hundred or more.
(7) Fees and charges as set by the board may be assessed when permits are granted for the exclusive use of areas or facilities, or when charges are necessary to defray the cost of special facilities, services, or supplies provided by the State, or as

otherwise determined by the board or its authorized representative when necessary to carry out the provisions of chapter 183, Hawaii Revised Statutes. Charges may be waived by the board or its authorized representative if the waiver is in the public interest.

(8) All permittees shall, upon request, show the permit to any law enforcement officer, the board, or its authorized representative. [Eff. SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-19 Camping permits. (a) All persons, groups, organizations, or associations wishing to camp within a forest reserve shall obtain a camping permit authorizing the use of the specific area and facilities for camping purposes.

(b) Camping permits shall be obtained from the district offices of the division during regular working hours of the department.

(c) Persons applying for a permit shall provide their names and addresses and shall produce identification satisfactory to the board or its authorized representative. The board or its authorized representative may require the names, addresses, and telephone numbers of all persons included on a permit.

(d) Each permit will reserve the use of a designated area for the stated date or dates of use. Camping is permitted only in designated areas or sites.

(e) No person, group, organization, or association shall remain at any one specific camping site for longer than fourteen days; provided that the board or its authorized representative may extend the length of stay for good cause; provided further that the length of stay (including the extension as well as the permitted stay) shall not exceed thirty days.

(f) After the expiration of a permit, a period of thirty days shall pass before another permit may be issued to the same person for the same designated area. This restriction shall apply to all persons named on the expired permit. The board or its authorized representative may waive a portion of the thirty day period for good cause.

(g) Camping with recreational trailers or other camper units is permitted only at locations designated by the board or its authorized representative.

(h) Permits may be denied, cancelled, or terminated for the following reasons:

(1) When the size of the group exceeds the capacity of the existing site or facilities;
(2) When there are inadequate facilities to meet the immediate needs of the camper or campers;
(3) When repairs or improvements are being made at the campsite; or
(4) When a state of emergency is declared by the board or its authorized representative. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-20 Special use permits. (a) Special uses are permitted within a forest reserve only by a permit issued by the board or its authorized representative. Special uses are all types of uses other than those provided for herein and which are considered compatible with the functions and purposes of each individual area, facility, or unit within a forest reserve. Special uses include but are not limited to activities such as meetings, weddings, concerts, shows, and other community events or activities.

(b) Applications for special use permits shall be received by the board or its authorized representative at least fifteen working days in advance of the date the permit is to be in effect, unless otherwise received and accepted by the board or its authorized representative.

(c) A request for a special use permit shall be considered on its own merits including its effect on the premises, facilities, and the public's use and enjoyment of the forest reserve. [Eff: SEP 2 8 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-21 Collecting permits. (a) Persons wishing to collect forest items (e.g. ti leaves, bamboo) for personal use and at no charge shall obtain a collecting permit authorizing the collection in a specific area.

(b) Collecting permits shall be obtained from the district offices of the division during regular working hours of the department.

(c) Persons applying for a permit shall provide their names and addresses and shall produce identification satisfactory to the board or its authorized representative.

(d) Collecting permits shall specify:
(1) The date or dates of collection;

(2) The quantities and items to be collected;
(3) The areas of collection; and
(4) Any other terms and conditions deemed necessary by the board or its authorized representative.

(e) Permits shall not be issued for collecting items for sale.

(f) No permits shall be issued for the collection of endangered or threatened wildlife or plants except as provided by chapter 124, Administrative Rules. [Eff. SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-22 Commercial harvest permits. (a) The board or its authorized representative may issue permits for the purpose of purchasing, harvesting, and removing forest products (e.g. timber, seedlings, greenery, tree fern, cinder, and lava rock).

(b) Permits shall be obtained from the district offices of the division during regular working hours of the department.

(c) Each application for a harvest permit shall be considered on its own merits including its effect on the premises and the public's use and enjoyment of the forest reserve.

(d) Permits will not be issued for harvesting material for direct resale.

(e) The value of the raw material to be harvested shall not exceed $1,000. The quantity to be harvested shall be decided by the board or its authorized representative.

(f) The time of entry for harvesting shall not exceed 14 days, except that the board or its authorized representative may extend this time for good cause.

(g) No more than one permit within a thirty day period or three permits within a calendar year may be issued to the same person, group, organization, or association for harvesting the same product.

(h) Each permit shall specify:
(1) The products to be harvested;
(2) The amount to be harvested;
(3) The dollar value of the products;
(4) The designated area to be harvested
(5) The date or dates the harvesting may take place; and
(6) Any other terms or conditions deemed necessary by the board or its authorized representative. [Eff. SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

§13-104-23 Access permits. (a) Permits for access to or entry into forest reserves may be required by the board or its authorized representative for the following purposes:

(1) To comply with the requirements of private landowners or lessees who permit access to forest reserves through their land;

(2) To control the number of people using a forest reserve or an area within a forest reserve in order to minimize the impact upon environmentally sensitive areas;

(3) To control the types of uses of a forest reserve or an area within a forest reserve in order to minimize the dangers of incompatible uses in the same area (e.g. horseback riding and motorcycle riding); and

(4) To control periods of use of a forest reserve, especially during periods when fire danger levels are high.

(b) Access permits shall be obtained from the district offices of the division during regular working hours of the department.

(c) Persons applying for an access permit shall provide their names and addresses and shall produce identification satisfactory to the board or its authorized representative. The board or its authorized representative may require the names, addresses, and telephone numbers of all persons included on a permit. [Eff. SEP 28 1981] (Auth: HRS §183-2) (Imp: HRS §183-2)

APPENDIX B

CHEMICAL INFORMATION AND SAFETY DATA

Material Information Bulletin

(Approved – "Essentially Similar" to Form OSHA 20, Material Safety Data Sheet)

Chevron

CHEVRON Weed Oil **CMS 276506**

CAUTION! **HARMFUL OR FATAL IF SWALLOWED**
COMBUSTIBLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Paraffins (incl. naphthenes)	≤55%
Aromatics	
C_8^+	≥45%
Emulsifier	~0.03%

EXPOSURE STANDARD

The OSHA exposure standard and the Threshold Limit Value (TLV) (1980) is 5 mg/m^3 (milligrams of material per cubic meter of air) for a daily 8-hour exposure. This is the OSHA exposure standard and the TLV for mineral oil mists.

PHYSIOLOGICAL & HEALTH EFFECTS

EMERGENCY & FIRST AID PROCEDURES

Eyes

Expected to cause no more than minor eye irritation.

Wash eyes with fresh water for at least 15 minutes. If irritation continues, see a doctor.

Skin

Expected to produce no more than minor skin irritation following prolonged or frequently repeated contact.

Wash thoroughly with soap and water following skin contact. Launder contaminated clothing.

Inhalation

Breathing the vapors at concentrations above the exposure standard can cause central nervous system depression. See Additional Health Data.

If respiratory irritation or any signs or symptoms, as described in this bulletin occur, move the person to fresh air. If any of these effects continue, see a doctor.

Ingestion

Not expected to be acutely toxic by ingestion. **Note to Physician:** Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

If swallowed, DO NOT make person vomit. Call a doctor immediately.

ADDITIONAL HEALTH DATA

See Page 3.

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Avoid contact with eyes. Eye contact can be avoided by wearing chemical safety goggles.

Skin Protection: Avoid prolonged or frequently repreated skin contact with this material. Skin contact can be minimized by wearing impervious protective clothing including gloves.

Respiratory Protection: If operating conditions create airborne concentrations which exceed the exposure standard, the use of an approved respirator is recommended.

Ventilation: Use adequate ventilation to keep the airborne concentrations of this material below the exposure standard.

FIRE PROTECTION

Liquid evaporates and forms vapors (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85°F.

Flash Point: (PM) 66°C (Min.)
Autoignition Temp.: 260°C
Flammability Limits: 1.0-6.0%

Extinguishing Media: CO_2, Dry Chemical, Foam, Water Spray.

Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. See Hazardous Decomposition Products. Read the entire bulletin.

SPECIAL PRECAUTIONS

See Page 3.

ENVIRONMENTAL PROTECTION

Environmental Impact: This material is not expected to present any environmental problems other than those associated with oil spills. However, because of its dispersant properties, this material forms emulsions with water. For help with any spill, leak, fire, or exposure involving this material, call day or night (415) 233-3737.
Precautions if Material is Released or Spilled: Eliminate all open flames in vicinity of spill or released vapor. Clean up spills as soon as possible. Absorb large spills with absorbent clay, diatomaceous earth, or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquid; they will not absorb vapor.
Waste Disposal Methods: Place contaminated materials in disposable containers and bury in an approved dumping area.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.

Incompatibility (Materials to Avoid): May react with strong oxidizing materials.

Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor and may produce oxides of sulfur; incomplete combustion can produce carbon monoxide.

Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES

Solubility: Miscible with hydrocarbon solvents; emulsifies in water.

Appearance (Color, Odor, etc.): Amber liquid.

Boiling Range: 180-343°C
Melting Point: n/a
Specific Gravity: 0.893 (Min.)
Vapor Pressure: < 1 mm Hg @ 25°C
Vapor Density (Air = 1): NDA
Percent Volatile (Volume %): NDA
Evaporation (= 1): NDA
Viscosity: 2.5 cSt @ 40°C

n/a = Not Applicable
NDA = No Data Available

The above information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Information Bulletin

CHEVRON Weed Oil **CMS 276506**

ADDITIONAL HEALTH DATA

Signs and symptoms of central nervous system depression may include one or more of the following: headache, dizziness, loss of appetite, weakness and loss of coordination. Affected persons usually experience complete recovery when removed from the exposure area. Data available for a similar material indicate that this material is not expected to be acutely toxic.

SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

DO NOT USE OR STORE near flame, sparks or hot surfaces.
USE ONLY IN WELL VENTILATED AREA.
Keep container closed.
DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

CAUTION! Do not use pressure to empty drum or explosion may result.

CRR-6745(C)(10M-4-81) Printed in U.S.A.

B & B WEED OIL

P.O. BOX 218, Carpinteria, Ca., 93013

B & B WEED OIL — ACTIVE INGREDIENT: PETROLEUM HYDROCARBONS — 100%

Sub-packaged in accordance with California Administrative Code, Title 3, Agriculture Section 2396. B & B is an aromatic petroleum effective for weed killing. Effectiveness depends on the application by user. Seller makes no warranty, expressed or implied, concerning the use of this product other than as indicated on the label. Buyer assumes all risk of use and/or handling of this material, when such use and/or handling is contrary to label instructions.

FOR THE BEST RESULTS WE RECOMMEND THE FOLLOWING DIRECTIONS: ADD FROM 1 TO 3 PARTS OF WATER FOR CONTROLLING WEEDS IN THE GROUPS FROM "OLD" OR "HARD TO KILL" TO THE "YOUNG" OR "EASY TO KILL" GROUP. THE MIXTURE MUST BE AGITATED IMMEDIATELY PRIOR TO BEING SPRAYED.

CAUTION CAUTION

AVOID EXCESSIVE CONTACT WITH BODY. REMOVE CLOTHING QUICKLY IF SATURATED WITH OIL. NOT FOR HUMAN CONSUMPTION IN ANY FORM. DO NOT ALLOW SPRAY OR SPRAY DRIFT TO CONTACT VALUABLE PLANTS OR EDIBLE FRUITS OR VEGETABLES. HARMFUL IF SWALLOWED. AVOID INHALATION OF VAPORS OR SPRAY MIST. DO NOT CONTAMINATE WATER BY CLEANING OF EQUIPMENT OR DISPOSAL OF WASTES. KEEP OUT OF ANY BODY OF WATER. DO NOT APPLY WHERE RUNOFF IS LIKELY TO OCCUR. DO NOT REUSE EMPTY CONTAINER. DISPOSE OF IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS.

****NORMAL APPLICATION AREAS****

Non-cultivation areas such as Citrus Groves, Canal Ditches, Road areas, Power Line areas, Fence Lines, Airports and any Industrial Plant or Building where weeds are a problem.

****WEEDS EFFECTIVE ON****

All known California weeds and grasses including but not limited to, "Chick Weed", "Bermuda Grass", "Star Thistle", "Malva Weed (Cheese Weed)" and "Orchard Grass".

FLASH POINT 196°F. CAUTION: KEEP OUT OF REACH OF CHILDREN

"STATE REG. NO. 11103-50001 ZA"

B & B WEED OIL
5025 8th St.
Carpinteria, California, 93013

CHEVRON®
Weed Oil

CONTAINS PETROLEUM DISTILLATE

Active Ingredient	
Petroleum Oil	99.97%
Inert Ingredient	.03%

KEEP OUT OF REACH OF CHILDREN

CAUTION

SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS.

TRANSPORTED IN BULK

Sold by
Chevron U.S.A. Inc.
San Francisco CA 94119
EPA Reg. No. 522-44-AA EPA Est. 522-CA-1 Made in U.S.A.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS & DOMESTIC ANIMALS

CAUTION

Harmful or fatal if swallowed. Avoid breathing of vapor or contact with skin or eyes.

STATEMENT OF PRACTICAL TREATMENT

If swallowed, DO NOT MAKE PERSON VOMIT. CALL A DOCTOR IMMEDIATELY. Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

Note to Physicians: Emergency Information - call (415) 233-1737.

PHYSICAL OR CHEMICAL HAZARDS

COMBUSTIBLE. DO NOT USE OR STORE near flame, sparks or hot surfaces. USE ONLY IN WELL VENTILATED AREA. Keep container closed. Clean up spills immediately. Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85° F.

DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

REENTRY STATEMENT

Keep all unprotected persons out of operating areas or vicinity where there may be danger of drift.

Do not enter treated areas without protective clothing until sprays are dried.

Certain states may require more restrictive reentry intervals; consult your State Department of Agriculture for further information.

Written or oral warnings regarding use of protective clothing and accidental exposure must be given to workers who are expected to be in treated areas or in areas about to be treated.

STORAGE AND DISPOSAL

PROHIBITIONS

Do not contaminate water, food, or feed by storage, disposal or cleaning of equipment.

Open dumping is prohibited.

PESTICIDE DISPOSAL

Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

DIRECTIONS

Chevron Weed Oil is a light-bodied highly aromatic petroleum oil, which may be diluted up to 2 parts water with one part oil for general control of most annual and many perennial weeds on ditch banks, along roadways, fence lines, railroad right of ways and in orchards, vineyards or groves where non-cultivation is practiced. Also used as a preemergence weed killer on row crops such as sweetcorn, onions and tomatoes. Use 20-40 gallons straight oil or mixture 1 part oil - 2 parts water, at rate of 30-60 gallons per acre. Application to be made at a minimum of 48-72 hours prior to anticipated plant emergence from the soil. Best results are obtained by spraying weeds when they are small. Spray sufficient on all weeds to be killed to completely cover them with a thin film of oil. Chevron Weed Oil will defoliate practically all plants when applying to orchard floors, citrus groves, and grape vineyards. Use a directed spray and keep off crop stem and foliage. Apply carefully to prevent oil from contacting valuable plants and trees.

CONDITIONS OF SALE

1. This Company (manufacturer) warrants that this material conforms to the chemical description of the label and is reasonably fit for use as directed hereon. Manufacturer neither makes nor authorizes any agent or representative to make any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning this material.
2. Critical and unforeseeable factors beyond the manufacturer's control prevent it from eliminating all risks in connection with the use of chemicals. Such risks include but are not limited to damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the product is reasonably fit for the uses stated hereon and even though label directions are followed. Buyer and user acknowledge and assume all risks and liability (except those assumed by the manufacturer under 1 above) resulting from handling, storage and use of this material

ECONOMIC POISON REGISTRATION LAWS

LET THE SELLER BEWARE — is the attitude of the courts with regard to the sale of economic poisons. Therefore, all products sold for use as a pesticide, herbicide, etc., must be registered with the U.S. EPA.

We are required to register certain Special Products as economic poisons with the states in which we market as well as with the Environmental Protection Agency. Where the particular state's Department of Agriculture has listed our product as a "restricted use" pesticide, state law may also require the local dealer or distributor to be licensed by the state. Only one product is registered currently:

Sold Only in Bulk:	EPA	Calif.	Ariz.	Nev.
Chevron Weed Oil	X	X	X	X

BULK TANK CAR, TANK TRUCK & TRAILER OR TANK TRUCK DELIVERIES

When this product is sold in bulk, as indicated above, please adhere to the procedure set forth below:

1. Attach the appropriate product tag (MOT series) to the outlet valve of each compartment in a tank truck, tank truck and trailer or tank car containing the product. An appropriate label (EP series) must also be attached to any Chevron U.S.A. bulk tank containing CHEVRON WEED OIL.

2. The driver making the tank truck or tank truck and trailer delivery of any economic poison must present a copy of the product label (P series) to the customer at the delivery site. This label should be attached to the transfer invoice or S-800-A. In the case of tank car deliveries, the product label (P series) should be mailed directly to the customer along with the shipping notice.

3. If a delivery vehicle returns to a Chevron U.S.A. plant with a retain of this product, the quantity must be pumped into barrels having the appropriate label attached.

4. Appropriate product tags (MOT series) for vehicle outlet valves can be obtained from the Richmond Stationery Warehouse, 841 Standard Avenue, Richmond, CA 94820. Specify product name and code.

   Chevron Weed Oil MOT-273-31

5. Appropriate product labels (EP and P series) for use on bulk deliveries of this product can be obtained from the Packaging Coordinator, Chevron U.S.A. Inc., 575 Market Street, San Francisco, CA 94105. Please order by product name and specify the plant supplying the product.

Chevron Weed Oil (Richmond production)	EP-70	P-70
Chevron Weed Oil (El Segundo production)	EP-72	P-72

GENERAL

Products registered as economic poisons cannot be sold to a consumer except for those end uses stated on the labels. Similarly, nonregistered products (such as CHEVRON DIESEL FUEL) cannot be sold for direct application to plant or weed growth. SUCH SALES ARE PROHIBITED BY FEDERAL LAW.

We repeat, "LET THE SELLER BEWARE." Don't violate these procedures in any way or Chevron may be subject to lawsuits, imposition of large fines and penalties, or one or more of our plants may be closed.

SPECIAL NOTE

Under no conditions are sales personnel, Jobbers, Commissioned Agents or others to make any agricultural use recommendations on a registered economic poison. Customers are to be advised that the product label covers the usage and instructions for the product.

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CHEVRON WEED KILLER APPLICATIONS

Recommended application rates for Chevron Weed Oil should be adhered to in order to provide the customer maximum weed control with little or no plant damage.

CONDITIONS OF SALE:

1. Chevron U.S.A. Inc. (manufacturer) warrants that these materials conform to the description on the label and are reasonably fit for use as directed. Manufacturer neither makes, nor authorizes any agent or representative to make, any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning these materials.

2. Critical and unforseeable factors beyond the manufacturer's control prevent it from eliminating all risks in connection with the use of these materials. Such risks include, but are not limited to, damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the products are reasonably fit for the uses stated and even though label directions are followed. Buyer and user acknowledge and assume all risks and liability (except those assumed by the manufacturer under 1 above) resulting from handling, storage, and use of these materials.

Users should also note the following points:

1. Too high a spray pressure produces fine sprays that drift, and therefore will not deposit on the weeds.

2. Proper agitation is necessary when Chevron Weed Oil is mixed with water. Emulsion break time is important in order to insure a uniform spread of the oil film over the weed leaf to promote killing of the weed.

3. Nozzle spacing, spray rig travel speed and spray pressures govern application rates per acre. We outline examples below for a spray rig with nozzles spaced 18" apart. Generally, the spray rig manufacturer specifies the type and size nozzles — spray pressures — and travel speeds to achieve the application rate desired.

Speed of Travel	3MPH			4 MPH			5 MPH		
Gals–Desired Per Acre	GPM	Nozzle Number	Pound Pressure	GPM	Nozzle Number	Pound Pressure	GPM	Nozzle Number	Pound Pressure
50	.45	46	65	.60	59	70	.76	59	100
100	.91	67	80	1.21	78	85	1.62	78	125

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Chevron

CHEVRON WEED OIL

TYPICAL TEST DATA*

Test	Data
Gravity, °API	24
Viscosity @ 40°C, cSt	2.0
Flash Point, °F, PM	170
Aromatics, % ASTM D 1319	75
Aniline Point Mixed, °F	110
Distillation, °F ASTM D86	
Initial	350
50%	490
90%	580
End Point	640

PRODUCT DESCRIPTION

CHEVRON WEED OIL is a light-bodied highly aromatic petroleum oil which may be diluted up to 2 parts water with one part oil for general control of most annual and many perennial weeds on ditch banks, along roadways, fence lines, railroad right of ways and in orchards, vineyards or groves where non-cultivation is practiced. Also used as a pre-emergence weed killer on row crops such as sweetcorn, onions and tomatoes. Best results are obtained by spraying weeds when they are small. Spray sufficiently on all weeds to be killed to completely cover them with a thin film of oil.

Active Ingredient
Petroleum Oil 99.97%
Inert Ingredient 0.03%

CHEVRON WEED OIL will damage or kill all green plant growth. Do not use on any desirable crop or ornamental plant.

Fish and other aquatic life may be killed by this product. Keep out of lakes, streams or ponds. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on label.

Do not use where weather conditions favor drift of spray to any crop or plant. Complete soil saturation may leave area bare or sterile. CHEVRON WEED OIL is not recommended as a carrier for 2, 4-D or similar chemicals.

CONDITIONS OF SALE

1. Chevron U.S.A., Inc. (manufacturer) warrants that this material conforms to the chemical description on the label and is reasonably fit for use as directed thereon. Manufacturer neither makes nor authorizes any agent or representative to make any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning this material.

2. Critical and unforeseeable factors beyond the manufacturer's control prevent it from eliminating all risks in connection with the use of chemicals. Such risks include, but are not limited to, damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the product is reasonably fit for the uses stated on the label and even though label directions are followed. Buyer and user acknowledge and assume all risks and liability (except those assumed by the manufacturer above) resulting from handling, storage and use of this material.

WARNING STATEMENT

HAZARDS TO HUMANS & DOMESTIC ANIMALS

CAUTION: KEEP OUT OF REACH OF CHILDREN
Harmful or fatal if swallowed

CONTAINS PETROLEUM DISTILLATE. Avoid breathing of vapor or contact with skin or eyes.

STATEMENT OF PRACTICAL TREATMENT

If swallowed, DO NOT MAKE PERSON VOMIT. CALL A DOCTOR IMMEDIATELY. Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

Note to Physician: Emergency Information • call (415) 233-3737.

PHYSICAL OR CHEMICAL HAZARDS

COMBUSTIBLE. DO NOT USE OR STORE near flame, sparks or hot surfaces. USE ONLY IN WELL VENTILATED AREA. Keep container closed. Clean up spills immediately. Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85°F.

DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

*Subject to change without notice.

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Chevron

CHEVRON WEED OIL, continued

TYPICAL USES

GENERAL WEED CONTROL: Use sprayer with mechanical agitator. Fill with oil to desired levels; add water (Chevron Weed Oil can be diluted up to one part oil to two parts water); continue to run agitator until solution is used. For best results, spray pressures should range between 20-50 psi. Too high a pressure will cause drift and may damage crops.

PRE-EMERGENCE USE: Use 20-40 gallons straight oil or mixture 1 part oil to 2 parts water, at rate of 30-60 gallons per acre.

DITCH BANKS, ROAD SIDE AREAS, NON-CROPPED AREAS, RIGHT OF WAYS, ETC.: Apply 50 to 150 gallons per acre plus water, depending upon the density of the weeds. Best results are obtained when the weed is at the tender stage. Repeat as needed.

CITRUS GROVES (LEMONS, ORANGES, ETC.) AND VINEYARDS: Apply 35 to 100 gallons per acre plus water, depending upon the density of the weeds. Best results are obtained when the weed is 2-4 inches high. In vineyards do not apply after vine begins to fold. Use low pressure, approximately 20-30 psi, to minimize drift. Repeat as needed.

PERENNIAL GRASSES (SUCH AS BERMUDA GRASS AND JOHNSON GRASS): Apply undiluted at rate of 25 to 150 gallons per acre. Use higher pressure to ensure full coverage (45-50 psi). Repeat treatment at first sign of regrowth; reduce rate of application for regrowth.

POTATO DEFOLIATION: Apply 15 to 35 gallons per acre (diluted one part to 2 parts of water if desired) and cover foliage thoroughly.

CAUTION: Apply to mature potatoes only after tops have started to turn brown, or vascular discoloration of the potato will result. Avoid drift to other plant growth during application.

COTTON BOLL DESICCANT: Apply (air or ground) 10 to 15 gallons per acre. Primary use to dry the cotton boll when the lack of frost prevents the boll from opening in normal manner. Normally takes 4 to 5 days for boll to pop.

CAUTION: Excessive application rates will stain the partially open boll. Avoid drift to other plants. Will defoliate any plants contacted.

ALFALFA: For control of annual weeds. Apply 25-75 gallons per acre diluted one part oil to two parts water, to alfalfa which has been established one or more years. For applications by air, apply 15 to 35 gallons of straight oil per acre. The alfalfa and young weeds will be killed to ground level. The alfalfa will regrow from the crown.

CAUTION: Do not apply to first-year stand of alfalfa. Avoid drift to other plant growth. Alkali or dry soil, weak plants and abnormal weather conditions may retard crown regrowth of alfalfa, thus reducing the stand.

MILO MAIZE DESICCANT: Apply (by ground or air) 12 to 20 gallons of straight oil per acre. Primary use is to reduce moisture content in Milo Maize prior to harvest. For best results, apply at temperatures above 60°F and 10 days or longer before harvest.

CAUTION: Excessive application rate will fully desiccate plant and release maize. Avoid drift to other desired plant growth.

LEGUMES: To desiccate mature small seed legumes, (alfalfa, clover, trefoil), apply up to 15 gallons per acre by air and up to 40 gallons per acre by ground rig (may be diluted one part oil with up to two parts water). Heavy crop growth may require more than one application to assure complete coverage of plant parts.

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

STORAGE AND DISPOSAL

PROHIBITIONS

Do not contaminate water, food, or feed by storage, disposal or cleaning of equipment.

Open dumping is prohibited.

PESTICIDE DISPOSAL

Pesticide, spray mixture, or rinse water that cannot be used according to label instructions must be disposed of according to applicable federal, state, or local procedures.

CUSTOMER BENEFITS

Advantages of Chevron Weed Oil Versus Diesel Fuel:

1. Weed Oil is two to three times greater in phytotoxicity.
2. Provides a more uniform plant kill.
3. Can be applied in lower volumes, therefore less expensive.
4. Has higher aromatic content.
5. Supplemental herbicides not required.

Advantages of Chevron Weed Oil Versus Persistent Herbicides:

1. Weed oil does not contaminate if applied at recommended concentrations.
2. Does not transfer to crops.
3. Low toxicity to birds and wildlife.

SPECIAL NOTE

Under no conditions are our sales personnel, Jobbers, Commissioned Agents or others to make any agricultural use recommendations on a registered economic poison. Customers are to be advised that our label covers the usage and instructions for the product.

See page 104.11 for specific instructions to follow when selling registered economic poisons.

Chevron

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product. Please make sure this information is given to them. If you resell this product, this Bulletin should be given to the Buyer. This Form may be reproduced without permission

Chevron U.S.A. Inc.

Material Information Bulletin

(Approved – "Essentially Similar" to Form OSHA 20, Material Safety Data Sheet)

CHEVRON Diesel Fuel No. 1 **CPS 270003**

DANGER! **HARMFUL OR FATAL IF SWALLOWED**
COMBUSTIBLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

Paraffins (incl. naphthenes)	74-88%
Aromatics:	
C_8^+	12-20%
Olefins	0-3%
Naphthalenes	0-3%

EXPOSURE STANDARD

The suggested Threshold Limit Value is 200 ppm (parts of vapor per million parts of air) for a daily 8-hour exposure. There is no OSHA exposure standard.

PHYSIOLOGICAL & HEALTH EFFECTS — EMERGENCY & FIRST AID PROCEDURES

Eyes

May cause eye irritation.

Wash eyes with fresh water for at least 15 minutes. If irritation continues, see a doctor.

Skin

Expected to produce no more than minor skin irritation following prolonged or frequently repeated contact.

Wash thoroughly with soap and water following skin contact. Launder contaminated clothing.

Inhalation

Breathing the vapors at concentrations above the exposure standard can cause central nervous system depression. See Additional Health Data.

If there are signs or symptoms, as described in this bulletin, due to breathing this material, move the person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately.

Ingestion

Not expected to be acutely toxic by ingestion. **Note to Physician:** Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.

If swallowed, DO NOT make person vomit. Call a doctor immediately.

ADDITIONAL HEALTH DATA

Signs and symptoms of central nervous system depression may include one or more of the following: headache, dizziness, loss of appetite, weakness and loss of coordination. Affected persons usually experience complete recovery when removed from the exposure area.

Data available for a similar material indicate that this material is not expected to be acutely toxic.

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Avoid contact with eyes. Eye contact can be avoided by wearing chemical safety goggles.

Skin Protection: Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing impervious protective clothing including rubber gloves.

Respiratory Protection: Wear approved respiratory protection such as an organic vapor cartridge respirator or an air-supplying respirator unless ventilation equipment is adequate to keep airborne concentrations below the exposure standard.

Ventilation: Use adequate ventilation to keep the airborne concentrations of this material below the exposure standard.

FIRE PROTECTION

Liquid evaporates and forms vapors (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85°F.

Flash Point: (P-M) 107-120°F
Autoignition Temp.: NDA
Flammability Limits: NDA
Extinguishing Media: CO_2, Dry Chemical, Foam, Water Spray.
Special Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Read the entire bulletin.

SPECIAL PRECAUTIONS

See Page 3.

ENVIRONMENTAL PROTECTION

Environmental Impact: Certain geographical areas have air pollution restrictions concerning the use of materials in work situations which may release volatile components to the atmosphere. Air pollution regulations should be studied to determine if this material is regulated in the area where it is to be used.

Precautions if Material is Released or Spilled: Eliminate all open flames in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Special Protective Information. Absorb large spills with absorbent clay, diatomaceous earth or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquid; they will not absorb vapor.

Waste Disposal Methods: Place contaminated materials in disposable containers and bury in an approved dumping area.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.
Incompatibility (Materials to Avoid): May react with strong oxidizing materials.
Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.
Hazardous Polymerization: Will not occur.

PHYSICAL PROPERTIES

Solubility: Insoluble in water; miscible with hydrocarbons.

Appearance (Color, odor, etc.): Pale yellow liquid.
Boiling Range: 150-290°C
Freeze Point: -40°
Specific Gravity: 0.784-0.811
Vapor Pressure (mm Hg & Temp.): NDA
Vapor Density (Air = 1): NDA
Percent Volatile (Volume %): NDA
Evaporation (= 1): NDA
Viscosity: 8 cSt @ -30°F

NDA = No Data Available

The above information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Information Bulletin

CHEVRON Diesel Fuel No. 1. **CPS 270003**

SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL

Contains Petroleum Distillate.
DO NOT USE or STORE near flame, sparks or hot surfaces. USE ONLY IN WELL VENTILATED AREA.
Keep container closed.
DO NOT weld, heat or drill container.
Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

CAUTION! Do not use pressure to empty drum or explosion may result.

WARNING! Not for use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.

CRR-6745(C)(10M-4-81) Printed in U.S.A.
No. 533 - Rev. 12/82

Customer: This Bulletin contains important environmental, health and toxicology information for your employees who recently ordered this product. Please make sure this information is given to them. If you resell this product, this Bulletin should be given to the Buyer. This Form may be reproduced without permission.

CPS 272102

Chevron U S A Inc.

Material Information Bulletin

(Approved – "Essentially Similar" to Form OSHA 20, Material Safety Data Sheet)

CHEVRON Diesel Fuel No. 2 **CPS 272102**

DANGER!

HARMFUL OR FATAL IF SWALLOWED
PROLONGED OR REPEATED CONTACT WITH SKIN CAN BE HARMFUL
COMBUSTIBLE
KEEP OUT OF REACH OF CHILDREN

TYPICAL COMPOSITION

A blend of paraffins, naphthenes, aromatics and olefins

EXPOSURE STANDARD

No OSHA exposure standard or Threshold Limit Value has been established for this material. However, due to the possible carcinogenic effect, exposure should be reduced to the lowest feasible level.

PHYSIOLOGICAL & HEALTH EFFECTS	EMERGENCY & FIRST AID PROCEDURES
Eyes	
Expected to cause no more than minor eye irritation.	Wash eyes with fresh water for at least 15 minutes. If irritation continues, see a doctor.
Skin	
Prolonged or frequently repeated contact may cause skin irritation or may cause the skin to become cracked or dry from the defatting action of the material. See Additional Health Data.	Wash thoroughly with soap and water following skin contact. Launder contaminated clothing.
Inhalation	
Prolonged breathing of high vapor concentrations can cause central nervous system depression. See Additional Health Data.	If there are signs or symptoms, as described in this bulletin, due to breathing this material, move the person to fresh air. If breathing has stopped, apply artificial respiration. Call a doctor immediately.
Ingestion	
Not expected to be acutely toxic by ingestion. **Note to Physician:** Ingestion of this product or subsequent vomiting can result in aspiration of light hydrocarbon liquid which can cause pneumonitis.	If swallowed, DO NOT make person vomit. Call a doctor immediately.

ADDITIONAL HEALTH DATA

See Page 3.

SPECIAL PROTECTIVE INFORMATION

Eye Protection: Avoid contact with eyes. Eye contact can be avoided by wearing chemical safety goggles.
Skin Protection: Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing impervious protective clothing including gloves.
Respiratory Protection: This material may be an inhalation hazard, and unless ventilation is adequate, the use of an approved respirator is recommended.
Ventilation: Use this material only in well ventilated areas.
Other: If eye or skin contact can occur, washing facilities for eyes and skin should be available nearby.

FIRE PROTECTION

Liquid evaporates and forms vapors (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above $85^{o}F$.

Flash Point: (P-M) $85^{o}C$ (Typical)
Autoignition Temp.: NDA
Flammability Limits: n/a

Extinguishing Media: CO_2, Dry Chemical, Foam, Water Spray.

Special Fire Fighting Procedures: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Read the entire bulletin.

SPECIAL PRECAUTIONS

See Page 3.

ENVIRONMENTAL PROTECTION

Environmental Impact: This material is not expected to present any environmental problems other than those associated with oil spills.

Precautions if Material is Released or Spilled: Eliminate all open flames in vicinity of spill or released vapor. Clean up spills as soon as possible, observing precautions in Special Protective Information and on product label. Absorb large spills with absorbent clay, diatomaceous earth, or other suitable material. A fire or vapor hazard may exist since these cleanup materials will only absorb liquid; they will not absorb vapor.

Waste Disposal Methods: Place contaminated materials in disposable containers and bury in an approved dumping area.

REACTIVITY DATA

Stability (Thermal, Light, etc.): Stable.

Incompatibility (Materials to Avoid): May react with strong oxidizing materials.

Hazardous Decomposition Products: Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

PHYSICAL PROPERTIES

Solubility: Miscible with hydrocarbons; insoluble in water.

Appearance (Color, Odor, etc.): Pale yellow liquid.

Boiling Range: $157-371^{o}C$
Melting Point: n/a
Specific Gravity: 0.82 @ $60/60^{o}F$ (Typical)
Vapor Pressure: 0.04 psia @ $40^{o}C$
Vapor Density (Air = 1): NDA
Percent Volatile (Volume %): NDA
Evaporation (= 1): NDA
Viscosity: 1.9-4.1 cSt @ $40^{o}C$

n/a = Not Applicable
NDA = No Data Available

The above information is based on data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon the condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Information Bulletin

CHEVRON Diesel Fuel No. 2 **CPS 272102**

ADDITIONAL HEALTH DATA

Signs and symptoms of central nervous system depression may include one or more of the following: headache, dizziness, loss of appetite, weakness and loss of coordination. Affected persons usually experience complete recovery when removed from the exposure area.

There is no evidence to indicate that this produce can cause cancer in humans. However, a similar product caused a slight increase in tumors when repeatedly applied to the skin of mice for the expected life span of a mouse (approximately 2 years). Another related product was examined in several mutagen testing systems. Only the Mouse Lymphoma Assay showed a positive result.

While brief or intermittent skin contact with this product is not expected to have serious effects, such contact should be reduced to a minimum by following the precautions outlined in this bulletin and promptly washing the skin in cases of accidental exposure.

SPECIAL PRECAUTIONS

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

Contains Petroleum Distillate.
DO NOT USE OR STORE near flame, sparks, or hot surfaces. USE ONLY IN WELL VENTILATED AREA.
Keep container closed.
DO NOT weld, heat or drill container.
Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

CAUTION! Do not use pressure to empty drum or explosion may result.

WARNING! Not for use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.

CRR-6745(C)(10M-4-81) Printed in U.S.A.
No. 525 - Rev. 12/82

MONSANTO PRODUCT NAME

GLYPHOSATE TECHNICAL

MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO 63167

Emergency Phone No.
(Call Collect)
314-694-4000

PRODUCT IDENTIFICATION

Synonyms:	None
Chemical Name:	N-(phosphonomethyl) glycine
Chemical Formula:	$C_3H_8NO_5P$
Active Ingredient:	Glyphosate Technical is a wet-cake of glyphosate, 95% minimum assay (dry basis)
Inert Ingredient:	Glyphosate Technical wet-cake typically contains 10-20% water
CAS Reg. No.:	1071-83-6
EPA Reg. No.:	Not Applicable
DOT Shipping Name:	Not Applicable
DOT Hazard Class/ I.D. No.:	Not Applicable
DOT Label(s):	Not Applicable
Hazardous Substance(s)/RQ(s):	Not Applicable
U.S. Surface Freight Classification:	Weed Killing Compound, N.O.I.B.N.

WARNING STATEMENTS

Keep out of reach of children.
CAUTION!
HARMFUL IF SWALLOWED!

PRECAUTIONARY MEASURES

Do not get in eyes, on skin or on clothing.
Avoid contamination of seed, feed and foodstuffs.

EMERGENCY AND FIRST AID PROCEDURES

IN CASE OF CONTACT, immediately flush skin or eyes with plenty of water for at least 15 minutes. For eyes, call a Physician.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Wear chemical safety goggles to minimize eye contact during mixing and dumping operation or other activities when exposure is likely.

Skin Protection: Glyphosate Technical does not present a significant skin concern requiring special protection.

Respiratory Protection: Use NIOSH approved equipment when airborne exposure exceeds established limits for nuisance dusts. Consult respirator manufacturers to determine the appropriate type of equipment for a given application.

Ventilation: Provide ventilation to control exposure levels below nuisance dust limits.

Airborne Exposure Limits: Product: GLYPHOSATE TECHNICAL - 100% by wt.

Although no specific exposure limit has been established for this material, OSHA and ACGIH have established limits for nuisance dusts.

OSHA PEL/TWA: Total 15 mg/m^3; Respirable 5 mg/m^3
ACGIH TLV/TWA: Total 10 mg/m^3; Respirable 5 mg/m^3

Exposure should be kept below these limits.

FIRE PROTECTION INFORMATION

Flash Point: Non-Flammable, Non Combustible. Heating above 212F in a closed container can generate pressure due to steam formation from water present.

Extinguishing Media: In case of FIRE, use water spray, foam, dry chemical or CO_2.

Special Fire Fighting Procedures: None.

Unusual Fire And Explosion Hazards: None.

PHYSIOLOGICAL EFFECTS SUMMARY

Oral LD_{50} (Rat): 5600 mg/kg, practically non-toxic
Dermal LD_{50} (Rabbit): > 5000 mg/kg, practically non-toxic
Eye Irritation (Rabbit): (FHSA) Score = 6.9/110, slightly irritating
Skin Irritation (Rabbit): (FHSA) Score = 0.1/8.0, practically non-irritating

Three different types of microbial mutagenicity tests were performed using glyphosate. A total of 8 strains (7 bacterial and 1 yeast) including 5 *S. typhimurium* strains and one strain each of *B. subtilis*, *E. coli* and *S. cereveciae* (yeast) were treated. No mutagenic effect was observed in any strain.

Male mice were given 200, 800 or 2000 mg glyphosate per kg body weight and subsequently mated with untreated females. No evidence of mutagenicity was observed in this dominant lethal mutation assay.

Glyphosate was fed to rats and beagle dogs for 2 years at dietary concentrations of 30, 100 and 300 ppm. No evidence of carcinogenicity was detected in these animals. Similarly, mice fed 300 ppm glyphosate for 1.5 years showed no evidence of carcinogenicity.

PHYSIOLOGICAL EFFECTS SUMMARY (Continued)

A 3-generation rat reproduction study was conducted with glyphosate fed at dosages of 3, 10 and 30 mg glyphosate per kg body weight. No treatment-related effects were observed in parental or pup body weight gain, behavior, survival or reproductive performance.

Glyphosate was administered to pregnant rabbits at dosages of 75, 175 and 350 mg/kg/day on days 6 through 27 of gestation. No evidence of fetal toxicity or birth defects in the offspring (teratogenic response) was observed.

Pregnant rats were treated with glyphosate at dosages of 300, 1000 and 3500 mg/kg/day on days 6 through 19 of gestation. No evidence of birth defects in the offspring was observed.

A neurotoxicity study was conducted with glyphosate in chickens. Ten adult hens were dosed orally with 1.25 g/kg, 2-times daily, for 3 consecutive days. This regimen was repeated to give a cumulative dose of 15.0 g/kg of glyphosate. No behavioral or microscopic treatment-related changes were observed.

Glyphosate is not an acetylcholinesterase inhibitor.

PHYSICAL DATA

Appearance/Odor: White, odorless solid.

Solubility: 1.2% in water at 25C. Insoluble in organic solvent.

Melting Point: 200C, Decomposes.

Vapor Pressure: Negligible.

REACTIVITY DATA

Stability: Formulations of glyphosate are quite stable under temperatures up to 140F. However, they will freeze at -20F, but will go back into solution upon thawing. Heated facilities are not required.

Incompatibility: Non-corrosive to stainless steel, polyethylene, plastics. Corrosive to mild steel, galvanized steel and zinc. This material and solutions of this material react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode if ignited by open flame, spark or other ignition sources.

Hazardous Decomposition Products: None.

Hazardous Polymerization: Does not occur. This product can react with caustic (basic) materials to liberate heat. This is not a polymerization but rather a chemical neutralization in an acid-base reaction.

SPILL, LEAK & DISPOSAL INFORMATION

Avoid skin and eye contact - Use goggles, gloves, and boots.
Scoop or sweep up and dispose of in approved landfills.
Large spills should be contained where possible and picked up by suction or vacuum truck and disposed of by incineration or in an approved landfill.

ADDITIONAL COMMENTS

Environmental Toxicity Information:
96-hr LC_{50} Bluegill: 120 ppm, practically non-toxic
96-hr LC_{50} Trout: 86 ppm, slightly toxic
96-hr TL_{50} Carp: 115 ppm, practically non-toxic
96-hr TL_{50} Atlantic Oyster: > 10 mg/kg, no more than slightly toxic
96-hr TL_{50} Shrimp: 281 ppm, practically non-toxic
96-hr TL_{50} Fiddler Crab: 934 mg/l, practically non-toxic
96-hr LC_{50} Harlequin Fish: 168 ppm, practically non-toxic
48-hr LC_{50} Daphnia: 780 mg/l, practically non-toxic
5-day LC_{50} Ducks: > 4640 ppm, practically non-toxic
5-day LC_{50} Quail: > 4640 ppm, practically non-toxic

A series of residue and metabolism studies have shown that glyphosate is very slowly absorbed across the gastro-intestinal membrane and that there is minimal tissue retention and rapid elimination of residues in several animal species, including mammals, birds and fish. Thus, it is concluded that glyphosate will not bioaccumulate in the food chain.

DATE: March, 1982 **REVISED:** New **SUPERSEDES:** None
MSDS NO.: 1071-83-6

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CALL: 314-694-4000

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Monsanto Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Monsanto Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

This form has been approved by the Occupational Safety and Health Administration as "equivalent to" OSHA Form 20.

MONSANTO PRODUCT NAME
ROUNDUP® HERBICIDE

MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO. 63167

Emergency Phone No.
(Call Collect)
314-694-4000

PRODUCT IDENTIFICATION

Synonyms:	None
Chemical Name:	Not Applicable, Formulated Product
Active Ingredient:	*Isopropylamine salt of Glyphosate 41.0%
Inert Ingredients:	..... 59.0%
	100.0%

**Contains 480 grams per liter or 4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon. Equivalent to 356 grams per liter or 3 pounds per U.S. gallon of the acid, glyphosate.*

CAS Reg. No.:	Not Applicable, Formulated Product
CAS Reg. No. Active Ingredient:	38641-94-0
EPA Reg. No.:	524-308-AA
DOT Shipping Name:	Not Applicable
DOT Hazard Class/ I.D. No.:	Not Applicable
DOT Label(s):	Not Applicable
Hazardous Substance(s)/ RQ(s):	Not Applicable
U.S. Surface Freight Classification:	Weed Killing Compound, N.O.I.B.N.

WARNING STATEMENTS

Keep out of reach of children.
WARNING!
CAUSES EYE IRRITATION.
HARMFUL IF SWALLOWED.
See Additional Comments section for Physical or Chemical Hazards.

PRECAUTIONARY MEASURES

Do not get in eyes, on skin or on clothing.
Avoid contamination of seed, feed and foodstuffs.

EMERGENCY AND FIRST AID PROCEDURES

FIRST AID: *IF IN EYES*, immediately flush with plenty of water for at least 15 minutes. Call a physician. *IF ON SKIN*, flush with water. Wash clothing before reuse.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: During mixing or pouring operations or other activities in which eye contact with undiluted Roundup® herbicide is likely to occur, splash goggles should be worn.

Skin Protection: In case of skin contact, wash exposed area thoroughly. In cases in which prolonged or repeated skin contact with Roundup herbicide may occur, long-sleeved shirt, long pants and rubber or plastic gloves are recommended. Clothing soaked with Roundup solution should be promptly removed and laundered before reuse.

In manufacturing and processing operations, the use of a face shield is recommended when handling undiluted Roundup herbicide in a pressurized system where equipment failure might result in facial contact with liquid splash or aerosol spray.

Respiratory Protection: Respiratory protection is not required for normal use and handling. During periods of abnormal exposure to heavy spray or mist, use a NIOSH approved dust/mist respirator.

Ventilation: No special precautions recommended.

Airborne Exposure Limits: Product: ROUNDUP herbicide — 100% by wt.
OSHA PEL/TWA and ACGIH TLV/TWA/STEL not established.

FIRE PROTECTION INFORMATION

Flash Point (TCC): > 200F. Water-based formulation, Non-Flammable, Non-Combustible.

Extinguishing Media: In case of FIRE, use water spray, foam, dry chemical or CO_2.

Special Firefighting Procedures: None.

Unusual Fire And Explosion Hazards: None.

PHYSIOLOGICAL EFFECTS SUMMARY

Oral LD_{50} (Rat): 5400 mg/kg, practically non-toxic
Dermal LD_{50} (Rabbit): > 5000 mg/kg, practically non-toxic
Eye Irritation (Rabbit): (FHSA) Score = 18.4 on a scale of 110, moderately irritating
Skin Irritation (Rabbit): (FHSA) Score = 4.3 on a scale of 8.0, moderately irritating
Inhalation LC_{50} (Rat): 3.28 mg/l for 4 hour aerosol exposure, slightly toxic

Tests on the biologically active ingredient in this formulation (glyphosate) showed that glyphosate did not cause any mutagenic, carcinogenic, teratogenic (birth defects), adverse reproductive changes, or neurotoxic effects.

PHYSICAL DATA

Appearance: Clear, viscous amber-colored solution.

Odor: Practically odorless to slight amine-like odor.

pH: 4.8

Specific Gravity (Water = 1): 1.17

REACTIVITY DATA

Stability:	Stable for at least 5 years under normal conditions of warehouse storage. Heated facilities are not required.
Incompatibility:	Non-corrosive to stainless steel, aluminum, polyethylene, plastic, fiberglass. Corrosive to mild steel, galvanized steel and zinc. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode if ignited by open flame, spark or other ignition sources.
Hazardous Decomposition Products:	None.
Hazardous Polymerization:	Does not occur. The product can react with caustic (basic) materials to liberate heat. This is not polymerization, but rather a chemical neutralization in an acid-base reaction.

SPILL, LEAK & DISPOSAL INFORMATION

Open dumping is prohibited.

This product, spray mixture or rinsate that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticides.

Triple rinse container and offer for recycling, reconditioning, or disposal in approved landfill.

Consult federal, state or local disposal authorities for additional or alternative requirements.

Avoid skin and eye contact—see Occupational Control Procedures.

Soak up small amounts with absorbent clays (kitty litter, oil dri, etc.).

Sweep or scoop up spilled material and dispose of in approved landfill.

Wash down surfaces (floors, truck beds, streets, etc.) with detergent and water solution.

ADDITIONAL COMMENTS

Environmental Toxicity Information:
96-hr TL_{50} Bluegill: 14 mg/l, slightly toxic
96-hr TL_{50} Carp: 3.9 ppm, moderately toxic
96-hr TL_{50} Trout: 11 mg/l, slightly toxic
96-hr LC_{50} Catfish: 16 mg/l, slightly toxic
96-hr LC_{50} Crayfish: > 1000 ppm, practically non-toxic
96-hr LC_{50} Fathead Minnow: 9.4 mg/l, moderately toxic
48-hr LC_{50} *Daphnia*: 5.3 mg/l, moderately toxic

Carp contained in a static pond were unaffected at any time during the 90-day observation period by exposure to an aerial application of ROUNDUP herbicide at the intended use level. Tissue residue analyses indicated that glyphosate will not bioaccumulate.

Physical or Chemical Hazards: Spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, polyethylene, plastic and fiberglass containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS.

ADDITIONAL COMMENTS (Continued)

This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette, or other ignition source.

DATE: March, 1982 **REVISED:** New **SUPERSEDES:** None
MSDS NO.: M00007588

FOR ADDITIONAL NON-EMERGENCY INFORMATION, CALL: 314-694-4000

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This form has been approved by the Occupational Safety and Health Administration as "equivalent to" OSHA Form 20.

Roundup®
Herbicide by Monsanto

Complete Directions for Use

EPA Reg. No. 524-308-AA

AVOID CONTACT WITH FOLIAGE, GREEN STEMS, OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, SINCE SEVERE INJURY OR DESTRUCTION MAY RESULT.

This product has been approved for use in California except as stated otherwise

1984-2 897.10-002.22/53

Read the entire label before using this product.

Use only according to label instructions.

Read "LIMIT OF WARRANTY AND LIABILITY" before buying or using. If terms are not acceptable, return at once unopened.

LIMIT OF WARRANTY AND LIABILITY

(Not applicable to consumer applications applied by the homeowner for noncommercial purposes as permitted by the supplemental labeling for one-quart containers.)

This company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this company, including but not limited to incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather (i. weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied with the normal range being determined on the basis of the average range for the prior 40 years computed from the best available information, and ii. weather perils, including but not limited to hurricanes, tornadoes and floods) as well as weather considerations set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

The buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Keep out of reach of children.

WARNING!

CAUSES EYE IRRITATION.
HARMFUL IF SWALLOWED.
MAY CAUSE SKIN IRRITATION.
Do not get in eyes, on skin or on clothing.
Wash thoroughly after handling.

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Call a physician.

IF ON SKIN, immediately flush with plenty of water. Remove contaminated clothing. Wash clothing before reuse.

IF SWALLOWED, this product will cause gastrointestinal tract irritation. Immediately dilute by swallowing water or milk. Call a physician.

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

Environmental Hazards

Avoid direct applications to any body of water. Do not contaminate water by disposal of waste or cleaning of equipment.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied only in stainless steel, aluminum, fiberglass, plastic and plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Storage and Disposal

Do not contaminate water, foodstuffs, seed or feed by storage and disposal.

See container label for STORAGE AND DISPOSAL instructions.

ACTIVE INGREDIENT:	
*Isopropylamine salt of glyphosate	41.0%
INERT INGREDIENTS:	59.0%
	100.0%

*Contains 480 grams per litre or 4 pounds of the active ingredient isopropylamine salt of N-(phosphonomethyl) glycine per U.S. gallon. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

®Roundup herbicide is protected by
U.S. Pat. No. 3,799,758 and
U.S. Pat. No. 4,405,531.
Other patents are pending.
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In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

MONSANTO COMPANY
AGRICULTURAL PRODUCTS
ST. LOUIS, MISSOURI, 63167 U.S.A.

GENERAL INFORMATION

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL.

Roundup® herbicide, a water soluble liquid, mixes readily with water to be applied as a foliage spray for the control or destruction of most herbaceous plants. It may be applied through most standard industrial or field type sprayers after dilution and thorough mixing with water in accordance with label instructions.

This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow down activity of this product and delay visual effects of control. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above ground growth and deterioration of underground plant parts.

Unless otherwise specified on this label delay application until vegetation has emerged and reached the stages described for control of such vegetation under the "Weeds Controlled" section of this label. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the spray and will continue to grow. For this reason best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity.

Always use the higher rate of this product per acre within the recommended range when (1) weed growth is heavy or dense, or (2) weeds are growing in an undisturbed (non-cultivated) area.

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow for the recommended stage for treatment.

Rainfall or irrigation occurring within 6 hours after application may reduce effectiveness. Heavy rainfall or irrigation within 2 hours after application may wash the chemical off the foliage and a repeat treatment may be required.

Roundup herbicide does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

Nonionic surfactants which are labeled for use with herbicides may be used to improve wetting of foliage. Do not reduce rates of Roundup when adding surfactant. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Read and carefully observe surfactant cautionary statements, and other information appearing on the surfactant label.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of Roundup with herbicides or other materials that are not expressly recommended in this labeling. Mixing this product with herbicides or other materials not recommended on this label, may result in reduced Roundup performance.

For best results, spray coverage should be uniform and complete. Do not spray weed foliage to the point of runoff.

Keep people and pets off treated areas until spray solution has dried to prevent transfer of this product onto desirable vegetation.

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ATTENTION

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift, or splash onto desirable vegetation since minute quantities of this herbicide can cause severe damage or destruction to the crop, plants, or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

MIXING AND APPLICATION INSTRUCTIONS

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES. DO NOT APPLY UNDER WIND OR OTHER CONDITIONS WHICH ALLOW DRIFT TO OCCUR. HAND GUN APPLICATIONS SHOULD BE PROPERLY DIRECTED TO AVOID SPRAYING DESIRABLE PLANTS. NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, such as WATER FROM PONDS AND UNLINED DITCHES.

MIXING

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the proper amount of this product (see "Directions for Use" and "Weeds Controlled" sections of this label) near the end of the filling process and mix well. Remove hose from tank immediately after filling to avoid siphoning back into the carrier source. During mixing and application foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, place the filling hose below the surface of the spray solution, terminate by-pass and return lines at the bottom of the tank and if needed use an approved anti-foam or defoaming agent.

TANK MIXTURES

Always predetermine the compatibility of labeled tank mixtures of this herbicide with water carrier by mixing small proportional quantities in advance.

Mix labeled tank mixtures of Roundup herbicide with water as follows:

1. Place a 20 to 35 mesh screen or wetting basket over filling port.
2. Through the screen, fill the sprayer tank one-half full with water and start agitation.
3. If a wettable powder is used, make a slurry with the water carrier, and add it SLOWLY through the screen into the tank. Continue agitation.
4. If a flowable formulation is used, pre-mix one part flowable with one part water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
5. If an emulsifiable concentrate formulation is used, pre-mix one part emulsifiable concentrate with two parts water. Add diluted mixture slowly through the screen into the tank. Continue agitation.
6. Continue filling the sprayer tank with water and add the required amount of Roundup herbicide near the end of the filling.
7. Where nonionic surfactant is recommended, add this to the spray tank before completing the filling process.
8. Add individual formulations to the spray tank as follows: wettable powder, flowable, emulsifiable concentrate, drift control additive, water soluble liquid followed by surfactant.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near bottom of tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh. Carefully select proper nozzle to avoid spraying a fine mist. For best results with conventional ground applications equipment, use flat fan nozzles.

Clean sprayer and parts immediately after using this product by thoroughly flushing with water.

SOIL TEXTURE

The recommended use rates of other herbicides labeled for use with this product in tank mixtures generally vary with soil texture. Rate tables throughout this label, unless the soil texture is specifically named, refer to only three soil texture groups: Coarse, Medium and Fine. The following is a complete listing of soil textures included in each of these three soil texture groups:

SOIL TEXTURE GROUP	SOIL TEXTURE
COARSE:	sand, loamy sand, sandy loam
MEDIUM:	loam, silt loam, silt, sandy clay loam
FINE:	silty clay loam, clay loam, sandy clay, silty clay, clay

Refer to the above table to determine the corresponding soil texture group for the soil to be treated.

APPLICATION EQUIPMENT AND TECHNIQUES

This product may be applied with the following application equipment:

Aerial – fixed wing and helicopter

Boom – conventional broadcast spray

Controlled Droplet Applicator (CDA) – hand-held or boom mounted applicators which produce a spray consisting of a narrow range of droplet sizes.

Hand-held and high-volume spray equipment – knapsack and backpack sprayers, pump-up pressure sprayers, handguns, handwands, lances, and other hand-held spray equipment used to direct the spray onto weed foliage and vehicle mounted high-volume spray equipment for spray-to-wet applications.

Selective equipment—recirculating sprayers, shielded sprayers and wiper applicators.

See the appropriate part of this section for specific rates of application and instructions.

AERIAL EQUIPMENT

Use the recommended rates of this herbicide in 3 to 15 gallons of water per acre unless otherwise specified on this label. See "WEEDS CONTROLLED" section of this label for specific rates. **Aerial applications of this product may only be made in fallow and reduced tillage systems, silvicultural sites, and rights-of-way. Refer to the individual use area sections of this label for recommended volumes and application rates.**

Avoid direct application to any body of water.

AVOID DRIFT — DO NOT APPLY DURING INVERSION CONDITIONS, WHEN WINDS ARE GUSTY, OR UNDER ANY OTHER CONDITION WHICH WILL ALLOW DRIFT. DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Coarse sprays are less likely to drift, therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure.

Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

Ensure uniform application — To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (Paint) which meets aerospace specification MIL-C-38413 may prevent corrosion.

BOOM EQUIPMENT

For control of annual or perennial weeds listed on this label using conventional boom equipment — Use the recommended rates of this product in 10 to 40 gallons of water per acre as a broadcast spray unless otherwise specified on this label. See "Weeds Controlled" section of this label for specific rates. As density of weeds increases, spray gallonage should be increased within the recommended range to insure complete coverage. Carefully select proper nozzle to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

CONTROLLED DROPLET APPLICATION (CDA)

The rate of this product applied per acre by vehicle mounted CDA equipment must not be less than the amount recommended in this label when applied by conventional broadcast equipment. For vehicle mounted CDA equipment appl 3 to 15 gallons of water per acre.

For the control of labeled annual weeds with hand-held CDA units, apply a 20 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 1.5 MPH (1 quart per acre). For the control of labeled perennial weeds, apply a 20 to 40 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 0.75 MPH (2 to 4 quarts per acre).

Controlled droplet application equipment produces a spray pattern which is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation as damage or destruction may result.

HAND-HELD and HIGH-VOLUME EQUIPMENT

Use coarse sprays only

Mix this product in water and apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff. Use a 1 percent solution, unless otherwise specified. For best results, use a 2 percent solution on harder-to-control perennials, such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

Less than complete coverage of weeds may result from the use of spray equipment designed for motorized spot treatments. Where less than complete coverage of annual weeds occurs, use a 5 percent solution. Do not reduce recommended concentrations of Roundup when adding surfactant.

An agriculturally approved marking dye may be added to recommended rates of Roundup when making applications with hand-held equipment. Reduced control of perennial weeds may result from applications made with a dye. Use dyes according to manufacturer's recommendations.

Prepare the desired volume of spray solution by mixing the amount of this product in water, shown in the following table:

Spray solution

DESIRED VOLUME	AMOUNT OF ROUNDUP* 1%	1½%	2%	5%
1 gallon	1⅓ oz	2 oz	2⅔ oz	6½ oz
25 gallons	1 qt	1½ qt	2 qt	5 qt
100 gallons	1 gal	1½ gal	2 gal	5 gal

2 tablespoons = 1 ounce

For use in knapsack sprayers, it is suggested that the proper amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution.

For hand-held WIPER APPLICATORS see the "Selective Equipment" section and for hand-held CONTROLLED DROPLET APPLICATORS see the "Controlled Droplet Applicator (CDA)" section of this label.

SELECTIVE EQUIPMENT

This product may be applied through a recirculating spray system, a shielded applicator, or a wiper applicator after dilution and thorough mixing with water to listed weeds growing in any non-crop site specified on this label and only when specifically recommended in cropping systems.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

A shielded applicator directs the herbicide solution onto weeds while shielding desirable vegetation from the herbicide.

A wiper applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

AVOID CONTACT WITH DESIRABLE VEGETATION

Contact of the herbicide solution with the desirable vegetation may result in damage or destruction. Applicators used above desired vegetation should be adjusted so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation. Droplets, mist, foam, or splatter of the herbicide solution settling on desirable vegetation may result in discoloration, stunting, or destruction. Applications made above the crops should be made when the weeds are a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

See the "Weeds Controlled" section of this label for recommended stage of growth for specific weeds.

NOTE

- Maintain equipment in good operating condition. Avoid leakage or dripping onto desirable vegetation.
- Adjust height of applicator to insure adequate contact with weeds.
- Keep nozzle tips and wiping surfaces clean.
- Keep spray patterns aligned into recovery chamber of the recirculating sprayer.
- Keep shields on shielded applicators adjusted to protect desirable vegetation.
- Maintain recommended roller RPM on roller applicators while in use.
- Keep wiper material at proper degree of saturation with herbicide solution.
- DO NOT use wiper equipment when weeds are wet.
- DO NOT operate equipment at ground speeds greater than 5 mph. Weed control may be affected by speed of application equipment. As weed density increases, reduce equipment ground speed to insure good coverage of weeds.
- Be aware that on sloping ground the herbicide solution may migrate, causing dripping on the lower end and drying on the upper end of a wiper applicator.
- Variation in equipment design may affect weed control. With wiper applicators, the wiping material and its orientation must allow delivery of sufficient quantities of the recommended herbicide solution directly to the weed.

- Care must be taken with all types of wipers to insure that the absorbent material does not become oversaturated, causing the herbicide to drip on desirable vegetation.
- Mix only the amount of solution to be used during a one day period, as reduced activity may result from use of leftover solutions. With all equipment, drain and clean sprayer and wiper parts immediately after using this product by thoroughly flushing with water.

RECIRCULATING SPRAYERS

Recirculating sprayer calibration is made on the basis of ground speed and delivery volume. Two procedures can be used to calibrate: (1) determine the discharge being delivered per minute, then operate at the designated ground speed, or (2) select the desired ground speed and then adjust the sprayer to deliver the recommended volume per minute (this may require nozzle changes). Use the appropriate table below.

Do not operate at nozzle pressure above 20 PSI.

Table 1. Use this table when calibrating Box or Row type recirculating sprayers. Box or Row type sprayer calibration is based on the total discharge collected per row. Use only straight stream or 15° fan type nozzles.

*VOLUME PER MINUTE PER ROW	
MPH	Ounces
2	26 to 35
3	38 to 51
4	51 to 68
5	65 to 86

*NOTE: Be certain the amount collected is for all spray streams treating one row.

Table 2. Use this table when calibrating Broadcast type recirculating sprayers. Broadcast recirculating sprayer calibration is based on the discharge collected per minute from one nozzle on a 20 inch spacing.

VOLUME PER MINUTE PER NOZZLE	
MPH	Ounces
2	7 to 9
3	10 to 13
4	13 to 18
5	16 to 22

When applied as recommended under the conditions described for recirculating sprayers, this product will control the following weeds growing a minimum of 6 inches above desirable vegetation.

Perennial Broadleaf Weeds – To SUPPRESS the following weeds, mix in a ratio of 4 quarts of this product in 20 gallons of water and apply as directed.

Dogbane (hemp) Apocynum cannabinum
Milkweed Asclepias syriaca

Perennial Grasses and Annual Broadleaf Weeds – To control the following weeds, mix in a ratio of 3 quarts of this product in 20 gallons of water and apply as directed.

Cocklebur Xanthium pensylvanicum
Johnsongrass Sorghum halepense
Pigweed, Redroot Amaranthus retroflexus
Sunflower Helianthus annuus

Annual Grasses – To control the following weeds, mix in a ratio of 2 quarts of this product in 20 gallons of water and apply as directed.

Corn (volunteer) Zea mays
Shattercane Sorghum bicolor

SHIELDED APPLICATORS

When applied as directed under conditions described for shielded applicators, this product will control those weeds listed in the "Weeds Controlled" section of this label.

Shielded applicators which apply the herbicide solution as a spray band should be calibrated on a broadcast equivalent rate and volume basis. To determine these:

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \text{Herbicide Broadcast RATE per acre} = \text{Herbicide Band RATE per acre}$$

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \text{Broadcast VOLUME of solution per acre} = \text{Band VOLUME of solution per acre}$$

Use nozzles that provide uniform coverage within the treated area. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT WITH DESIRABLE VEGETATION.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

WIPER APPLICATORS

Wiper applicators include either roller or wick devices which physically wipe appropriate concentrations or amounts of this product directly onto the weed. Equipment must be designed, maintained, and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to insure adequate wiper saturation. Better results may be obtained if 2 applications are made in opposite directions.

Do not add surfactant to the herbicide solution.

For Roller Applicators – Mix 1 gallon of this product in enough water to prepare 10 gallons of herbicide solution (10% solution). Apply this solution to perennial weeds or annual broadleaf weeds listed in this "Wiper Applicators" section.

Mix 1 gallon of this product in enough water to provide 20 gallons of herbicide solution (5% solution). Apply this solution to annual grasses listed in this "Wiper Applicators" section.

Roller speed should be maintained at 40 to 60 RPM.

For Wick or other Wiper Applicators – Mix 1 gallon of this product in 2 gallons of water to prepare a 33% solution. Apply this solution to weeds listed in this "Wiper Applicators" section.

In severe infestations, reduce equipment ground speed to insure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation.

When applied as recommended under the conditions described for "Wiper Applicators", this product CONTROLS the following weeds:

ANNUAL GRASSES

Corn (volunteer) Zea mays
Rye (common) Secale cereale
Shattercane Sorghum bicolor
Texas panicum Panicum texanum

ANNUAL BROADLEAVES

Bristly starbur Acanthospermum hispidum
Spanishneedles Bidens bipinnata
Sicklepod Cassia obtusifolia

When applied as recommended under the conditions described for "Wiper Applicators", this product SUPPRESSES the following weeds:

ANNUAL BROADLEAVES

Dog fennel Eupatorium capillifolium
Florida beggarweed Desmodium tortuosum
Pigweed, Redroot Amaranthus retroflexus
Ragweed, (common) Ambrosia artemisiifolia
Ragweed (giant) Ambrosia trifida
Sunflower Helianthus annuus
Thistle (musk) Carduus nutans
Velvetleaf Abutilon theophrasti

PERENNIAL GRASSES

Bermudagrass Cynodon dactylon
Guineagrass Panicum maximum
Johnsongrass Sorghum halepense
Smutgrass Sporobolus poiretii
Vaseygrass Paspalum urvillei

PERENNIAL BROADLEAVES

Dogbane (hemp) Apocynum cannabinum
Milkweed Ascelepias syriaca
Nightshade (silverleaf) Solanum elaeagnifolium
Thistle (Canada) Cirsium arvense

WEEDS CONTROLLED

This herbicide controls many annual and perennial grasses and broadleaf weeds.

ANNUAL WEEDS

Apply to actively growing grasses and broadleaf weeds. Use 1 quart of this product per acre if weeds are less than 6 inches tall. If weeds are over 6 inches tall, apply 1.5 quarts of this product per acre. Allow at least 3 days after treatment before tillage. See "Directions for Use" for specific volumes of water.

When applied as recommended under the conditions described, this product WILL CONTROL the following ANNUAL WEEDS:

Balsamapple**
Momordica charantia
Barley
Hordeum spp.
Barnyardgrass
Echinochloa crus-galli
Bassia (fivehook)
Bassia hyssopifolia
Bluegrass (annual)
Poa annua
Brome
Bromus spp.
Chickweed
Stellaria media
Cocklebur
Xanthium pensylvanicum
Corn (volunteer)
Zea mays
Crabgrass
Digitaria spp.
Falseflax (smallseed)
Camelina microcarpa
Fiddleneck
Amsinckia spp.
Flax-leaf fleabane
Conyza bonariensis
Fleabane
Erigeron spp.
Foxtail
Setaria spp.
Groundsel (common)
Senecio vulgaris
Horseweed
Conyza canadensis
Kochia
Kochia scoparia
Lambsquarters (common)
Chenopodium album
Lettuce (prickly)
Lactuca serriola
London rocket
Sisymbrium irio
Mustard (tansy)
Descurainia pinnata
Mustard (tumble)
Sisymbrium altissimum
Oats (wild)
Avena fatua
Panicum
Panicum spp.
Pennycress (field)
Thlaspi arvense
Pigweed, Redroot
Amaranthus retroflexus
Pigweed (smooth)
Amaranthus hybridus
Ragweed (common)
Ambrosia artemisiifolia
Ragweed (giant)
Ambrosia trifida
Rye
Secale cereale
Ryegrass (Italian)*
Lolium multiflorum
Sandbur (field)
Cenchrus spp.
Shattercane
Sorghum bicolor
Shepherdspurse
Capsella bursa-pastoris
Smartweed (Pennsylvania)
Polygonum pensylvanicum
Sowthistle
Sonchus oleraceus
Spanishneedles*
Bidens bipinnata
Sunflower
Helianthus annuus
Thistle (Russian)
Salsola kali
Velvetleaf
Abutilon theophrasti
Wheat (volunteer)
Triticum aestivum

*Apply 2 quarts of this product per acre.
**Apply with hand-held equipment only.

Annual weeds generally will continue to germinate from seed throughout the growing season. Repeat treatments may be necessary to control later germinating weeds. Repeat treatments must be made prior to crop emergence.

PERENNIAL WEEDS

Apply this product as follows to control or destroy most perennial weeds:

NOTE: If weeds have been mowed or tilled, do not treat until regrowth has reached the recommended stages.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Repeat treatments must be made prior to crop emergence.

When applied as recommended under the conditions described, this product WILL CONTROL the following PERENNIAL WEEDS:

Alfalfa
Medicago sativa
Alligatorweed*
Alternanthera philoxeroides
Artichoke (Jerusalem)
Helianthus tuberosus
Bahiagrass
Paspalum notatum
Bermudagrass
Cynodon dactylon
Bindweed (field)
Convolvulus arvensis
Bluegrass (Kentucky)
Poa spp.
Brackenfern
Pteridium aquilinum
Bromegrass (smooth)
Bromus inermis
Cattail
Typha spp.
Clover (red)
Trifolium pratense
Clover (white)
Trifolium repens
Dallisgrass
Paspalum dilatatum
Dandelion
Taraxacum officinale
Dock (curly)
Rumex crispus
Dogbane (hemp)
Apocynum cannabinum
Fescues
Festuca spp
Guineagrass
Panicum maximum
Horsenettle
Solanum carolinense
Horseradish
Armoracia rusticana
Johnsongrass
Sorghum halepense
Kikuyugrass
Pennisetum clandestinum
Knapweed
Centaurea repens
Lantana
Lanta camara
Milkweed
Asclepias spp.
Muhly (wirestem)
Muhlenbergia frondosa
Mullein (common)
Verbascum thapsus
Napiergrass
Pennisetum purpureum
Nightshade (silverleaf)
Solanum elaeagnifolium
Nutsedge (purple, yellow)
Cyperus rotundus
Cyperus esculentus
Orchardgrass
Dactylis glomerata
Paragrass
Brachiaria mutica
Quackgrass
Agropyron repens
Reed canarygrass
Phalaris arundinacea
Ryegrass (perennial)
Lolium perenne
Smartweed (swamp)
Polygonum coccineum
Sweet potato, wild*
Ipomoea pandurata
Tall fescue
Festuca arundinaceae
Texas blueweed
Helianthus ciliaris
Thistle (Canada)
Cirsium arvense
Timothy
Phleum pratense
Torpedograss*
Panicum repens
Vaseygrass
Paspalum urvillei
Wheatgrass (western)
Agropyron smithii
Woollyleaf bursage
Franseria tomentosa

*Partial control.

Alligatorweed – Apply 4 quarts of this product per acre or apply a 1½ percent solution with hand-held equipment to provide partial control. Apply when most of the plants are in bloom. Repeat applications will be required to maintain such control.

Bermudagrass – For control, apply 5 quarts of this product per acre and for partial control apply 3 quarts per acre. Treat when bermudagrass is actively growing and seedheads are present. Retreatment may be necessary to maintain control. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Bluegrass (Kentucky) / Bromegrass (smooth) / Orchardgrass – Apply 2 quarts of this product in 10 to 40 gallons of water per acre when the grasses are actively growing and most plants have reached boot to early seedhead stage of development. For partial control in pasture or hay crop renovation apply 1 to 1½ quarts of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 5 to 10 gallons of water per acre. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Apply to actively growing plants when most have reached 4 to 12 inches in height. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections and "PASTURES" in the "Cropping Systems" section of this label for labeled uses and specific application instructions.

Brackenfern – Apply 3 to 4 quarts of this product per acre as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment. Apply to fully expanded fronds which are at least 18 inches long.

Canada Thistle – Apply 2 to 3 quarts of this product per acre. Apply to actively growing thistles when most are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Field Bindweed / Silverleaf Nightshade / Texas Blueweed – Apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts per acre east of the Mississippi River. Apply when weed is actively growing and is at or beyond full bloom. For silverleaf nightshade, best results can be achieved when application is made after berries are formed. Do not treat when weed is under drought stress as good soil moisture is necessary for active growth. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Guineagrass – Apply 3 quarts of this product per acre or use a 1 percent solution with hand-held equipment. Apply to actively growing guineagrass when most has reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Hemp Dogbane/Knapweed/Horseradish – Apply 4 quarts of this product per acre. Apply when actively growing and most weeds have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or

fall. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Johnsongrass – Apply 1 to 3 quarts of this product per acre. In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume in 5 to 10 gallons of water per acre. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In non-crop or areas where annual tillage (no-till), is not performed, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre. For best results, apply to actively growing plants when most are at least 18 inches in height and have reached the boot-to-head stage of growth. Allow 7 or more days after application before tillage. Do not tank mix with residual herbicides when using the 1 quart per acre rate. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Lantana – Apply this product as a 1 to 1¼ percent solution using hand-held equipment only. Apply to actively growing lantana at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth. Allow 7 or more days after application before tillage.

Milkweed (common) – Apply 3 quarts of this product per acre. Apply when actively growing and most of the milkweed has reached the late bud to flower stage of growth. Following small grain harvest or mowing, allow milkweed to regrow to a mature stage prior to treatment. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Nutsedge (purple, yellow) – Apply 3 quarts of this product per acre as a broadcast spray, or apply a 1 percent solution from hand-held equipment to control existing nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control. Wait 7 days after treatment before tillage. Tillage will stimulate nutlet germination.

Quackgrass – In Annual Cropping Systems, or in Pastures and Sods Followed by Deep Tillage: Apply 1 to 2 quarts of this product per acre. For the one quart rate, apply 0.5 to 1 percent nonionic surfactant by total spray volume in 5 to 10 gallons of water per acre. Use the 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. For the 2 quart rate, apply in 10 to 40 gallons of water per acre. Do not tank mix with residual herbicides when using the 1 quart rate. Spray when quackgrass is 8 to 12 inches in height and actively growing. Do not till between harvest and fall applications or in fall or spring prior to spring application. Allow 3 or more days after application before tillage. In pastures or sods, for best results use a moldboard plow.

Pasture or Sod or Other Noncrop Areas Where Deep Tillage is Not Planned Following Application: Apply 2 to 3 quarts in 10 to 40 gallons of water per acre. Spray when the quackgrass is greater than 8 inches tall and actively growing. Do not till between harvest and fall application or in fall or spring prior to spring application. Allow 3 or more days after application before tillage.

See Directions for use and "Mixing and Application" section of this label for labeled uses and specific application instructions.

Reed Canarygrass / Ryegrass (perennial) / Timothy Wheatgrass (western) – Apply 2 to 3 quarts of this product per acre. For best results apply to actively growing plants when most have reached the boot to head stage of growth. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Sweet Potato, Wild – Apply this product as a 2 percent solution using hand-held equipment. Apply to actively growing weeds that are at or beyond the bloom stage of growth. Repeat applications will be required. Allow the plant to reach the recommended stage of growth before retreatment. Allow 7 or more days before tillage.

Tall Fescue – Apply 3 quarts of this product in 10 to 40 gallons of water per acre to actively growing plants when most have reached boot-to-early seedhead stage of development. For partial control in pasture or hay renovation apply 2 quarts of this product plus 0.5 to 1 percent by total spray volume of nonionic surfactant in 5 to 10 gallons of water per acre. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Apply to actively growing plants when most have reached 4 to 12 inches in height. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections and "PASTURES" in the "Cropping Systems" section of this label for labeled uses and specific application instruction.

Torpedograss – Apply 4 to 5 quarts of this product per acre to provide partial control of torpedograss. Apply to actively growing torpedograss when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Wirestem Muhly / Kikuyugrass – Apply 2 to 3 quarts of this product per acre. Spray when most kikuyugrass or wirestem muhly is at least 8 inches in height (3 or 4 leaf stage of growth), and actively growing. Do not fall plow or spring till prior to spring application. Allow 3 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Woollyleaf Bursage – For control apply 2 quarts of this product plus 1 pint of Banvel™ per acre. For partial control apply 1 quart of this product plus 1 pint of Banvel per acre. Add 0.5 to 1 percent nonionic surfactant by total spray volume and apply 3 to 20 gallons of water per acre. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Apply when plants are producing new active growth which has been initiated by moisture for at least 2 weeks and when plants are at or beyond flowering. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

Other perennials listed on this label – Apply 3 to 5 quarts of this product per acre. Apply when actively growing and most have reached early head or early bud stage of growth. Allow 7 or more days after application before tillage. See "Directions for Use" and "Mixing and Application" sections of this label for labeled uses and specific application instructions.

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WOODY BRUSH AND TREES

When applied as recommended under the conditions described, this product CONTROLS or PARTIALLY CONTROLS the following woody brush plants and trees:

Alder
Alnus spp.
Ash*
Fraxinus spp.
Aspen (quaking)
Populus tremuloides
Birch
Betula spp.
Blackberry
Rubus spp.
Cascara*
Rhamnus purshiana
Catsclaw*
Acacia greggi
Ceanothus:
Deerbrush*
Ceanothus integerrimus
Redstem*
Ceanothus sanguineus
Cherry:
Bitter
Prunus emarginata
Black
Prunus serotina
Pin
Prunus Pensylvanica
Coyote brush
Baccharis consanguinea
Dewberry
Rubus trivialis
Elderberry
Sambucus spp.
Elm*
Ulmus spp.
Hawthorn
Crataegus spp.
Hazel
Corylus spp.
Honeysuckle
Lonicera spp.
Kudzu
Pueraria lobata
Locust* (black)
Robinia pseudoacacia
Maple:
Red**
Acer rubrum
Sugar
Acer saccharum
Vine*
Acer circinatum
Multiflora Rose
Rosa multiflora
Oak:
Black*
Quercus velutina
Northern Pin
Quercus palustris
Post
Quercus stellata
Red
Quercus rubra
Southern Red
Quercus falcata
White*
Quercus alba
Persimmon*
Diospyros spp.

Poison Ivy
Rhus radicans
Poison Oak
Rhus toxicodendron
Poplar* (yellow)
Liriodendron tulipifera
Raspberry
Rubus spp.
Salmonberry
Rubus spectabilis
Sassafras
Sassafras albidum
Sourwood*
Oxydendrum arboreum
Sumac:
Poison*
Rhus vernix
Smooth*
Rhus glabra
Winged*
Rhus copallina
Sweetgum
Liquidambar styraciflua
Swordfern*
Polystichum munitum
Thimbleberry
Rubus parviflorus
Trumpet Creeper
Campsis radicans
Virginia creeper*
Parthenocissus quinquefolia
Willow
Salix spp.

*Partial control
**See below for Control or Partial Control instructions.

NOTE: If brush has been mowed or tilled or trees have been cut, do not treat until regrowth has reached the recommended stages of growth.

Apply this product when plants are actively growing, and unless otherwise directed, after full leaf expansion. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation. Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

See "Directions for Use" and "Mixing Application" sections of this label for labeled uses and specific application instructions.

Apply this product as follows to control or partially control the following woody brush and trees.

Alder/Blackberry/Dewberry/Honeysuckle/Post Oak/Raspberry — For control, apply 3 to 4 quarts per acre of this product as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment.

Aspen (quaking) / Bitter Cherry / Black Cherry / Hawthorn/Pin Cherry/Southern Red Oak/Sweetgum/Trumpet Creeper — For control, apply 2 to 3 quarts of this product per acre as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment.

Birch/Elderberry/Hazel/Salmonberry/Thimbleberry — For control, apply 2 quarts per acre of this product as a broadcast spray or as a 1 percent solution with hand-held equipment.

Catsclaw — For partial control, apply as a 1 to 1½ percent solution with hand-held equipment.

Coyote Brush — For control, apply a 1½ to 2 percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Kudzu — For control, apply 4 quarts of this product per acre as a broadcast spray or as a 2 percent solution with hand-held equipment. Repeat applications will be required to maintain control.

Multiflora Rose — For control, apply 2 quarts of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment. Treatments should be made prior to leaf deterioration by leaf-feeding insects.

Poison Ivy/Poison Oak — For control, apply 4 to 5 quarts of this product per acre as a broadcast spray or as a 2 percent solution with hand-held equipment.

Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.

Red Maple** — For control, apply as a 1 to 1½ percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

For partial control, apply 2 to 4 quarts of this product per acre as a broadcast spray.

Sugar Maple/Northern Pin Oak/Red Oak — For control, apply as a 1 to 1½ percent solution with hand-held equipment when at least 50 percent of the new leaves are fully developed.

Willow — For control, apply 3 quarts of this product per acre as a broadcast spray or as a 1 percent solution with hand-held equipment.

Other Woody Brush and Trees listed on this label* — For partial control, apply 2 to 4 quarts of this product per acre as a broadcast spray or as a 1 to 1½ percent solution with hand-held equipment. Apply when plants are actively growing and after full leaf expansion. Use the higher rate for larger plants and/or dense areas of growth. Best results are achieved when application is made in late summer or fall after fruit formation. Fall treatments must be applied before a killing frost. Symptoms may not appear prior to frost or senescence with fall treatments.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

NON-CROP USES

See "General Information" and "Mixing and Application Instructions" sections of this label for essential product performance information and the following NON-CROP SECTIONS for specific recommended uses.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF SPRAY WITH FOLIAGE OF DESIRABLE TURFGRASSES, TREES, SHRUBS, OR OTHER DESIRABLE VEGETATION SINCE SEVERE DAMAGE OR DESTRUCTION MAY RESULT.

NOTE: If spraying areas adjacent to desirable plants, use a shield made of cardboard, sheet metal or plyboard while spraying to help prevent spray from contacting foliage of desirable plants.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seeds.

Roundup herbicide does not provide residual weed control. For subsequent weed control, follow a label approved herbicide program.

Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used.

INDUSTRIAL, RECREATIONAL AND PUBLIC AREAS

When applied as directed for "Non-Crop Uses", under conditions described, this product controls annual and perennial weeds listed on this label growing in areas such as airports, ditch banks, dry ditches, dry canals, fencerows, golf courses, highways, industrial plant sites, lumberyards, parking areas, parks, petroleum tank farms and pumping installations, pipelines, power and telephone rights-of-way, railroads, roadsides, schools, storage areas, other public areas and similar industrial or non-crop areas.

For specific rates of application and instructions for control of various annual and perennial weeds and woody brush and trees, see the "Weeds Controlled" section of this label.

This product may be applied with recirculating sprayers, shielded applicators, or wiper applicators in any non-crop site specified on this label. See the "Selective Equipment" part of "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment.

TANK MIXTURES NON-CROP SITES

When applied as a tank mixture, this product provides control of the emerged annual weeds and partial control of the emerged perennial weeds listed in this label. When applied as a tank mixture, the following residual herbicides will provide pre-emergence control of the weeds listed in the individual product labels.

- ROUNDUP® plus KROVAR™ I
- ROUNDUP plus KROVAR II
- ROUNDUP plus PRINCEP™ CALIBER™ 90
- ROUNDUP plus PRINCEP 4L
- ROUNDUP plus PRINCEP 80W
- ROUNDUP plus SURFLAN™ 75W
- ROUNDUP plus SURFLAN AS

When tank mixing with residual herbicides add an agriculturally approved nonionic surfactant at 0.5 to 1 percent by volume of spray solution. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. See the "Mixing and Application Instructions" section of this label before preparing these tank mixtures.

Read and carefully observe the label claims, cautionary statements, recommended use rates and all other information on the labels of all products used in these tank mixtures. Use according to the most restrictive label directions for each product in the mixture.

CONTROL OF EMERGED WEEDS

Annual Weeds – Apply 1 quart per acre of this product in these tank mixtures when weeds are less than 6 inches tall and 1.5 quarts per acre when weeds are more than 6 inches tall.

Perennial Weeds – For partial control of perennial weeds using these tank mixtures apply 2 to 5 quarts per acre of this product. Follow the recommendations in the "Weeds Controlled" section of this label for stage of growth and rate of application for specific perennial weeds.

PREEMERGENCE WEED CONTROL

The following are the labeled rates for the recommended residual herbicides for non-crop uses:

PRODUCT	RATE / ACRE
Krovar I	4 to 6 lbs.
Krovar II	2 to 5 lbs.
Princep Caliber 90	5.3 to 11.1 lbs.
Princep 80W	6 to 12½ lbs.
Princep 4L	4.8 to 10.0 qts.
Surflan 75W	2⅔ to 5⅓ lbs.
Surflan AS	2 to 4 qts.

Refer to the individual product labels for specific noncrop sites, rates, carrier volumes and precautionary statements.

Mix only the quantity of spray solution which can be used during the same day. Do not allow these tank mixtures to stand overnight as this may result in reduced weed control.

APPLY THESE TANK MIXTURES THROUGH CONVENTIONAL BROADCAST EQUIPMENT ONLY.

™Krovar is a trademark of E. I. du Pont de Nemours and Company.
™Princep is a trademark of Ciba-Geigy Corporation.
™Caliber is a trademark of Ciba-Geigy Corporation.
™Surflan is a trademark of Elanco Products Company

■ Tank Mixture ■

■ ROUNDUP® PLUS BANVEL ■

Use in GROUND APPLICATION EQUIPMENT ONLY

Refer to the specific product labels for cautionary statements of all products used in these tank mixtures.

See the "Control of Perennial Weeds" part of the "Weeds Controlled" section of this label for the weed growth stage needed to obtain best results.

Apply 2 quarts of this product and 0.5 pound a.i. of Banvel™ in 10 to 20 gallons of water per acre.

When applied as directed under the conditions described, this product plus Banvel, will control the following perennial broadleaf weed:

Bindweed (field)
Convolvulus arvensis

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FARMSTEAD WEED CONTROL

When applied as directed for "Non-Crop Uses," under conditions described, this product controls undesirable vegetation listed on this label around farmstead building foundations, along and in fences, shelterbelts, and for general nonselective farmstead weed control.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

ORNAMENTALS

THIS PRODUCT IS NOT RECOMMENDED FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN ORNAMENTALS.

When applied as directed for the conditions described for "Non-Crop Uses", this product controls undesirable vegetation listed on this label prior to planting ornamentals, in established ornamentals, and within and around greenhouses and shadehouses.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Where repeat applications are necessary, do not exceed 10.6 quarts of this product per acre per year.

Site Preparation – Following preplant applications of this product, any ornamental species may be planted. Precautions should be taken to protect non-target plants during site preparation applications.

Greenhouse/Shadehouse Use – This product may be used to control weeds listed on this label which are growing in greenhouses. Desirable vegetation must not be present during application and air circulation fans must be turned off.

Post Directed Spray – Use as a directed spray toward the base of established woody ornamentals species listed below.

Arborvitae
Thuja spp.
Azalea
Rhododendron spp.
Boxwood
Buxus spp.
Crabapple
Malus spp.
Euonymus
Euonymus spp.
Fir
Abies spp.
Pseudotsuga spp.
Hollies
Ilex spp.
Lilac
Syringa spp.
Magnolia
Magnolia spp.
Maple
Acer spp.
Oak
Quercus spp.
Privet
Ligustrum spp.
Pine
Pinus spp.
Spruce
Picea spp.
Yew
Taxus spp.

SILVICULTURAL SITES RIGHTS-OF-WAY and CHRISTMAS TREES

NOTE: NOT RECOMMENDED FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN SILVICULTURAL NURSERIES, OR CHRISTMAS TREE PLANTATIONS.

When applied as directed for "Non-Crop Uses" under conditions described, this product controls undesirable vegetation listed on this label. This product also suppresses or controls undesirable vegetation listed on this label when applied at recommended rates for release of established coniferous species listed on this label.

For specific rates of application and instructions for control of various brush, annual and perennial weeds, see the "Weeds Controlled" section of this label. For specific rates of application for release of listed coniferous species, see the "Conifer Release" part of this section of the label.

Where repeat applications are necessary do not exceed 10.6 quarts of this product per acre per year.

Aerial Application – This product may be applied using aerial spray equipment for silvicultural site preparation, conifer release and rights-of-way treatments. See the "Application Equipment and Techniques" part of the "Mixing and Application" section of this label for information on how to properly spray this product by air.

DO NOT APPLY THIS PRODUCT BY AIR TO RIGHTS-OF-WAY SITES IN THE STATE OF CALIFORNIA

In order to reduce the aerial application drift hazard to aquatic sites*, to non-target sites, or any site containing desirable vegetation always maintain appropriate buffer zones. A buffer zone of the following minimum distances should be maintained:

- Helicopter using a Microfoil™ boom should maintain at least a 50-foot buffer zone.
- When using other aerial equipment:
  1. Maintain at least a 75-foot buffer zone for applications using 2 quarts or less per acre of this product.
  2. Maintain at least a 125-foot buffer zone for application using more than 2 quarts per acre of this product.
  3. Maintain at least a 400-foot buffer zone for applications on rights-of-way when applied from 75 feet or more above ground level.

These distances should be increased if conditions favoring drift exist.

*Aquatic sites include all lakes, ponds, and streams used for significant domestic purposes or angling.

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■ SITE PREPARATION ■

Following preplant applications of this product, any silvicultural species may be planted.

■ POST DIRECTED SPRAY ■

In established silvicultural sites, use as a spray on the foliage of undesirable vegetation. Care must be exercised to avoid contact of spray, drift or mist with foliage or green bark of desirable species.

■ CONIFER RELEASE ■

For release, apply only where conifers have been established for more than one year. Vegetation should not be disturbed prior to treatment or until visual symptoms appear after treatment. Symptoms of treat-

ment are slow to appear, especially in woody species treated in late fall. Injury may occur to conifers treated for release, especially where spray patterns overlap or the higher rates are applied or when applications are made during periods of active conifer growth.

Applications must be made after formation of final conifer resting buds in the fall or prior to initial bud swelling in spring. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Use the following rates for conifer release to control or partially control the weeds listed in the "Weeds Controlled" section of this label.

For release of the following conifer species:

Douglas fir
Pseudotsuga menziesii
Fir
Abies spp.
Hemlock
Tsuga spp.
Pines*
Pinus spp.
Spruce
Picea spp.

*Includes all species except Eastern White Pine, Loblolly Pine or Slash Pine.

Apply 1½ to 2 quarts of this product per acre except in Washington and Oregon, west of the crest of the Cascade Mountains. For spring treatments west of the crest of the Cascade Mountains apply 1 quart of this product per acre before conifer bud swell for control of annual weeds. For fall treatments in Washington and Oregon, west of the crest of the Cascade Mountains, apply 1 to 1½ quarts of this product per acre before any major leaf drop of deciduous species.

For release of western hemlock apply 1 quart of this product per acre.

For release of the following conifer species:

Loblolly Pine
Pinus taeda
Eastern White Pine
Pinus strobus
Slash Pine
Pinus elliottii

Late Season Application – Apply 1½ to 2 quarts of this product in a mimimum of 5 gallons of spray solution per acre during early autumn. Applications made prior to September 1 or when conditions are conducive to rapid growth of conifers will result in potential for increased injury in the form of tip and / or needle burn. Injury may decrease with later applications. Some autumn colors are acceptable at time of application. Apply prior to frost or leaf drop of undesirable plants. Applications made according to label direction will release Loblolly Pine, Eastern White Pine and Slash Pine by reducing competition from the following species:

Ash
Fraxinus spp.
Cherry:
Black
Prunus serotina
Pin
Prunus Pensylvanica
Elm
Ulmus spp.
Hawthorn
Crataegus spp.
Locust (black)
Robina pseudoacacia
Maple (red)
Acer rubra
Oak:
Black
Quercus velutina
Post
Quercus stellata
Southern Red
Quercus falcata
White
Quercus alba
Persimmon
Diospyros spp.
Poplar (yellow)
Liriodendron tulipifera
Sassafras
Sassafras albidum
Sourwood
Oxydendrum arboreum
Sumac:
Poison
Rhus vernix
Smooth
Rhus glabra
Winged
Rhus copallina
Sweetgum
Liquidambar styraciflua

Apply only to those sites where woody brush and trees listed in this label constitute the majority of the undesirable species.

NOTE TO USER

This product must not be used in areas where adverse impact on Federally designated endangered / threatened plant or aquatic species is likely.

Prior to making applications the user of this product must determine that no such species are located in or immediately adjacent to the area to be treated.

■ INJECTION AND FRILL APPLICATIONS ■

Woody vegetation may be controlled by injection or frill application of this product. Apply this product using suitable equipment which must penetrate into living tissue. Use this product without dilution and apply at least 1 ml (1 / 29 oz.) of herbicide solution for each 2 to 3 inches of trunk diameter breast height (DBH). Space applications evenly around the circumference of the trunk. Application should be made during periods of active growth and full leaf expansion.

This treatment WILL CONTROL the following woody species:

Oak
Quercus spp.
Poplar
Populus spp.
Sweetgum
Liquidambar styraciflua
Sycamore
Platanus occidentalis

This treatment WILL SUPPRESS the following woody species:

Black gum
Nyssa sylvatica
Dogwood
Cornus spp.
Hickory
Carya spp.
Maple (red)
Acer rubrum

TURFGRASSES AND GRASSES FOR SEED PRODUCTION

■ PREPLANT AND RENOVATION ■

When applied as directed for "Non-Crop Uses," under conditions described, this product controls most existing vegetation prior to the planting or renovation of either turfgrasses or grass seed production areas.

For specific rates of application and instructions for control of various annual and perennial weeds, and woody brush and trees, see the "Weeds Controlled" section of this label.

For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as bermudagrass, summer or fall application provide best control.

DO NOT DISTURB SOIL OR UNDERGROUND PLANT PARTS BEFORE TREATMENT. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts.

TURFGRASSES

Where existing vegetation is growing in a field or unmowed situation, apply this product to actively growing weeds at the stages of growth given in the "Weeds Controlled" section of this label.

Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at least one regular mowing to allow sufficient growth for good interception of the spray.

Desirable turfgrasses may be planted following the above procedures.

GRASSES FOR SEED PRODUCTION

Apply this product to actively growing weeds at the stages of growth given in the "Weeds Controlled" section of this label prior to planting or renovation of turf or forage grass areas grown for seed production.

DO NOT feed or graze treated areas within 8 weeks after application.

■ ANNUAL WEED CONTROL IN DORMANT BERMUDAGRASS TURF ■

Annual Bluegrass (Poa annua) – Apply ¾ pint (12 fl. oz.) of this product plus 0.5 to 1 percent by total spray volume nonionic surfactant in 5 to 20 gallons of water per acre. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Application to actively growing annual bluegrass in dormant bermudagrass turf must be made prior to initiation of bermudagrass greenup in the spring.

ROADSIDE BERMUDAGRASS RELEASE

When applied as directed for "Non-Crop Uses" this product will provide partial control of rhizome Johnsongrass in bermudagrass growing on roadsides. See the "Johnsongrass" part of the "WEEDS CONTROLLED" section of Roundup "Complete Directions for Use" booklet for the correct growth stage and specific application conditions needed to obtain best results.

Use 1.0 to 1.5 quarts of this product in 10 to 40 gallons of water per acre. Apply to Johnsongrass growing on roadsides where bermudagrass (common and coastal varieties) exists and is desired for ground cover. Bermudagrass injury may result from treatment, but regrowth will occur under moist conditions. Repeat applications during the same season are not recommended, since severe bermudagrass injury may result.

BAHIAGRASS SEEDHEAD AND VEGETATIVE SUPPRESSION

When applied as directed for "NON-CROP USES" and "TREE AND VINE CROPS", this product will provide

significant inhibition of seedhead emergence and will suppress vegetative growth for a period of approximately 45 days.

Apply Roundup in the spring 1 to 2 weeks after the bahiagrass has been initially mowed to a uniform height of 3 to 4 inches. Apply 8 fluid ounces per acre of Roundup plus 0.5 to 1 percent nonionic surfactant by total spray volume. Use the 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. Make applications in 10 to 25 gallons of water per acre. Applications must be made prior to seedhead emergence. Make only one application per year.

CROPPING SYSTEMS

See "General Information" and "Mixing and Application Instructions" sections of this label for essential product performance information.

See the following CROPPING SYSTEM SECTIONS for specific recommended uses.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF SPRAY WITH FOLIAGE, GREEN STEMS OR FRUIT OF DESIRABLE CROPS, PLANTS, TREES OR OTHER DESIRABLE VEGETATION SINCE SEVERE DAMAGE OR DESTRUCTION MAY RESULT.

Repeat treatments may be necessary to control weeds regenerating from under ground parts or seed. Except as otherwise specified on this label, repeat treatments must be made before the crop emerges in accordance with the instuctions of this label.

Except as otherwise specified in a Crop section of this label the combined total of all treatments must not exceed 8 quarts per acre of this product per year.

Do not plant subsequent crops other than those on the label for one year following application.

Do not graze treated cotton fields or feed treated cotton forage to livestock. For other cropping systems, except following spot treatment in forage grasses and legumes, do not harvest or feed treated crops for 8 weeks after application. Allow 14 days following spot treatment or selective equipment use before grazing domestic livestock or harvesting forage grasses and legumes.

When applied as directed for "Cropping Systems", under the conditions described, this product controls annual and perennial weeds listed on this label, prior to the emergence of these crops.

ALFALFA
ARTICHOKE (JERUSALEM)
BARLEY*
BEANS (All)
BEET GREENS
BEETS (Red, Sugar)
BROCCOLI
CABBAGE
CARROT
CAULIFLOWER
CELERY
CHICORY
CORN (All)*
COTTON*
FORAGE GRASSES*
FORAGE LEGUMES*
HORSERADISH
KALE
LENTILS
LETTUCE
MUSTARD GREENS
OATS*
OKRA
ONION
PARSNIPS
PEANUTS*
PEAS (All)
PINEAPPLE
POTATO (Irish, Sweet)
RADISH
RICE**
RUTABAGA
SORGHUM (Milo)*
SOYBEANS*
SPINACH
WATERCRESS***
WHEAT*

*Spot treatments may be applied in these crops

**Do not treat rice fields or levees when the fields contain flood water.

***Apply only prior to planting. Allow at least 3 days between application and planting.

Spot Treatment (Only those crops with "*" can be spot treated) — Applications in growing crops must be made prior to heading of small grains and milo, initial pod set in soybeans, silking of corn, boll opening on cotton and pegging of peanuts.

For forage grasses and forage legumes see Spot Treatment in the "Pastures" section of "CROPPING SYSTEMS" in this label.

For dilution and rates of application using Boom or Hand-Held Equipment, see "Mixing and Application" and "Weeds Controlled" sections of this label.

NOTE: FOR FORAGE GRASSES AND FORAGE LEGUMES, NO MORE THAN ONE-TENTH OF ANY ACRE SHOULD BE TREATED AT ONE TIME. FOR ALL OTHER CROPS, DO NOT TREAT MORE THAN 10% OF THE TOTAL FIELD AREA TO BE HARVESTED.

THE CROP RECEIVING SPRAY IN TREATED AREA WILL BE KILLED. TAKE CARE TO AVOID DRIFT OR SPRAY OUTSIDE TARGET AREA FOR THE SAME REASON.

Selective Equipment — This product may be applied through recirculating sprayers, shielded applicators, or wiper applicators in cotton and soybeans. Shielded and wiper applicators may also be used in tree crops and grapes. Wiper applicators may be used in parsnips, rutabagas, forage grasses and forage legumes, including pasture sites.

See the "Selective Equipment" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment.

Allow at least the following time intervals between application and harvest:

Cotton, Soybeans	7 days
Apples, Avocado, Cherry, Citrus, Grapes, Parsnips, Pear, Rutabagas, Stone Fruit	14 days
Nut Crops	21 days

ASPARAGUS

When applied as directed for "Cropping Systems" under the conditions described, this product controls weeds listed on this label in asparagus.

For specific rates of applications and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Prior to Crop Emergence — Apply this product prior to crop emergence for the control of emerged labeled annual and perennial weeds. DO NOT APPLY WITHIN A WEEK BEFORE THE FIRST SPEARS EMERGE.

Post Harvest — Apply this product after the last harvest and all spears have been removed. If spears are allowed to regrow, delay application until ferns have developed. Delayed treatments should be applied as a directed or shielded spray in order to avoid contact of the spray with ferns, stems or spears. Direct contact of the spray with the asparagus may result in serious crop injury.

NOTE: Select and use recommended types of spray equipment for post-emergence post harvest applications. A directed spray is any application where the spray pattern is aligned in such a way as to avoid direct contact of the spray with the crop. A shielded spray is any application where a physical barrier is positioned and maintained between the spray and the crop to prevent contact of spray with the crop.

CRANBERRIES

Wiper applicators may be used in cranberries in accordance with instructions in this section.

See "General Information" and "Mixing and Application Instructions" sections of this label for essential product performance information.

See the "Selective Equipment" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on recommended use and calibration of this equipment.

For Wick or other Wiper Applicators — Mix 1 gallon of this product in 4 gallons of water to prepare a 20 percent solution. Apply the solution to emerged weeds. Apply after cranberry fruit set and no later than 30 days before harvest.

In severe infestations, reduce equipment ground speed to insure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

Do not permit herbicide solution to contact desirable vegetation.

FALLOW AND REDUCED TILLAGE SYSTEMS

FOR AERIAL APPLICATION IN CALIFORNIA, REFER TO SUPPLEMENTAL LABEL.

EMERGED ANNUAL WEEDS

Use this product in fallow and reduced tillage systems prior to the emergence of crops listed in this label. Refer to specific product labels for crop rotation restrictions of all products recommended for tank mixing as outlined in this section.

This product does not provide residual weed control; therefore, delay herbicide applications until maximum emergence of annual weeds, but before weeds are greater than 6 inches tall. Reduced control may be observed when application is made to weeds which have been cut to less than 6 inches tall.

Avoid spraying when weeds are subject to moisture stress, when dust is on foliage, or when straw canopy covers the weeds.

This product may be applied using ground or aerial spray equipment for weed control in fallow or reduced tillage systems. See the "Application Equipment and Techniques" section of this label for instructions.

For Ground Applications: Apply in 3 to 10 gallons of water per acre.

For Aerial Applications: Apply in 3 to 5 gallons of water per acre.

Mixing Instructions: Fill spray tank with the required amount of water. Add the recommended amounts of herbicide and surfactant, and mix well before using.

SPRAY SOLUTION RATE TABLE

Volume gallons / acre	Nonionic Surfactant Rate fl. oz. / acre 0.5%	1%
3	2	4
5*	3.2	6.4
10	6.5	13

*Maximum aerial application volume.

When applied as directed under the conditions described for fallow and reduced tillage systems, this product, plus an approved agricultural nonionic surfactant will control the following emerged annual weeds. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient.

Apply ½ pint of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control the following emerged annual weed:

Foxtails
Setaria spp.

Apply ¾ pint of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control the following emerged annual weeds:

Bluegrass (annual)
Poa annua
Brome (downy)*
Bromus tectorum
Barley (volunteer)
Hordeum vulgare
Barnyardgrass
Echinochloa crus-galli
Chickweed (jagged)
Holosteum umbellatum
Mustard (blue)
Chorispora tenella
Mustard (tansy)
Descurainia pinnata
Mustard (tumble)
Sisymbrium altissimum
Mustard (wild)
Brassica kaber
Rye
Secale cereale
Stinkgrass
Eragrostis cilianensis
Wheat
Triticum aestivum

*For control in no-till systems use 16 fluid ounces per acre.

Apply 1 pint of this product plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control the additional emerged annual weeds:

Bulbous bluegrass
Poa bulbosa
Chickweed
Cerastium vulgatum
Cocklebur
Xanthium pensylvanicum
Crabgrass
Digitaria spp.
Falseflax (smallseed)
Camelina microcarpa
Groundsel (common)
Senecio vulgaris
Johnsongrass (seedling)
Sorghum halepense
Lambsquarters
Chenopodium album
London Rocket
Sisymbrium irio
Oats (wild)
Avena fatua
Pennycress (field), Fanweed
Thlaspi arvense
Pigweed, Redroot
Amaranthus retroflexus
Ryegrass (annual)
Lolium multiflorum
Shepherdspurse
Capsella bursa-pastoris
Witchgrass
Panicum capillare

TANK MIXTURES

ROUNDUP® plus NONIONIC SURFACTANT plus BANVEL

ROUNDUP NONIONIC SURFACTANT plus 2,4-D AMINE

DO NOT APPLY BANVEL OR 2,4-D AMINE TANK MIXTURES BY AIR IN CALIFORNIA.

The addition of Banvel in a mixture with this product may provide short-term residual control of selected weed species. Some crop injury may occur if Banvel is applied within 45 days of planting. For use instructions, refer to Banvel label.

These recommended tank mixtures may be applied using ground or aerial spray equipment. Use only the following recommended rates of Roundup in these tank mixtures. See the "Application Equipment and Techniques" section of this label for instructions.

Mixing Instructions: Fill the spray tank with the required amount of water. Add the recommended amounts of herbicide and surfactant, and mix well before using.

This product plus Banvel or 2,4-D amine will control the annual grasses and broadleaf weeds previously listed for Roundup alone (except ½ pint applications) plus the following broadleaf weeds. For those weeds previously listed at ½ pint per acre, use the ¾ pint rate in these tank mixtures.

Apply ¾ pint of this product plus 0.25 lb. a.i. of Banvel plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control the following broadleaf weeds:

Kochia
Kochia scoparia
Lambsquarters
Chenopodium album
Lettuce (prickly)
Lactuca serriola
Pigweed, Redroot
Amaranthus retroflexus
Thistle (Russian)
Salsola kali

Apply 1 pint of this product plus 0.25 lb. a.i. of Banvel or 0.5 lb. a.e. of 2,4-D amine plus 0.5 to 1 percent nonionic surfactant by total spray volume per acre to control dense populations of the following annual broadleaf weeds:

Kochia*
Kochia scoparia
Lettuce (prickly)
Lactuca serriola
Thistle (Russian)
Salsola kali

*Controlled with Banvel tank mixture only.

EMERGED PERENNIAL WEEDS

When applied as directed under the conditions described, this product plus Banvel will control the following perennial broadleaf weed:

Bindweed (field)
Convolvulus arvensis

Tank Mixture

ROUNDUP® plus BANVEL

PRIOR TO PLANTING SMALL GRAINS

Use in GROUND APPLICATION EQUIPMENT ONLY

Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures.

See the "Control of Perennial Weeds" part of the "Weeds Controlled" section of this label for the weed growth stage needed to obtain best results.

Apply 2 quarts of this product and 0.5 pound a.i. of Banvel in 10 to 20 gallons of water per acre. Some crop injury may occur if Banvel is applied within 45 days of planting.

PASTURES

Apply this product prior to planting forage grasses and legumes.

Pasture or Hay Crop renovation — When applied as a broadcast spray this product controls the annual and perennial weeds listed in this label prior to planting forage grasses or legumes. Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Spot Treatment — When applied as a spot treatment as recommended, this product controls annual and perennial weeds listed in this label which are growing in pastures, forage grasses and forage legumes composed of bahiagrass, bermudagrass, bluegrass, brome, fescue, orchardgrass, ryegrass, timothy, wheatgrass, alfalfa or clover.

Wiper Application — When applied as directed this product controls or suppresses the weeds listed under "Wiper Applicators" in the "Selective Equipment" section of this label. Remove domestic livestock before application and wait 14 days after application before grazing or harvesting.

Apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre should be treated at one time. Further applications may be made in the same area at 30 day intervals. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

See "General Information", "Mixing and Application Instructions" and "Weeds Controlled" sections of this label.

SUGARCANE

When applied as directed for "Cropping Systems" under the condition described, this product controls those emerged annual and perennial weeds listed on

this label growing in or around sugarcane or in fields to be planted to sugarcane. This product will also control undesirable sugarcane.

NOTE: Where repeat treatments are necessary, do not exceed a total of 10.6 quarts of this product per acre per year. Do not apply to vegetation in or around ditches, canals or ponds containing water to be used for irrigation.

Broadcast Treatment – Apply this product in 10 to 40 gallons of water per acre on emerged weeds growing in fields to be planted to sugarcane.

For specific rates of application and instructions for control of various annual and perennial weeds see the "Weeds Controlled" section of this label.

For removal of last stubble or ratoon cane, apply 4 to 5 quarts of this product in 10 to 40 gallons of water per acre to new growth having at least 7 or more new leaves. Allow 7 or more days after application before tillage.

Spot Treatment in or Around Sugarcane Fields – For dilution and rates of application using Hand-Held Equipment, see "Mixing and Application" and "Weeds Controlled" sections of this label.

For control of volunteer or diseased sugarcane, make a 1 percent solution of this product in water and spray to wet the foliage of vegetation to be controlled.

NOTE: When spraying volunteer or diseased sugarcane, the plants should have at least 7 new leaves.

Avoid spray contact with healthy cane plants since severe damage or destruction may result.

TANK MIXTURES
Minimum Tillage Systems
CORN

When applied as recommended under the conditions described, these tank mixtures control many emerged weeds, and give preemergence control of many annual weeds when corn will be planted directly into a cover crop, established sod, or in previous crop residues.

Refer to specific product labels for crop rotation restrictions and cautionary statements of all products used in these tank mixtures. Lasso® EC herbicide may be substituted for Lasso herbicide in these tank mixtures. For mixing instructions, see the "Mixing and Application Instructions" section of this label.

ROUNDUP® plus LASSO®

Do not use these tank mixtures on sand or loamy sand soils.

ROUNDUP plus LASSO plus ATRAZINE

or

ROUNDUP plus LASSO plus BLADEX™

or

ROUNDUP plus LASSO plus PRINCEP™

or

ROUNDUP plus ATRAZINE plus PRINCEP

Apply these tank mixtures in 10 to 40 gallons of water per acre after planting or during planting in such manner that the planter does not disturb the treated soil. Do not apply these mixtures after crop emergence.

REDUCED CONTROL MAY RESULT IF THIS PRODUCT IS USED IN TANK MIXTURES CONTAINING FLUID FERTILIZERS.

CONTROL OF EMERGED WEEDS

Annual Weeds – Apply to actively growing grasses and broadleaf weeds. Use 1 quart of Roundup herbicide per acre in these tank mixtures if weeds are less than 6 inches tall. If weeds are over 6 inches tall, apply 1.5 quarts of this product per acre. For emerged annual weeds controlled, see the "Weeds Controlled" section of this label.

Perennial Weeds – At normal application dates in minimum tillage systems, perennial weeds may not be at the proper stage of growth for control. See the "General Information" section of this label for the proper stage of growth for perennial weeds.

Use of 2 to 4 quarts of Roundup herbicide per acre in these tank mixtures, under these conditions provides top kill and reduces competition from many emerged perennial grass and broadleaf weeds. For emerged perennial weeds controlled, see the "Weeds Controlled" section of this label. To obtain control, follow recommendations on this label for stage of growth and rate of application for specific perennial weeds. To obtain the desired stage of growth, it may be necessary to apply Roundup herbicide alone in the late summer or fall and then follow with a label approved seedling weed control program at planting.

NOTE: When using these tank mixtures, do not exceed 4 quarts of Roundup herbicide per acre.

USE OF THESE TANK MIXTURES FOR BERMUDAGRASS OR JOHNSONGRASS CONTROL IN MINIMUM TILLAGE SYSTEMS IS NOT RECOMMENDED. For bermudagrass control, follow the instructions under "Control of Perennial Weeds" section of this label and then use a label approved seedling weed control program in a minimum tillage or conventional tillage system. For Johnsongrass control, follow the instructions under the "Control of Perennial Weeds" section of the label, and then use a label approved seedling weed control program with conventional tillage.

PREEMERGENCE WEED CONTROL

LASSO®

For weeds controlled preemergence see the "Weed Control with Lasso®" section of the label for Lasso herbicide.

See the following table for recommended rates of Lasso in this tank mixture with Roundup herbicide on various soil types.

Lasso®

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso® (Quarts)
COARSE	2.5 to 3
MEDIUM	3
FINE	3.5 to 4

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestation or when organic matter content is 3 percent or more.

LASSO® plus ATRAZINE

For weeds controlled preemergence, see the "Weed Control with Lasso and Lasso plus atrazine (Tank Mixture)" sections of the label for Lasso herbicide.

See the following table for recommended rates of Lasso plus atrazine 80W in this tank mixture with Roundup herbicide on various soil types.

Lasso® plus atrazine

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso® (Quarts)	atrazine 80W** (Pounds)
COARSE		
Sandy Loam only	2 to 2.5	1.25 to 1.5
MEDIUM	2.5 to 3	1.5 to 2
FINE	2.5 to 3	2 to 2.5

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

**When using atrazine 4L or AAtrex™ 4LC use equivalent rates. One quart equals 1.25 pound of atrazine 80W.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestation or when fall panicum or crabgrass will be present.

Use the higher rate of atrazine in the recommended ranges on soils with greater than 3% organic matter.

LASSO® plus BLADEX

For weeds controlled preemergence see the "Weed Control with Lasso and Lasso plus Bladex (Tank Mixture)" sections of the label for Lasso herbicide.

See the following table for recommended rates of Lasso plus Bladex in this tank mixture with Roundup herbicide on various soil types.

Lasso® plus Bladex

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso® (Quarts)	+	Bladex™** 4L (Quarts)
COARSE	2 to 2.5		1 to 1.6
MEDIUM	2.5 to 3		1.2 to 1.6
FINE	2.5 to 3		1.6 to 2.2

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

**When using Bladex 80W use equivalent rates. One quart Bladex 4L equals 1.25 lbs. of Bladex 80W.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestation or when fall panicum or crabgrass will be present.

Use the higher rate of Bladex in the recommended ranges on soils with greater than 3% organic matter.

NOTE: Do not use this mixture on sand or loamy sand soils with less than 2% organic matter.

™Bladex is a trademark of the Shell Chemical Company.

■ LASSO* plus PRINCEP™ ■

For weeds controlled preemergence see the "Weed Control" sections of the labels for Lasso and Princep.

See the following table for recommended rates of Lasso plus Princep in this tank mixture with Roundup herbicide on various soil types.

Lasso® plus Princep

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso* (Quarts)	Princep 80W** (Pounds)
COARSE		
Sandy Loam only	2 to 2.5	1.25 to 1.5
MEDIUM	2.5 to 3	1.5 to 2
FINE	2.5 to 3	2 to 2.5

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

**When using Princep 4L use equivalent rates. One quart equals 1.25 pounds of Princep 80W.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestation or when fall panicum or crabgrass will be present.

Use the higher rate of Princep herbicide in the recommended ranges on soils with greater than 3% organic matter.

*Lasso is a registered trademark of Monsanto Company
™Princep is a trademark of Ciba-Geigy Corporation.
™AAtrex is a trademark of Ciba-Geigy Corporation

■ ATRAZINE PLUS PRINCEP ■

For weeds controlled preemergence see the "Weed Control" sections of the labels for atrazine and Princep.

See the following table for recommended rates of atrazine 80W and Princep 80W in this tank mixture with Roundup herbicide on various soil types.

Atrazine 80W plus Princep 80W

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE atrazine 80W** (Pounds)	Princep 80W** (Pounds)
COARSE		
Sandy Loam only	1.25	1.25
MEDIUM	1.25 to 1.75	1.25 to 1.75
FINE	1.5 to 2	1.5 to 2

*Refer to the Soil Texture of the label to determine the corresponding soil texture group for the soil to be treated.

**When using atrazine 4L, AAtrex 4LC or Princep 4L use equivalent rates. One quart equals 1.25 pounds of atrazine 80W or Princep 80W.

Use the higher rate of these products in the recommended ranges on soils with greater than 3% organic matter.

■ TANK MIXTURES ■
Minimum Tillage Systems
SOYBEANS

When applied as directed under the conditions described, these tank mixtures control many emerged annual weeds, suppress many emerged perennial weeds and give preemergence control of many annual weeds when soybeans will be planted directly into a cover crop, stale seed bed, or in previous crop residues such as wheat stubble. These tank mixtures will not control regrowth from perennial weeds.

Refer to specific product labels for crop rotation restrictions and cautionary statements of all products used in these tank mixtures. Lasso EC herbicide may be substituted for Lasso herbicide in these tank mixtures. For mixing instructions, see the "Mixing and Application Instructions" section of this label.

■ **ROUNDUP* plus LASSO*** ■
or
■ **ROUNDUP plus LASSO plus LOROX™** ■
or
■ **ROUNDUP plus LASSO plus LEXONE™** ■
or
■ **ROUNDUP plus LASSO plus SENCOR™** ■

Apply these tank mixtures in 10 to 40 gallons of water per acre after planting or during planting in such manner that the planter does not disturb the treated soil. Do not apply these mixtures after crop emergence.

REDUCED CONTROL MAY RESULT IF THIS PRODUCT IS USED IN TANK MIXTURES CONTAINING FLUID FERTILIZERS.

CONTROL OF EMERGED WEEDS

Annual Weeds -- Apply to actively growing grasses and broadleaf weeds. Use 1 quart of Roundup per acre in these tank mixtures if weeds are less than 6 inches tall. If weeds are over 6 inches tall, apply 1.5 quarts of this product per acre. For emerged annual weeds controlled, see the "Weeds Controlled" section of this label.

Perennial Weeds -- At normal application dates in minimum tillage systems, perennial weeds may not be at the proper stage of growth for control. See the "General Information" section of this label for the proper stage of growth for perennial weeds. Use of 2 to 4 quarts of Roundup herbicide per acre in these tank mixtures under these conditions provides top kill and reduces competition from many emerged perennial grass and broadleaf weeds. For emerged perennial weeds controlled, see the "Weeds Controlled" section of this label. To obtain control, follow recommendations on this label for stage of growth and rate of application for specific perennial weeds. To obtain the desired stage of growth, it may be necessary to apply Roundup herbicide alone in the late summer or fall and then follow with a label approved seedling weed control program at planting.

NOTE: When using these tank mixtures, do not exceed 4 quarts of Roundup herbicide per acre.

USE OF THESE TANK MIXTURES FOR BERMUDAGRASS OR JOHNSONGRASS CONTROL IN MINIMUM TILLAGE SYSTEMS IS NOT RECOMMENDED. For bermudagrass control, follow the instructions under "Control of Perennial Weeds" section of this label and then use a label approved seedling weed control program in a minimum tillage or conventional tillage system. For Johnsongrass control, follow the instructions under the "Control of Perennial Weeds" section of the label, and then use a label approved seedling weed control program with conventional tillage.

PREEMERGENCE WEED CONTROL

■ LASSO* ■

For weeds controlled preemergence, see the "Weed Control with Lasso" section of the label for Lasso herbicide.

See the following table for recommended rates of Lasso in this tank mixture on various soil types.

Lasso*

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso* (Quarts)
COARSE	2.5 to 3
MEDIUM	3
FINE	3.5 to 4

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestation, or when organic matter content is 3 percent or more.

■ LASSO® plus LOROX ■

For weeds controlled preemergence, see the "Weed Control with Lasso and Lasso plus Lorox 50WP" sections of the label for Lasso herbicide.

See the following table for recommended rates of Lasso plus Lorox 50WP in this tank mixture with Roundup herbicide on various soil types.

Lasso® plus Lorox

SOIL TEXTURE GROUP*	BROADCAST RATE PER ACRE Lasso® (Quarts)	Lorox 50WP (Pounds)
COARSE		
Sandy Loam only	2 to 2.5	1 to 1.5
MEDIUM	2.5 to 3	1.5 to 2
FINE	2.5 to 3	2 to 3

*Refer to the Soil Texture section of the label to determine the corresponding soil texture group for the soil to be treated.

Use the higher rate of Lasso in the recommended ranges in areas of heavy grass infestation or when fall panicum or crabgrass will be present.

Use the higher rate of Lorox 50WP in the recommended ranges on soils with greater than 3% organic matter.

Do not use this mixture on sand or loamy sand or on soil with less than 1% organic matter as crop injury from Lorox may occur.

™Lorox is a trademark of E.I. duPont de Nemours and Company.

■ LASSO* plus LEXONE ■
or
■ LASSO plus SENCOR ■

For weeds controlled preemergence, see the "Weed Control with Lasso and Lasso plus Lexone or Sencor" sections of the label for Lasso herbicide.

See the following table for recommended rates of Lasso plus Lexone 50WP or Lasso plus Sencor 50WP in this tank mixture on various soil types.

Lasso* plus Lexone 50WP or Lasso* plus Sencor 50WP

	BROADCAST RATE PER ACRE	
SOIL TEXTURE GROUP*	Lasso* (Quarts)	Lexone 50WP** or Sencor 50WP** (Pounds)
COARSE		
Sandy Loam only	2 to 2.5	0.5 to 0.75
MEDIUM	2.5 to 3	0.75 to 1
FINE	2.5 to 3	1 to 1.5***

*Refer to the Soil Texture section of this label to determine the corresponding soil texture group for the soil to be treated.

**When using Lexone 4L or Sencor 4 Flowable use equivalent rates. One quart equals 2 pounds of Lexone 50WP or Sencor 50WP.

***On the silty clay or heavy clay soils of the Mississippi Delta, use 1.5 to 2 pounds of Lexone or Sencor per acre.

Use the higher rate of Lasso herbicide in the recommended ranges in areas of heavy grass infestations or when fall panicum or crabgrass will be present.

Use the higher rate of Lexone or Sencor herbicides in the recommended ranges on soils with greater than 2% organic matter.

Do not use this mixture on sand or loamy sand soils as crop injury from Lexone or Sencor may occur.

Do not use on muck soils.

Do not apply on alkaline soils with a pH of more than 7.4.

Crop injury may occur if any atrazine was applied on the soil the year before use of this Lexone or Sencor tank mixture.

DO NOT REPLANT CROPS OTHER THAN SOYBEANS FOR 120 DAYS AFTER APPLICATION.

™Lexone is a trademark of E.I. duPont de Nemours and Company

™Sencor is a trademark of the parent company of Farbenfabriken Bayer GmbH, Leverkusen

PRE-HARVEST APPLICATIONS

When applied as directed under the conditions described, this product controls annual and perennial weeds listed on this label prior to the harvest of COTTON.

For specific rates of application and instructions for control of various annual and perennial weeds, see the "Weeds Controlled" section of this label.

Ground Applications — Apply this product in 10 to 40 gallons of water per acre on emerged labeled annual and perennial weeds.

Timing of Application — Apply this product for pre-harvest weed control after 80% of the cotton bolls have opened.

NOTE: DO NOT APPLY TO CROPS GROWN FOR SEED. Allow a minimum of 7 days between application and harvest.

Do not feed or graze treated areas within 8 weeks after application.

TREE AND VINE CROPS

This product is recommended for weed control in established groves, vineyards, or orchards, or for site preparation prior to transplanting crops listed in this section. Applications may be made with boom equipment, CDA, shielded sprayers, hand-held and high-volume wands, lances, or orchard guns, or with wiper applicator equipment, except as directed in this section. See the "Application Equipment and Techniques" section of this label for specific information on use of equipment.

When applying Roundup alone, refer to the "WEEDS CONTROLLED" and "FALLOW AND REDUCED TILLAGE SYSTEMS" sections for recommended rates to be used.

NOTE

Repeat treatments may be necessary to control weeds originating from underground parts of untreated weeds or from seeds. This product does not provide residual weed control. For subsequent weed control, follow a program using residual herbicides or use repeated applications of this product. Do not apply more than 10.6 quarts of this product per acre per year.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE SOLUTION, SPRAY, DRIFT, OR MIST WITH FOLIAGE OR GREEN BARK OF TRUNK, BRANCHES, SUCKERS, FRUIT, OR OTHER PARTS OF TREES OR VINES. CONTACT OF THIS PRODUCT WITH OTHER THAN MATURED BROWN BARK CAN RESULT IN SERIOUS CROP DAMAGE.

Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed or cut and have not been allowed to regrow to the recommended stage for treatment.

For specific rates of applications and instructions, see the "Weeds Controlled" section of this label.

■ TANK MIXTURES TREE AND VINE CROPS ■

When applied as a tank mixture, this product provides control of the emerged annual weeds and partial control of the emerged perennial weeds listed in this label. The following residual herbicides will provide pre-emergence control of those weeds listed in the individual product labels.

■ ROUNDUP* plus GOAL™ 1.6E ■
■ ROUNDUP plus KARMEX™ WP ■
■ ROUNDUP plus KROVAR™ I ■
■ ROUNDUP plus KROVAR™ II ■
■ ROUNDUP plus PRINCEP™ CALIBER™ 90 ■
■ ROUNDUP plus PRINCEP 4L ■
■ ROUNDUP plus PRINCEP 80W ■
■ ROUNDUP plus SOLICAM™ 80WP ■
■ ROUNDUP plus SURFLAN™ AS ■
■ ROUNDUP plus SURFLAN 75W ■
■ ROUNDUP plus PRINCEP (80W, or 4L, or CALIBER 90) plus SURFLAN (AS or 75W) ■
■ ROUNDUP plus GOAL (1.6E) plus SURFLAN (AS or 75W) ■
■ ROUNDUP plus GOAL (1.6E) plus PRINCEP (80W, or 4L, or CALIBER 90)* ■

*See the Roundup plus Goal plus Princep tank mixture section below for specific use instructions.

When tank mixing with residual herbicides add an agriculturally approved nonionic surfactant. Use 0.5 percent surfactant concentration when using surfactants which contain at least 50 percent active ingredient or a 1 percent surfactant concentration for those surfactants containing less than 50 percent active ingredient. See the "Mixing and Application Instructions" section of this label.

Do not apply these tank mixtures in Puerto Rico.

CONTROL OF EMERGED WEEDS

Annual Weeds — Apply 1 quart per acre of this product in these tank mixtures when weeds are less than 12 inches tall. For weeds greater than 12 inches tall, apply 1.5 quarts per acre.

Perennial Weeds — For partial control of perennial weeds using these tank mixtures apply 2 to 5 quarts per acre of this product. Follow the recommendations in the "Weeds Controlled" section of this label for stage of growth and rate of application for specific perennial weeds.

PREEMERGENCE WEED CONTROL

The following are the labeled rates for the recommended residual herbicides:

PRODUCT	RATE / ACRE
Goal 1.6E	1.25 to 5 qts.
Karmex WP	2 to 8 lbs.
Krovar I	2 to 8 lbs.
Krovar II	2 to 8 lbs.
Princep Caliber 90	1.1 to 10.6 lbs.
Princep 80W	1¼ to 12 lbs.
Princep 4L	2 to 9.6 qts.
Solicam 80WP	2½ to 5 lbs.
Surflan AS	2 to 4 qts.
Surflan 75W	2⅔ to 5⅓ lbs.

NOTE: These residual herbicides may provide post-emergence activity on certain annual weed species.

Refer to the individual product labels for specific crops, rates, geographical restrictions and precautionary statements.

Read and carefully observe the label claims, cautionary statements, rates and all other information on the labels of all products. Use according to the

most restrictive label directions for each product in the mixture.

For specific rates of application and instructions see the "Weeds Controlled" section of this label.

■ **ROUNDUP® plus GOAL plus PRINCEP** ■
(California only)

Roundup may be tank mixed with Goal plus Princep for broad spectrum postemergence and preemergence control. Refer to the following table for approved crops and rate ranges for each product in this tank mix. Refer to the individual product labels for weeds controlled, geographical restrictions, precautionary statements and specific use rates.

CROP	RATE RANGES* ROUNDUP® (quarts)	+ GOAL 1.6E* (quarts)	+ PRINCEP 80W** (Pounds)
Grapes	1 to 1.5	1 to 4	2.5 to 5
Almond	1 to 1.5	1 to 4	1.25 to 2.5

Use equivalent rates of Caliber 90 or Princep 4L.

*Rate dependent on weeds present.

**Rate dependent on soil type and weeds present.

™Goal is a trademark of Rohm and Haas Company.
™Karmex and ™Krovar are trademarks of E. I. du Pont de Nemours and Company.
™Princep and ™Caliber are trademarks of Ciba-Geigy Corporation.
™Solicam is a trademark of Sandoz, Inc.
™Surflan is a trademark of Elanco Products Company.

TREE CROPS

Citrus*: citron, grapefruit, kumquat, lemon, lime, orange, tangelo, tangerine.

Nuts:** almond, filbert, macadamia, pecan, pistachio, walnut.

Pome Fruit*: apple, pear.

Stone Fruit*: apricots, cherries, nectarines, peaches plums/prunes.

For cherries, any application equipment listed in this section may be used in all states.

For citron, apply as a directed spray only.

Any application equipment listed in this section may be used in apricots, nectarines, peaches, and plums/prunes growing in Arizona, California, Colorado, Idaho, Kansas, Kentucky, New Jersey, North Dakota, Oklahoma, Oregon, Texas, Utah, and Washington, except for peaches grown in the states specified in the following paragraph. In all other states use wiper equipment only.

For PEACHES grown in Alabama, Arkansas, Florida, Georgia, North Carolina, South Carolina, and Tennessee only, apply with a shielded boom sprayer or shielded wiper applicator which prevents any contact of this product with the foliage or bark of trees. Apply no later than 90 days after first bloom. Applications made after this time may result in severe damage. Remove suckers and low hanging limbs at least 10 days prior to application. Avoid applications near trees with recent pruning wounds or other mechanical injury. Apply only near trees which have been planted in the orchard for 2 or more years. EXTREME CARE MUST BE TAKEN TO ENSURE NO PART OF THE PEACH TREE IS CONTACTED.

Tropical Fruit: avocado*, banana, coffee*, guava, mango,* papaya, tea. Allow a minimum of 1 day between last application and harvest of guava and papaya. In coffee and banana delay applications 3 months after transplanting to allow the new coffee or banana plant to become established.

NOTE:

*Allow a minimum of 14 days between last application and harvest.

**Allow a minimum of 21 days between last application and harvest of these crops.

VINE CROPS

Grapes*: any variety of table, wine, or raisin grape may be treated with any equipment listed in this section. Applications should not be made when green shoots, canes, or foliage are in the spray zone.

In the northeast and Great Lakes regions, applications must be made prior to the end of bloom stage of grapes to avoid injury.

NOTE:

*Allow a minimum of 14 days between last application and harvest.

CALIFORNIA

Roundup® herbicide has been approved by the U.S. Environmental Protection Agency for the uses, crops and sites listed in this label and by California under label designation 1984-1. Approval of the items listed below is pending under the State of California registration requirements. With the exception of these items, this booklet contains the material approved by California in label 1984-1.

These use conditions, crops and sites may not be treated with this product in California until approval is received:

- Control of Catsclaw and Virginia Creeper.
- Use in Pineapple and Watercress.
- 1% surfactant concentration with less than 50% active ingredient for Bluegrass, Tall Fescue, Dormant Bermudagrass, Woollyleaf Bursage and non-crop tank mixtures.
- Inhibition of Bahiagrass seedhead emergence and suppression of vegetative growth.
- Roundup plus Goal plus Princep, and Roundup plus Goal plus Surflan tank mixtures for use on tree and vine crops in California only.
- Use as a directed spray on citron in tree crops.
- Use of dyes in hand-held and high-volume equipment.
- Round plus Surflan AS in non-crop sites.
- Silvicultural applications with Microfoil boom within 50-foot buffer zone.

ROUNDUP® Herbicide Complete Directions for Use
in NON-CROP AREAS such as
Industrial, Recreational and Public areas
Farmstead Weed Control
Ornamentals
Silvicultural Sites and Rights of Way
Turfgrasses and Grasses for Seed Production
in CROPPING SYSTEMS

Alfalfa	Corn	Parsnips
Artichoke (Jerusalem)	Cotton	Peanuts
Asparagus	Cranberries	Peas (English, green)
Barley	Forage Grasses	Pineapple
Beans Edible (all)	Forage legumes	Potato (Irish, sweet)
Beet Greens	Horseradish	Radish
Beets (red, sugar)	Kale	Rice
Broccoli	Lentils	Rutabaga
Cabbage	Lettuce	Sorghum (milo)
Carrot	Mustard greens	Soybeans
Cauliflower	Oats	Spinach
Celery	Okra	Sugarcane
Chicory	Onion	Watercress
		Wheat

Fallow and Reduced Tillage Systems
Pastures
Preharvest Applications to Cotton
Sugarcane
in TREE CROPS

Citrus (as listed)	Pome Fruit (as listed)
Cherry	Stone Fruit (as listed)
Nuts (as listed)	Tropical Fruit (as listed)

in GRAPES — Wine, Table and Raisin
in MINIMUM TILLAGE SYSTEMS for Corn Soybeans

This product has been approved for use in California except as stated otherwise on pages 106 and 107

EPA Reg. No. 524-308-AA
1984-2

897-10-002-22-53

In case of an emergency involving this product. Call Collect, day or night, (314) 694-4000.

APPENDIX C

INVERTEBRATES UNDER REVIEW FOR THREATENED
AND ENDANGERED STATUS
FEDERAL REGISTER
5/22/84

Federal Register

Tuesday
May 22, 1984

Part III

Department of the Interior

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Review of Invertebrate Wildlife for Listing as Endangered or Threatened Species

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Review of Invertebrate Wildlife for Listing as Endangered or Threatened Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of review.

SUMMARY: The U.S. Fish and Wildlife Service identifies invertebrate animal taxa native to the United States being considered for addition to the List of Endangered and Threatened Wildlife. Although "candidate" species receive no substantive or procedural protections under the Endangered Species Act, the Service encourages federal agencies and other planners to take such taxa into account in environmental planning under the National Environmental Policy Act and similar statutes. Also identified in this notice are those invertebrate taxa that were previously under consideration for listing, but that are currently presumed either to be extinct, to not be valid species or subspecies, or to be more abundant and widespread than previously thought and/or not subject to identifiable threats.

DATE: Comments may be submitted until further notice.

ADDRESSES: Interested persons or organizations are requested to submit comments to: Director, U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240. Comments and materials relating to this notice are available for public inspection by appointment during normal business hours at the Service's Office of Endangered Species, Suite 500, 1000 North Glebe Road, Arlington, Virginia.

Information relating to particular taxa may be obtained from appropriate Service Regional Offices listed below:

Region 1.—California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Guam, Territory of the Northern Marianas, and Trust Territories of the Pacific.

Regional Director (ARD/FA), U.S. Fish and Wildlife Service, Suite 1692, Lloyd 500 Building, 500 N.E. Multnomah Street, Portland, Oregon 97232 (503/231–6131 or FTS 8/429–6131).

Region 2.—Arizona, New Mexico, Oklahoma, and Texas.

Regional Director (ARD/AFF), U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103 (505/766–3972 or FTS 8/474–3972).

Region 3.—Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

Regional Director (ARD/AFF), U.S. Fish and Wildlife Service, Federal Building, Fort Snelling, Twin Cities, Minnesota 55111 (612/725–3596 or FTS 8/725–3596).

Region 4.—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico, and the Virgin Islands.

Regional Director (ARD/FA), U.S. Fish and Wildlife Service, The Richard B. Russell Federal Building, 75 Spring Street, S.W., Atlanta, Georgia 30303 (404/221–3583 or FTS 8/242–3583).

Region 5.—Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.

Regional Director (ARD/FA), U.S. Fish and Wildlife Service, Suite 700, One Gateway Center, Newton Corner, Massachusetts 02158 (617/965–5100 ext. 316 or FTS 8/829–9316, 7, 8).

Region 6.—Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming.

Regional Director (ARD/FA), U.S. Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, Colorado 80225 (303/234–2496 or FTS 8/234–2496).

Region 7.—Alaska.

Regional Director (ARD/AFF), U.S. Fish and Wildlife Service, 1101 East Tudor Road, Anchorage, Alaska 99503 (907/263–3539 or FTS 8/263–3539).

FOR FURTHER INFORMATION CONTACT: John L. Spinks, Jr., Chief, Office of Endangered Species, U.S. Fish and Wildlife Service, Washington, D.C. 20240 (703/235–2771), or the appropriate Regional Office.

SUPPLEMENTARY INFORMATION:

Background

The Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) requires a determination of whether species of wildlife and plants are endangered or threatened based on the best available scientific and commercial data. For many years, the U.S. Fish and Wildlife Service (hereafter the Service) has been gathering data on taxa of invertebrates (sponges, crustaceans, arachnids, insects and mollusks), native to the United States, that have appeared, at least at times, to warrant consideration for addition to the List of Endangered and Threatened Wildlife. The accompanying table identifies many of these taxa (including, by definition, biological subspecies) and assigns each to one of the following three categories.

Category 1 comprises taxa for which the Service currently has substantial information on hand to support the biological appropriateness of proposing to list the species as endangered or threatened. Currently, data are being gathered concerning essential habitat needs and, for some taxa, data concerning the precise boundaries for critical habitat designations. Development and publication of proposed rules on such species is anticipated.

Category 2 comprises taxa for which information now in possession of the Service indicates that proposing to list the species as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat(s) are not currently available to support proposed rules at this time. Taxa in this category for which there have not been authenticated records since 1963 are indicated by an asterisk (*); some of these are possibly extinct, but further biological research and field study are needed to ascertain their status with any confidence. It is likely that many of the taxa in this category will not warrant listing, while some will be found to be in greater danger of extinction than some taxa in category 1. It is hoped that this notice will encourage the necessary research on vulnerability and/or threats for these taxa.

Category 3 comprises taxa that are no longer being considered for listing as endangered or threatened. Such taxa are included in one of three subcategories depending on the reasons for removal from consideration.

3A. Taxa for which the Service has persuasive evidence of extinction. If rediscovered, however, such species might acquire high priority for listing. At this time, the best available information indicates that the taxa included in this category, or the habitats from which they were known, are in fact extinct or destroyed, respectively.

3B. Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the Act's definition of "species." Such supposed taxa could be reevaluated in the future on the basis of subsequent research.

3C. Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat. Should further research or changes in land use indicate significant

decline in any of these taxa, they may be reevaluated for possible inclusion in category 1 or 2.

The Service hereby solicits data concerning the taxa in the accompanying table. Especially sought is information—

(1) Indicating that a taxon would more properly be assigned to a category other than the one in which it appears;

(2) Nominating a taxon not included in the table;

(3) Recommending an area as critical habitat for a candidate taxon, or indicating why it would not be prudent to propose critical habitat for a taxon, or why critical habitat may not be determinable for a taxon;

(4) Documenting threats to any of the listed taxa;

(5) Pointing out taxonomic changes for any of the taxa;

(6) Suggesting new or more appropriate names; or

(7) Noting errors, such as in the indicated distributions.

The Service intends to consider all data received in response to this notice, to make appropriate amendments to the accompanying table, and to indicate intentions with regard to future listing actions. Substantive changes in status may be announced by periodic notice in the **Federal Register.**

The following table is arranged in a general systematic order, beginning with sponges and ending with mollusks. For each taxon, the assigned category appears on the left, followed by the common name, the scientific name, the family name, and the known distribution, usually indicated by abbreviations of State names. For mollusks the authority and date for the scientific name is given, because of unusual instability in systematics of those groups. The species may no longer occur in some of the areas shown. Some taxa have been included that have not yet been formally described in the scientific literature. Such taxa are indicated by the abbreviation "sp." after the generic name, or "ssp." after the generic and specific names.

A provisional vernacular name in English or Hawaiian is given for most species. Some are vernacular names actually in common use, and in some groups whose systematics most need revision these are about as informative as the current scientific name in Latin. Most of the taxa are rare, however, and the obscurity of many almost guarantees that no name has much history of use. Group names such as snail, amphipod, or dragonfly have been appended to many names to clarify distinctions from other invertebrates or plants with similar or confusing names; such extra qualifiers would probably be dropped from any name that came into truly common use. These provisional names may be changed or discarded if their use is later found to be inappropriate.

This notice was prepared by the zoologists in the Service's Office of Endangered Species in Washington that specialize in invertebrate species, and the Endangered Species Program staff of the Service's Regional Offices and Field Stations.

List of Subjects in 50 CFR Part 17

Endangered and threatened wildlife, Fish, Marine mammals, Plants (agriculture).

Dated: April 24, 1984.

G. Ray Arnett,

Assistant Secretary for Fish and Wildlife and Parks.

Category and common name	Scientific name	Family	Distribution
SPONGES			
3B—Muscular sponge	*Anheteromyia biceps*	Spongillidae	MI.
2—Carolina sponge	*Corvomeyenia carolinensis*	Spongillidae	SC.
2—Oklawaha sponge	*Dosilia palmeri*	Spongillidae	FL, Mexico.
2—Kissimmee sponge	*Ephydatia subtilis*	Spongillidae	FL.
2—Pennsylvania sponge	*Heteromeyenia longistylis*	Spongillidae	PA.
2—Oneida sponge	*Spongilla heteroslerita*	Spongillidae	NY.
3B—Spongy sponge	*Spongilla spongiosa*	Spongillidae	SC.
FLATWORMS (Turbellaria)			
2—(No common name)	*Kenkia rhynchida*	Kenkiidae	OR.
2—(No common name)	*Macrocotyla glandulosa*	Kenkiidae	MO, IA.
2—(No common name)	*Procotyla typhlops*	Kenkiidae	MD, VA.
3A—Holsinger's groundwater planarian	*Sphalloplana holsingeri*	Planariidae	VA.
2—Refton Cave planarian	*Sphalloplana pricei*	Planariidae	PA.
3A—Bigger's groundwater planarian	*Sphalloplana subtilis*	Planariidae	VA.
BRANCHIOPODS (Crustaceans, Subclass Branchiopoda)			
2—Mono Lake brine shrimp	*Artemia monica*	Artemiidae	CA.
ISOPODS (Crustaceans, Order Isopoda)			
2—Clifton Cave isopod	*Caecidotea barri*	Asellidae	KY.
2—Bat Cave isopod	*Caecidotea macropoda*	Asellidae	OK.
2—Nickajack Cave isopod	*Caecidotea nickajackensis*	Asellidae	TN.
2—Rye Cove Cave isopod	*Lirceus culveri*	Asellidae	VA.
2—Lee County Cave isopod	*Lirceus usdagskun*	Asellidae	VA.
AMPHIPODS (Crustaceans, Order Amphipoda)			
2—Central Missouri cave amphipod	*Allocrangonyx hubrichti*	Crangonyctidae	MO.
2—Oklahoma cave amphipod	*Allocrangonyx pellucidus*	Crangonyctidae	OK.
3C—Kansas well amphipod	*Bactrurus hubrichti*	Crangonyctidae	KS, MO, OK.
3C—Anomalous spring amphipod	*Crangonyx anomalus*	Crangonyctidae	IN, KY, OH.
3C—Appalachian Valley cave amphipod	*Crangonyx antennatus*	Crangonyctidae	AL, IL, TN, VA.
2—Pennsylvania cave amphipod	*Crangonyx dearolfi*	Crangonyctidae	MD, PA.
2—Florida cave amphipod	*Crangonyx grandimanus*	Crangonyctidae	FL.
2—Hobbs' cave amphipod	*Crangonyx hobbsi*	Crangonyctidae	FL.
3C—Minor cave amphipod	*Crangonyx minor*	Crangonyctidae	IA, IL, IN, MI, Canada.
3C—Packard's cave amphipod	*Crangonyx packardi*	Crangonyctidae	IN, KY.
2—Illinois cave amphipod	*Gammarus acherondytes*	Gammaridae	IL.
2—Bousfield's amphipod	*Gammarus bousfieldi*	Gammaridae	KY.
2—Noel's amphipod	*Gammarus desperatus*	Gammaridae	NM.
2—Diminutive amphipod	*Gammarus hyalelaides*	Gammaridae	TX.
2—Pecos amphipod	*Gammarus pecos*	Gammaridae	TX.
2—Kauai cave amphipod	*Spelaeorchestia koloana*	Talitridae	HI.
3C—Alleghany cave amphipod	*Stygobromus (= Stygonectes) alleghenensis*	Crangonyctidae	MD, NY, PA.
2—Tidewater interstitial amphipod	*Stygobromus (= Apocrangonyx) araeus*	Crangonyctidae	VA.
2—Arizona cave amphipod	*Stygobromus arizonensis*	Crangonyctidae	AZ.

Category and common name	Scientific name	Family	Distribution
2—Balcones cave amphipod	*Stygobromus (=Stygonectes) balconius*	Crangonyctidae	TX.
2—Barr's cave amphipod	*Stygobromus (=Stygonectes) barri*	Crangonyctidae	MO.
2—Bifurcated cave amphipod	*Stygobromus (=Stygonectes) bifurcatus*	Crangonyctidae	TX.
2—Bowman's cave amphipod	*Stygobromus (=Stygonectes) bowmani*	Crangonyctidae	OK.
2—Clanton's cave amphipod	*Stygobromus (=Stygonectes) clantoni*	Crangonyctidae	KS, MO.
2—Burnsville Cove cave amphipod	*Stygobromus (=Stygonectes) conradi*	Crangonyctidae	VA.
2—Cooper's cave amphipod	*Stygobromus (=Stygonectes) cooperi*	Crangonyctidae	WV.
2—Cascade Cave amphipod	*Stygobromus (=Stygonectes) dejectus*	Crangonyctidae	TX.
2—Elevated Spring amphipod	*Stygobromus (=Stygonectes) elatus*	Crangonyctidae	AR.
2—Greenbrier Cave amphipod	*Stygobromus (=Stygonectes) emarginatus*	Crangonyctidae	MD, WV.
2—Ephemeral cave amphipod	*Stygobromus (=Apocrangonyx) ephemerus*	Crangonyctidae	VA.
3C—Central Kentucky cave amphipod	*Stygobromus exilis*	Crangonyctidae	AL, KY, TN.
2—Ezell's Cave amphipod	*Stygobromus (=Stygonectes) flagellatus*	Crangonyctidae	TX.
3C—Shenandoah Valley cave amphipod	*Stygobromus (=Stygonectes) gracilipes*	Crangonyctidae	MD, PA, VA, WV.
2—Grady's cave amphipod	*Stygobromus gradyi*	Crangonyctidae	CA.
2—Devil's Sinkhole amphipod	*Stygobromus (=Stygonectes) hadenoecus*	Crangonyctidae	TX.
2—Hara's cave amphipod	*Stygobromus harai*	Crangonyctidae	CA.
2—(No common name)	*Stygobromus heteropodus*	Crangonyctidae	MO.
2—Malheur Cave amphipod	*Stygobromus hubbsi*	Crangonyctidae	OR.
2—Tidewater amphipod	*Stygobromus (=Stygonectes) identatus*	Crangonyctidae	VA.
3C—Iowa amphipod	*Stygobromus iowae*	Crangonyctidae	IA.
2—Long-legged cave amphipod	*Stygobromus (=Stygonectes) longipes*	Crangonyctidae	TX.
3A—Rubious Cave amphipod	*Stygobromus (=Apocrangonyx) lucifugus*	Crangonyctidae	IL.
2—MacKenzie's cave amphipod	*Stygobromus mackenziei*	Crangonyctidae	CA.
3C—Southwestern Virginia cave amphipod	*Stygobromus macklini*	Crangonyctidae	TN, VA.
2—Mountain cave amphipod	*Stygobromus (=Stygonectes) montanus*	Crangonyctidae	AR.
2—Morrison's cave amphipod	*Stygobromus (=Stygonectes) morrisoni*	Crangonyctidae	VA, WV.
2—Bath County cave amphipod	*Stygobromus (=Stygonectes) mundus*	Crangonyctidae	VA.
2—Norton's cave amphipod	*Stygobromus (=Apocrangonyx) nortoni*	Crangonyctidae	TN.
2—Onondaga Cave amphipod	*Stygobromus onondagaensis*	Crangonyctidae	MO.
3C—Oregon cave amphipod	*Stygobromus oregonensis*	Crangonyctidae	OR.
2—Ozark cave amphipod	*Stygobromus (=Stygonectes) ozarkensis*	Crangonyctidae	AR, MO, OK.
2—Minute cave amphipod	*Stygobromus (=Apocrangonyx) parvus*	Crangonyctidae	WV.
2—Peck's cave amphipod	*Stygobromus (=Stygonectes) pecki*	Crangonyctidae	TX.
2—Pizzini's amphipod	*Stygobromus (=Stygonectes) pizzini*	Crangonyctidae	DC, MD, PA, VA.
2—Wisconsin well amphipod	*Stygobromus putealis*	Crangonyctidae	WI.
2—Reddell's cave amphipod	*Stygobromus (=Stygonectes) reddelli*	Crangonyctidae	TX.
2—Alabama well amphipod	*Stygobromus smithi*	Crangonyctidae	AL.
2—Spring cave amphipod	*Stygobromus (=Stygonectes) spinatus*	Crangonyctidae	WV.
2—Stellmack's cave amphipod	*Stygobromus (=Stygonectes) stellmacki*	Crangonyctidae	PA.
2—Subtle cave amphipod	*Stygobromus (=Apocrangonyx) subtilis*	Crangonyctidae	IL, MO.
3C—Potomac groundwater amphipod	*Stygobromus (=Stygonectes) tenuis potomacus*	Crangonyctidae	DC, MD, PA, VA.
2—Wengerors' cave amphipod	*Stygobromus wengerorum*	Crangonyctidae	CA.
CRAYFISHES AND SHRIMPS (Crustaceans, Order Decapoda)			
1—Shasta (=Ptacid) crayfish	*Pacifastacus fortis*	Astacidae	CA.
2—Alabama cave shrimp	*Palaemonias alabamae*	Atyidae	AL.
1—California freshwater shrimp	*Syncaris pacifica*	Atyidae	CA.
2—Mona cave shrimp	*Typhlatya monae*	Atyidae	PR, West Indies.
2—(No common name)	*Cambarus balchi*	Cambaridae	KY.
2—Big South Fork crayfish	*Cambarus bouchardi*	Cambaridae	KY, TN.
2—Greensboro burrowing crayfish	*Cambarus catagius*	Cambaridae	NC.
2—New River riffle crayfish	*Cambarus chasmodactylus*	Cambaridae	NC, VA, WV.
2—Chickamauga crayfish	*Cambarus extraneus*	Cambaridae	GA, TN.
2—Obey crayfish	*Cambarus obeyensis*	Cambaridae	TN.
3C—Conchas crayfish	*Orconectes deanae*	Cambaridae	NM.
2—Louisville crayfish	*Orconectes jeffersoni*	Cambaridae	KY.
2—Nashville crayfish	*Orconectes shoupi*	Cambaridae	TN.
2—Palm Springs Cave crayfish	*Procambarus acherontis*	Cambaridae	FL.
2—Pee Dee lotic crayfish	*Procambarus lepidodactylus*	Cambaridae	NC, SC.
2—(No common name)	*Procambarus cornus*	Cambaridae	MS.
2—Texas cave shrimp	*Palaemonetes antrorum*	Palaemonidae	TX.
1—Squirrel Chimney cave shrimp	*Palaemonetes cummingi*	Palaemonidae	FL.
SPIDERS (Arachnids, Order Aranea)			
2—Dolloff Cave spider	*Meta dolloff*	Araneidae	CA.
2—Torreya trap-door spider	*Cyclocosmia torreya*	Ctenizidae	FL.
2—Key gnaphosid spider	*Cesona irvingi*	Gnaphosidae	FL.
2—Kauai cave wolf spider (pe'e pe'e maka 'ole)	*Adelocosa anops*	Lycosidae	HI.
2—Rosemary wolf spider	*Lycosa ericeticola*	Lycosidae	FL.
2—Lake Placid funnel wolf spider	*Sosippus placidus*	Lycosidae	FL.
2—Santa Cruz telemian spider	*Telema* sp. (undescribed)	Telemidae	CA.
PSEUDOSCORPIONS (Arachnids, Order Pseudoscorpiones)			
2—Empire Cave pseudoscorpion	*Microcreagris imperialis*	Neobisiidae	CA.
ROCKHOPPERS AND BRISTLETAILS (Insects, Order Archeognatha)			
2—Hawaiian long-palp bristletail	*Machilóides heteropus*	Machilidae	HI.
2—Perkin's club-palp bristletail	*Machiloides perkinsi*	Machilidae	HI.
MAYFLIES (Insects, Order Ephemeroptera)			
2—Berner's two-winged mayfly	*Heterocloeon berneri*	Baetidae	GA.
2—American sand-burrowing mayfly	*Dolania americana*	Behningiidae	FL, GA, SC, NC.
2*—Yellow brachycercus mayfly	*Brachycercus flavus*	Caenidae	LA*.
2*—Frison's ceratellan mayfly	*Ceratella frisoni*	Ephemerellidae	AL*, IL*.
2*—Spiculose ceratellan mayfly	*Ceratella spiculosa*	Ephemerellidae	TN*, NC*.
2—Argo ephemerellan mayfly	*Ephemerella argo*	Ephemerellidae	IL, IN.
2*—Colorado burrowing mayfly	*Ephemera compar*	Ephemeridae	CO*.
2*—West Virginia burrowing mayfly	*Ephemera triplex*	Ephemeridae	WV*.
3A—Robust pentagenian burrowing mayfly	*Pentagenia robusta*	Ephemeridae	OH*.
2—Mendon blackwater mayfly	*Pseudiron meridionalis*	Heptageniidae	FL, GA.

Category and common name	Scientific name	Family	Distribution
2—Cahaba sand-filtering mayfly	*Homoeoneuria cahabensis*	Oligoneuridae	AL, MS.
2—Blackwater sand-filtering mayfly	*Homoeoneuria dolani*	Oligoneuridae	FL, GA, SC.
3A—Pecatonica River mayfly	*Acanthometropus pecatonica*	Siphlonuridae	IL*.
2—False ameletus mayfly	*Ameletus falsus*	Siphlonuridae	AZ*.
2*—Diverse isonychian mayfly	*Isonychia diversa*	Siphlonuridae	TN*.
DRAGONFLIES AND DAMSELFLIES (insects, Order Odonata)			
2—Barrens bluet damselfly	*Enallagma recurvatum*	Coenagrionidae	MA, NY, NJ.
1—San Francisco forktail damselfly	*Ischnura gemina*	Coenagrionidae	CA.
2—Adytum megalagrion damselfly	*Megalagrion adytum*	Coenagrionidae	HI.
2*—Fallax megalagrion damselfly	*Megalagrion amaurodytum fallax*	Coenagrionidae	HI*.
2*—Pele megalagrion damselfly	*Megalagrion amaurodytum pelea*	Coenagrionidae	HI*.
2*—Waianae megalagrion damselfly	*Megalagrion amaurodytum waianaenum*	Coenagrionidae	HI*.
3A—Jugorum megalagrion damselfly	*Megalagrion jugorum*	Coenagrionidae	HI*.
2—Leptodemas megalagrion damselfly	*Megalagrion leptodemus*	Coenagrionidae	HI.
2—Molokai megalagrion damselfly	*Megalagrion molokaiense*	Coenagrionidae	HI.
3A—Nesiotes megalagrion damselfly	*Megalagrion nesiotes*	Coenagrionidae	HI*.
2—Nigrohamatum megalagrion damselfly	*Megalagrion nigrohamatum*	Coenagrionidae	HI.
2—Blackline megalagrion damselfly	*Megalagrion nigrolineatum*	Coenagrionidae	HI.
2—Oahu megalagrion damselfly	*Megalagrion oahuensis*	Coenagrionidae	HI.
2—Oceanic megalagrion damselfly	*Megalagrion oceanicum*	Coenagrionidae	HI.
2—Pacific megalagrion damselfly	*Megalagrion pacificum*	Coenagrionidae	HI.
2—Orange-black megalagrion damselfly	*Megalagrion xanthomelas*	Coenagrionidae	HI.
1—Say's spiketail dragonfly	*Cordulegaster sayi*	Cordulegastridae	FL, GA.
2—Apalachicola twilight skimmer dragonfly	*Neurocordulia clara*	Cordulidae	AI, FL.
2*—Ohio emerald dragonfly	*Somatochlora hineana*	Corduliidae	OH*, IN*.
2—Big Thicket emerald dragonfly	*Somatochlora margarita*	Corduliidae	TX.
2—Banded bog skimmer dragonfly	*Williamsonia lintneri*	Corduliidae	NY, NJ, MA, RI, NH.
2—Sandhills clubtail dragonfly	*Gomphus (=Hylogomphus) cerotinus*	Gomphidae	NC, SC.
3B—Riffle clubtail (syn.)	*Gomphus adelphus*[1] *(=G. brevis)*	Gomphidae	MA, NY.
2—Cherokee clubtail dragonfly	*Gomphus consanguis*	Gomphidae	SC, AL, NC, TN, VA.
2—Tennessee clubtail dragonfly	*Gomphus sandrius*	Gomphidae	TN.
2—Septima's clubtail dragonfly	*Gomphus septima*	Gomphidae	AI, NC.
2—Bronze clubtail dragonfly	*Gomphus townesi*	Gomphidae	FL, AL, SC, NC, TN.
2*—Edmund's snaketail dragonfly	*Ophiogomphus edmundo*	Gomphidae	NC*.
2—Midget snaketail dragonfly	*Ophiogomphus howei*	Gomphidae	MA*, NY, PA, VA, KY, NC, TN.
2—Allegheny snaketail dragonfly	*Ophiogomphus incurvatus alleghaniensis*	Gomphidae	WV, VA, AL, TN?.
2—Variegated clubtail dragonfly	*Progomphus bellei*	Gomphidae	FL, NC.
2—Wabash belted skimmer dragonfly	*Macromia wabashensis*	Macromiidae	OH*, IN* TX.
STONEFLIES (Insects, Order Plecoptera)			
2—Lake Tahoe benthic stonefly	*Capnia lacustra*	Capniidae	CA, NV.
3A—Robert's alloperlan stonefly	*Alloperla roberti*	Chloroperlidae	IL*.
2—Schoolhouse Springs leuctran stonefly	*Leuctra szczytkoi*	Leuctridae	LA.
2—Meltwater lednian stonefly	*Lednia tumana*	Nemouridae	MT.
2—Wahkeena Falls flightless stonefly	*Nemoura wahkeena*	Nemouridae	OR.
2—Fender's soliperlan stonefly	*Soliperla fenderi*	Peltoperlidae	WA.
2—Georgia beloneurian stonefly	*Beloneuria georgiana*	Perlidae	GA, NC.
2—Cheaha beloneurian stonefly	*Beloneuria jamesae*	Perlidae	AL.
2—Hanson's appalachian stonefly	*Hansonoperla appalachia*	Perlidae	TN, MA.
2—Leon River taeniopteryx stonefly	*Taeniopteryx starki*	Taeniopterygidae	TX.
GRASSHOPPERS, CRICKETS AND KATYDIDS (Insects, Order Orthoptera)			
2—Idaho point-headed grasshopper	*Acrolophitus pulchellus*	Acrididae	ID.
2—Michigan bog grasshopper	*Appalachia arcana*	Acrididae	MI
2—Siskiyou chloealtis grasshopper	*Chloaeltis aspasma*	Acrididae	OR.
2*—Superb spharagemon grasshopper	*Spharagemon supertum*	Acrididae	TX*, OK*
2—Pinaleno monkey grasshopper	*Eumorsea pinaleno*	Eumastacidae	AZ.
2—Desert monkey grasshopper	*Psychomastix deserticola*	Eumastacidae	CA/NV.
2—Howarth's cave cricket	*Caconemobius howarthi*	Gryllidae	HI
2—Schauinsland's bush cricket	*Caconemobius schauinslandi*	Gryllidae	HI.
2—Kaumana Cave cricket	*Caconemobius varius*	Gryllidae	HI
2—Keys scaly cricket	*Cycloptilum irregularis*	Gryllidae	FL
2*—Prairie mole cricket	*Gryllotalpa major*	Gryllidae	KS*, IL*, MO*, MS*, OK*.
2—Oahu deceptor bush cricket	*Leptogryllus deceptor*	Gryllidae	HI.
2—Laricis tree cricket	*Oecanthus laricis*	Gryllidae	MI/OH.
2—Volcanoes cave cricket	*Thaumatogryllus cavicola*	Gryllidae	HI.
2—Kauai thin-footed bush cricket	*Thaumatogryllus variegatus*	Gryllidae	HI.
2—Arizona giant sand treader cricket	*Daihinibaenetes arizonensis*	Rhaphidophoridae	AZ.
2—Kelso giant sand treader cricket	*Macrobaenetes kelsoensis*	Rhaphidophoridae	CA.
2—Coachella giant sand treader cricket	*Macrobaenetes valgum*	Rhaphidophoridae	CA.
2—Samwell Cave cricket	*Pristoceuthophilus sp.*	Rhaphidophoridae	CA.
2—Tanner's black camel cricket	*Utabaenetes tanneri*	Rhaphidophoridae	UT.
2—Kelso Jerusalem cricket	*Ammopelmatus kelsoensis*	Stenopelmatidae	CA
2—Port Conception Jerusalem cricket	*Ammopelmatus muiri*	Stenopelmatidae	CA.
2—Coachella Valley Jerusalem cricket	*Stenopelmatus cahuilaensis*	Stenopelmatidae	CA.
2—Navajo Jerusalem cricket	*Stenopelmatus navajo*	Stenopelmatidae	AZ.
2—Sierra pygmy grasshopper	*Tetrix sierrana*	Tetrigidae	CA.
2—Torreya pygmy grasshopper	*Tettigidea empedonepia*	Tetrigidae	FL.
2—Nihoa banza conehead katydid	*Banza nihoae*	Tettigoniidae	HI.
2—Big Pine Key conehead katydid	*Belocephalus micanopy*	Tettigoniidae	FL.
2—Keys short-winged conehead katydid	*Belocephalus sloanii*	Tettigoniidae	FL.
3A—Remote conehead katydid	*Conocephaloides remotus*	Tettigoniidae	HI*.
2—Middlekauf's shieldback katydid	*Idiostatus middlekauffi*	Tettigoniidae	CA.
3A—Antioch Dunes shieldback katydid	*Neduba extincta*	Tettigoniidae	CA*.
2—Santa Monica shieldback katydid	*Neduba longipenna*	Tettigoniidae	CA.
COCKROACHES (Insects, Order Blattodea)			
2—Tuna cave roach	*Aspiduchus cavernicola*	Blattidae	PR.
ZOROAPTERANS (Insects, Order Zoroaptera)			
2—Swezey's zoroapteran	*Zorotypus swezeyi*	Zorotypidae	HI.

Category and common name	Scientific name	Family	Distribution
TRUE BUGS (Insects, Order Hemiptera)			
2—Saratoga Springs belostomian bug	*Belostoma saratogae*	Belostomatide	CA.
2—Mauna Loa metrargan seed bug	*Metrarga obscura*	Lygaeidae	HI.
2—Kauai band-legged nesels seed bug	*Nesels alternatus*	Lygaeidae	HI.
2—Mt. Haleakala nesels seed bug	*Nesels haleakalae*	Lygaeidae	HI.
2—Villosan flightless seed bug	*Nesocryptias villosa*	Lygaeidae	HI.
2—French Frigate Shoal nysius seed bug	*Nysius frigatensis*	Lygaeidae	HI.
2—Fullaway's nysius seed bug	*Nysius fullawayi*	Lygaeidae	HI.
2—Necker goosefoot nysius seed bug	*Nysius neckerensis*	Lygaeidae	HI.
2—Nihoa nysius seed bug	*Nysius nihoae*	Lygaeidae	HI.
2—Necker bunchgrass nysius seed bug	*Nysius suffusus*	Lygaeidae	HI.
2—Bryan's oceanides seed bug	*Oceanides bryani*	Lygaeidae	HI.
2—Perkins' oceanides seed bug	*Oceanides perkinsi*	Lygaeidae	HI.
2—Rough-headed oceanides seed bug	*Oceanides rugosiceps*	Lygaeidae	HI.
2—Dry Creek cliff strider bug	*Oravelia pega*	Macrovelidae	CA.
2—Aas water treader bug	*Cavaticovelia aus*	Mesoveliidae	HI.
3A—Phyllostegian leaf bug	*Cyrtopeltis (=Engytatus) phyllostegiae*	Miridae	HI.
2—Lanai kalanian leaf bug	*Kalania hawaiiensis*	Miridae	HI.
2—Oahu kalanian leaf bug	*Kalania* sp. (undescribed)	Miridae	HI.
1—Ash Meadows naucorid bug	*Ambrysus amargosus*	Naucoridae	NV.
2—Amargosa naucorid bug	*Pelocoris shoshone*	Naucoridae	CA, NV.
2—Pulchrus thread bug	*Empicoris pulchrus*	Reduviidae	HI.
2—Ana wingless thread bug	*Nesidiolestes ana*	Reduviidae	HI.
2—Mt. Tantalus wingless thread bug	*Nesidiolestes insularis*	Reduviidae	HI.
2—Robert's wingless thread bug	*Nesidiolestes roberti*	Reduviidae	HI.
2—Selium wingless thread bug	*Nesidiolestes selium*	Reduviidae	HI.
2—Smith's sicellan reduviid bug	*Sicicella smithi*	Reduviidae	HI.
2—Annectans rhopalid bug	*Ithamar annectans*	Rhopalidae	HI.
2—Hawiian rhopalid bug	*Ithamar hawaiiense*	Rhopalidae	HI.
CICADAS AND ALLIES (Insects, Order Homoptera)			
3A—Red-veined prairie leafhopper	*Felsaamia rubranura*	Cicadellidae	IL*.
2—Kauai parti-colored oliarus planthopper	*Oliarus consimilis*	Cixiidae	HI.
2—Oliarus wild cotton planthopper	*Oliarus discrepans*	Cixiidae	HI.
2—Lanai oliarus planthopper	*Oliarus lanaiensis*	Cixiidae	HI.
2—Lihue oliarus planthopper	*Oliarus lihue*	Cixiidae	HI.
2—Barber's Point oliarus planthopper	*Oliarus myoporicola*	Cixiidae	HI.
2—Pholan oliarus planthopper	*Oliarus priola*	Cixiidae	HI.
2—Mt. Tantalus short-wing fern planthopper	*Nesorestias ilicicola*	Delphacidae	HI.
2—Iao Valley nesosydne planthopper	*Nesosydne acuta*	Dphacidae	HI.
2—Bridewell's nesosydne planthopper	*Nesosydne bridwelli*	Dphacidae	HI.
2—Nahuku nesosydne planthopper	*Nesosydne cyrtandrae*	Dphacidae	HI.
2—Glenwood nesosydne planthopper	*Nesosydne cyrtandricola*	Dphacidae	HI.
2—Kusche's nesosydne planthopper	*Nesosydne kuschei*	Dphacidae	HI.
2—Diamond Head nesosydne planthopper	*Nesosydne lashi*	Dphacidae	HI.
2—Long-footed nesosydne planthopper	*Nesosydne longipes*	Dphacidae	HI.
2—Keanae nesosydne planthopper	*Nesosydne sulcata*	Dphacidae	HI.
LACEWINGS AND ALLIES (Insects, Order Neuroptera)			
2—Haleakala nesothauman spongillafly	*Nesothauma haleakalae*	Hemerobiidae	HI.
2—Cookes's pseudopsectran spongillafly	*Pseudopsectra cookeorum*	Hemerobiidae	HI.
2—Lobe-wing pseudopsectran spongillafly	*Pseudopsectra lobipennis*	Hemerobiidae	HI.
2—Swezey's pseudopsectran spongillafly	*Pseudopsectra swezeyi*	Hemerobiidae	HI.
2—Usinger's pseudopsectran spongillafly	*Pseudopsectra usingeri*	Hemerobiidae	HI.
2—(No common Name)	*Oliarces clara*	Ithonidae	CA.
2—Molokai antlion	*Eidoleon perjurus*	Myrmeleontidae	HI.
BEETLES (Insects, Order Coleoptera)			
2—Piko anobiid beetle	*Holcobius pikoensis*	Anobiidae	HI.
2—Antioch Dunes anthicid beetle	*Anthicus antiochensis*	Anthicidae	CA.
2—Sacrameto anthicid beetle	*Anthicus sacramento*	Anthicidae	CA.
2—Beller's ground beetle	*Agonum belleri*	Carabidae	WA.
2—Schaum's Blue Ridge ground beetle	*Sphaerodorus schaumi shenandoah*	Carabidae	VA.
3C—Mojave rabbitbrush longhorn beetle	*Crossidius mojavensis mojavensis*	Cerambycidae	CA.
2—Six-banded longhorn beetle	*Dryobius sexnotatus*	Cerambycidae	MD, MS, OH, PA, AL*, AR*, IN*, KS*, KY*, LA*, MI*, MO*, TN*, VA*.
2—Rude's longhorn beetle	*Necydalis rudei*	Cerambycidae	CA.
2—Hawaiian *Plagithymysus* longhorn beetles	*Plagithymysus* (Genus, about 43 spp.)	Cerambycidae	HI.
2*—Bog idol leaf beetle	*Donacia idola*	Chrysomelidae	WA*.
2—Idaho dunes tiger beetle	*Cicindela arenicola*	Cicindelidae	ID.
2*—Cazier's tiger beetle	*Cicindela cazieri*	Cicindelidae	TX*.
2*—Smyth's tiger beetle	*Cicindela chlorocephala smythi*	Cicindelidae	TX*.
2—Columbia River tiger beetle	*Cicindela columbica*	Cicindelidae	ID, WA, OR*.
2—Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*	Cicindelidae	MA, MD, NY, NJ, RI, PA*.
2*—Oblivious tiger beetle	*Cicindela latesignata obliviosa*	Cicindelidae	CA*.
2—Coral Pink Dunes tiger beetle	*Cicindela limbata albissima*	Cicindelidae	UT.
2—Cobblestone tiger beetle	*Cicindela marginipennis*	Cicindelidae	NH, VT, NY, NJ, OH, PA, WV*, MS.
2—Los Olmos tiger beetle	*Cicindela nevadica olmosa*	Cicindelidae	TX, NM, Mexico?.
2*—Subtropical blue-black tiger beetle	*Circindela nigrocoerula subtropica*	Cicindelidae	TX*.
2*—Neojuvenile tiger beetle	*Cicindela obsoleta neojuvenalis*	Cicindelidae	TX*.
2—Puritan tiger beetle	*Cicindela puritana*	Cicindelidae	MD, CT? MA*, NH*, NH*, VT.
2—Greenest tiger beetle	*Cicindela tranquebarica viridissima*	Cicindelidae	CA.
2—Oahu nesioxes weevil	*Deinocossonus nesiotes*	Curculionidae	HI.
3C—Antioch Dune weevil	*Dysticheus rotundicollis*	Curculionidae	CA.
2—Oahu heteramphus fern weevil	*Heteramphus ficum*	Curculionidae	HI.
2—Nelson's miloderes weevil	*Miloderes nelsoni*	Curculionidae	CA.
2—Rullen's miloderes weevil	*Miloderes rulieni*	Curculionidae	NV.
2—Gifford's nesotocus weevil	*Nesotocus giffordi*	Curculionidae	HI.
2*—Kauai nesotocus weevil	*Nesotocus kauaiense*	Curculionidae	HI*.
2—Munro's nesotocus weevil	*Nesotocus munroi*	Curculionidae	HI.
2—Lange's El Segundo Dune weevil	*Onchobarus langei*	Curculionidae	CA.
2—Windward Chain *Oodemas* weevils	*Oodemas*, 4 spp.	Curculionidae	HI.
2—Blackburn's pentarthrum weevil	*Pentarthrum blackburni*	Curculionidae	HI.

Category and common name	Scientific name	Family	Distribution
2—Obscure pentarthrum weevil	*Pentarthrum obscura*	Curculionidae	HI.
2—Hawaiian *Rhyncogonus* snout beetles	*Rhyncogonus* (Genus, 23 spp.)	Curculionidae	HI.
2—Nihoa stenotrupis weevil	*Stenotrupis pritchardae*	Curculionidae	HI.
2*—Brown-tassel trigonoscuta weevil	*Trigonoscuta brunnotesselata*	Curculionidae	CA*.
2—Dorothy's El Segundo Dune weevil	*Trigonoscuta dorotheae dorotheae*	Curculionidae	CA.
1—Doyen's trigonoscuta dune weevil	*Trigonoscuta doyeni*	Curculionidae	CA.
3A—Fort Ross trigonoscuta weevil	*Trigonoscuta rossi*	Curculionidae	CA*.
3A—Yorba Linda trigonoscuta weevil	*Trigonoscuta yorbalindae*	Curculionidae	CA*.
2—Death Valley agabus diving beetle	*Agabus rumppi*	Dytiscidae	CA, NV?
2*—Fig seed diving beetle	*Desmopachria cenchramis*	Dytiscidae	FL*.
2—Texas cave dytiscid beetle	*Haideoporus texanus*	Dytiscidae	TX.
2*—Elusive hydroporus diving beetle	*Hydroporus elusivus*	Dytiscidae	NH*.
2—Folkerts' hydroporus diving beetle	*Hydroporus folkertsi*	Dytiscidae	AL.
2—Wooly hydroporus diving beetle	*Hydroporus hirsutus*	Dytiscidae	CA.
2—Leech's skyline diving beetle	*Hydroporus leechi*	Dytiscidae	CA.
2—Simple hydroporus diving beetle	*Hydroporus simplex*	Dytiscidae	CA.
2—Spangler's hydroporus diving beetle	*Hydroporus spangleri*	Dytiscidae	UT.
2*—Sulphur Springs hydroporus diving beetle	*Hydroporus sulphurius*	Dytiscidae	AR*.
2—Utah hydroporus diving beetle	*Hydroporus utahensis*	Dytiscidae	UT.
3A—Mono Lake hygrotus diving beetle	*Hygrotus artus*	Dytiscidae	CA*.
2—Curved-foot hygrotus diving beetle	*Hygrotus curvipes*	Dytiscidae	CA.
2—Narrow-foot hygrotus diving beetle	*Hygrotus diversipes*	Dytiscidae	WY.
2—Travertine band-thigh diving beetle	*Hygrotus fontinalis*	Dytiscidae	CA.
2—Sylvan hygrotus diving beetle	*Hygrotus sylvanus*	Dytiscidae	MN, NY*.
2—Hatch's click beetle	*Eanus hatchi*	Elateridae	WA, Canada?
2—Hawaiian *Eopanthes* click beetles	*Eopanthes* (Genus, 17 spp.)	Elateridae	HI.
2—Necker *Ilodacnus* click beetles	*Ilodacnus*, 2 spp.	Elateridae	HI.
2—Wawona riffle beetle	*Atractelmis wawona*	Elmidae	CA.
2—Parker's cylloepus riffle beetle	*Cylloepus parkeri*	Elmidae	AZ.
2—Brownish dubiraphian riffle beetle	*Dubiraphia brunnescens*	Elmidae	CA.
2—Giuliani's dubiraphian riffle beetle	*Dubiraphia giuliani*	Elmidae	CA.
2—Little dubiraphian riffle beetle	*Dubiraphia parva*	Elmidae	OK, LA.
2—Robust dubiraphian riffle beetle	*Dubiraphia robusta*	Elmidae	WI.
2—Dubiraphian riffle beetle (undescribed)	*Dubiraphia* sp. (undescribed)	Elmidae	ME.
2—Stephan's heterelmis riffle beetle	*Heterelmis stephani*	Elmidae	AZ.
2—Marron's San Carlos riffle beetle	*Huleechius marroni carolus*	Elmidae	AZ.
2—Brown's microcylloepus riffle beetle	*Microcylloepus browni*	Elmidae	MT.
2—Brown's optioservus riffle beetle	*Optioservus browni*	Elmidae	AR.
2—Pinnacles optioservus riffle beetle	*Optioservus canus*	Elmidae	CA.
2—Scott optioservus riffle beetle	*Optioservus phaeus*	Elmidae	KS.
2—Devil's Hole warm spring riffle beetle	*Stenelmis calida calida*	Elmidae	NV.
2—Moapa warm springs riffle beetle	*Stenelmis calida moapa*	Elmidae	NV.
2—Douglas stenelmis riffle beetle	*Stenelmis douglasensis*	Elmidae	MI.
2—Gammon's stenelmis riffle beetle	*Stenelmis gammoni*	Elmidae	NC.
2*—Warm spring zaitzevan riffle beetle	*Zaitzeva thermae*	Elmidae	MT*.
2—Beer's false water penny beetle	*Acneus beeri*	Eubriidae	OR.
2—Burnell's false water penny beetle	*Acneus burnelli*	Eubriidae	OR
2—Stark's false water penny beetle	*Alabameubria starki*	Eubriidae	AL.
2—Variegated false water penny beetle	*Dicranopselaphus variegatus*	Eubriidae	IL.
2*—Dohrn's elegant eucnemid beetle	*Paleoxenus dohrni*	Eucnemidae	CA*.
2—Red Hills unique whirligig beetle	*Spangleronectus albiventris*	Gyrinidae	AL.
2—Hungerford's crawling water beetle	*Brychius hungerfordi*	Haliplidae	MI.
2*—Disjunct crawling water beetle	*Haliplus nitens*	Haliplidae	TX*, Canada*.
2—Maureen's gymnocthebius minute moss beetle	*Gymnocthebius maureenae*	Hydraenidae	MS.
2—Maureen's hydraenan minute moss beetle	*Hydraena maureenae*	Hydraenidae	VA.
2—Animas limnebius minute moss beetle	*Limnebius aridus*	Hydraenidae	NM.
2—Texas limnebius minute moss beetle	*Limnebius texanus*	Hydraenidae	TX.
2—Utah Limnebius minute moss beetle	*Limnebius utahensis*	Hydraenidae	UT.
2—Wing-shoulder minute moss beetle	*Ochthebius crassalus*	Hydraenidae	CA.
2—Indiana ochthebius minute moss beetle	*Ochthebius putnamensis*	Hydraenidae	IN.
2—Wilbur Springs minute moss beetle	*Ochthebius reticulatus*	Hydraenidae	CA.
2—Leech's chaetarthria water scavenger beetle	*Chaetarthria leechi*	Hydrophilidae	CA.
2—Utah chaetarthrian water scavenger beetle	*Chaetarthria utahensis*	Hydrophilidae	UT.
2—Arizona cymbiodyta water scavenger beetle	*Cymbiodyta arizonica*	Hydrophilidae	AZ.
2—Ricksecker's water scavenger beetle	*Hydrochara ricksecker*	Hydrophilidae	CA.
2—Seclusive water scavenger beetle	*Paracymus seclusus*	Hydrophilidae	MS.
2—Florida intertidal firefly	*Micronaspis floridana*	Lampyridae	FL.
2—Everglades brownwing firefly	*Photuris brunnipennis floridana*	Lampyridae	FL.
2—Turtle Mound firefly	*Photuris* sp. (undescribed)	Lampyrida	FL.
2—Blind cave leiodid beetle	*Glacicavicola bathysciodes*	Leiodidae	ID.
2—Kauai flightless stag beetle	*Apterocyclus honoluluensis*	Lucanidae	HI.
2—Hopping's blister beetle	*Lytta hoppingi*	Meloidae	CA.
2*—Mojave Desert blister beetle	*Lytta inseperata*	Meloidae	CA*.
2—Anthony blister beetle	*Lytta mirifica*	Meloidae	NM*, Mexico.
2*—Moestan blister beetle	*Lytta moesta*	Meloidae	CA*.
2—Molestan blister beetle	*Lytta molesta*	Meloidae	CA.
2—Morrison's blister beetle	*Lytta morrisoni*	Meloidae	CA.
2—Hawaiian proterhinid beetles	*Proterhinus* (Genus, 72 spp.)	Proterhinidae	HI.
2—Arizona water penny beetle	*Psephenus arizonensis*	Psephenidae	AZ.
2—White Mountains water penny beetle	*Psephenus montanus*	Psephenidae	AZ.
2—Ciervo aegialian scarab beetle	*Aegialia concinna*	Scarabaeidae	CA.
2—Crescent-Dune aegialian scarab beetle	*Aegialia crescenta*	Scarabaeidae	NV.
2—Hardy's aegialian scarab beetle	*Aegialia hardyi*	Scarabaeidae	NV.
2—Large aegialian scarab beetle	*Aegialia magnifica*	Scarabaeidae	NV.
2*—Exiguous anomala scarab beetle	*Anomala exigua*	Scarabaeidae	FL*.
2—Archbold anomala scarab beetle	*Anomala eximia*	Scarabaeidae	FL.
2*—Tibial anomala scarab beetle	*Anomala tibialis*	Scarabaeidae	TX*.
2—Ford's aphodius scarab beetle	*Aphodius fordi*	Scarabaeidae	GA.
2—Aphodius tortoise commensal scarab beetle	*Aphodius troglodytes*	Scarabaeidae	FL, SC.
2—Big Pine Key ataenius dung beetle	*Ataenius superficialis*	Scarabaeidae	FL.
2—Woodruff's ataenius dung beetle	*Ataenius woodruffi*	Scarabaeidae	FL.
2—Copris tortoise commensal scarab beetle	*Copris gopheri*	Scarabaeidae	FL.
2*—Miami roundhead scarab beetle	*Cyclocephala miamiensis*	Scarabaeidae	FL*.
2—Kelso Dune glaresis scarab beetle	*Glaresis arenata*	Scarabaeidae	CA.

Category and common name	Scientific name	Family	Distribution
2—Spiny Florida sandhill scarab beetle	*Gronocarus multispinosus*	Scarabaeidae	FL.
2—White sand bear scarab beetle	*Lichnanthe albopilosa*	Scarabaeidae	CA.
2—Pacific sand bear scarab beetle	*Lichnanthe ursina*	Scarabaeidae	CA.
2—Scrub Island burrowing scarab beetle	*Mycotrupes pedester*	Scarabaeidae	FL.
2—Onthophagus tortoise commensal scarab beetle	*Onthophagus polyphemi*	Scarabaeidae	SC, GA, FL, AL, MS.
2—Ocala burrowing scarab beetle	*Peltotrupes youngi*	Scarabaeidae	FL.
2—Wooly Gulf dune scarab beetle	*Polylamina pubescens*	Scarabaeidae	FL.
2—Saline Valley snow-front scarab beetle	*Polyphylla anteronivea*	Scarabaeidae	CA.
2—Spotted Warner Valley Dunes scarab beetle	*Polyphylla avittata*	Scarabaeidae	UT.
2—Barbate polyphyllan scarab beetle	*Polyphylla barbata*	Scarabaeidae	CA.
2—Atascadero polyphyllan scarab beetle	*Polyphylla nubila*	Scarabaeidae	CA.
2—Andrews' dune scarab beetle	*Pseudocotalpa andrewsi*	Scarabaeidae	CA, Mexico.
2—Giuliani's dune scarab beetle	*Pseudocotalpa giulianii*	Scarabaeidae	NV.
2—Frost's spring serican scarab beetle	*Serica frosti*	Scarabaeidae	FL.
2*—Tantula serican scarab beetle	*Serica tantula*	Scarabaeidae	FL.
2—Scrub palmetto flower scarab beetle	*Trigonopelastes floridana*	Scarabaeidae	FL.
2—Caracara commensal scarab beetle	*Trox howelli*	Scarabaeidae	FL.
2—American burying beetle	*Nicrophorus americanus*	Silphidae	KY, IN, MI, MO, RI, Canada, AL*, AR*, CT*, DC*, FL*, GA*, IA*, IL*, KS*, LA*, MD*, MA*, MN*, MS*, NH*, NJ*, NY*, NC*, OH*, PA*, SC*, SD*, TN*, TX*, VA*, WI*.
2—Black lordithon rove beetle	*Lordithon niger*	Staphylinidae	MO, Canada, AR*, CT*, DC*, GA*, IL*, KS*, KY*, MI*, NY*, NC*, OH*, PA*, TX*, VA*, WV*.
2—Globose dune beetle	*Coelus globosus*	Tenebrinoidae	CA, Mexico.
* 2—San Joaquin dune beetle	*Coelus gracilis*	Tenebrionidae	CA.
FLIES (Insects, Order Diptera)			
2—Mary Alice's small-headed fly	*Eulonchus marialiciae*	Acroceridae	NC.
3A—Valley mydas fly	*Raphiomydas trochilus*	Apioceratidae	CA*.
2*—Antioch cophuran robberfly	*Cophura hurdi*	Asilidae	CA*.
2—Antioch efferian robberfly	*Efferia antiochi*	Asilidae	CA.
2—Hurd's metapogon robberfly	*Metapogon hurdi*	Asilidae	CA.
2—Nihoa two-spotted asterid fly	*Bryania bipunctata*	Asteriidae	HI.
3A—Ko'olau spurwing long-legged fly	*Campsicnemus mirabilis*	Dolichopodidae	HI*.
3A—Lanai pomace fly	*Drosophila lanaiensis*	Drosophilidae	HI*.
3A—Hawaiian chersodromian dance fly	*Chersodromia hawaiiensis*	Empididae	HI*.
2—Wilber Springs shore fly	*Parscoenia calida*	Ephydridae	CA.
2—Sugarfoot moth fly	*Nemopalpus nearcticus*	Psychodidae	FL.
2—Delong's mixogaster flower fly	*Mixogaster delongi*	Syrphidae	FL.
2*—Ross's apetaiestes tabanid fly	*Apetaiestes rossi*	Tabanidae	CA*.
2—Florida asaphomyian tabanid fly	*Asaphomyia floridensis*	Tabanidae	FL.
2*—Texas asaphomyian tabanid fly	*Asaphomyia texanus*	Tabanidae	TX*.
2—Belkin's dune tabanid fly	*Brennania belkini*	Tabanidae	CA, Mexico.
2—Brown merycomyian tabanid fly	*Merycomyia brunnea*	Tabanidae	FL.
3A—Volutine stonemyian tabanid fly	*Stonemyia volutina*	Tabanidae	CA*.
BUTTERFLIES AND MOTHS (Insects, Order Lepidoptera)			
3A—Chestnut ermine moth	*Argyresthia castaneela*	Argyresthiidae	NH* VT*.
2—Green heterocrossan carposinid moth	*Heterocrossa viridis*	Carposinidae	HI.
3A—Chestnut case-bearer moth	*Coleophora leucochrysella*	Coleophoridae	PA*.
2—Ioxanthan looper moth	*Fletcherarna ioxantha*	Geometridae	HI.
3A—Kona giant looper moth	*Scotorythra megalophylla*	Geometridae	HI*.
3A—Ko'olau giant looper moth	*Scotorythra nesiotes*	Geometridae	HI*.
3A—Hawaiian hopseed looper moth	*Scotorythra paratactis*	Geometridae	HI*.
3A—'Ola'a peppered looper moth	*Trifocleis microphylla*	Geometridae	HI*.
2—Necker petrochroan leaf miner moth	*Petrochroa neckerensis*	Gracilariidae	HI*.
2—Dakota skipper butterfly	*Hesperia dacotae*	Hesperiidae	MN, IA, SD, ND, IL*, Canda.
1—North Platte montane skipper butterfly	*Hesperia leonardus* (=*pawnee*) *montana*	Hesperiidae	CO.
2—Salt marsh skipper butterfly	*Panoquina panoquinoides errans*	Hesperiidae	CA, Mexico.
2—Rare skipper	*Problema bulenta*	Hesperiidae	MD, VA, NC, SC, GA.
2—Wandering skipper	*Pseudocopaeodes eunus eunus*	Hesperiidae	CA, NV?, AZ?, Mexico?.
2—Atala butterfly	*Eumaeus atala florida*	Lycaenidae	FL.
2—Comstock's blue butterfly	*Euphilotes* (=*Shijimiaeoides* =*Philotes*) *battioides comstocki.*	Lycaenidae	CA.
2—Langston's blue butterfly	*Euphilotes* (=*Shijimiaeoides*) *langstoni langstoni*	Lycaenidae	CA.
2—Mattoni's blue butterfly	*Euphilotes* (=*Shijimiaeoides*) *rita mattoni*	Lycaenidae	NV.
3A—Xerces blue butterfly	*Glaucopsyche xerces*	Lycaenidae	CA*.
2—Miami blue butterfly	*Hemiargus thomasi bethune-bakeri*	Lycaenidae	FL.
2—Moro Bay blue butterfly	*Icaricia icarioides morroensis*	Lycaenidae	CA.
3A—Pheres blue butterfly	*Icaricia icarioides pheres*	Lycaenidae	CA*.
3C—Bog elfin butterfly	*Incisalia* (=*Callophrys* =*Mitoura*) *lanoraieensis*	Lycaenidae	CA.
3C—Wind's elfin butterfly	*Incisalia* (=*Callophrys* =*Mitoura*) *mossi windi*	Lycaenidae	CA.
3C—Doudoroff's elfin butterfly	*Incisalia* (=*Callophrys* =*Mitoura*) *mossi doudoroffi*	Lycaenidae	CA.
2—Karner blue butterfly	*Lycaeides melissa samuelis*	Lycaenidae	NY, NH, IN, MI, WI, MA*, PA*.
3C—Clouded tailed copper butterfly	*Lycaena arota nubila*	Lycaenidae	CA.
2—Clayton's copper butterfly	*Lycaena dorcas claytoni*	Lycaenidae	ME.
2—Hermes copper butterfly	*Lycaena hermes*	Lycaenidae	CA, MEX.
3C—Hessel's hairstreak butterfly	*Mitoura* (=*Callophrys*) *hesseli*	Lycaenidae	NH, MA, NJ, MD, VA, NC, GA, FL.
2—Boharts' blue butterfly	*Philotiella* (=*Zizeeria*) *speciosa boharlorum*	Lycaenidae	CA.
2—San Emigdio blue butterfly	*Plebulina* (=*Plebejus*) *emigdionis*	Lycaenidae	CA.
2—Bartram's hairstreak butterfly	*Strymon acis bartrami*	Lycaenidae	FL.
3C—Hawaiian hairstreak butterfly	*Vaga blackburni*	Lycaenidae	HI.
3C—Kendall's yucca skipper butterfly	*Magathymus coloradensis kendalli*	Magathymidae	TX.
2—Maculated manfreda skipper butterfly	*Stallingsia maculosus*	Magathymidae	TX.
3A—American chestnut nepticulid moth	*Ectodemia castaneae*	Nepticulidae	MD*.
3A—Phleophagan chestnut nepticulid moth	*Ectodemia phleophaga*	Nepticulidae	MD*.
2—Albarufan dagger moth	*Acronicta albarufa*	Noctuidae	MA*, GA*, NJ*, CT*, NY*, PA*, OH*, CO*, NM*, Canada*.
3A—"Poko" noctuid moth	*Agrotis crinigera*	Noctuidae	HI*.
3A—Midway agrotis noctuid moth	*Agrotis fasciata*	Noctuidae	HI*.
3A—Kern's agrotis noctuid moth	*Agrotis kerri*	Noctuidae	HI*.
3A—Laysan agrotis noctuid moth	*Agrotis laysanensis*	Noctuidae	HI*.
3A—Procellans agrotis noctuid moth	*Agrotis procellaris*	Noctuidae	HI*.

Category and common name	Scientific name	Family	Distribution
2—Marbled underwing moth	*Catocala marmorata*	Noctuidae	NC, SC, VT*, NY*, NJ*, PA*, VA*, KY*, IN*, IL*, MO*.
2—Precious underwing moth	*Catocala preciosa*	Noctuidae	NJ, NH*, CT*, MA*, NY*, PA*, MD*, VA*, TN*.
2—Hebard's noctuid moth	*Erythroecia hebardi*	Noctuidae	NJ, VA.
3A—Confused helicoverpan noctuid moth	*Helicoverpa confusa*	Noctuidae	HI*.
3A—Minute helicoverpan noctuid moth	*Helicoverpa minuta*	Noctuidae	HI*.
3A—Laysan dropseed noctuid moth	*Hypena laysanensis*	Noctuidae	HI*.
3A—Hilo hyperan noctuid moth	*Hypena newelli*	Noctuidae	HI*.
3A—Lovegrass noctuid moth	*Hypena plagiota*	Noctuidae	HI*.
3A—Kahoiuamano noctuid moth	*Hypena senicula*	Noctuidae	HI*.
2—Lemmer's noctuid moth	*Lithophane lemmeri*	Noctuidae	CT, NJ, NC, SC.
2—Ceromatic noctuid moth	*Pyreferra ceromatica*	Noctuidae	FL, SC, ME, AL, IN, Canada.
2—Florida leafwing butterfly	*Anaea floridalis*	Nymphalidae	FL.
1—Uncompahgre fritillary butterfly	*Boloria acrocnema*	Nymphalidae	CO.
3C—Alamosa satyr butterfly	*Cercyonis meadi alamosa*	Nymphalidae	CO.
3A—Sthenele wood nymph butterfly	*Cercyonis sthenele sthenele*	Nymphalidae	CA*.
1—Bay checkerspot butterfly	*Euphydryas editha bayensis*	Nymphalidae	CA.
2—Mono checkerspot butterfly	*Euphydryas editha monoensis*	Nymphalidae	CA/NV.
3C—Wright's checkerspot butterfly	*Euphydryas editha wrighti*	Nymphalidae	CA.
3C—Obsolete viceroy butterfly	*Limenitis archippus obsoletus*	Nymphalidae	AZ, CA, NM, NV, Mexico.
3C—Mitchell satyr butterfly	*Neonympha (=Euptychia) mitchellii*	Nymphalidae	MI, NJ, OH*.
3C—Chryxus arctic butterfly	*Oeneis chryxus valerata*	Nymphalidae	WA.
2—Tawny crescent butterfly	*Phyciodes batesi*	Nymphalidae	NC, VA, NY, OH, MI, WI, ND, SD, CO, MN, Canada, GA*, WV*, PA*, NJ*.
3C—Minute checkerspot butterfly	*Poladryas minuta*	Nymphalidae	TX.
2—Smoky eyed brown butterfly	*Satyrodes eurydice fumosa*	Nymphalidae	IL, IA, NE, CO*.
3C—Unsilvered fritillary butterfly	*Speyeria adiaste adiaste*	Nymphalidae	CA.
3A—Atossa fritillary butterfly	*Speyeria adiaste atossa*	Nymphalidae	CA*.
3C—Clemence's fritillary butterfly	*Speyeria adiaste clemencei*	Nymphalidae	CA.
2—Calippe silverspot butterfly	*Speyeria callipe callipe*	Nymphalidae	CA.
3C—Tehachapi Mountain silverspot butterfly	*Speyeria egleis tehachapina*	Nymphalidae	CA.
2*—Hydaspe fritillary butterfly	*Speyeria hydaspe conquista*	Nymphalidae	CO, NM.
2—Regal fritillary butterfly	*Speyeria idalia*	Nymphalidae	ME*, NH*, MA, RI, NY, NJ, MD, DE, VA, NC*, WV, PA, OH, IN, MI, IL, MO, MN, WI, IA, OK, KS, NE, SD, ND, CO, MT, Canada.
3C—Apache silverspot butterfly	*Speyeria nokomis apacheana*	Nymphalidae	CA/NV.
2—Blue silverspot butterfly	*Speyeria nokomis caerulescens*	Nymphalidae	AZ*, Mexico.
3B—Blue-black silverspot butterfly	*Speyeria nokomis nigrocaerulea*	Nymphalidae	AZ, NM.
3C—Mountain silverspot butterfly	*Speyeria nokomis nitocris*	Nymphalidae	AZ, NM, CO.
2—Great basin silverspot butterfly	*Speyeria nokomis nokomis*	Nymphalidae	CO, UT.
2—Behren's silverspot butterfly	*Speyeria zerene behrensii*	Nymphalidae	CA.
2—Myrtle's silverspot butterfly	*Speyeria zerene myrtleae*	Nymphalidae	CA.
2—Henne's eucosman moth	*Eucosma hennei*	Olethreutidae	CA.
2—San Francisco tree lupine moth	*Grapholita edwardsiana*	Olethreutidae	CA.
3A—Strohbeen's parnassian butterfly	*Parnassius clodius strohbeeni*	Papilionidae	CA*.
2—Bush's gall moth	*Carolella busckana*	Phaloniidae	CA.
3C—Catalina orange tip butterfly	*Anthocharis cethura cataline*	Pieridae	CA.
2—Andrew's marble butterfly	*Euchloe hyantis andrewsi*	Pieridae	CA.
3C—Helios yellow butterfly	*Eurema dina helios*	Pieridae	CA.
2*—Molokai sedge hedyleptan moth	*Hedylepta anastrepta*	Pieridae	PR, Caribbean.
2—Kohala Mountain sedge hedyleptan moth	*Hedylepta anastreptoides*	Pyralidae	HI*.
2*—'Ohe hedyleptan moth	*Hedylepta asaphombra*	Pyralidae	HI.
3A—Oahu swamp hedyleptan moth	*Hedylepta epicentra*	Pyralidae	HI*.
2*—Ola'a banana hedeleptan moth	*Hedylepta euryprora*	Pyralidae	HI*.
2*—Fullaway's banana hedyleptan moth	*Hedylepta futilawayi*	Pyralidae	HI*.
2*—Gifford's 'ohe hedyleptan moth	*Hedylepta gifferdi*	Pyralidae	HI*.
2*—Kilauea pa'iniu hedyleptan moth	*Hedylepta iridias*	Pyralidae	HI*.
3A—Laysan hedyleptan moth	*Hedylepta laysanensis*	Pyralidae	HI*.
2*—Meyrick's banana hedyleptan moth	*Hedylepta meyricki*	Pyralidae	HI*.
2*—Hawaiian bean leafroller moth	*Hedylepta monogona*	Pyralidae	HI*.
2*—Maui banana hedyleptan moth	*Hedylepta musicola*	Pyralidae	HI*.
2*—Hawaiian lo'utu hedeleptan moth	*Hedylepta pritchardi*	Pyralidae	HI*.
3A—Telegraphic hedyleptan moth	*Hedylepta telegrapha*	Pyralidae	HI*.
2—Blue margaronian moth	*Margaronia cyanomichla*	Pyralidae	HI.
2—Green margaronian moth	*Margaronia exaula*	Pyralidae	HI.
2—'Ohenaupaka oeobian moth	*Oeobia dryadopa*	Pyralidae	HI.
2*—Chestnut cleanwing moth	*Symanthedon castaneae*	Sesiidae	VA*, PA*, SC*, ME*, MS*, NY*.
1—Weist's sphinx moth	*Euproserpinus wiesti*	Sphingidae	CO, NM*.
3A—Blackburn's sphinx moth	*Manduca blackburni*	Sphingidae	HI*.
3A—Fabulous green sphinx of Kauai	*Tinostoma smaragditis*	Sphingidae	HI*.
3A—Chestnut leaf miner moth	*Tischeria perplexa*	Tischeriidae	VA*.
2—'Ohe'ohe leaf roller moth	*Sphoterista oheoheana*	Tortricidae	HI.
2—Green-banded 'ohe'ohe leaf-roller moth	*Sphelerista pterotropiana*	Tortricidae	HI.
2—Wailupe leaf-roller moth	*Sphelerista reynoldsiana*	Tortricidae	HI.
CADDISFLIES (Insects, Order Trichoptera)			
2—Mt. Hood primitive brachycentrid caddisfly	*Eobrachycentrus gelidae*	Barchycentridae	OR.
2—Artesian agapetus caddisfly	*Agapetus artesus*	Glossosomatidae	MO.
2*—Denning's agapetus caddisfly	*Agapetus denningi*	Glossosomatidae	OR*.
2—Arkansas agapetus caddisfly	*Agapetus medicus*	Glossosomatidae	AR.
2—San Marcos protoptilan caddisfly	*Protoptila arca*	Glossosomatidae	TX.
2—Flint's cheumatopsyche caddisfly	*Cheumatopsyche flinti*	Hydropsychidae	TX.
2—Helma's cheumatopsyche caddisfly	*Cheumatopsyche helma*	Hydropsychidae	TN.
2—Vannote's cheumatopsyche caddisfly	*Cheumatopsyche vannotei*	Hydropsychidae	PA.
2—California diplectronan caddisfly	*Diplectrona californica*	Hydropsychidae	CA.
2—Schuh's homoplectran caddisfly	*Homoplectra schuhi*	Hydropsychidae	OR.
2—Buffalo Springs caddisfly	*Hydropsyche etnieri*	Hydropsychidae	TN
2—Abelian hydropsyche caddisfly	*Hydropsyche reiseni*	Hydropsychidae	OR.
2—Reisen's hydropsyche caddisfly	*Hydropsyche reiseni*	Hydropsychidae	OK.
2*—King's Creek parapsyche caddisfly	*Parapsyche extensa*	Hydropsychidae	CA*.
2—Knoxville hydroptilan micro caddisfly	*Hydroptila decia*	Hydroptilidae	TN.
2—Kite's neotrichan micro caddisfly	*Neotrichia kitae*	Hydroptilidae	MO.
2—Alsea ochrotrichan micro caddisfly	*Ochrotrichia alsea*	Hydroptilidae	OR.
2—Contorted ochrotrichan micro caddisfly	*Ochrotrichia contorta*	Hydroptilidae	MO, AR.

Category and common name	Scientific name	Family	Distribution
2—Deschutes ochrotrichian micro caddisfly	*Ochrotrichia phenosa*	Hydroptilidae	OR*, CA.
2—Provost's ochrotrichian micro caddisfly	*Ochrotrichia provosti*	Hydroptilidae	FL.
2—Vertrees's ochrotrichian micro caddisfly	*Ochrotrichia vertreesi*	Hydroptilidae	OR, CA.
2—Florida oxyethiran micro caddisfly	*Oxyethira florida*	Hydroptilidae	FL.
2—Fischer's lepidostoman caddisfly	*Lepidostoma fischeri*	Lepidostomatidae	OR.
2—Goeden's lepidostoman caddisfly	*Lepidostoma goedeni*	Lepidostomatidae	OR.
2—Vertrees's ceraclean caddisfly	*Ceraclea (=Athripsodes) vertreesi*	Leptoceridae	OR.
2*—Florida ceraclean longhorn caddisfly	*Ceraclea floridana*	Leptoceridae	FL*.
2*—Little oecetis longhorn caddisfly	*Oecetis parva*	Leptoceridae	FL*.
3A—Athens triaenodes caddisfly	*Triaenodes phalacris*	Leptoceridae	OH*.
2*—Three-tooth triaenodes caddisfly	*Triaenodes tridonta*	Leptoceridae	OK*, FL*.
2—Cascades apatanian caddisfly	*Apatania (=Radema) tavala*	Limnephilidae	OR.
2—Kings Canyon cryptochian caddisfly	*Cryptochia excella*	Lemnephilidae	CA.
2—Blue Mountains cryptochian caddisfly	*Cryptochia nidosa*	Limnephilidae	OR.
2—King's Creek ecclisomyian caddisfly	*Ecclisomyia bilera*	Limnephilidae	CA.
2*—Green Springs Mountain farulan caddisfly	*Farula davisi*	Limnephilidae	OR*.
2—Mt. Hood farulan caddisfly	*Farula jewetti*	Limnephilidae	OR.
2—Tombstone Prairie farulan caddisfly	*Farula reaperi*	Limnephilidae	OR.
2—Missouri Glyphopsyche caddisfly	*Glyphopsyche missouri*	Limnephilidae	MO.
2—Klamath limnephilan caddisfly	*Limnephilus alconura*	Limnephilidae	OR.
2—Fort Dick limnephilus caddisfly	*Limnephilus atercus*	Limnephilidae	CA, OR.
2—Columbus gorge neothremman caddisfly	*Neothremma andersoni*	Limnephilidae	OR.
2—Tombstone Prairie oligophlebodes caddisfly	*Oligophlebodes mostbento*	Limnephilidae	OR.
2*—Clatsop philocascan caddisfly	*Philocasca oron*	Limnephilidae	OR*.
3B—(No common name)	*Psilotreta hansoni*	Odontoceridae	MA.
2—Oregon dolophilodas caddisfly	*Dolophilodes (=Sortosa) oregona*	Philoptamidae	OR.
2—Carlson's polycentropus caddisfly	*Polycentropus carlsoni*	Polycentropodidae	SC.
2—Nearctic paduniellan caddisfly	*Paduniella nearctica*	Psychomyidae	AR.
2—Siskiyou caddisfly	*Tinodes siskiyou*	Psychomyiidae	OR.
2—Alexander's rhyacophilan caddisfly	*Rhyacophila alexanderi*	Rhyacophilidae	MT.
3A—Castle Lake rhyacophilan caddisfly	*Rhyacophila amabilis*	Rhyacophilidae	CA*.
2—Obrien rhyacophilan caddisfly	*Rhyacophila colonus*	Rhyacophilidae	OR.
2—Fender's rhyacophilan caddisfly	*Rhyacophila fenderi*	Rhyacophilidae	OR.
2—Haddock's rhyacophilan caddisfly	*Rhyacophila haddocki*	Rhyacophilidae	OR.
2—Castle Crags rhyacophilan caddisfly	*Rhyacophila lineata*	Rhyacophilidae	CA.
2—Bilobed rhyacophilan caddisfly	*Rhyacophila mosana*	Rhyacophilidae	CA.
2—Spiny rhyacophilan caddisfly	*Rhyacophila spinata*	Rhyacophilidae	CA.
2—One-spot rhyacophilan caddisfly	*Rhyacophila unipunctata*	Rhyacophilidae	OR.
2—Zigzag blackwater caddisfly	*Agarodes ziczac*	Sericostomatidae	FL.
ANTS, BEES AND WASPS (Insects, Order Hymenoptera)			
2*—Yellow-banded andrenid bee	*Perdita hirticeps luteocincta*	Andrenidae	CA*.
2—Antioch andrenid bee	*Perdita scitula antiochensis*	Andrenidae	CA.
2—Nihoa sclerodermus wasp	*Sclerodermus nihoaensis*	Bethylidae	HI.
2—Nihoa eupelmus wasp	*Eupelmus nihoaensis*	Eupelmidae	HI.
2*—Assimulans yellow-faced bee	*Nesoprosopis assimulans*	Hylaeidae	HI*.
2*—Andrenoid yellow-faced bee	*Nesoprosopis andrenoides*	Hylaeidae	HI*.
3A—Lanai yellow-faced bee	*Nesoprosopis angustula*	Hylaeidae	HI*.
2—Anomalous yellow-faced bee	*Nesoprosopis anomala*	Hylaeidae	HI.
2*—Anthricinan yellow-faced bee	*Nesoprosopis anthricina*	Hylaeidae	HI*.
3A—Blackburn's yellow-faced bee	*Nesoprosopis blackburni*	Hylaeidae	HI*.
2*—Bluewing yellow-faced bee	*Nesoprosopis caeruleipennis*	Hylaeidae	HI*.
2*—Chlorosticlan yellow-faced bee	*Nesoprosopis chlorosticta*	Hylaeidae	HI*.
2*—Comes yellow-faced bee	*Nesoprosopis comes*	Hylaeidae	HI*.
2*—Conehead yellow-faced bee	*Nesoprosopis coniceps*	Hylaeidae	HI*.
3A—Connected yellow-faced bee	*Nesoprosopis connectens*	Hylaeidae	HI*.
2*—Crabronoid yellow-faced bee	*Nesoprosopis crabronoides*	Hylaeidae	HI*.
2*—Difficult yellow-faced bee	*Nesoprosopis difficilis*	Hylaeidae	HI*.
2*—Dimidiatan yellow-faced bee	*Nesoprosopis dimidiata*	Hylaeidae	HI*.
3A—Erythrodeme yellow-faced bee	*Nesoprosopis erythrodemas*	Hylaeidae	HI*.
2*—Easy yellow-faced bee	*Nesoprosopis facilis*	Hylaeidae	HI*.
2*—Fern yellow-faced bee	*Nesoprosopis filicum*	Hylaeidae	HI*.
3A—Finitiman yellow-faced bee	*Nesoprosopis finitima*	Hylaeidae	HI*.
2—Very yellow-faced bee	*Nesoprosopis flavifrons*	Hylaeidae	HI.
2*—Yellow-foot yellow-faced bee	*Nesoprosopis flavipes*	Hylaeidae	HI*.
2—Darkwing yellow-faced bee	*Nesoprosopis fuscipennis*	Hylaeidae	HI.
2*—Shadowfoot darkwing yellow-faced bee	*Nesoprosopis fuscipennis obscuripes*	Hylaeidae	HI*.
2*—Haleakala yellow-faced bee	*Nesoprosopis haleakalae*	Hylaeidae	HI*.
3A—Hilaris yellow-faced bee	*Nesoprosopis hilaris*	Hylaeidae	HI*.
2*—Hirsute yellow-faced bee	*Nesoprosopis hirsutula*	Hylaeidae	HI*.
3A—Monocolor yellow-faced bee	*Nesoprosopis homeochroma*	Hylaeidae	HI*.
2*—Hostile yellow-faced bee	*Nesoprosopis hostilis*	Hylaeidae	HI*.
2*—Hutan yellow-faced bee	*Nesoprosopis hula*	Hylaeidae	HI*.
2*—Insignis yellow-faced bee	*Nesoprosopis insignis*	Hylaeidae	HI*.
2*—Kauai yellow-faced bee	*Nesoprosopis kauaensis*	Hylaeidae	HI*.
2*—Koa yellow-faced bee	*Nesoprosopis koae*	Hylaeidae	HI*.
2*—Kona yellow-faced bee	*Nesoprosopis kona*	Hylaeidae	HI*.
2*—Laetan yellow-faced bee	*Nesoprosopis laeta*	Hylaeidae	HI*.
3A—Broadhead yellow-faced bee	*Nesoprosopis laticeps*	Hylaeidae	HI*.
2*—Longhead yellow-faced bee	*Nesoprosopis longiceps*	Hylaeidae	HI*.
3A—Maui yellow-faced bee	*Nesoprosopis mauiensis*	Hylaeidae	HI*.
3A—Melanothrix yellow-faced bee	*Nesoprosopis melanothrix*	Hylaeidae	HI*.
3A—Mutatan yellow-faced bee	*Nesoprosopis mutata*	Hylaeidae	HI*.
3A—Molokai yellow-faced bee	*Nesoprosopis neglecta*	Hylaeidae	HI*.
3A—Snowy yellow-faced bee	*Nesoprosopis nivalis*	Hylaeidae	HI*.
2*—Obscuratan yellow-faced bee	*Nesoprosopis obscurata*	Hylaeidae	HI*.
2*—Ombrias yellow-faced bee	*Nesoprosopis ombrias*	Hylaeidae	HI*.
3A—Pele yellow-faced bee	*Nesoprosopis pele*	Hylaeidae	HI*.
2—Perkin's yellow-faced bee	*Nesoprosopis perkinsiana*	Hylaeidae	HI*.
3A—Perspicuan yellow-faced bee	*Nesoprosopis perspicua*	Hylaeidae	HI*.
3A—Psammobian yellow-faced bee	*Nesoprosopis psammobia*	Hylaeidae	HI*.
2*—Furry yellow-faced bee	*Nesoprosopis pubescens*	Hylaeidae	HI*.
2*—Redtail yellow-faced bee	*Nesoprosopis rubrocaudatus*	Hylaeidae	HI*.

Category and common name	Scientific name	Family	Distribution
3A—Ruguiose yellow-faced bee	*Nesoprosopis rugulosa*	Hylaeidae	HI*.
2*—Satellus yellow-faced bee	*Nesoprosopis satellus*	Hylaeidae	HI*.
2*—Bristlefront yellow-faced bee	*Nesoprosopis setosifrons*	Hylaeidae	HI*.
2*—Simple yellow-faced bee	*Nesoprosopis simplex*	Hylaeidae	HI*.
2*—Specular yellow-faced bee	*Nesoprosopis specularis*	Hylaeidae	HI*.
2*—Sphecodoid yellow-faced bee	*Nesoprosopis sphecodoides*	Hylaeidae	HI*.
2*—Unique yellow-faced bee	*Nesoprosopis unica*	Hylaeidae	HI*.
2*—Vicinan yellow-faced bee	*Nesoprosopis vicina*	Hylaeidae	HI*.
2—Volatile yellow-faced bee	*Nesoprosopis volatilis*	Hylaeidae	HI*.
2—Anticoh mutillid wasp	*Myrmosula (Myrmosa) pacifica*	Mutillidae	CA.
2—Hawaiian deinomimesan sphecid wasp	*Deinomimesa hawaiiensis*	Shpecidae	HI.
2—Puna deinomimesan sphecid wasp	*Deinomimesa punae*	Sphecidae	HI.
2—Giffard's ectemnius sphecid wasp	*Ectemnius (=Nesocrabo) giffardi*	Sphecidae	HI.
2—Short-foot ectemnius sphecid wasp	*Ectemnius (=Oreocrabro) curtipes*	Sphecidae	HI.
2—Haleakala ectemnius sphecid wasp	*Ectemnius (=Oreocrabro) haleakalae*	Sphecidae	HI.
2—Brown cross ectemnius sphecid wasp	*Ectemnius (=Orocrabro) fulvicrus*	Sphecidae	HI.
2—Bidecoratus sphecid wasp	*Ectemnius nesocrabo bidecoratus*	Sphecidae	HI.
2—Redheaded sphecid wasp	*Eucerceris ruficeps*	Sphecidae	CA*, NV.
2—Kauai nesomimesan sphecid wasp	*Nesomimesa kauaiensis*	Sphecidae	HI.
2—Shade-winged nesomimesan sphecid wasp	*Nesomimesa sciopteryx*	Sphecidae	HI.
2*—Antioch sphecid wasp	*Philanthus nasalis*	Sphecidae	CA*.
2—Niihau odynerus vespid wasp	*Odynerus niihauensis*	Vespidae	HI.
2—Soror odynerus vespid wasp	*Odynerus soror*	Vespidae	HI.
SNAILS (Molluscs, Class Gastropoda)			
2—(No common name)	*Valvata utahensis* Call, 1884	Valvatidae	ID, UT.
3B—Newcomb's littorine snail	*Algamorda newcombiana* Hemphill, 1877	Littorinidae	CA, WA, OR.
2—St. George snail	*Amnicola deserta* Pilsbry, 1916	Hydrobiidae	UT.
2—(No common name)	*Aphaostracon asthenes* Thompson, 1968	Hydrobiidae	FL.
2—(No common name)	*Aphaostracon monas* (Pilsbry, 1899)	Hydrobiidae	FL.
2—Compact hydrobe snail	*Aphaostracon pycnus* Thompson, 1968	Hydrobiidae	FL.
2—Fenney Spring hydrobe snail	*Aphaostracon xynoelictus* Thompson, 1968	Hydrobiidae	FL.
2—Helicoid spring snail	*Cincinnatia helicogyra* Thompson, 1968	Hydrobiidae	FL.
2—(No common name)	*Cincinnatia mica* Thompson, 1968	Hydrobiidae	FL.
2—(No common name)	*Cincinnatia monroensis* (Dall, 1885)	Hydrobiidae	FL.
2—(No common name)	*Cincinnatia parva* Thompson, 1968	Hydrobiidae	FL.
2—Ponderous spring snail	*Cincinnatia ponderosa* Thompson, 1968	Hydrobiidae	FL.
2—Seminole Spring snail	*Cincinnatia vanhyningi* (Vanatta, 1934)	Hydrobiidae	FL.
2—Wekiwa Spring snail	*Cincinnatia wekiwae* Thompson, 1968	Hydrobiidae	FL.
2—Phantom cave snail	*Cochliopa texana* Pilsbry, 1935	Hydrobiidae	TX.
2—Muddy Valley turban snail	*Fluminicola avernalis* Pilsbry, 1935	Hydrobiidae	NV.
1—Point of Rocks Spring snail	*Fluminicola erythropoma* Pilsbry, 1899	Hydrobiidae	NV.
2—Pahranagat Valley turban snail	*Fluminicola merriami* Pilsbry and Belcher, 1892	Hydrobiidae	NV.
2—Longstreet Spring snail	*"Fluminicola"* sp.	Hydrobiidae	NV.
1—Median-gland Nevada spring snail	*"Fluminicola"* sp.	Hydrobiidae	NV.
1—Large-gland Nevada spring snail	*"Fluminicola"* sp.	Hydrobiidae	NV.
3C—(No common name)	*Fontelicella micrococcus* (Pilsbry, 1893)	Hydrobiidae	NV.
1—Socorro spring snail	*Fontelicella (=Amnicola) neomexicana* (Pilsbry, 1916).	Hydrobiidae	NM.
2—Elk Island snail	*Fontelicella robusta* Walker, 1908	Hydrobiidae	WY.
1—Chupadera spring snail	*Fontelicella* sp.	Hydrobiidae	NM.
1—Roswell spring snail	*Fontelicella* sp.	Hydrobiidae	NM.
2—Great Columbia River spire snail	*Lithoglyphus columbianus* (Pilsbry, 1899)	Hydrobiidae	ID, OR, WA.
2—(No common name)	*Marstonia agarhecta* Thompson, 1977	Hydrobiidae	GA.
2—(No common name)	*Marstonia castor* Thompson, 1977	Hydrobiidae	GA.
2—Obese Marstonia snail	*Marstonia ogmoraphe* Thompson, 1977	Hydrobiidae	TN.
2—Thick-shelled Marstonia snail	*Marstonia pachyta* Thompson, 1977	Hydrobiidae	AL.
2—(No common name)	*Somatogyrus catanotus* Thompson, 1974	Hydrobiidae	GA.
2—(No common name)	*Somatogyrus parvulus* Tryon, 1865	Hydrobiidae	TN.
2—(No common name)	*Somatogyrus tenax* Thompson, 1969	Hydrobiidae	GA.
2—(No common name)	*Stiobia nana* Thompson, 1978	Hydrobiidae	AL.
1—Virile Amargosa snail	Genus and species undescribed	Hydrobiidae	NV.
1—Bliss Rapids snail	Genus and species undescribed	Hydrobiidae	ID.
1—Bruneau Hot Spring snail	Genus and species undescribed	Hydrobiidae	ID.
2—Cheatum's snail	*Tryonia cheatumi* (Pilsbry, 1935)	Littoridinidae	TX.
2—White River snail	*Tryonia clathrata* Stimpson, 1865	Littoridinidae	NV.
2—California brackish water snail	*Tryonia imitator* (Pilsbry, 1899)	Littoridinidae	CA.
1—Point of Rocks Tryonia snail	*Tryonia* sp.	Littoridinidae	NV.
1—Sportinggoods Tryonia snail	*Tryonia* sp.	Littoridinidae	NV.
1—Small solid Tryonia snail	*Tryonia* sp.	Littoridinidae	NV.
1—Minute slender Tryonia snail	*Tryonia* sp.	Littoridinidae	NV.
2—Amargosa Tryonia snail	*Tryonia* sp.	Littoridinidae	NV.
1—Alamosa spring snail	*Tryonia* sp.	Littoridinidae	NM.
2—Badwater snail	*Assiminea infima* Berry, 1947	Assimineidae	CA.
1—Pecos assiminea snail	*Assiminea* sp.	Assimineidae	NM, TX.
2—Anthony's river snail	*Athearnia anthonyi* (Redfield, 1854)	Pleurocenidae	TN.
2—Cress River snail	*Athearnia crassa* (Haldeman, 1841)	Pleurocenidae	GA, TN.
2—Albany snail	*Goniobasis albanyensis* Lea, 1864	Pleurocenidae	AL, FL, GA.
3B—Indiana river snail	*Goniobasis, semicarinata indianensis* Pilsbry, 1903	Pleurocenidae	IN.
1—Spiny river snail	*Io fluvialis* (Say, 1834)	Pleurocenidae	TN, VA.
2—Mainstream river snail	*Leptoxis praerosa* (Say, 1824)	Pleurocenidae	TN.
3B—Umbilicate river snail	*Leptoxis subglobosa umbilicata* (Weatherby, 1876)	Pleurocenidae	TN.
2—Armigerous river snail	*Lithasia armigera* (Say, 1821)	Pleurocenidae	KY.
2—Dutton's river snail	*Lithasia duttoniana* (Lea, 1841)	Pleurocenidae	TN.
2—Geniculate River snail	*Lithasia geniculata* Haldeman, 1840	Pleurocenidae	TN.
2—Jay's river snail	*Lithasia jayana* (Lea, 1841)	Pleurocenidae	TN.
2—Elk River lile snail	*Lithasia lima* (Conrad, 1834)	Pleurocenidae	TN, AL.
3C—Small geniculate river snail	*Lithasia pinguis* (Lea, 1852)	Pleurocenidae	TN.
2—Rugged river snail	*Lithasia salebrosa* (Conrad, 1834)	Pleurocenidae	TN.
2—Verrucose lile snail	*Lithasia verrucosa* (Rafinesque, 1820)	Pleurocenidae	TN
2—Giant Columbia River limpet	*Fisherola nuttalli* (Haldeman, 1841)	Lancidae	ID, OR, WA.
2—Utah band snail	*Lymnaea kingii* Meek, 1877 (=*Stagnicola utahensis* Call, 1844).	Lymnaeidae	UT.
2—Fish Springs pond snail	*Stagnicola pilsbryi* (Hemphill, 1890)	Lymnaeidae	UT.

Category and common name	Scientific name	Family	Distribution
2—Cape Fear ramshorn snail	*Helisoma magnificum* (Pilsbry, 1903)	Planorbidae	NC.
2—Jackson Lake snail	*Helisoma* (=*Carinifex*) *jacksonense* Henderson, 1932.	Planorbidae	WY.
2—Greenfield ramshorn snail	*Taphius eucosmius eucosmius* Bartsch, 1906	Planorbidae	NC.
1—New Mexico ramshorn snail	Genus and Species undescribed	Planorbidae	NM.
2—Wyoming cave snail	*Physa spelunca* (Turner & Clench, 1974)	Physidae	WY.
2—Utah bubble snail	*Physa utahensis* Clench, 1925	Physidae	UT.
3B—Diamond-Y pond snail	*Physa virgata bottomeri* Clench, 1924	Physidae	TX.
2—Zion Canyon snail	*Physa zionis* Pilsbry, 1905	Physidae	UT.
1—Snake River physa snail	*Physa* sp.	Physidae	ID.
2—Fish Lake snail	*Stenophysa* (=*Aplexa*) *microstriata* (Chamberlain & Berry, 1930).	Physidae	UT.
2—Short Samoan tree snail	*Somoana abbreviata* (Mousson, 1869)	Partulidae	American Samoa.
3A—(No common name)	*Carelia* (all species)	Amastridae	HI.
2—San Clemente Island blunt-top snail	*Sterkia clementina* (Sterki, 1890)	Pupillidae	CA.
2—(No common name)	*Vertigo alabamensis* Clapp, 1915	Pupillidae	AL.
2—(No common name)	*Vertigo hebardi* Vanatta, 1912	Pupillidae	FL.
2—Kanab amber snail	*Oxyloma haydeni kanabensis* Pilsbry, 1948	Succineidae	UT.
3C—Florida tree snail	*Liguus fasciatus* (Muller, 1774)	Bulimulidae	FL.
2—(No common name)	*Helicodiscus diadema* Grimm, 1967	Helicodiscidae	VA.
2—(No common name)	*Helicodiscus herodon* Hubricht, 1966	Helicodiscidae	TN.
2—(No common name)	*Discus marmorensis* (H. B. Baker, 1932)	Discidae	ID.
1—Slug snail	*Binneya notabilis* Cooper, 1863	Arionidae	CA.
2—(No common name)	*Glyphyalinia pecki* Hubricht, 1966	Zonitidae	AL.
2—(No common name)	*Paravitrea clappi* (Pilsbry, 1898)	Zonitidae	NC, TN.
2—Mt. Matafao different snail	*Diastole matafaoi* Baker, 1938	Helicartonidae	American Samoa.
2—Yate's snail	*Ammonitella yatesi* Cooper, 1868	Ammonitellidae	CA.
2—(No common name)	*Ashmunella pasonis* (Drake, 1951)	Polygyridae	TX.
2—Archer's toothed land snail	*Mesodon archeri* Pilsbry, 1940	Polygyridae	TN.
2—Clench's middle-toothed land snail	*Mesodon clenchi* (Rehder, 1932)	Polygyridae	AR.
2—(No common name)	*Mesodon clausus trossulus* Hubricht, 1966	Polygyridae	AL.
3C—Jones' middle-toothed land snail	*Mesodon jonesianus* (Archer, 1938)	Polygyridae	NC.
2—Magazine Mountain middle-toothed snail	*Mesodon magazinensis* (Pilsbry and Ferris, 1906)	Polygyridae	AR.
2—(No common name)	*Polygyra hippocrepis* (Pfeiffer, 1848)	Polygyridae	TX.
2—Strange many-whorled land snail	*Polygyra peregrina* Rehder, 1932	Polygyridae	AR.
2—(No common name)	*Stenotrema leai cheatumi* Fullington, 1974	Polygyridae	TX.
2—(No common name)	*Stenotrema hubrichti* Pilsbry, 1940	Polygyridae	IL.
2—Pilsbry's narrow-apertured land snail	*Stenotrema pilsbryi* (Ferris, 1900)	Polygyridae	AR, OK.
2—(No common name)	*Triodopsis multani magnidentata* (Pilsbry, 1940)	Polygyridae	ID.
2—Western three-toothed land snail	*Triodopsis occidentalis* (Pilsbry and Ferris, 1907)	Polygyridae	AR.
1—Karok Indian snail	*Vespericola karokorum* Talmage, 1962	Polygyridae	CA.
2—(No common name)	*Oreohelix avalonensis* Pilsbry, 1905	Oreohelicidae	CA.
2—Carinated striate banded mountain snail	*Oreohelix strigosa goniogyra* Pilsbry, 1933	Oreohelicidae	ID.
2—Idaho banded mountain snail	*Oreohelix idahoensis idahoensis* Newcomb, 1866	Oreohelicidae	ID.
2—(No common name)	*Oreohelix jugalis jugalis* (Hemphill, 1890)	Oreohelicidae	ID.
2—Vortex banded mountain snail	*Oreohelix jugalis vortex* Berry, 1932	Oreohelicidae	ID.
2—Walton's banded mountain snail	*Oreohelix waltoni* Solem, 1975	Oreohelicidae	ID.
2—Coalville mountain snail	*Oreohelix peripherica wasatchensis* Pilsbry, 1939	Oreohelicidae	UT.
2—Allyn Smith's banded snail	*Helminthoglypta allynsmithi* Pilsbry, 1939	Helminthoglyptidae	CA.
3B—Cape Mendocino snail	*Helminthoglypta arrosa mattolensis* A. G. Smith, 1936.	Helminthoglyptidae	CA.
3B—Dented Peninsula snail	*Helminthoglypta arrosa miwoka* (Bartsch, 1919)	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta arrosa pomoensis* A. G. Smith, 1936.	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta arrosa williamsi* A. G. Smith, 1938	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta callistoderma* (Pilsbry & Ferris, 1918).	Helminthoglyptidae	CA.
2—Nicklin's peninsula snail	*Helminthoglypta mohaveana* Berry, 1927	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta nickliniana awania* (Bartsch, 1919)	Helminthoglyptidae	CA.
	Helminthoglypta nickliniana bridgesi (Newcomb, 1861).	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta sequoicola consors* (Berry, 1838)	Helminthoglyptidae	CA.
2—(No common name)	*Helminthoglypta traski coelata* (Bartsch, 1916)	Helminthoglyptidae	CA.
1—Banded dune snail	*Helminthoglypta walkeriana* (Hemphill, 1911)	Helminthoglyptidae	CA.
1—Concentrated snail	*Micrarionta facta* (Newcomb, 1864)	Helminthoglyptidae	CA.
2—Fraternal snail	*Micrarionta feralis* (Hemphill, 1901)	Helminthoglyptidae	CA.
2—Gabb's snail	*Micrarionta gabbi* (Newcomb, 1864)	Helminthoglyptidae	CA.
3B—Cathedral snail	*Micrarionta indiensis cathedralis* Willet, 1930	Helminthoglyptidae	CA.
2—(No common name)	*Micrarionta rowelli bakerensis* Pilsbry and Lowe, 1934.	Helminthoglyptidae	CA.
2—California McCoy snail	*Micrarionta rowelli mccoiana* Willet, 1935	Helminthoglyptidae	CA.
2—(No common name)	*Micrarionta immaculata* Willet, 1937	Helminthoglyptidae	CA.
3C—Horseshoe snail	*Micrarionta intercisa* (W. G. Binney, 1857)	Helminthoglyptidae	CA.
2—Colorado desert snail	*Micrarionta morongoana* Berry, 1929	Helminthoglyptidae	CA.
2—Prickly pear snail	*Micrarionta opuntia* Roth, 1975	Helminthoglyptidae	CA.
3C—Wreathed island snail	*Micrarionta redimita* (W. G. Binney, 1858)	Helminthoglyptidae	CA.
3C—Tryon's snail	*Micrarionta tryoni* (Newcomb, 1864)	Helminthoglyptidae	CA.
2—(No common name)	*Monadenia circumcincta* (Stearns, 1879)	Helminthoglyptidae	CA.
2—(No common name)	*Monadenia fidelis minor* (W. G. Binney, 1865)	Helminthoglyptidae	OR.
2—Rocky coast snail	*Monadenia fidelis pronota* Berry, 1931	Helminthoglyptidae	CA.
2—Indian Yosemite snail	*Monadenia hillebrandi yosemitensis* (Lowe, 1916)	Helminthoglyptidae	CA.
2—(No common name)	*Monadenia mormonum buttoni* (Pilsbry, 1900)	Helminthoglyptidae	CA.
2—(No common name)	*Monadenia mormonum hirsuta* Pilsbry, 1927	Helminthoglyptidae	CA.
2—(No common name)	*Monadenia troglodytes* Hanna and Smith, 1933	Helminthoglyptidae	CA.
2—Trinity bristle snail (=California northern river snail).	*Monadenia setosa* Talmadge, 1952	Helminthoglyptidae	CA.
2—(No common name)	*Sonorella arenita* Pilsbry and Ferris, 1915	Helminthoglyptidae	AZ.
2—(No common name)	*Sonorella metcalfi* Miller, 1976	Helminthoglyptidae	TX.
CLAMS AND MUSSELS (Mollusca, Class Bivalvia)			
2—Spectacle case pearly mussel	*Cumberlandia monodonta* (Say, 1829)	Margaritiferidae	IN, IL, KY, MO, NE, OH, TN, VA.
2—Alabama pearl shell	*Margaritifera marrianae* Johnson, 1983	Margaritiferidae	AL.
2—(No common name)	*Alasmidonta arcula* (Lea, 1830)	Unionidae	GA.
2—(No common name)	*Atasmidonta atropurpurea* (Rafinesque, 1831)	Unionidae	KY, TN.

Category and common name	Scientific name	Family	Distribution
2—Dwarf wedge mussel	*Alasmidonta heterodon* (Lea, 1830)	Unionidae	MA, MD, NC, NH, NJ, PA, VA, VT, Canada.
3A—(No common name)	*Alasmidonta mccordi* Athearn, 1964	Unionidae	GA.
2—(No common name)	*Alasmidonta ravenelliana* (Lea, 1834)	Unionidae	NC, TN.
2—(No common name)	*Alasmidonta robusta* Clarke, 1981	Unionidae	NC, SC.
2—(No common name)	*Alasmidonta wrightiana* Walker, 1901	Unionidae	FL.
2—Wheeler's pearly mussel	*Arkansia wheeleri* Ortmann and Walker, 1912	Unionidae	AR, OK.
2—Virginia spiny mussel	*Fusconaia collina* (Conrad, 1837)	Unionidae	VA.
1—Tar River spiny mussel	*Elliptio (Canthyria) steinstansana* Johnson and Clarke, 1963.	Unionidae	NC.
2—Georgia spiny mussel	*Elliptio (Canthyria) spinosa* (Lea, 1836)	Unionidae	GA.
2—Savannah shore mussel	*Canunculina pulla* (Conrad, 1838)	Unionidae	GA, NC, SC.
2—Western fan-shell pearly mussel	*Cyprogenia aberti* (Conrad, 1838)	Unionidae	AR, KS, MO, OK.
2—Eastern fan-shell pearly mussel	*Cyprogenia irrorata* (Lea, 1830)	Unionidae	AL, TN, KY, VA.
2—Cape Fear spike pearly mussel	*Elliptio marsupiobesa* Fuller, 1972	Unionidae	NC.
2—Waccamaw lance pearly mussel	*Elliptio* sp.	Unicnidae	NC.
3A—Recovery pearly mussel	*Elliptio nigella* (Lea, 1852)	Unionidae	GA.
2—Waccamaw spike	*Elliptio waccamawensis* (Lea, 1863)	Unionidae	NC.
3A—Arc-form pearly mussel	*Epioblasma (=Dysnomia) arcaeformis* (Lea, 1831)	Unionidae	AL, TN.
3A—(No common name)	*Epioblasma (=Dysnomia) biemarginata* (Lea, 1857)	Unionidae	AL, TN.
2—(No common name)	*Epioblasma (=Dysnomia) brevidens* (Lea, 1831)	Unionidae	AL, KY, TN, VA.
2—(No common name)	*Epioblasma (=Dysnomia) capsaeformis* (Lea, 1834)	Unionidae	AL, TN, KY, VA.
3A—Arcuate pearly mussel	*Epioblasma (=Dysnomia) flexuosa* (Rafinesque, 1820).	Unionidae	AL, TN.
3A—Acorn pearly mussel	*Epioblasma (=Dysnomia) haysiana* (Lea, 1834)	Unionidae	AL, TN, VA.
3A—Lefevre's pearly mussel	*Epioblasma (=Dysnomia) lefevrei* (Utterback, 1915)	Unionidae	AR, MO.
3A—Stones pearly mussel	*Epioblasma (=Dysnomia) lenior* (Lea, 1843)	Unionidae	AL, TN.
3A—Lewis' pearly mussel	*Epioblasma (=Dysnomia) lewisi* (Walker, 1910)	Unionidae	AL, TN, KY.
1—Penitent mussel	*Epioblasma (=Dysnomia) penita* (Conrad, 1834)	Unionidae	AL, MS.
3A—Fine-rayed pearly mussel	*Epioblasma (=Dysnomia) personata* (Say, 1829)	Unionidae	AL, TN.
3A—Nearby pearly mussel	*Epioblasma (=Dysnomia) propinqua* (Lea, 1857)	Unionidae	AL, TN.
3A—Steward's pearly mussel	*Epioblasma (=Dysnomia) stewardsoni* (Lea, 1852)	Unionidae	AL, TN.
2—Purple cat's paw pearly mussel	*Epioblasma (=Dysnomia) sulcata sulcata* (Lea, 1824).	Unionidae	AL, TN, KY.
2—Cracking pearly mussel	*Hemistena (=Lastena) lata* (Rafinesque, 1820)	Unionidae	KY, TN, VA.
2—(No common name)	*Lampsilis perovalis* (Conrad, 1834)	Unionidae	AL, MS.
2—Neosho pearly mussel	*Lampsilis rafinesqueana* Frierson, 1927	Unionidae	KS, MO, OK.
2—(No common name)	*Lampsilis streckeri* Frierson, 1927	Unionidae	AR TX.
2—(No common name)	*Lasmigona holstonia* (Lea, 1838)	Unionidae	AL, TN, VA.
2—Scale shell	*Leptodea leptodon* (Rafinesque, 1820)	Unionidae	AR, MO, OK.
2—Slab-side pearly mussel	*Lexingtonia dolabelloides* (Lea, 1840)	Unionidae	AL, TN, VA.
2—Golf stick pearly mussel	*Obovaria retusa* (Lamarck, 1819)	Unionidae	AL, TN, KY.
2—Little-winged pearly mussel	*Pegias fabula* (Lea, 1836)	Unionidae	AL, KY, VA.
2—Northern club shell	*Pleurobema clava* (Lamarck, 1819)	Unionidae	AL, IN, KY, MI, OH, TN.
1—Curtus' mussel	*Pleurobema curtum* (Lea, 1859)	Unionidae	AL, MS.
1—Marshall's mussel	*Pleurobema marshalli* Frierson, 1927	Unionidae	AL, MS.
2—(No common name)	*Pleurobema oviforme* (Conrad, 1834)	Unionidae	TN, VA.
2—(No common name)	*Pleurobema rubrum* (Rafinesque, 1820)	Unionidae	AL, KY, TN.
1—Judge Tait's mussel	*Pleurobema taitianum* (Lea, 1834)	Unionidae	AL, MS.
2—(No common name)	*Potamilus inflatus* (Lea, 1831)	Unionidae	AL, MS.
2—Rough rabbit's foot pearly mussel	*Quadrula cylindrica strigillata* (Wright, 1898)	Unionidae	AR, OH, TN, VA.
2—Rough maple leaf pearly mussel	*Quadrula fragosa* (Conrad, 1836)	Unionidae	OK.
1—Stirrup shell	*Quadrula stapes* (Lea, 1831)	Unionidae	AL, MS.
2—Salamander mussel	*Simpsoniconcha (=Simpsonaias) ambigua* (Say, 1825).	Unionidae	IA, IL, IN, KY, MI, MO, OH, TN, WI.
2—Choctaw pearly mussel (Athearn's Villosa pearly mussel).	*Villosa choctawensis* (Athearn, 1964)	Unionidae	AL, FL.
2—(No common name)	*Villosa (=Micromya) fabalis* (Lea, 1831)	Unionidae	KY, MI, OH, TN, VA.
2—Ortmann's pearly mussel	*Villosa (=Micromya) ortmanni* (Walker, 1925)	Unionidae	KY.
2—Fine-rayed purple pearly mussel	*Villosa (=Micromya) perpurpurea* (Lea, 1861)	Unionidae	VA.
2—(No common name)	*Pisidium ultramontanum* Prime, 1865	Sphaeriidae	CA, OR.

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APPENDIX D

PLANTS UNDER REVIEW FOR THREATENED AND ENDANGERED STATUS
ISLANDS OF HAWAII, MAUI AND MOLOKAI
FEDERAL REGISTER
9/27/85

2587D

PLANTS FOR THE ISLAND OF HAWAII UNDER REVIEW FOR T&E STATUS (F.R. 9/27/85)

1. Acacia koaia
   Koa oha
2. Adenophorus periens
   Pendant kihi fern
3. Argemone glauca var. inermis
4. Argyroxiphium kauense*
   Ka'u silversword
5. Asplenium fragile var. insularis
6. Bidens campylotheca*
   Campylotheca bidens
7. Bidens micrantha ssp. ctenophylla*
8. Bobea timonioides
   'Ahakea
9. Bonamia menziesii*
10. Botrychium subbifoliatim
    Makou
11. Canavalia kauensis
    Jack-bean
12. Cheirodendron trigynum var. subcordatum
    Olapa
13. Claoxylon sandwicense var. sandwicense
    Poola
14. Clermontia drepanomorpha
    Kohala clermontia
15. Clermontia lindseyana
16. Clermontia loyana
17. Clermontia pyrularia
18. Colubrina oppositifolia
    Kauila
19. Coprosma montana var. orbicularis
20. Coprosma serrata
21. Cyanea bryanii
    Bryan cyanea
22. Cyanea carlsonii
23. Cyanea fernaldii
24. Cyanea giffardii
25. Cyanea marksii
26. Cyanea nelsonii
27. Cyanea platyphylla
28. Cyanea pycnocarpa
29. Cyanea rollandioides
30. Cyanea shipmanii

31. Cyanea stictophylla
32. Cyanea submuricata
33. Cyanea tritomantha
    Aku'aku
34. Cyrtandra giffardii*
35. Cyrtandra hawaiiensis
36. Cyrtandra lysiosepala var. lysiosepala
37. Cyrtandra menziesii*
    Ha'i wale
38. Cyrtandra platyphylla var. hiloensis
39. Cyrtandra ramosissima*
40. Delissea fallax*
41. Delissea parviflora*
42. Delissea undulata*
43. Diellia erecta
44. Diplazium molokaiense
45. Dodonaea eriocarpa var. confertior
46. Dodonaea eriocarpa var. forbesii
47. Dodonaea eriocarpa var. skottsbergii
48. Dracaena hawaiiensis
    Halapepe
49. Euphorbia celastroides var. kohalana
50. Euphorbia celastroides var. nelsonii
51. Euphorbia celastroides var. saxicola
52. Geranium cuneatum var. hololeucum*
    Native geranium
53. Gouldia terminalis var. congesta
54. Gouldia terminalis var. quadrangularis
55. Hedyotis coriacea
    Kio'ele
56. Hedyotis littoralis
57. Hedyotis mannii
58. Hesperocnide sandwicensis
59. Hibiscadelphus giffardianus
    Kilauea hau kuahiwi
60. Hibiscadelphus hualalaiensis
    Hualalai hau kuahiwi
61. Hibiscus brackenridgei
    Native yellow hibiscus
62. Ischaemum byrone
63. Isodendrion hosakae
    Aupaka
64. Isodendrion subsessilifolium
    Aupaka
65. Labordia hedyosmifolia var. kilaueana
66. Labordia hedyosmifolia var. magnifolia
67. Labordia hedyosmifolia var. robusta
68. Labordia hedyosmifolia var. skottsbergii

69. Labordia hirtella var. imbricata
70. Labordia hirtella var. microcalyx
71. Labordia nelsonii
72. Labordia tinifolia var. lanaiensis
73. Lepidium bidentatum var. remyi*
    Remy's anaunau
74. Lipochaeta perdita
    Nehe
75. Lycopodium mannii
76. Metrosideros collina var. newellii
77. Neowawraea phyllanthoides*
    Mehamehame
78. Naraudia ovata
    Big island ma'oloa
79. Nothocestrum breviflorum
80. Nothocestrum latifolium
    'Aiea
81. Nothocestrum longifolium var. rufipilosum
    'Aiea
82. Ochrosia kilaueaensis*
    Holei
83. Ophioglossum concinnum
    Adder's-tongue
84. Panicum fauriei
    Faurie's panic grass
85. Pelea clusiaefolia var. pickeringii
86. Pelea grandifolia var. montana
87. Pelea grandifolia var. ovalifolia
88. Pelea hawaiensis
    Manena
89. Pelea lanceolata
90. Pelea oblongifolia
91. Pelea parvifolia var. apoda
92. Pelea puauluensis
93. Pelea volcanica var. kohalae
94. Pelea zahlbruckneri
95. Peperomia cookiana var. minutilimba
96. Peperomia cornifolia
97. Peperomia lilifolia var. obtusata
98. Peperomia maunakeana
99. Peperomia rigidilimba
100. Phyllostegia brevidens var. heterodoxa
101. Phyllostegia brevidens var. longipes
102. Phyllostegia floribunda var. forbesii
103. Phyllostegia macrophylla var. velutina
104. Phyllostegia parviflora var. glabriuscula
105. Pittosporum hawaiiense
106. Plantago princeps var. laxifolia

107. Platydesma remyi
Remy pilokea
108. Portulaca hawaiiensis
Hawaii portulaca
109. Portulaca sclerocarpa
Ihi-makole
110. Pritchardia montis-kea
111. Pritchardia schattaueri
112. Sanicula sandwicensis
113. Scaevola kilaueae
Kilauea naupaka
114. Sesbania hawaiiensis
'Ohai
115. Sesbania tomentosa
'Ohai
116. Sida ledyardii
117. Sida nelsonii
118. Silene hawaiiensis*
119. Silene lanceolata*
120. Smilax melastomifolia var. melastomifolia
121. Solanum hillebrandii
122. Solanum incompletum
Thorny popolo
123. Sophora chrysophylla var. circularis
124. Sophora chrysophylla var. glabrata
125. Sophora chrysophylla var. grisea
126. Sophora chrysophylla var. kauensis
127. Sophora chrysophylla var. unifoliata
128. Stenogyne affinis var. affinis
129. Stenogyne angustifolia var. meeboldii
130. Stenogyne angustifolia var. spathulata
131. Stenogyne calaminthoides var. oxyodonata
132. Stenogyne diffusa
133. Stenogyne hirsutula
134. Stenogyne macrantha
135. Stenogyne microphylla
136. Stenogyne mollis
137. Stenogyne oxygona
138. Stenogyne rugosa var. subulata
Ma'ohi'ohi
139. Stenogyne scandens
140. Stenogyne scrophularioides
141. Stenogyne sessilis var. hexantha
142. Stenogyne sessilis var. wilkesii
143. Tetramolopium arenarium*
144. Tetramolopium consanguineum*
145. Tetramolopium conyzoides
146. Tetramolopium humile var. sublaeve*

147. Tetraplasandra hawaiiensis var. hawaiiensis
148. Tetraplasandra hawaiiensis var. microcarpa
'Ohe
149. Tetraplasandra kavaiensis var. dipyrena
'Ohe'ohe
150. Tetraplasandra kavaiensis var grandis
'Ohe'ohe
151. Tetraplasandra kohalae
152. Tetraplasandra meiandra var. bisobtusa
153. Tetraplasandra meiandra var. hiloensis
154. Tetraplasandra meiandra var. rhynchocarpoides
155. Tetraplasandra meiandra var. simulans
156. Trematolobelia wimmeri
157. Trichomanes draytonianum
158. Urera konaensis
159. Vigna sandwicensis
160. Wikstroemia perdita*
161. Zanthoxylum bluettianum
A'e, hea'e
162. Zanthoxylum dipetalum
Kawa'u
163. Zanthoxylum hawaiiense
164. Zanthoxylum maviense

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PLANTS FOR THE ISLAND OF MOLOKAI UNDER REVIEW FOR T&E STATUS (F.R. 9/27/85)

1. Acacia koaia
   Koa oha
2. Adenophorus periens
   Pendant kihi fern
3. Alectryon macrococcum
   Mahoe
4. Bidens molokaiensis*
   Ko'oko'olau
5. Bidens wiebkei*
   Ko'oko'olau
6. Bonamia menziesii*
7. Botrychium subbifoliatum
   Makou
8. Brighamia rockii
   Pua 'ala
9. Canavalia molokaiensis
   Molokai jack-bean
10. Canavalia peninsularis
    Jack-bean
11. Canavalia stenophylla
    Jack-bean
12. Chenopodium pekeloi
    Molokai goosefoot
13. Claoxylon sandwicense var. sandwicense
    Poola
14. Cocculus virgatus
15. Ctenitis squamigera
16. Cyanea solanacea
    Popolo
17. Cyanea solenocalyx
    Molokai cyanea
18. Cyrtandra biserrata*
19. Cyrtandra conradtii
20. Cyrtandra filipes*
21. Cyrtandra halawensis*
22. Cyrtandra limosiflora*
23. Diellia erecta
24. Diplazium molokaiense
25. Dodonaea eriocarpa var. molokaiensis
26. Dodonaea eriocarpa var. pallida
27. Dodonaea sandwicensis var. simulans
28. Dodonaea stenoptera var. stenoptera

29. Dubautia plantaginea var. acridentata
30. Eugenia molokaiana
    Nioi
31. Euphorbia celastroides var. stokesii*
32. Euphorbia degeneri var. molokaiensis
33. Euphorbia multiformis var. kapuleiensis
34. Euphorbia skottsbergii var. audens
35. Euphorbia skottsbergii var. skottsbergii*
36. Euphorbia skottsbergii var. vaccinioides*
37. Gnaphalium sandwicensium var. molokaiense*
    'Ena'ena
38. Gouania fauriei
39. Gouldia terminalis var. rotundifolia
40. Haplostachys bryanii*
41. Haplostachys linearifolia*
42. Hedyotis elatior var. elatior
43. Hedyotis littoralis
44. Hedyotis remyi var. plana
45. Hedyotis schlechtendahliana var. reticulata
46. Hedyotis thyrsoidea
47. Hesperomannia arborescens*
    Lanai hesperomannia
48. Hesperomannia arbuscula*
    Maui hesperomannia
49. Hibiscus brackenridgei
    Native yellow hibiscus
50. Hibiscus immaculatus
    White Molokai hibiscus
51. Hibiscus kokio var. pukoonis
52. Ischaemum byrone
53. Isodendrion molokaiense
    Aupaka
54. Labordia hirtella var. laevis
55. Labordia hirtella var. laevisepala
56. Labordia molokaiana var. molokaiana
57. Labordia molokaiana var. setosa
58. Labordia tinifolia var. forbesii
59. Labordia tinifolia var. parvifolia
60. Labordia tinifolia var. tenuifolia
61. Labordia triflora
62. Lipochaeta degeneri*
    Small-leaved nehe
63. Lobelia dunbariae*
64. Marsilea villosa
65. Neowawraea phyllanthoides*
    Mehamehame
66. Neraudia sericea
67. Nothocestrum latifolium
    'Aiea

68. Panicum fauriei
    Faurie's panic grass
69. Pelea hawaiensis
    Manena
70. Pelea parvifolia var. sessilis
71. Pelea reflexa
72. Pelea sandwicensis
73. Peperomia degeneri
74. Peperomia fauriei
75. Peperomia forbesii
76. Peperomia lilifolia var. obtusata
77. Peperomia treleasei
78. Peucedanum sandwicense var. sandwicense
    Makou
79. Phyllanthus sandwicensis var. degeneri
80. Plantago princeps var. denticulata
81. Plantanthera holochila*
82. Pritchardia gaudichaudii
    Lo'ulu
83. Pritchardia hillebrandii
    Lo'ulu-lelo
84. Pritchardia munroii
85. Pteris lidgatei
86. Schiedea lydgatei*
    Ma'oli'oli
87. Schiedea pubescens var. pubescens*
    Ma'oli'oli
88. Sesbania arborea
    'Ohai
89. Sesbania molokaiensis
    'Ohai
90. Silene alexandri*
91. Silene lanceolata*
92. Stenogyne angustifolia var. hillebrandii
93. Tetramolopium conyzoides
94. Tetramolopium rockii
95. Tetraplasandra hawaiiensis var. microcarpa
    'Ohe
96. Trichomanes draytonianum
97. Vigna owahuensis
    Oahu vigna
98. Vigna sandwicensis
99. Viola robusta
100. Zanthoxylum maviense

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PLANTS FOR THE ISLAND OF MAUI UNDER REVIEW FOR T&E STATUS (F.R. 9/27/85)

1. Acacia koaia
   Koa oha
2. Acaena exigua
   Lili-wai
3. Adenophorus periens
   Pendant kihi fern
4. Alectryon macrococcum
   Mahoe
5. Argyroxiphium macrocephalum
   Maui silversword
6. Argyroxiphium virescens var. virescens*
   Greensword
7. Asplenium fragile var. insularis
8. Asplenium leucostegioides
9. Bidens campylotheca*
   Campylotheca bidens
10. Bidens micrantha ssp. kalealaha*
    Ko'oko'olau
11. Bobea timonioides
    'Ahakea
12. Bonamia menziesii*
13. Botrychium subbifoliatim
    Makou
14. Brighamia remyi*
15. Canavalia forbesii
    Jack-bean
16. Canavalia haleakalaensis
    Jack-bean
17. Chenopodium oahuense var. discospermum
18. Claoxylon sandwicense var. sandwicense
    Poola
19. Cleome spinosa ssp. nov./ined.*
    Wild spiderflower
20. Clermontia munroi
21. Cocculus lonchophyllus
22. Ctenitis squamigera
23. Cyanea angustifolia var. lanaiensis
24. Cyanea arborea
25. Cyanea aspleniifolia
26. Cyanea grimesiana var. lygatei
27. Cyanea grimesiana var. mauiensis
28. Cyanea kunthiana

29. Cyanea mceldowneyi
30. Cyanea scabra
31. Cyanea solanacea
    Popolo
32. Cyrtandra cordifolia var. gynoglabra
33. Cyrtandra filipes*
34. Cyrtandra lysiosepala var. grayi
35. Cyrtandra lysiosepala var. haleakalensis*
36. Cyrtandra lysiosepala var. lysiosepala
37. Cyrtandra malacophylla var. malacophylla
38. Cyrtandra pickeringii
39. Delissea undulata*
40. Diellia erecta
41. Diplazium molokaiense
42. Dodonaea eriocarpa var. pallida
43. Dubautia laxa var. blakei
44. Dubautia platyphylla var. leptophylla*
45. Dubautia reticulata*
46. Embelia hillebrandii
47. Eragrostis mauiensis
    Maui love grass
48. Euphorbia arnottiana var. integrifolia*
49. Euphorbia skottsbergii var. vaccinioides*
50. Geranium arboreum*
    Red-flowered Hawaiian geranium
51. Geranium multiflorum var. multiflorum*
    Native geranium
52. Geranium multiflorum var. ovatifolium*
    Large-leaved hina hina
53. Geranium multiflorum var. superbum*
    Native geranium
54. Gouldia terminalis var. crassicaulis
55. Gouldia terminalis var. parvifolia
56. Gouldia terminalis var. pubescens
57. Haplostachys haplostachya var. haplostachya
58. Haplostachys linearifolia*
59. Haplostachys truncata*
60. Hedyotis elatior var. herbacea
61. Hedyotis foliosa
62. Hedyotis formosa
63. Hedyotis littoralis
64. Hedyotis mannii
65. Hesperomannia arbuscula*
    Maui hesperomannia
66. Hibiscus brackenridgei
    Native yellow hibiscus
67. Hibiscus kokio var. kokio
    Pualoalo, koki'o-'ula'ula

68. Hibiscus kokio var. pukoonis
69. Ischaemum byrone
70. Labordia cyrtandrae var. nahikuana
71. Labordia glabra
72. Labordia hedyosmifolia var. rockii
73. Labordia hirtella var. microphylla
74. Labordia membranacea
    Kamakahala
75. Labordia pedunculata
76. Labordia tinifolia var. euphorbioidea
77. Labordia tinifolia var. lanaiensis
78. Lipochaeta kamolensis*
79. Lipochaeta lobata var. hastulatoides
80. Lycopodium haleakalae
81. Lycopodium mannii
82. Lycopodium nutans
83. Lysimachia sp./sp. nov. ined.
84. Morinda trimera
    Noni-kuahiwi
85. Neowawraea phyllanthoides*
    Mehamehame
86. Neraudia melastomaefolia
    Ma'oloa
87. Neraudia sericea
88. Nothocestrum latifolium
    'Aiea
89. Nototrichium humile*
90. Ophioglossum concinnum
    Adder's-tongue
91. Pelea balloui
92. Pelea cinerea
    Manena
93. Pelea grandifolia var. ovalifolia
94. Pelea hawaiensis
    Manena
95. Pelea mucronulata
    Alani
96. Pelea multiflora
97. Pelea olowaluensis
98. Pelea orbicularis
99. Pelea ovalis
100. Pelea tomentosa
101. Peperomia degeneri
102. Pereromia expallescens var. brevipilosa
103. Peperomia kulensis
104. Peperomia subpetiolata
105. Peperomia treleasei
106. Peperomia waikamoiana

107. Peucedanum sandwicense var. sandwicense
Makou
108. Phyllostegia brevidens var. ambigua
109. Phyllostegia brevidens var. degeneri
110. Phyllostegia brevidens var. hirsutula
111. Phyllostegia brevidens var. longipes
112. Phyllostegia brevidens var. pubescens
113. Phyllostegia hillebrandii
114. Phyllostegia parviflora var. canescens
115. Pittosporum confertiflorum var. longipes
116. Plantago princeps var. laxifolia
117. Plantanthera holochila*
118. Pouteria auahiensis
Ala'a
119. Pouteria rhynchosperma
Ala'a
120. Pritchardia glabrata
121. Pteris lidgatei
122. Remya mauiensis*
Maui remya
123. Sanicula sandwicensis
124. Schiedea haleakalensis*
Ma'oli'oli
125. Schiedea hookeri*
Ma'oli'oli
126. Schiedea implexa*
Ma'oli'oli
127. Schiedea pubescens var. pubescens*
Ma'oli'oli
128. Schiedea salicaria*
Ma'oli'oli
129. Sesbania tomentosa
'Ohai
130. Silene cryptopetala*
131. Silene degeneri*
132. Smilax melastomifolia var. melastomifolia
133. Solanum haleakalaense
134. Solanum incompletum
Thorny popolo
135. Sophora chrysophylla var. elliptica
136. Sophora chrysophylla var. kanaioensis
137. Stenogyne affinis var. degeneri
138. Stenogyne angustifolia var. mauiensis
139. Stenogyne cinerea
140. Stenogyne crenata
Crenate-leaved stenogyne
141. Stenogyne glabrata
142. Stenogyne haliakalae
Haleakala stenogyne

143. Stenogyne rotundifolia var. oblonga
144. Stenogyne vagans
145. Stenogyne viridis
146. Tetramolopium arbusculum
147. Tetramolopium arenarium*
148. Tetramolopium capillare*
149. Tetramolopium conyzoides
150. Tetramolopium lepidotum*
151. Tetramolopium remyi*
152. Tetraplasandra hawaiiensis var. microcarpa 'Ohe
153. Tetraplasandra kavaiensis var. dipyrena 'Ohe'ohe
154. Tetraplasandra kavaiensis var. intercedens 'Ohe'ohe
155. Tetraplasandra kavaiensis var. nahikuensis
156. Tetraplasandra kavaiensis var. occidua
157. Tetraplasandra meiandra var. leptomera
158. Trichomanes draytonianum
159. Vigna sandwicensis
160. Waltheria pyrolaefolia
161. Wikstroemia monticola var. occidentalis
162. Wikstroemia villosa*
163. Zanthoxylum glandulosum
164. Zanthoxylum maviense

APPENDIX E
PART 1

COMMENT LETTERS AND RESPONSES
TO NOTICE OF PREPARATION

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. BOX 50004
HONOLULU, HAWAII 96850

August 19, 1986

RECEIVED
'86 AUG 21 P1:38
FOR
STATE HAWAII

Division of Forestry and Wildlife
Department of Land and Natural Resources
Attention: Libert Landgraf, Administrator
P.O. Box 621
Honolulu, HI 96809

Gentlemen:

Subject: Eradication of Marijuana on State-owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai

We reviewed the environmental assessment and notice of preparation of environmental impact statement for the proposed project and have no comments to offer.

Thank you for the opportunity to review the document.

Sincerely,

ACTING

RICHARD N. DUNCAN
State Conservationist

cc:
Mrs. Jacqueline Parnell
KRP Information Services
P.O. Box 27506
Honolulu, HI 96827

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AGRICULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Richard N. Duncan
State Conservationist
U.S. Soil Conservation Service
300 Ala Moana Blvd.
P.O. Box 50006, Room 3120
Honolulu, HI 96850

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Duncan:

Thank you for your letter of August 19, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Very truly yours,

for Libert K. Landgraf
Administrator

United States Department of Agriculture | Forest Service | Pacific Southwest Region
1151 Punchbowl St., Rm. 323
Honolulu, Hawaii 96813

Reply to: 3200
Date: Aug. 15, 1986

Division of Forestry And Wildlife
Department of Land and Natural Resources
Attention: Libert Landgraf, Administrator
P.O. Box 621
Honolulu, Hi. 96809

'86 AUG 18 A9:24

RECEIVED

Dear Libert:

I have reviewed the Environmental Assessment and Notice of Preparation of Environmental Impact Statement for eradication of marijuana on state-owned and managed Conservation District Lands, Islands of Hawaii, Maui and Molokai. You and your staff are to be congratulated for a job well done.

As preparation of the EIS proceeds, I advise that arguments in a few areas be strengthened so as to arrive at a document of maximum effectiveness in this important program:

1. Part III Alternatives (pp 24-26): (a) Actual cost comparisons, in tabular form, between Alternatives A and B would strengthen the argument for the proposed action. (b) The argument against relying overly on Alternative D would be strengthened by pointing out that the National Park Service has more trained law enforcement people per unit area of responsibility than does DLNR. (c) Give reasons for not using other chemicals under Alternative G.

2. Add a discussion under Part IV, Anticipated Environmental Impacts and Mitigatory Measures, of the negative impacts of helicopter noise (already a serious problem on some islands) and how it will be minimized by careful planning of helicopter use in this program.

I also noticed a few minor items which you may wish to modify: (a) p.11, Item B1, third sentence--the word "now" seems inappropriate in context. (b) p.22, Item D1--how can it be that only "15% of the marijuana grown in the United States is domestically grown"? My understanding of the terms used indicates that it would have to be 100%. Perhaps the DEA was misquoted. It appears as though the statement should read 15% of the marijuana consumed in the US is grown here.

Thank you for the opportunity to review this document. I wish you well in implementing this program. As always, the US Forest Service is available to assist within our capabilities and authorities.

Sincerely,

LEONARD A. NEWELL
Pacific Islands Forester

cc: Tom Fulk, ARF, S&PF
Mike Duffy, ARF, F&AM
Jacqueline Parnell, KRP Information Services

FS-6200-28a (5/84)

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Leonard Newell
Pacific Islands Forester
Institute of Pacific Islands Forestry
U.S. Forest Service
Honolulu, Hawaii 96813

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Newell:

Thank you for your letter of August 15, 1986 concerning the subject Notice of Preparation. Your comments, corrections, and suggestions are appreciated and will be incorporated into the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P O BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:

AUG 19 1986

'86 AUG 20 P12:39

FOR[illegible]
STATE [illegible]

Libert K. Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Landgraf:

Thank you for providing us with a copy of the Division's Environmental Assessment and Notice of Preparation of an Environmental Impact Statement (EIS) for the eradication of marijuana on state-owned and managed conservation district lands on the islands of Hawaii, Maui and Molokai. Our staff has completed their review of the document and offers the following comments for your consideration.

General Comments

We are pleased to note that an Operations Plan will be established to ensure that ecologically sensitive areas and resources will not be accidentally affected by the proposed activity. The Service offers the technical expertise of our Endangered Species and Habitat Resources staffs to assist the Chairperson in identifying and mapping these important areas.

Specific Comments

1. Page 9. The paragraph on endangered and threatened species should cite thirteen (not ten) species of birds: the Hawaii Creeper, Hawaii 'Akepa and Akiapola'au should be added to this list. Also, Newell Shearwater should read Newell's Townsend's Shearwater.

2. Page 9. A brief discussion of indigenous and introduced aquatic life would enhance the paragraphs concerning water quality and aquatic systems. We recommend that specific reference be made to the fact that the endemic goby Lentipes concolor is listed as a Category 1 Candidate Endangered Species in the latest Notice of Review for Endangered and Threatened Wildlife and Plants (50 FR 181; September 18, 1985). The Service currently has substantial information on hand to support the biological appropriateness of proposing to list this species as threatened or endangered. Lentipes concolor is an anadromous fish as defined in the Anadromous Fish Conservation Act (16 U.S.C. 757a-757f) and in 50 CFR 401.2(g).

3. Page 15. The first paragraph concerning endangered and threatened species should be rewritten to indicate that the one threatened species found there is the Newell's Townsend's Shearwater. Further, the paragraph should be corrected to show that there are eleven endangered species of birds on Maui; in addition to the Hawaiian Dark-rumped Petrel (vice Hawaii Petrel), the 'O'u, Nukupuu, Maui Creeper, Maui Akepa and Po'ouli should be added to the list of endangered birds on Maui.

4. Page 15. The section on water quality and aquatic systems should include a more complete description of the living resources of Maui streams. This section should state that Palikea and O'heo streams drain the Kipahulu District of Haleakala National Park; portions of Hanawi Stream lie within a state-designated Natural Area Reserve; and the headwaters of Waikamoi Stream and several East Maui streams originate in a nature preserve of The Nature Conservancy of Hawaii. Since Lentipes concolor is also present in Maui streams, its status should also be mentioned in this section.

5. Page 20. Molokai has four endangered species (the I'iwi is not a listed species), and one threatened species (Newell's Townsend's Shearwater).

6. Page 20. The section on water quality and aquatic systems should include a more complete description of stream life on Molokai. Reference should also be made to the status of Lentipes concolor which occurs in several streams on Molokai's windward coastline.

We appreciate this opportunity to review the Division's proposal. Please contact Mr. Ernest Kosaka (phone 546-7530) if you have any questions regarding our remarks, or to request our attendance at a meeting of the Operations Plan Panel. We look forward to working closely with your staff during the course of this project.

Sincerely,

William R. Kramer
Acting Project Leader
Office of Environmental Services

cc: RD, FWS, Portland, OR (ARD-SE/ARD-HR)
The Nature Conservancy of Hawaii

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. William R. Kramer
Acting Project Leader
Office of Environmental Services
U.S. Fish and Wildlife Serivce
300 Ala Moana Blvd.
P.O. Box 50167
Honolulu, Hawaii 96850

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Kramer:

Thank you for your letter of August 20, 1986 concerning the subject Notice of Preparation. Your comments, corrections, and suggestions are appreciated and will be incorporated into the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

United States Department of the Interior

GEOLOGICAL SURVEY

Water Resources Division
P.O. Box 50166
Honolulu, Hawaii 96850

July 30, 1986

RECEIVED
'86 AUG -4 A9:10
FORESTRY & WILDLIFE
STATE OF HAWAII

Mr. Libert K. Landgraf
Administrator
Division of Forestry and Wildlife
State Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Re: Environmental Assessment and Notice of Preparation for Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui and Molokai

Dear Mr. Landgraf:

The Honolulu District Office of the United States Geological Survey, Water Resources Division has reviewed the above document, and offers the following comments.

The EIS should describe the monitoring efforts to determine the effects of the marijuana eradication program on soils, ground water, surface water, wildlife, and non-target vegetation.

There was no discussion on ground-water quality in the preparation notice.

What is the purity of the Chevron Weed Oil and glyphosate used for the eradication program? Will there be unforeseen impurities that may adversely affect the environment? Will any procedures be included to test product impurities to evaluate long-term effects?

Thank you for the opportunity to review the document, and we look forward to reviewing the EIS.

Sincerely,

Charles J. Huxel Jr.
Acting District Chief

Copy to: KRP Information Svcs.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Charles J. Huxel, Jr.
Acting District Chief
U.S. Geological Survey
Water Resources Division
300 Ala Moana Blvd.
P.O. Box 50166
Honolulu, HI 96850

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Huxel:

Thank you for your letter of July 30, 1986 concerning the subject Notice of Preparation. Your comments and suggestions are appreciated.

A description of the monitoring program and a discussion of groundwater quality will be included in the environmental impact statement.

With respect to the purity of the herbicides planned to be used, no special tests are contemplated. Determining the consistency of a product with the ingredients listed on its label is under the jurisdiction of the U.S. Environmental Protection Agency. However, monitoring of actual usage is planned.

Very truly yours,

Libert K. Landgraf
Administrator

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

REPLY TO ATTENTION OF:

August 14, 1986

RECEIVED
'86 AUG 19 P1:37
FORES... U.S.
STATE OF HAWAII

Mr. Libert K. Landgraf
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Landgraf:

Thank you for the opportunity to review and comment on the Environmental Assessment and Notice of Preparation on the EIS for Eradication of Marijuana of State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui and Molokai. The following comments are offered:

a. The EIS should clarify if state-owned lands includes leased lands and whether the eradication program will extend to state-leased lands.

b. Wildlife should include wild cattle.

c. The EIS should consider the impact of weed oil on the entomological resources. In particular, if native insects or other species which are food sources to native birds are adversely affected. Moreover, the EIS should include a discussion on the impact on the evolutionary studies for the native fruit fly (Drosophila).

d. Long-term impacts such as effect on the groundwater aquifer should be included in the EIS.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Kisuk Cheung
Chief, Engineering Division
U. S. Army Engineer District
Fort Shafter, Hawaii 96858-5440

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Cheung:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your comments, corrections, and suggestions are appreciated and will be incorporated into the environmental impact statement.

Please note that the environmental impact statement is being expanded to cover all Conservation District lands, not just those that are state-owned and managed.

Very truly yours,

for: Libert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR

JACK K. SUWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

86 AUG 20 P1:58

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

STATE OF HAWAII August 18, 1986

'86 AUG 21 P1:42

MEMORANDUM

To: Mr. Susumu Ono, Chairperson
Board of Land and Natural Resources

Subject: Request for Comments: Environmental Assessment for Eradication of Marijuana on State-owned Conservation District (CD) Land - Islands of Hawaii, Maui, and Molokai

The Department of Agriculture (DOA) has reviewed the subject environmental assessment (EA) and offers the following comments:

1. DOA supports the objective of the proposal and has no objections to the method proposed for the eradication.

2. Any risks on endangered/threatened habitats of native plants and animals appear to be minimal and therefore, attempts to eradicate marijuana and recover lands for intended uses, i.e., legal economic, conservation, scientific, and recreational far outweigh any risks.

3. Although most successes of eradication of marijuana have been on private lands (e.g., sugarcane lands), such successes may not be obtainable on CD lands due to the complexity and sensitivity of the environment.

4. All critical/essential habitats of native flora and fauna need to be identified more explicitly in the EIS for minimizing damage to these areas.

5. Any chemical used for marijuana eradication must be properly registered for the site of application by the EPA and licensed in the State of Hawaii.

Previously, we had submitted comments on a similar EA for the Island of Kauai. Our concerns were that the herbicides used

be registered and approved by the U.S. Environmental Protection Agency and that broadcast spraying by helicopter not be done.

Thank you for the opportunity to comment.

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

cc: KRP Information Services
OEQC

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Jack Suwa
Chairperson, Board of Agriculture
1428 South King Street
Honolulu, Hawaii 96814

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Suwa:

Thank you for your letter of August 18, 1986 concerning the subject Notice of Preparation. Your comments and suggestions are appreciated and will be incorporated into the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

ALEXIS T. LUM
MAJOR GENERAL
ADJUTANT GENERAL

PAUL R. NAKAMURA
COLONEL (HI)
DEPUTY ADJUTANT GENERAL

HIENG

RECEIVED
'86 AUG -8 P4:11
FORE
STATE

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Landgraf:

Eradication of Marijuana on State-Owned and
Managed Conservation District Lands

Reference your letter dated July 23, 1986.

We have reviewed and evaluated the subject matter and concluded we have no objection to the project. However, if we have any questions on the subject matter, we will address it to you before August 22, 1986.

Yours truly,

Jerry M. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

cc: KRP Information Services
(Jacqueline Parnell)

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Major Jerry M. Matsuda
Office of the Adjutant General
Department of Defense
3949 Diamond Head Road
Honolulu, Hawaii 96816

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Major Matsuda:

Thank you for your letter of August 7, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Very truly yours,

Libert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSD

'86 AUG 19 A9:46

August 18, 1986

FOR

MEMORANDUM

To: Mr. Libert Landgraf, Administrator
Division of Forestry & Wildlife, Department of Land & Natural Resources

From: Deputy Director for Environmental Health

Subject: Environmental Assessment and Notice of Preparation of Environmental Impact Statement--Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai

The use of chemical to control marijuana cultivation in a conservation district land is a very sensitive issue. At many of the public hearings on Maui relating to air and water quality, the use of glyphosate and other pesticides by the agricultural industry was seriously questioned by various environmentalist groups. These groups are against the presence of any pesticide in the environment.

In the environmental assessment document, it states that Kauai and Hawaii Counties have successfully used diesel oil to control marijuana plants in cane land. The success of such operation probably was due to the cane plant being hardy and tolerant to diesel oil. Also, all other plants within the cane land are considered objectionable or weeds. However, in a virgin land, as found in conservation district, the surroundings are highly sensitive to any introduction of chemical control. All plant life exposed to the spray may die. Surface runoff water may be contaminated. And in spite of the successful chemical application, marijuana cultivation continues to thrive on these islands.

Therefore, we recommend the use of chemical to control marijuana cultivation be restricted to cane lands and other nonsensitive land areas where its impact is minimal and not to conservation district land as requested.

JAMES K. IKEDA

cc: Jacqueline Parnell
DHO, Maui

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Dr. James K. Ikeda
Deputy Director for Environmental Health
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Dr. Ikeda:

Thank you for your letter of August 18, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Your concerns will be considered and addressed in the environmental impact statement. We are aware of the sensitivity of some citizens to the spraying of chemicals of any kind. Please note, however, that the areas where marijuana is under cultivation are not "virgin land." Growers are farmers who clear land and utilize a variety of pesticides to protect their very valuable crops.

It will not be feasible to restrict the use of chemicals for plant eradication to sugarcane lands and nonsensitive areas only, since marijuana growers seek inaccessible areas for their operations and many of these are on Conservation District lands. The method that is being used to minimize adverse environmental impacts is in the choice of chemicals and the amounts and methods of application, rather than prohibition. A more complete discussion of this topic will be included in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX: 7430250 HIDPED

GEORGE R. ARIYOSHI
GOVERNOR
KENT M. KEITH
DIRECTOR
MURRAY E. TOWILL
DEPUTY DIRECTOR
Roger A. Ulveling
DEPUTY DIRECTOR

DIVISIONS:
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
FOREIGN TRADE ZONE DIVISION
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION
OFFICES:
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

86 AUG 28 P1:15

Ref. No. P-4881

August 21, 1986

...OURCES
STATE OF HAWAII

(RECEIVED)
'86 AUG 28 A10:50
FOR: ...
STATE ...

MEMORANDUM

TO: The Honorable Susumu Ono, Chairperson
Department of Land and Natural Resources

ATTN: Mr. Libert Landgraf, Administrator
Forestry and Wildlife Division

FROM: Kent M. Keith

SUBJECT: EIS Preparation Notice for Eradication of Marijuana, Islands of Hawaii, Maui, and Molokai

We have reviewed the subject document and have no comment to offer since it includes safeguards which adequately addresses the concerns that we have expressed on a similar DEIS eradication program on the island of Kauai.

Thank you for the opportunity to comment.

cc: Office of Environmental Quality Control
KRP Informational Services

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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AQUATIC RESOURCES
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Kent M. Keith, Director
Department of Planning
and Economic Development
250 South King Street
Honolulu, Hawaii 96813

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Keith:

Thank you for your letter of August 21, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Very truly yours,

for: Libert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR

WAYNE J. YAMASAKI
DIRECTOR

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D.
WALTER T.M. HO
CHERYL D. SOON
ADAM D. VINCENT

IN REPLY REFER TO

STP 8.1497

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

August 1, 1986

RECEIVED

'86 AUG -8 P4:10

FORESTRY & WILDLIFE
STATE OF HAWAII

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Landgraf:

Eradication of Marijuana on
Maui, Molokai, and Hawaii

We have no objections to the marijuana eradication program proposed by your agency for the islands of Maui, Molokai, and Hawaii.

Thank you for this opportunity to provide comments.

Very truly yours,

Wayne J. Yamasaki
Director of Transportation

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
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STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Wayne J. Yamasaki, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Yamasaki:

Thank you for your letter of August 1, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Very truly yours,

for Libert K. Landgraf
Administrator

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

August 22, 1986
PN:0049

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Landgraf:

Environmental Assessment / Preparation Notice
Eradication of Marijuana
State-Owned and Managed Conservation District Lands
Islands of Hawaii, Maui & Molokai

The above cited document relates to the potential environmental effects of the proposed chemical and physical means to eradicate marijuana grown on Conservation District lands owned by the State of Hawaii on the islands of Hawaii, Maui and Molokai. The Environmental Center does not usually review documents at the preparation stage, however, because many of our reviewers have been directly involved in evaluating the effects of similar or related projects on other Hawaiian Islands it seemed appropriate to provide comments at this prepartion stage. This review was prepared with the assistance of Barry Brennan, and John Hylin, Agricultural Biochemistry; Paul Ekern, Water Resources Research Center; Arthur Kodama, Public Health; James Parrish, Hawaii Cooperative Fishery Research Unit and Walington Yee, Environmental Center.

On June 21, 1985 we submitted rather extensive comments on a similar EIS prepared to evaluate the effects of a proposed marijuana eradication program on the island of Kauai. Because many of the concerns and issues expressed in that review are relevant to this present proposal we are submitting a copy of our comments on the Kauai eradication program for your information. Although not all the substantive material in our earlier review is applicable to this new geographic location, some points are of universal concern. In particular we call attention to the problems associated with spraying from a helicopter where the winds will inevitably cause drift of the spray to non-target areas. Annihilation of non-taraget species through either destruction of their habitat or food sources or other synergistically initiated impacts as well as direct toxicity are concerns inherent with aerial eradication methods on all islands.

AN EQUAL OPPORTUNITY EMPLOYER

The proposed use of Weed oil seems to be the least environmentally intrusive chemical agent, while glyphosate is slightly more deleterious. The DEIS should provide an estimate of the frequency of chemical applications to a given geographical area since the cummulative impact will be the sum of the individual applications. Only when the economics of marijuana production do not permit replanting in a given area will a one-time application be adequate. We suggest that any given land area be sprayed no more than twice a year with 6 month intervals between sprayings. At these levels it is still very speculative whether the ecosystem involved can maintain its integrity with this kind of chemical intrusion.

On page 15 there is a statement that the water quality on Maui is generally excellent. This statement is somewhat misleading, particularly in light of the recent discoveries of pesticide contamination of water wells. A water quality assessment for pesticide concentrations in the ground water should be included in the DEIS. This would assure that baseline conditions are known prior to spraying.

We appreciate the opportunity to comment at this preparation stage.

Yours truly,

Jacquelin N. Miller
Acting Associate Director

Attachment

cc: Patrick Takahashi
Jacqueline Parnell
OEQC
Barry Brennan
John Hylin
Paul Ekern
James Parrish
Walington Yee

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

June 21, 1985

RECEIVED

RE:0297

'86 AUG 25 A10:26

FORE[illegible]
STATE [illegible]

Ms. Letitia N. Uyehara
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft Environmental Impact Statement
Eradication of Marijuana
State Owned and Managed Conservation District Lands
Island of Kauai

The above cited Draft Environmental Impact Statement (DEIS) addresses the potential impacts that are likely to be associated with the proposed eradication of marijuana (Cannabis sp.) grown on conservation district lands on Kauai. The Environmental Center review of the DEIS has been prepared with the assistance of Barry Brennan and John Hylin, Agricultural Biochemistry; Kenneth Kaneshiro, Entomology/ Hawaiian Evolutionary Biology; Arthur Kodama, Public Health Service; Marshall Mock, Kauai Community College; James Parrish, Hawaii Cooperation Fishery Research Unit; Frank Scott, Jr., Agricultural and Resource Economics; B.Z. Siegel, Pacific Biomedical Research Center/Pesticide Hazard Assessment Project; Sanford Siegel, Botany; Jacquelin Miller and Noreen Tashima, Environmental Center.

The Proposed Action (p. 2)

The use of oil and water emulsions in cane fields for the eradication of marijuana, as proposed, is feasible since marijuana can be readily distinguished from cane. However, even the most experienced plant scientists have some difficulty distinguishing marijuana from native forest species from the air even when they are surveying from low flying helicopters. There are many forest plants that have general leaf patterns and growth habits which can easily be mistaken for marijuana. Although, the pigmentation and reflectance properties of leaves may enable aerial observers to differentiate one plant species from another, the varied greens of the local forest make it most difficult to distinguish marijuana from plants in mixed forest habitats. As pointed out in the DEA 1984 EIS (p. III-6), marijuana plantations "occupy only a small percentage of the forest acreage" and are often camouflaged so that the "visual impacts of these plots will virtually disappear". Because of the difficulty of recognition from the air, we consider that among the proposed methods for eradication of marijuana, only backpack-spray application is suitable in most forest areas.

The Proposed Action (p. I-4)

We recognized the need for DLNR and the Kauai county police department to undertake marijuana eradication action as expeditiously as possible. We are concerned, however, with the use of the various proposed methods in sensitve areas. The DEIS states that a person will be designated with the authority to make the necessary "go/no-go" decisions with regard to the eradication based on various conditions including consideration of "open water, vegetation types, the ecological sensitivity of the area, presence of endangered or threatened species, etc." We note further that only manual methods will be used in critical habitat areas and that, prior to chemical eradication measures, "qualified personnel will delineate areas where those endangered or threatened species" or their habitats are likely to occur (p. V-5-7). A specific definition of "critical habitat" should be provided. In general, the procedural safeguards noted in the DEIS (pp. V-6-7) should adequately protect the sensitive areas. However, the time available to assure that critical habitat and species will not be adversely affected, may in some cases be insufficient to permit an informed decision on the part of the person with the designated "go/no-go" responsibility (p. I-4). It would seem advisable to prepare maps as soon as possible identifying, at least in general, the sensitive areas and the eradication methods appropriate for use in those areas. If such maps already exist, or the information is available in other forms, we suggest that adherence to their content be made a part of the procedural requirements for eradication specified in this EIS. On page I-4, the statement is made that Weed Oil will damage or kill all green plant growth and that it should be kept out of water or aquatic life may be killed. This statement further coroborates the need for some pre-evaluation procedures so that appropriate eradication techniques can be instituted in potentially sensitive habitats.

Eradication Methods (p. I-6)

Our reviewers have expressed general concern with the application of each of the herbicides proposed for use, including Weed Oil, by aerial methods for the reasons cited previo sly, and for the most part recognized in the DEIS. The use of back-pack applicators should reduce the potential for drift for both Weed Oil and Glyphosate. Wipe-on application is preferred as it would be less likely to harm non-target species.

Since diesel oil and Weed Oil are contact herbicides, in contrast to the systemic action of glyphosate, spray drift of the oils to non-target species should have somewhat less impact.

Diesel oil is not now registered for use as a herbicide and there appears to be little specific data on its environmental characteristics in terms of biological toxicity to animals and residence time for concentration in soil and water. The information provided in the DEIS seems to be largely based on characteristics of Chevron Weed Oil. However, the environmental effects of Chevron Weed Oil may be quite different from those of diesel oil. For example, Weed Oil emulsifies in water. Whereas, the diesel oil is insoluble in water. These characteristics alone may produce quite different impacts to non-target species or habitats including soil recovery times. It would seem essential, prior to the use of diesel oil, that these characteristics be evaluated. If published sources of information on the use of diesel oil as an herbicide are available they should be cited in the EIS. If the information is not available, its lack should be acknowledged in the Unresolved Issues Section (Part VII).

Endangered and Threatened Species (p. III-5)

Unfortunately, there have been no systematic studies of many of the potentially endangered or threatened species on Kauai. This is particularly true of the less obvious biota, such as mollusks and insects. It would be most helpful for future eradication efforts if a before and after application study was done on the population structure of samples of mollusk, plant, and insect species to determine whether significant impacts result from the eradication methods employed.

Chemical Eradication Operations (p. V-2)

The DEIS claims that the herbicide products used will be adsorbed by the soils and rapidly broken down by bacterial action so that revegetation is expected to be rapid. It is well to recognize that in any disturbance of the forest ecosystem, which certainly includes the cultivation of marijuana or any other exotic plant, as well as the use of herbicides, the regrowth after harvest or eradication is most likely to be noxious weeds rather than native species. We mention this only to call attention to the need to be most discriminating in eradication treatment so as to avoid any unessential disturbance to the ecosystems.

It is our understanding that many of Hawaii's soils are acidic in nature. The DEIS discusses the bacterial breakdown of the oil products in neutral soils and suggests that since marijuana farmers neutralize their soils with lime that bacterial breakdown will occur in the marijuana sites. It is not clear whether under these conditions, sufficient populations of bacteria would be present to be effective. Is there any evidence for the success of bacterial degradation of the herbicides under these conditions?

Water Resources and Aquatic Systems (p. V-7)

The use of Rodeo in the state of Hawaii is limited to treatment of only one side of a stream at a time. This is to reduce the quantity of dead and dying vegetation which otherwise can lead to oxygen deficiency and result in eutrophication. Roundup may not be used on bodies of water. In general, runoff control of the herbicides to streams appears to be adequately addressed in the DEIS.

Public Health and Occupational Safety (p. V-11)

Under the section on occupational safety considerations for helicopter operations, the need for hearing protection should probably be added to the list of personal protective measures.

The discussion on the possible teratogenic effects of glyphosate (p. V-12) is confusing and appears to be inconsistent. Reference is made to such effects but a few lines further it is stated that the product has not been shown to be teratogenic, i.e., the "reproductive effects have probably been the result of maternal toxicity rather than direct effects on the fetus". While technically it may be important to determine whether a product, by definition, is or is not teratogenic, if adverse reproductive effects result from exposure the end result is the issue of concern. The discussion on this topic should be clarified.

Economic Elements (p. V-13)

The discussion of cost effectiveness of the use of diesel-oil sprays implies that the findings have been quantified. It would be appropriate to include the substantiating explanations or references for this economic analysis. The use of the term "economically desirable" is unclear. This section further states that "impacts on state and county economies should be directly related to the effectiveness of the operation". Yet in the next sentence, the estimation of the economic effect is cited as being "difficult to predict". This statement seems to be in conflict with the earlier statement implying that the program would be cost effective and "economically desirable." What is most likely intended is that the proposed methods would be the least costly means of eradicating marijuana. The "economic elements" section would be strengthen by more quantitative information.

List of Necessary Approvals (p. VI-1)

It should be noted that Weed Oil may be registered by the Department of Agriculture but it is not likely that diesel oil can be used as there are no toxicological data to back up the registration. Hawaii cannot register a product that is not also registered by EPA. It would appear that Weed Oil and glyphosate, though more expensive, are far better candidates in so far as legal questions are concerned. Were other herbicides, besides paraquat and 2,4,-D, considered?

Concluding Remarks

In the interest of public safety, we suggest that a notification procedure be developed, by the appropriate state and county agencies, for warning users of state lands of the hazards of booby traps and aerial spray operations. Such notices should accompany hiking, hunting, or camping permits. After spraying, disclosure of the sprayed areas should receive full news coverage so that the public is made aware of the use of glyphosate and may withhold smoking or buying marijuana for at least 4 days to make sure that the marijuana is not contaminated. The news media coverage may also serve as a deterrant to the sale of non-sprayed crops, since consumers are likely to be more cautious about their purchases.

We appreciate the opportunity to comment on this DEIS and hope you will find our comments useful in the preparation of the final document.

Yours truly,

Doak C. Cox

Doak C. Cox
Director

cc: Jacqueline Parnell, KRP Information Services
Libert Landgraft, DLNR, Div. of Forestry & Wildlife
Victor Tanimoto, DLNR, Div. of Forestry & Wildlife
UH Reviewers

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Jacquelin Miller
Environmental Center
University of Hawaii
317 Crawford Hall
2550 Campus Rd
Honolulu, HI 96822

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Miller:

Thank you for your letter of August 22, 1986 concerning the subject Notice of Preparation. Your comments and suggestions are appreciated and will be addressed in the environmental impact statement.

We are not sure it is possible to give a solid estimate of the frequency of chemical applications to a specific area, although it is doubtful that the frequency would exceed twice a year. It appears unlikely that a grower would replant immediately in the exact same area, knowing that its location was now known to law enforcement officers.

Data on pesticide contaminantion levels of groundwater in Conservation District lands, if available, will be included in the environmental impact statement.

Very truly yours,

for Libert K. Landgraf
Administrator

University of Hawaii at Manoa

College of Tropical Agriculture and Human Resources
Department of Agricultural Biochemistry
Henke Hall 329 • 1800 East-West Road • Honolulu, Hawaii 96822

August 5, 1986

RECEIVED

'86 AUG -7 P1:53

FORE[illegible]
STATE [illegible]HAWAII

Mr. Libert K. Landgraf
Administrator
Division of Forestry
and Wildlife
Department of Land and
Natural Resources
P.O. Box 621
Honolulu, HI 96809

Re: Marijuana Eradication

Dear Mr. Landgraf:

The following comments are offered for your consideration.

1. Method of Application. Wind velocity under a helicopter will be more than 8 mph meaning that drift will occur regardless of nozzle pressure. I would suggest that a wipe-on applicator be considered for use.

2. What other alternative herbicides were considered (beside paraquat and the phenoxides)? Glyphosate does not act very quickly. If quick breakdown is needed (e.g. on mature plants) glyphosate would not be a herbicide of choice.

Sincerely,

Barry M. Brennan
Chairman

cc: J. Miller
J. Parnell

AN EQUAL OPPORTUNITY EMPLOYER

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Dr. Barry M. Brennan, Chair
Dept. of Agricultural Biochemistry
University of Hawaii
Henke Hall 329
1800 East-West Rd
Honolulu, HI 96822

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Dr. Brennan:

Thank you for your letter of August 5, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated. The method of application will be discussed in greater detail in the environmental impact statement.

The only other herbicide that was considered was 2, 4-D. This, glyphosate, and paraquat are the herbicides selected by the U.S. Drug Enforcement Administration and analyzed in depth in the two DEA environmental impact statements for federal and non-federal lands. The major consideration of the State of Hawaii was a chemical that would be non-persistent in the environment. Both the oil sprays and glyphosate meet this criterion. The oil sprays are the preferred choice because they have the added benefit of acting very quickly.

Very truly yours,

for Libert K. Landgraf
Administrator

Office of the Mayor

DANTE K. CARPENTER
MAYOR

August 25, 1986

RECEIVED
'86 AUG 29 A8:54
FORES... WILDLIFE
STATE ... HAWAII

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Landgraf:

Notice of Preparation of EIS - Eradication of Marijuana On State-owned and Managed Conservation District Lands - Islands of Hawaii, Maui, and Molokai

Thank you for allowing the Planning Director and me the opportunity to review this assessment and EIS Preparation Notice.

Marijuana eradication is a most difficult task, especially on the lands in question. As you are aware, we have many biologically sensitive areas on the Big Island. The protection of these areas is as great as the need to eradicate marijuana.

We look forward to reviewing the EIS.

Sincerely,

Dante K. Carpenter
Mayor

RN:aeb

cc: Planning Director

COUNTY OF HAWAII • HILO, HAWAII 96720

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Honorable Dante Carpenter
Mayor, County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mayor Carpenter:

Thank you for your letter of August 25, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We share your concern for the protection of sensitive ecological areas. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

for Libert K. Landgraf
Administrator

STEPHEN K. YAMASHIRO
Chairman & Presiding Officer
SPENCER KALANI SCHUTTE
Vice Chairman

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

JAMES L. K. DAHLBERG
FRANK DE LUZ III
TAKASHI DOMINGO
ROBERT N. HERKES
LORRAINE R. JIT CHAKU-INOUYE
RUSSELL S. KOKUBUN
MERLE K. LAI
Council Members

August 5, 1986

RECEIVED
'86 AUG -8 A9:38
FORE... STATE OF HAWAII

In Reply Refer
To: C-706

Mr. Libert Landgraf, Administrator
Division of Forestry & Wildlife
Department of Land & Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Landgraf:

This is to acknowledge receipt of your memorandum and copy of the environmental assessment for the eradication by chemical and physical means of marijuana grown on State lands.

Please be informed that your communication has been referred to the Council's Committee on Economic Development and will be discussed at its meeting on Tuesday, August 12, 1986, at the Honokaa District Courthouse.

Upon the completion of our deliberation on this matter, we will forward our recommendations to you. Thank you for inviting us to participate on this important concern.

Very truly yours,

Stephen K. Yamashiro
COUNCIL CHAIRMAN

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Stephen K. Yamashiro, Chairman
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Re: Eradication of Marijuana on Conservation Lands, Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Chairman Yamashiro:

Thank you for your letter of August 8, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

Very truly yours,

for: Libert K. Landgraf
Administrator

POLICE DEPARTMENT

COUNTY OF HAWAII
349 KAPIOLANI STREET
HILO, HAWAII 96720

GUY A. PAUL
CHIEF OF POLICE

WAYNE G. CARVALHO
DEPUTY CHIEF

OUR REFERENCE

YOUR REFERENCE

August 7, 1986

RECEIVED
'86 AUG -8 A9:38
FORESTRY AND WILDLIFE
STATE OF HAWAII

Division of Forestry and Wildlife
Department of Land and Natural Resources
Attention: Libert Landgraf, Administrator
P. O. Box 621
Honolulu, HI 96809

RE: Environmental Assessment and Notice of Preparation of An Environmental Impact Statement

This is in response to your letter of July 23, 1986, regarding the above subject.

We offer the following comments:

PART 1, Paragraph D, Page 3, PROPOSED ACTION

Chevron Weed Oil

When doing research on this chemical approximately a year ago, we found that Chevron Weed Oil was not readily available in the State of Hawaii. Chevron U.S.A. Inc. was contacted and it was determined that the Weed Oil could be shipped to the State of Hawaii if ordered in minimum lots of 5,000 gallons.

This posed two operational problems for us, both logistical in nature:

1. Where would the 5,000 gallons be stored?

2. How would we distribute it to the police departments on the outer islands?

Diesel Oil

During the same research period, we learned from the State Department of Agriculture that the diesel oil emulsion could not be utilized as it was not a licensed herbicide; however, we note in the

draft E.I.A. that it was not illegal to use diesel provided it was from stock on hand, and not sold or purchased for specific purposes or being used as an herbicide. This is how diesel oil emulsion was used during our Operation Wilt Program.

Roundup (Glyphosate)

Although its use is approved, it is our feeling that the number of days it takes to act on the plant removes it from any consideration. It is also much more expensive than other chemicals approved.

It is our recommendation that the enforcement agencies be allowed to continue the use of diesel oil emulsion as it is the least expensive, most readily available and has little, if any, adverse effect on the surrounding vegetation and the environment.

GUY A. PAUL
CHIEF OF POLICE

WGC:gs

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Guy A. Paul
Chief of Police
Hawaii Police Department
349 Kapiolani Street
Hilo, Hawaii 96720

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Chief Paul:

Thank you for your letter of August 7, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

The questions you pose about the logistics of bulk purchase, intermediate storage, and distribution of weed oil to various law enforcement agencies in the state are in the process of being resolved by the Department of Land and Natural Resources.

Very truly yours,

for Libert K. Landgraf
Administrator

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII 25 AUPUNI STREET HILO, HAWAII 96720 TELEPHONE (808) 961-8321

DANTE K CARPENTER
Mayor

HUGH Y. ONO
Chief Engineer

BRUCE C. McCLURE
Deputy Chief Engineer

August 1, 1986

RECEIVED
'86 AUG -6 P3:56
FORE... WILDLIFE
STATE OF HAWAII

DIVISION OF FORESTRY AND WILDLIFE
DEPARTMENT OF LAND AND NATURAL RESOURCES
ATTENTION LIBERT LANDGRAF ADMINISTRATOR
P O BOX 621
HONOLULU HI 96809

SUBJECT: Environmental Assessment
Eradication of Marijuana on State-Owned and Managed
Conservation District Lands, Island of
Hawaii, Maui and Molokai

Thank you for the opportunity to review the subject document. Our comments will be sent to you through the Planning Department.

HUGH Y. ONO
Chief Engineer

DHM/acs

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Hugh Y. Ono, Chief Engineer
Public Works Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Ono:

Thank you for your letter of August 1, 1986 concerning the subject Notice of Preparation. Your interest is appreciated.

Very truly yours,

for: Libert K. Landgraf
Administrator

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

25 AUPUNI STREET • HILO, HAWAII 96720

August 1, 1986

Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street
Honolulu, HI 96813

RECEIVED
'86 AUG 14 A11:39
FORESTRY & WILDLIFE
STATE OF HAWAII

ATTENTION: MR. LIBERT LANDGRAF, ADMINISTRATOR

ENVIRONMENTAL IMPACT STATEMENT ON ERADICATION OF MARIJUANA

We have no objections and support the subject program except for the following comments:

1. Chemical spraying at the following watersheds shall be prohibited due to possible contamination of our surface water sources.

   a. Piihonua Watershed, Hilo
   b. Waiakea Uka Watershed, Hilo
   c. Kohala Mountain, Waimea
   d. Haao Spring, Kau

2. We note that the Environmental Assessment addresses the above concern through the implementation of the Operations Plan whereby a panel will prepare a sensitive areas map.

H. William Sewake
Manager

KO

cc - Ms. Jacqueline Parnell, KRP Information Services
Mr. Gary Kawasaka

... Water brings progress ...

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. William Sewake, Manager
Department of Water Supply
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Sewake:

Thank you for your letter of August 1, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

The environmental impact statement will indicate the watershed areas that you have identified as requiring special consideration.

Very truly yours,

for: Libert K. Landgraf
Administrator

HANNIBAL TAVARES
Mayor
TELEPHONE 244-7855
CMO

OFFICE OF THE MAYOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

August 14, 1986

'86 AUG 22 A10:51

Division of Forestry and Wildlife
Department of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96809

ATTENTION: MR. LIBERT LANDGRAF
Administrator

Dear Mr. Landgraf:

Thank you very much for sending me a copy of the environmental assessment and notice of preparation of an environmental impact statement for the eradication of marijuana grown on Conservation District Lands.

I am strongly in favor of whatever action can be effectively taken to eradicate the growing of marijuana anywhere in Maui County. Therefore, I am very glad that you are proceeding with the necessary action to make it possible to eradicate marijuana, by chemical and physical means, on Conservation District Lands.

I have one suggestion for a change in the operations plan: Revise the procedure to ensure protection of the areas (shown on page 28 of the Environmental Assessment) to include a representive from Maui County's Department of Water Supply on the panel established to prepare a sensitive-areas map.

Also, I strongly suggest that you pursue as expeditiously as possible obtaining permission from the U.S. Environmental Protection Agency (EPA) and the Hawaii State Department of Agriculture for utilization of diesel oil as an eradication chemical because it would substantially reduce the cost of the eradication program.

I really appreciate your efforts to get this very important program underway as soon as possible.

Very truly yours,

Hannibal Tavares

HANNIBAL TAVARES
Mayor, County of Maui

cc: Chief of Police
Director of Water Supply
W.S. Haines, Executive Assistant

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

[illegible] A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Honorable Hannibal Tavares
Mayor, County of Maui
200 South High Street
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mayor Tavares:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your interest, comments, and support are deeply appreciated.

We will definitely request that a representative from the Maui County Department of Water Supply be on the panel that would prepare a sensitive areas map for the Maui County operations plan.

Ways to obtain permission to utilize diesel oil will continue to be a high priority item for us.

Very truly yours,

Libert K. Landgraf
Administrator

Council Chairman
Goro Hokama

Council Vice-Chairman
Howard S. Kihune

Council Members
Abraham Aiona
Linda Lingle
E. Lee Liu
Bob H. Nakasone
Wayne K. Nishiki
Charles S. Ota
Velma M. Santos

COUNTY COUNCIL
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

Gwen Yoshimi Ohashi
Director of Council Services

July 28, 1986

Mr. Libert K. Landgraf
Administrator
Department of Land and
Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Landgraf:

I am in receipt of your letter dated July 23, 1986, regarding the eradication of marijuana on state-owned and managed conservation district lands.

I appreciate receiving a copy of the enviromental impact statement.

Very truly yours,

GORO HOKAMA
Council Chairman

GH:tv

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Goro Hokama, Chairman
Maui County Council
200 South High Street
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Chairman Hokama:

Thank you for your letter of July 28, 1986 concerning the subject Notice of Preparation. Your interest and is appreciated.

A copy of the Draft EIS will be sent to you for your review and comments upon completion.

Very truly yours,

for: Libert K. Landgraf
Administrator

MAUI PLANNING COMMISSION
David T. Fukuda, Chairman
Joseph C. Ventura, Vice Chairman
Toshi Ansai
Joseph Felipa
Joseph J. Franco
Rachael Jio
Roy Suda
Tom Sato
Susumu Sakaida
Vince Bagoyo, Jr., Ex Officio
Alvin Fukunaga, Ex Officio

COUNTY OF MAUI
PLANNING DEPARTMENT
200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

August 14, 1986

HANNIBAL TAVARES
Mayor

CHRISTOPHER L. HART
Planning Director

RALPH N. MASUDA
Deputy Planning Director

'86 AUG 20 A9:26

Division of Forestry and Wildlike
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Landgraf:

Re: Environmental Assessment and Notice of preparation of Environmental Impact Statement for the eradication of Marijuana on State-owned and managed Conservation District Lands, Islands of Hawaii, Maui, & Molokai.

Thank you for the opportunity to review and comment on this matter. We have a few questions that should be addressed prior to implementation of this project.

The question of dispcsal of the poisoned Marijuana is of concern. If the poisoned Marijuana is left in the fields, there is a chance that the grower may try to salvage whatever he can and prepare it for the market. Although the toxicity would be at a low level to the user, there is still that chance of its being detrimental.

Also, if the plants are left in the field the possibility of seedlings being started from fertile plants should be a major concern. Wouldn't this defeat the purpose of the project?

Again, we would appreciate your response to these concerns.

If you have additional questions, please contact Mr. Philip Ohta or myself at this office.

Very truly yours,

CHRISTOPHER L. HART
Planning Director

PO:hk
cc: P. Ohta

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Christopher Hart, Director
Planning Department
County of Maui
200 South High Street
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Hart:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

In response to your concern about the possibility of growers salvaging sprayed marijuana for harvest and sale, one of the reasons the oil sprays are preferred for use is because they cause the plants to wilt immediately and become unsalvageable. In addition, the plants have an unpleasant odor. Glyphosate causes the plants to die in about a week.

There is a possibility that plants left in the field will resprout. However, this is also true with manual eradication where seeds are scattered during the removal process. In practice, there is always some resprouting because it is difficult for enforcement officers to get every single plant, using either method.

Very truly yours,

for: Libert K. Landgraf
Administrator

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P. O. BOX 1109
WAILUKU, MAUI, HAWAII 96793

August 14, 1986

RECEIVED
'86 AUG 18 P2:08
FOR... STATE OF HAWAII

Mr. Libert K. Landgraf, Administrator
Division of Forestry & Wildlife
Department of Land & Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Langraf:

Subject: Eradication of Marijuana on State-Owned and Managed Conservation District Lands - Environmental Assessment & Notice of Preparation of Environmental Impact Statement

Thank you for affording us the opportunity to review and comment relative to the subject matter.

We are very supportive of your efforts to eradicate marijuana plants. However, eradication of marijuana plants by using Chevron Weed Oil or glyphosate must be applied very carefully especially near our water sources, such as the streams; water pools or holes; wells, tanks and reservoirs; open cistern; etc. to prevent contamination of our water sources.

Again, thank you for the opportunity to comment on this matter. If you have any questions, please feel free to contact me.

Sincerely,

Vince G. Bagoyo, Jr., Director

VGB/ao

"By Water All Things Find Life"

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Vince G. Bagoyo, Jr., Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Bagoyo:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will definitely request that a representative from the Maui County Department of Water Supply be on the panel that would prepare a sensitive areas map for the Maui County operations plan to ensure that Maui's water sources are adequately protected.

Very truly yours,

for: Libert K. Landgraf
Administrator

200 E. Kuiaha Rd.
Haiku HI 96708

Division of Forestry and Wildlife
DLNR
PO Box 621
Honolulu Hi 96809

RECEIVED
'86 AUG 20 A9:27
FORES... STATE OF HAWAII

Dear folks,

I am writing to comment on the environmental impact of spraying glyphosate and weed oil on marijuana plants growing in state conservation lands in Maui County.

Such spraying would be detrimental to the existing wildlife and plants in these areas. Furthermore, the effect on the watershed could be disasterous. If they can get close enough to spray each plant individually, as they claim they will to avoid any drift, then they can get close enough to pull the plants out of the ground and avoid further disruption of the environment.

Spraying of these poisons is a terrible idea and I am very much opposed to it. I appreciate your consideration.

Sincerely,

Karen Anna

Karen Anna

cc KRP Information Services

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

October 8, 1986

Ms. Karen Anna
200 E. Kuiaha Rd.
Haiku, HI 96708

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Anna:

Thank you for your letter concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern about the potential deleterious impact of chemical spraying on native biological communities. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

Mr Langraf:
Please consult with me on the EIS for spraying toxic chemicals on marijuana in conservation districts.
~~Alex~~ When the EIS is published, please make them available in all state libraries & to the Kihei Community Library. Thank you.
Kelly Arbor
Box 1596
Kihei HI 96753

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

October 8, 1986

Ms. Kelly Arbor
P. O. Box 1596
Kihei, HI 96753

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Arbor:

Thank you for your postcard concerning the subject Notice of Preparation. Your interest and comments are appreciated.

A copy of the Notice is being sent to you, and we will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

Very truly yours,

for: Libert K. Landgraf
Administrator

Attachment

August 10, 1986

Dear Libert Landgraf.

Please don't spray! Please don't spray with Chevron weed oil (commercially called Roundup), or diesel oil.

I think it is unfair. I don't grow Maraquana, I don't smoke marijuana; and I don't want my environment ruined and damaged by the proposed spraying. Please think about us before such rash and dangerous action is taken on our ecological environment.

Mahalo,
Ronnie Bressler

RECEIVED
'86 AUG 12 A10:50
FORESTRY
STATE OF HAWAII

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

October 8, 1986

Mr. Ronnie Bressler
P. O. Box 1354
Makawao, HI 96768

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Bressler:

Thank you for your letter of August 10, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of sensitive ecological areas. Specific measures to protect native habitats and wildlife will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

August 22, 1986

Mr. Libert Landgraf, Administrator
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

RECEIVED
'86 AUG 25 A10:26
FOR

Dear Mr. Landgraf,

I am a Maui resident, born and raised, and I wish to register a formal complaint and to express concern over the proposed plans for aerial spraying of Chevron Weed Oil and glyphosate, or "Round-up" over the islands of Maui, Hawaii and Molokai. As you and your department are fully aware, hawaii already has the notoriety of having the highest number of endangered species of animals in the country. Our fragile native forests are home to countless irreplaceable fauna, flora and wildlife; chemicals powerful enough to kill the hardy marijuana plant, will surely devastate our fragile ecosystems.

I ask for reconsideration of this dangerous plan to eradicate marijuana from our islands. Surely there is a safer method to "round-up" the illeagal plant, one which won't endanger our islands and their people.

Thank you for your time and careful consideration of this matter.

Sincerely,

pls note
not signed

F.E. Cameron
P.O. Box 1683
Makawao, HI 96768
(808) 572-6259

cc. Jacquelin Parnell, KRP Information Services

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. F. E. Cameron
P.O. Box 1683
Makawao, HI 96768

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Cameron:

Thank you for your letter of August 22, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of sensitive ecological areas. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

Libert K. Landgraf
Administrator

Down to Earth

NATURAL FOODS
STORE & SNACK BAR

RECEIVED

'86 AUG 19 A9:47

FORES... STATE ...

Greetings

In regards to Aireal Spraying of Maui, by the division of forestry and wildlife for eradication of Marijuana - We understand your reason but disagree with your means, Keep our lungs, etc, free of Chemicals. Aireal Spraying is unsafe, and we are against it.

Mahalo

Tom Cobian
Management.

1910 Vineyard St., Wailuku, Maui, Hawaii 96793 Tel: (808) 242-6821

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Tom Cobian
Down to Earth
1910 Vineyard Street
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Cobian:

Thank you for your letter concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

Division of Forestry & Wildlife
Department of Land & Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809 August 27, 1986

RECEIVED
'86 AUG 22 A10:50
FORESTRY & WILDLIFE
STATE OF HAWAII

Aloha
Dear Mr. Landgraf

It has come to my attention that there is a consideration to aerial spray Maui, the island where I reside. This is not only against my principles but I consider a threat to my health & well being and a measure that could be handled in other areas in a different manner than toxicity to the environment.

I assume your department feels the same and are collecting like opinions to present to the government.

Mahalo
Sincerely
Jophiel Eloheim

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Joseph Eloheim
P.O. Box 561
Haiku, HI 96708

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Eloheim:

Thank you for your letter concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

Aug 22, 1986

To whom it may concern,

I have been a citizen of Maui for over seven years now and have made Maui my permanent home. I am writing in response to the possible spraying of toxic chemicals (especially roundup) in our mountain areas in order to eradicate marijuana growing. I am ~~#~~ strongly opposed to such action. Its not the erradication of the marijuana that I disagree with, its the method. Spraying this over our fragile mountain ecosystem will not only destroy our beautiful lush tropical forest and wildlife, but also will inevitably end up in our water system, as much of our water comes from mountain streams in addition to the fact that many use rain catch systems which can be poisoned by this action. Please reconsider this method. Personally, I am gravely concerned for the health and well-being of my family and those dear to me.

In addition, I feel that there was a lack of information to the public and time to respond. I feel that the people of Maui should have a more than adequate amount of time to respond to an issue that is of such grave concern to our health and our environment.

Thank you,

Carol Fenn
P.O. Box 1260
Paia, HI 96779

FOR
'86 AUG 25 AM 10

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Carol Fenn
P.O. Box 1260
Paia, HI 96779

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Fenn:

Thank you for your letter of August 22, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

A copy of the Notice is being sent to you, and we will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of sensitive ecological areas and rain catchment systems. Specific measures to protect native habitats and sources of water supply will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

Attachment

Constance H. Gaffney
Star Rt. 172
Hana Maui, Hawaii 96713

Aug 20

To whom it may concern:
I live peacefully in Kyahulu raising flowers + vegtables + farm animals.
I abhor the drug traffic and all connected with it — but I would rather have marijuana growing all around than have anyone spray poisons on this beautiful land.
Lets give some thought to this verdant land and let the addicts fall where they may.
Please dont spray poisons!

Sincerely,
C H Gaffney

'86 AUG 25 A10:19

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Constance H. Gaffney
Star Rt. 172
Hana, HI 96713

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Gaffney:

Thank you for your letter of August 20, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

Libert K. Landgraf
Administrator

For the Protection of Hawaii's Native Wildlife

HAWAII AUDUBON SOCIETY

P.O. BOX 22832
HONOLULU, HAWAII 96822

P. O. Box 275
Volcano, HI 96785

August 21, 1986

RECEIVED
'86 AUG 25 A10:25
FOR... DEPT.
STATE OF HAWAII

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Landgraf:

Thank you for sending the Society a copy of the Environmental Assessment and Preparation Notice for an Environmental Impact Statement on Eradication of Marijuana on State-owned and Managed Conservation District Lands on the Islands of Hawaii, Maui and Molokai.

The Hawaii Audubon Society fully supports the goal of the Department of Land and Natural Resources to eradicate marijuana growing on State-owned Conservation District Lands on all of the Hawaiian Islands. In conjunction with this goal, the Society also encourages the eradication of any other illegal farming or unauthorized land use within State-owned Conservation District lands.

Our major concern is the protection of native plants and animals from damage during the eradication process. We want to know the precise procedures to be followed each step of the way to insure that native habitats are not needlessly destroyed by vehicular use, or by spraying, or by spray drift, or by manual or mechanical means.

In preparation for the work, do you plan to conduct training sessions for work crews on how native forest vegetation, birds and other animal life must be fully protected from the eradication measures applied to marijuana?

We look forward to a carefully detailed plan for the protection of native habitats in different kinds of ecosystems at the same time that marijuana eradication is being carried out.

Thank you for the opportunity to make these comments.

Sincerely yours,

Mae E. Mull

Mae E. Mull
Member, Board of Directors and
Island of Hawaii Representative

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

October 8, 1986

Ms. Mae Mull
Hawaii Audubon Society
P.O. Box 22832
Honolulu, HI 96822

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Mull:

Thank you for your letter of August 21, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We share your concern about the potential deleterious impact of chemical spraying on native biological communities. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Operation plans will be prepared for each of the islands, similar to the one prepared for Kauai. Each plan prescribes the measures to be taken to ensure that spraying will be confined to the target areas, and includes training prescriptions for personnel involved in the operations.

Very truly yours,

for Libert K. Landgraf
Administrator

HAWAII MEDICAL ASSOCIATION
[illegible] AVENUE [illegible] ● HONOLULU, HAWAII 96813
[illegible]

August 15, 1986

RECEIVED
'86 SEP 2 P4:05
FOR [illegible]

Division of Forestry and Wildlife
Department of Land & Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, HI 96813

Dear Sirs:

I realize this may get to you late, but as chairman of the Toxic Agent Subcommittee of the Hawaii Medical Association, I have the following comments to make on your document "Environmental Assessment and Notice of Preparation of Environmental Impact Statement" for "Eradication of Marijuana on State Owned and Managed Conservation District Lands - Islands of Hawaii, Maui, Molokai."

(1) You list of "agencies, organizations and individuals to be notifed of preparation of an environmental impact statement under Chapter 343HRS" regretfully omits the Hawaii Medical Association and any other medically oriented organization accept for the American Lung Association of Hawaii. The Hawaii Medical Association and the medical community in general have a keen interest in protecting the health the residents of Hawaii, and as such, would like to be apprised of any developments which might have an impact on the public. We would also be able to provide expertise in the area of toxicology and the creation of such a plan.

(2) There is no mention whatever in this scoping document as to the toxicity to humans of glyphosate or Weed Oil, so that it is difficult for us to comment at this time as to the safety to human beings of the use of these compounds. We know, however, from the final environmental impact statement prepared by the federal Drug Enforcement Agency, entitled "Cannabis Eradication on Non-Federal and Indian Lands in the Contiguous United States and Hawaii," that completed long-term studies of the affects of glyphosate in test nimals are still pending as of this summer.

In particular, the Federal Insect, Fungicide, and Rodenticide Scientific Advisory Panel has decided, on the basis of a long-term mouse feeding study in which glyphosate given at submaximally tolerated dosage caused significantly elevated number of kidney adenomas (tumors), that glyphosate should be classified as a group D ("not classified"), carcinogen, and that there be a data call-in for further studies in rats and/or mice to clarify unresolved questions.

We would advise strongly that before proceeding with the State Environmental Impact Statement, that all pending studies be completed and data reviewed carefully and critically. Essentially what the FIFRA

Scientific Advisory Panel is saying is that it cannot determine the carcinogenicity of glyphosates based on the current data and that further studies should be performed. Certainly glyphosates should not be used prior to the determination of carcinogenicity of the substance.

In regards to the use of Weed Oil, again no toxicological data is available in the scoping document for the EICS. We would hope that ample discussion of this substance would be given in the draft EICS. Thank you.

Sincerely,

Steve M. Moser, M.D.,
Chairman, Toxic Agent Subcommittee

SMM:lpk

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Steve M. Moser, M.D.
Chair, Toxic Agent Subcommittee
Hawaii Medical Association
320 Ward Avenue, Suite 200
Honolulu, HI 96814

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

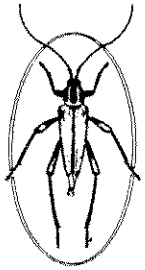
Dear Dr. Moser:

Thank you for your letter of August 15, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include the Hawaii Medical Association as a consulted party in the preparation of the environmental impact statement. Our consultant will be contacting you to discuss the items mentioned in your letter. A copy of the Draft EIS will be sent to you also for your review and comments upon completion.

Very truly yours,

Libert K. Landgraf
Administrator



Hawaiian Entomological Society

August 14, 1986

RECEIVED

'86 AUG 19 A9:47

FOR... STATE ... (illegible)

Division of Forestry and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809
Attention: Libert Landgraf, Administrator

Dear Mr. Landgraf:

Thank you for providing the Hawaiian Entomological Society with an opportunity to comment on the Environmental Assessment and Notice of Preparation of the Environmental Impact Statement on the proposed "Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai".

We do not object to the overall proposal and methods as described in the EA. However, some members of our Society have expressed concerns regarding the application of herbicides with helicopters, particularly in kipuka areas, and the possible negative impact to native insects from the accidental application of herbicides to rare and endangered native plants.

Sincerely,

Dick M Tsuda

for Po-Yung Lai, Ph. D.
President

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Dick M. Tsuda
Hawaiian Entomological Society
c/o Entomology Department
University of Hawaii
3050 Maile Way
Honolulu, HI 96822

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Tsuda:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We share your concern for the protection of sensitive ecological areas. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

for Libert K. Landgraf
Administrator

Division of Forestry and Wildlife
Dept. of Land & Natural Resources
P. O. Box 621
Honolulu Hi 96809

RECEIVED
'86 AUG 25 A10:20
FOR. & WILDLIFE
STATE OF HAWAII

Dear Mr. Landgraf -

I am writing you with regard to the proposed killing of marijuana plants with chemical weed killer - sprayed from the air -
I plead with you to spare us this poisoning of our Natural Resources on which we depend for our life & sustenance -
For how you may feel this is justified by the damage done by smoking pot - at least one may make this choice - when it comes to the air we breathe and the water we drink - the eco-system of the island is severely unbalanced by the introduction of poisons that kill plants, insects, birds & make it's way into our bodies - those of our children & babies. This is involuntary! We are being forced to take in toxic chemicals that are poisoning our Environment & us.

If you care about our land & natural resources you will not allow this action to take place! It is not worth it for what you may feel is the damage done by smoking pot. There are other ways! I am not trying to protect the pot growers - I do sincerely wish to help protect the health of our dear Planet - Mother Earth - Mother Nature - for that in turn directly affects our Health - & those for generations after. We can't harm our earth & Nature without harming ourselves! Please do not add to the damage that is mostly been done thru chemicals used in agriculture!

Mahalo for your consideration.

Sincerely -
Sunny Holmes

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Sunny Holmes
P.O. Box 879
Makawao, HI 96768

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Holmes:

Thank you for your letter concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

August 15, 1986

'86 AUG 18 A9:25

Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and
Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Landgraf:

Thank you for the opportunity to comment on the environmental assessment (EA) for the proposed marijuana eradication on Hawaii, Maui, and Molokai Conservation District lands. Since I have not heard from Dr. Kay that the Animal Species Advisory Committee will meet to discuss this, my comments on the EA and recommendations for the environmental impact statement (EIS) follow.

Page 4, para 2: The statement implies that glyphosate is a more environmentally compatible agent than weed oil. What are the circumstanaces which will determine glyphosate use? Is cost the reason that weed oil will be used predominantly? If so, assuming glyphosate is "safer", how much would 100% use of glyphosate add to the cost?

Page 9, para 1: Three birds, the Akepa, the Akiapolaau, and the Hawaii Creeper, are also listed as endangered, occur on Hawaii, and should be included in this paragraph.

Page 15, para 3: Two birds, the Nukupu'u and the Po'ouli, are also listed as endangered, occur on Maui, and should be included in this paragraph.

Page 20, para 4: The I'iwi is not listed as endangered and should be deleted from this paragraph.

Pages 22-23: (Social Considerations) Conspicuously missing from the socioeconomic groups affected by the project are the marijuana growers. While an impact on growers is an unstated objective of the project (the stated objectives include potential growers only), nevertheless this group should be included in the EIS among those affected by the proposed action.

Neither do I think that including growers in the EIS is a trivial matter. The estimated value of the crop is stated to be $289 million (p. 22), and some fraction of this loss would accrue to the growers. This could result in the growers turning to other means of "earning" their income, possibly also illegal, and possibly adversely impacting the general public even more than illegally growing marijuana. Such "occupations" might include robbery or theft, for example. I strongly urge that growers be included as an affected group in the EIS, and that socioeconomic effects resulting from impact on the growers be considered.

Page 28, subpara 1: The identification of sensitive areas is the most important procedure if the proposed action is to be conducted without damaging native wildlife or plants. Although the procedures for identifying these areas are delineated in the Operations Plan, which is not strictly open for comment, nevertheless the summary in subparagraph 1 raises some questions. The key word in this paragraph is "should", as in, "the panel should include representatives...", implying that the plan gives only guidelines as to which organizations will be represented on the panel. The organizations listed are certainly qualified to identify sensitive areas, and I recommend that the Operations Plan be worded such that "The panel will include representatives..." This would help ensure that all sensitive areas are properly identified. The panel should also include representatives from the University of Hawaii, particularly, at a minimum, personnel from the botany, entomology, zoology, and agronomy/soil science departments.

Given the comments and qualifications I have stated above, I nonetheless believe that crop cultivation is not an appropriate use for state Conservation District lands, and I support eradication. The eradication, if done carefully and responsibly, would start the process of restoring these disturbed areas to their natural condition.

Nevertheless, based on the information presented in the EA, I am not convinced that the Operations Plan will adequately ensure that all sensitive areas are properly identified. The plan should stipulate the membership organizations which comprise the panel, not merely provide guidelines. As long as the possibility exists that some sensitive areas could be overlooked, I do not support the Proposed Action (spraying), but rather support the "no action" alternative, i.e. continued manual eradication. Perhaps the draft EIS will allay some of my concerns.

Thank you again for the opportunity to comment, and I look forward to receiving a draft EIS. I would also appreciate receiving a copy of the Operations Plan.

Sincerely,

John R. Henderson
Member, Animal Species Advisory Committee

cc: Dr. E. A. Kay
Jacqueline Parnell

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 3, 1986

Mr. John R. Henderson
Member, Animal Species Advisory Committee
1238 Kainui Drive
Kailua, HI 96734

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Henderson:

Thank you for your letter of August 15, 1986 concerning the subject Notice of Preparation. Your comments, suggestions and corrections are appreciated and will be addressed in the environmental impact statement.

A diesel oil and water emulsion is the preferred choice for marijuana eradication because of its availability, low cost, low risk to health and the environment, and general public acceptance. Because diesel oil cannot be legally sold for use as an herbicide, Chevron Weed Oil is being proposed for use as a substitute. Glyphosate will be used only if Weed Oil is unavailable. Cost is one consideration, but not the major one.

The operations plan developed for Kauai and those that will be prepared for Hawaii, Maui and Molokai will not be made available to the public as separate documents because of the confidential nature of some of the material contained therein. However, recommendations for the operations plans will be contained in the environmental impact statement.

Very truly yours,

John Henderson

for Libert K. Landgraf
Administrator

Aloha 8 22 86

The following is concerning the aerial Spraying of Round UP—diesel oil in Maui and Molokai—We feel there has been ~~a~~ insufficient public notice!!—We object to this act and feel the spraying should be cancelled now, and that methods environmentally and socially and ethically sound be used—Our water and wildlife is at stake—There are alternatives—Don't Poison Maui please—Bruce Jacobs

Sincerely Dolores Soler

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Bruce Jacobs
Ms. Dolores Soler
P.O. Box 1128
Paia, HI 96779

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Jacobs and Ms. Soler:

Thank you for your postcard of August 22, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

8/22/86

Dear Libert, and staff,

I am writing this letter to you to express my opposition to the proposed marijuana ~~[illegible]~~ eradication program.

I believe it would have detrimental effects on my family, due to the fact that where we buy our drinking water from is in close proximity to one of the areas where the proposed spraying would occur. I am also against it, because I believe it would affect the water we bathe and wash our clothes in. I am also against it, because I know it would harm what few remaining indegenous plants & animals there are these regions.

As a protector of these lands and animals, I do not see how you could possibly condone this proposal!

I also definitely think that there should be an extension for the period of filing the environmental Impact Statement!

Sincerely,
Susan & Martin Jenson
P.O. Box 937
Paia, HI.
96779

86 AUG 20 A9:25
RECEIVED
STATE OF HAWAII

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. & Mrs. Martin Jenson
P.O. Box 937
Paia, HI 96779

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. & Mrs. Jenson:

Thank you for your letter of August 22, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion. Reviewers will have thirty days to comment.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

Libert K. Landgraf
Administrator

Aug. 21, 1986

RECEIVED
'86 AUG 25 A10:25
FORE... STATE OF HAWAII

Dear Mr Lundgraf—

I am writing in regards to the threat of spraying Chevron Weed Oil (commercially sold as Roundup) & also Deisel Oil; as a form of eradicating marijuana farming. Just because a few insensitive growers are not willing to conform to our political policies, is no reason to poison our residents & our rare birds.

Personally, my health has been made quite poor from exposure to these pollutants.

Also, I am greatly concerned about preserving the few rare birds & rare native plants on our islands.

Please make it clear to the authorities that this is not the proper way to deal with this situation. The people need to be educated, not poisoned.

Thankyou for your time.

Sincerely,
Nancy Marie Lutich

GEORGE R. ARITOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Nancy Marie Lutich
P.O. Box 773
Paia, HI 96779

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Lutich:

Thank you for your letter of August 21, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of public health and sensitive ecological areas. Specific measures to ensure the safety of humans and animals and to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

maui Chamber of Commerce
Established 1910

September 17, 1986

RECEIVED
'86 SEP 19 A11:28
FORESTRY & WILDLIFE
STATE

Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl St.
Honolulu HI 96813
ATTN: Mr. Libert Landraf
Administrator

Dear Mr. Landgraf:

We received your July 23rd notice regarding preparation of an environmental impact statement for the eradication, by chemical or physical means, of marijuana grown on Conservation District Lands owned and managed by the State of Hawaii on the islands of Maui, Molokai, and Hawaii.

For your information, we are enclosing copies of position statements from our Health Committee and Public Safety Committee which address the issue of paraquat spraying, as well as aerial spraying of insecticides.

It has come to our attention that we have missed the August 22nd deadline set for comments, but we hope the information provided will be taken into consideration.

Please contact this office, or the following committee chairmen if we may be of service:

John Wilt, Chairman
Public Safety Committee
c/o Maui Community College
310 Kaahumanu Ave.
Kahului Maui HI 96732

Chuck Knobel, Chairman
Health Committee
c/o Kaiser Foundation
80 Mahalani St.
Wailuku Maui HI 96793

Thank you for your consideration.

Sincerely,

Lynn Britton
Executive Director

Enclosures
cc: Chuck Knobel
John Wilt

sln

justice system is tracking of offenders. The Committee will support measures or legislation for better information sharing.

Resource: Alan Konishi, Director, Government Affairs-The Chamber of Commerce of Hawaii

F. Drug Information Program: The Committee will investigate the extent of the drug problem in Maui County as compared to other jurisdictions and initiate successful programs to increase public awareness of and availability to factual information on health hazards associated with drug abuse. The Committee will also investigate the possibility of legislation relating to "drugged drivers".

In the opinion of the Public Safety Committee, paraquat spraying is unwise. The Public Safety Committee supports an intensive program of narcotics detection (utilizing drug-sniffing dogs) at the Kahului Airport, Kahului Harbor and Lahaina.

Resource: Maui Chamber of Commerce, Health Committee; Tamara Horcajo, "Chemical People"; Dr. Robert Bjornson, Chair Substance Abuse & Impaired Physicians at the Maui County Medical Association; Mayor's Advisory Committee on Substance Abuse.

G. Marijuana: The Maui Chamber of Commerce will support "Operation Green Harvest" and other eradication measures necessary to ensure full compliance with the law as it relates to the use, possession and sale of this substance.

Resource: Vice Section, Maui County Police Department

H. Crime Symposium: Statistics indicate that the crime rate for the County of Maui in recent years has exceeded the average crime rate for the State and is equal to that of downtown Honolulu. The Committee will encourage organizations such as the Maui Community College Administration of Justice Advisory Committee to conduct a "crime symposium" to increase community awareness of the extent of our crime problem and determine action necessary to reduce the crime rate. The symposium could bring together experts such as prosecutors, legislators, criminal justice administrators, community

Maui and remote areas of the island. We therefore urge the responsible government parties to address the importance of providing an air ambulance service utilizing a helicopter based service to transfer the patient to the hospital where ever surface transport is required.

IV. THE ERADICATION OF THE TRI-FLY IN HAWAIIAN AGRICULTURAL PRODUCTS

The Maui Chamber of Commerce opposes the implementation of aerial spraying of insecticides by the federal government in the eradication of the tri-fly in Hawaiian agricultural products. Your committee strongly supports the conviction that the delineation of need for and implementation of such programs should be made at the local community government level.

Supporting Statement

The proposal by the United States Government to implement a multi-faceted program which is designed to eradicate the tri-fly complex of insects in agricultural products produced in Hawaii is of vital importance, both to our citizens and to the agricultural industry.

Of particular concern to the Board of Directors of the Maui Chamber of Commerce is that portion of the proposal which suggests the use of aerial spraying of insecticides developed to eradicate the infestation and destruction caused by this complex of insects. While the proposal appears well-intended, there is sufficient concern about the potential adverse effects of aerial spraying that the Board recommends that the federal government not implement this program in Maui County.

The members of the Board are particularly sensitive to both the need to control the infestation and damage caused

by the tri-fly, while at the same time there is a need to accelerate the distribution and sale of Hawaii grown agricultural products. At this time, however, there is an over-riding concern for the public's long-term health and therefore recommends that this program not be used in Maui County.

V. NON-PROFIT HUMAN-SERVICES

The Maui Chamber of Commerce encourages its members to fully support non-profit human-services agencies in their fund-raising activities.

Supporting Statement

Your Maui Chamber of Commerce understands that the Federal budget process has had a profound impact on the non-profit human-service delivery system in a far reaching manner. Declining funding sources and the increased cost of operations. have made it difficult for special services to be provided These services directly affect the health and well-being of the people of Maui.

Therefore, in view of the declining funds available to support the non-profit human-services industry, it is important that all Chamber members realize that they play an important role in assisting in the funding of these agencies. The health and well-being of a community can be directly correlated with the ability of the private sector to support those private agencies provide direct care services to people.

Therefore, the Chamber of Commerce urges all its members and the community at large to accept this responsibility and work to actively to provide the funding necessary for these non-profit agencies to carry out their mission.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Lynn Britton
Executive Director
Maui Chamber of Commerce
P.O. Box 1677
Kahului, HI 96732

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Britton:

Thank you for your letter of September 17, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

Please note that no broadcast aerial spraying is planned and that paraquat will not be utilized in the marijuana eradication program.

Very truly yours,

for: Libert K. Landgraf
Administrator

Save Hawaii Save Hawaii Save Hawaii Save Hawaii Save Hawaii
Hawaii Save Hawaii Save Hawaii Save Hawaii Save Hawaii Save
Save Hawaii Save Hawaii Save Hawaii Save Hawaii Save Hawaii
Hawaii Save Hawaii Save Hawaii Save Hawaii Save Hawaii Save

save hawaii

"a voice for the environment"

July 29, '86

RECEIVED
'86 AUG 1 P2:42
STATE OF HAWAII

Attn: Libert Landgraf:

(ie.: E.I.S. Preparation for Eradication of marijuana....)

I am concerned with the excessive use of herbicides & chemicals in Hawaii. For state officials to continue to find more uses for these chemicals, not knowing the long-term effects & consequences on the environment and groundwater could be disastrous.

The Big Island, especially in certain areas, has little soil and clay to help "bind" these chemicals. I would like to see a study done tracking the movement of these chemicals (especially in case of accidental spills) in Hawaii's porous lava soil.

Marijuana eradication has been highly successful without the use of chemicals.

I believe the state should set the example of using no chemicals for marijuana eradication, highway maintenance or otherwise. Please keep me informed on the progress of this Environmental Impact Statement preparation.

Ms. Jacque Prell
Box 888
Captain Cook, HI 96704

cc: Jacqueline Parnell

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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FORESTRY AND WILDLIFE
LAND MANAGEMENT
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WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Jacque Prell
P. O. Box 888
Captain Cook, HI 96704

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Prell:

Thank you for your letter of July 29, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement. Monitoring is also being done to determine the fate of the oil sprays in Hawaiian soils.

Very truly yours,

for Libert K. Landgraf
Administrator

ROUND-UP MONSANTO'$ BILLION-DOLLAR per year POISON

Round-up is a commonly used herbicide in Hawaii. Round-up (also sold as "Kleen-up" and "Doomsday") is a billion dollar a year business for its maker, Monsanto. (Wall Street Journal, April '82). It is used by the state and county highway dept. along roads and in parks. It's also used in mac-nut farms, coffee farms and for other agricultural and domestic uses. It may be used soon to eradicate marijuana if state and federal plans go through.

Pres. Reagan's advisor on Drug Abuse Policy, Carlton Turner, said in an interview in the Honolulu Star-Bulletin (June 27, '85), "Round-up is so safe you can take a bath in the stuff."

How safe is Round-up?

Monsanto has sued the EPA to prevent them from releasing registration data for scientific peer review and public examination, as required by law. But in 1979, summaries of their 'trade secret' data were released to Roger Sandquist, pesticide coordinator for the U.S. Forest Service, which made its way into a Forest Service environmental assessment for Round-up use. According to these summaries:

"In a 21 day subacute dermal study, rabbits were given daily doses of formulated product diluted to its use level and five times its use level. These dilutions produced severe local skin reactions and testicular effects. Further study found that the reactions were due to the surfactant in the product and that the testicular effects were a manifestation of the stress caused by the skin reaction. It was concluded that the rabbit was an unfortunate choice for the testing of dermal effects with this product. . ."

In their 18-month carcinogenic study in mice, Monsanto apparently observed neoplastic lesions in their test mice but were unable, for unexplained reasons, to correlate that phenomenon with their pathologic examinations.

Monsanto's study in dogs was clearly inadequate, since too few dogs (four of each sex) were utilized to produce statistically-useful information and only lasted two years, which is about six years shy of a realistic test period in beagles, according to cancer experts.

Their two-year oral toxicity study on rats produced no significant differences between the test and control populations—a fact hardly reassuring alongside their admission that the control population suffered nearly double the normal mortality rate.

Bluegills exposed to Round-Up absorbed the pesticide to levels above that in the water they swam in—a bioconcentration factor of 1.6 times.

Although Round-Up proponents have claimed that the herbicide breaks down almost instantaneously when it hits the ground, Sandquist reported that the active ingredient, glyphosate, "moved readily from the treated leaves of lower branches to other leaves, buds, and developing fruit on the same branch. . .," and, "after 90 days, 92 to 98 percent" was still present as unaltered glyphosate. Sandquist also reported that, "contrary to the effects of the phenoxy herbicides, the effects of glyphosate reached their maximum about two years after application," so apparently the active ingredient is much more persistent than generally believed by the herbicide's users.

Monsanto evidently saw fit not to give Sandquist full information about studies of Round-Up's effects on trout, which were performed for them by U.S. Fish & Wildlife Service. Even the Fish and Wildlife Service saw fit to soften the results of their study when they published[2], but a 1976 internal report unequivocably stated, "these results suggest that a change in the formulation of glyphosate would greatly improve its environmental safety."[3] The Fish and Wildlife Service had discovered that, like Monsanto's "unfortunate" rabbits, trout were extremely susceptible to the surfactant in Round-Up, and that the "toxicity of the surfactant used in the formulated product was similar to that for the whole formulation." They also discovered the toxicity of Round-Up in water was not reduced after aging the mixture; so the surfactant is evidently somewhat persistent as well.

In late 1979—as some people began to realize there might be a severe problem with the supposedly "inert" surfactant mixed with glyphosate to produce Round-Up

Although EPA has taken the position that the existing analytical method for identifying glyphosate in the environment is adequate for enforcement purposes,[4] Dr. Linden Baum, head of the Washington state Department of Social and Health Services Lab has taken the position that Round-Up cannot be tested for by DSHS because it is a "costly thing" ($3,000) and takes four days to run after initial procedures.[5] That aside, EPA has yet to offer an explanation how enforcement labs can test for a surfactant whose identity has never been revealed but nonetheless may leave a trail of "unfortunate" rabbits and trout.

At one time, EPA contemplated a regulatory action against Round-Up because of its contamination with *N*-nitrosoglyphosate, a suspected carcinogen; but EPA apparently accepted Monsanto's assurances that this didn't result in residues in raw agricultural commodities or pose a hazard to applicators.[6]

Independent researchers Shahamat Khan and Christopher Young have reported that *N*-nitrosoglyphosate apparently formed in soils when treated with sodium nitrite and Round-Up's active ingredient glyphosate.[7] This suggests a hazard when soils low in organic matter and clay content are heavily fertilized with urea and treated with Round-Up. Khan and Young also reported *N*-nitrosoglyphosate was very persistent in their study, with 7 parts per million remaining after 140 days. Also noted was the structural relationship of the latter to a known mutagen, *N*-nitrososarcosine.

Perhaps the beginning of the end of "miracle" Round-Up came in 1978, when a summary of a Nigerian study reported that doses as low as 15 mg/kg (15 parts per million) of Round-Up apparently caused reductions in daily body weight gain, blood hemoglobin, red blood cell count and other vital sign distortions in a 28-day study with rats.[10] Glyphosate reacts with sodium nitrite (an ingredient of N-fertilizers) to produce N-nitrosoglyphosate. Many N-nitroso compounds are potent animal carcinogens (for example, nitrosocarbaryl). This is a potential problem, particularly with agricultural uses of the pesticide.

Two independent studies have indicated that glyphosate has genotoxic effects. In one study, meiotic chromosome aberrations were observed in plant chromosomes treated with glyphosate. Plant chromosomes are more akin to mammalian chromosomes than are those of viruses, bacteria, and other prokaryotic organisms, so responses of plant chromosomes to chemical compounds should provide useful information.) In another study, Roundup yielded positive results in a sister-chromatid exchange (mutagenicity) test on human lymphocytes.

RESIDUES

The EPA has set tolerance standards for glyphosate residues in some foods and in potable water. The drinking water tolerance is 1ppm. However, standards are useless if residue levels cannot be readily determined, and if the basis for the standards is questionable in view of registration data problems. Testing for glyphosate is a very costly and time-consuming process. This means that the opportunity for testing to see whether glyphosate tolerances have been exceeded is limited, especially for members of the public who rarely have several thousand dollars available for such procedures. We should also remember that tests for glyphosate are not tests for the other unidentified "inert" ingredients" in Roundup that may cause more problems than glyphosate itself.

CONCLUSION

Clearly the situation with Roundup (glyphosate) is far from satisfactory. There is currently a lack of valid information available to the public regarding the health and environmental effects of glyphosate. What is available is sufficient to raise concern that such effects may be unreasonably adverse.

Much of the research on the potential health and environmental effects of glyphosate has been performed by Monsanto. In 1978 the law was amended to require that registration data be available to the public for review after registration. However, industry considers these studies to be "trade secrets". Lawsuits by industry have prevented the release of data to the public since 1978.

Citizens for a Better Environment and several other organizations are currently suing the California Department of Food and Agriculture and Monsanto to obtain copies of these "secret" studies. Other citizens have sued the EPA for these studies. Until they are made available, the public cannot feel comfortable that glyphosate is as harmless as it is claimed to be. One cannot help but suspect that there is something to hide when a company will go to such lengths to keep health and safety data secret...especially when the subject of these secrets is a predicted source of $1 billion a year in income to the manufacturer.

Excerpts from NCAP News, Fall 1980 and WTC News "Pesticide Profile" Oct '82

More on "Round-Up" next issue

California Watermelon Poisoning

the inside scoop

California's 1985 watermelon fiasco was not an accident, the result of carelessness by a few farmers, as California's director of agriculture and the Environmental Protection Agency would have us believe. Over a million melons, practically the entire crop, were ordered destroyed by the State Health Department because of contamination by the pesticide aldicarb, produced by Union Carbide Corporation.

When the company first marketed aldicarb in 1975 (under the name Temik) it was touted as a super-pesticide, one application effective for the entire season since it was systemic. It was guaranteed not to contaminate drinking water or to cause cancer. No tests were made regarding birth defects, loss of fertility or nerve damage. Cancer tests were made over nine years, though cancer caused by pesticides may take decades to develop.

Soon aldicarb began showing up in drinking water — in 11 of the 15 states monitored. In seven the amount exceeded EPA standards. Injesting something that exceeds EPA standards is tantamount to committing slow suicide.

Did Union Carbide take the stuff off the market? No. They just changed the directions: Don't plow it under and don't use it every year! They offered free filters to communities with excessively contaminated water. The corporation was not ready to abandon a product that accounts for 5 percent of its total sales and profits.

People in high places whose job it is to protect the public tried to cover up Union Carbide's guilt. They made sure fingers were pointed at "careless farmers" rather than at derelict state and federal officials and Union Carbide. The state director of agriculture said he would ferret out the guilty growers and "nail them to the cross". This would be a mild crucifixion considering that the penalty in California for poisoning people by pesticides is a maximum fine of $1000 and six months in jail!

The thousands of people in the U.S. and Canada made sick by the poisoned melons were sacrificed by agribusiness and the big chemical corporations. The corporations contribute big sums to politicians who pay them back by stacking or gutting regulatory agencies and getting rid of "restrictive" laws and "expensove" tests. The people who grow, harvest and consume the crops pay the final bill in sickness, birth defects and death.

Union carbide is the company which through greed and negligence caused the death of more than 2,000 people in Bhopal, India, last December, with a chemical, methyl isocyanate, which is also used to make aldicarb. The company is now pushing a new "miracle" chemical, Imidan, a close relative of aldicarb, for use on the West Coast 1985 apple crop. The California Coalition for Alternatives to Pesticides will go to court to block the use of Imidan, which the coalition says has not been properly tested.

Corporate greed is nothing new, but the people of America are faced with a dangerous coalition of industry and government, openly collaborating to increase profits regardless of the effect on the public. There is much talk of prosecuting pushers of cocaine, heroin and other drugs, but the big corporations like Union Carbide, Dow Chemical and Monsanto, which aldicarb, heptachlor and other toxic pesticides, usually go scot free.

William Reich.

next issue: also in California: forest fires tainted cheese, and killer bees.

Faulty Assumptions about Pesticide Safety

Ruth W. Shearer, Ph. D.
Consultant in Genetic Toxicology

2017 East Beaver Lake Drive S.E.
Issaquah, Washington 98027
(206) 392-5489

The idea that people can be exposed to pesticides safely is based on a number of faulty assumptions. These include:

1. Pesticides registered with the EPA have passed stringent health testing. The truth is that the agency's policy is not to cancel routinely the registration of products for which it lacks data or to withhold registration merely for the lack of data. Prior to 1972, no testing for chronic or cumulative injury to animals was required for pesticide registration. Since the passage of major amendments to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in 1972, the EPA has been charged with reviewing and reregistering more than 35,000 pesticides whose registrations were carried over from previous regulatory agencies, as well as registering new pesticides. Reregistrations and new registrations were to be done only after tests on animals indicated that the pesticide was unlikely to cause cancer, mutations, birth defects, sterility, neurotoxicity, or many other injuries.

Now, over 13 years later, no pesticide registration has been cancelled for lack of safety tests, and only 9% active ingredients have been reviewed for the publication of registration standards listing the data gaps which must be filled before they can be reregistered. At the current rate of about 15 per year, it will take at least 37 more years to review the more than 600 active ingredients in current use. Actual reregistration cannot take place until the EPA has received and evaluated the new test data requested in the registration standards.

2. A no-observable-effect level (NOEL) can be determined for any pesticide. There are several problems with this statement.

First, the NOEL differs with each type of test, each route of exposure, and each animal species tested, so it is meaningless unless the particular study used is cited.

Second, the quality of "observation" varies widely; the NOEL for a particular kind of test in a particular species may vary 1000-fold depending on whether it is based on gross observation, histopathology, or clinical chemistry, and whether or not the right organ or biochemical component was studied.

Third, there exists no safe dose (threshold) for any mutagen or cancer initiator because these injuries are not repaired between exposures and are therefore cumulative throughout life.

3. Pesticides are safe when used according the label. The truth is that this claim is made by the user agencies, not by EPA. EPA's position on this is stated clearly in the Code of Federal Regulations 162.10: Labeling of pesticides. (a)(9) False or misleading statements. Examples of statements in the labeling which constitute misbranding include: (ix) Claims as to the safety of the pesticide or its ingredients, including statements such as "safe," "nonpoisonous," "noninjurious," "harmless," or "nontoxic to humans and pets," with or without such a qualifying phrase as "when used as directed". A letter from EPA Region X commenting on an environmental impact statement of the Washington Department of Ecology in April 1980 states, "We would like to reemphasize that EPA registration of a chemical does not mean that there is zero risk from its use" and "the implication that adherence to label restrictions eliminates all threat to human health is not warranted".

Pesticide labels are still based on the lethal dose after brief exposure, and the degree of toxicity indicated on the label has no correlation with the risk of low-dose cumulative or unrepaired damage such as nervous system injury, cancer, fetal injury or loss, and mutations which may not appear for generations.

4. After a pesticide has been excreted from the body, all poisoning symptoms are gone. Irreparable tissue damage can be caused by many pesticides. Hit-and-run injuries include damage to the nervous system, the immune system, and the genes in any tissue. Such damage may not produce symptoms immediately and may manifest only after the inducing chemical has been largely excreted.

Roadside Poisoning

I'm into jogging as a way of keeping healthy, but I'm starting to learn that the air along our roadsides is sometimes unfit to breathe!

Recently I was jogging up "City of Refuge" Highway in Honaunau. Straining and exerting myself slowly toiled my way uphill, and breathing deeply, I suddenly came around a curve in the road, almost colliding with a Highway Department road crew as they were slowly, methodically, silently, and insidiously spraying herbicides along the barren ground. Wearing protective masks themselves, these roadside poisoners were spraying dangerous chemicals on the gravel shoulders of the road at 10 a.m. This is the third time this summer I have seen herbicide spraying on City of Refuge Highway. When tourists come over, they ought to be issued a warning: CAUTION: Driving with open windows (or in a convertible) may be hazardous to your health because of roadside spraying.

These are poisons, to humans as well as vegetation. If these chemicals they were spraying were safe, there wouldn't be any need for protective masks like the highway crew wears to protect themselves. The sad truth is that the roadside spraying is very subject to drift because of all the cars speeding by, creating wind, even if the natural windspeed is zero.

It was very nice recently to see roadside weeds mowed down for a change. Herbicided vegetation is a visual eyesore: the vegetation looks like it is rotting to death, turning from green to black. Roadside weeds are not so harmful, or bad to look at, to justify this hazardous, costly, and unnecessary program of roadside spraying.

S.B., Captain Cook

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ATLAS RECYCLING CENTER 329-6866

Pesticide Problems Just Starting

Thirteen chemicals have been identified in our drinking water. But where?

The Department of Health has received eleven written requests by me asking where this bad water is on each island.

The Department of Health will neither confirm nor deny the presence of all these 13 chemicals, but after giving data about DBCP, EDB and TCP, they carefully and repeatedly write that all information has been given.

Governor George Ariyoshi has been requested 8 times for these water data. He has responded with 2 public-relations letters, and not with the adequate information for each island.

Does "quiet and effective" really solve our problems, or just make them secret? Ask him about your Big Island water.

The message that comes out of the Governor's Investigatory Panel on Pesticides is clear. Pesticide inspectors must keep their mouths shut.

Hector Matsuda found out about studies showing that babies were harmed. Our state already has high rates of certain cancers and miscarriages among various ethnic groups. Even higher rates of birth defects occurred on Molokai; Lanai; Waialua, Oahu; and North Kohala, Hawaii.

Touched by these horrible realities, Mr. Matsuda broke the rules about being quiet and effective. Public input supported Mr. Matsuda's allegations and raised serious issues, none of which were addressed by the governor's panel.

An example is the "confidential" letter by Dan Inouye which warns industry (but not the public) of serious chemical problems in May of 1982.

Inouye relayed information which he considered reliable: "State enforcement and testing procedures are notoriously lax..." And "...pineapple growers have been ignored for years, with the tacit approval of State inspectors..."

"Tacit approval" was the gist of the charge made by Mr. Matsuda. Dan Inouye's letter supports what Mr. Matsuda was trying to say. The governor's panel did not investigate this "confidential" 1982 information. Why should they? Inouye was warning industry, not the public.

Our pesticide problems are just starting.

Bill Dougherty, Honolulu

Arica Hawaii

August 20, 1986

RECEIVED
'86 AUG 22 A10:50
FORESTRY & WILDLIFE
STATE OF HAWAII

Libert Landgraf, Administrator
Division of Forestry and Wildlife
DLNR
PO Box 621
Honolulu, HO 96809

I wish to be consulted on the EIS on the plan to spray glyphosate and Chevron Weed Oil on marijuana growing on state conservation lands in Maui County.

My comments:

There is no evidence of any doctors involved in either the preparation of the EIS or the evaluation of the EIS. I want to know if any medical doctors are consulting on the EIS.

What evidence has there been that the glyphosate does not get into the environment? Who supervises the spraying? How well will it be supervised? What are the costs involved and how will they compare with uprooting? What chemical companies will be involved in providing the spray and who is Labatt Anderson? Are any of the people preparing these reports consultants for the chemical companies who will be providing the chemicals?

Yours truly,

Mark Sheehan

Mark Sheehan, Ph.D.

cc: KRP Information Services
PO Box 27506
Honolulu HI 96827
Attn: Jacqueline Parnell

BOX 429, MAKAWAO, HAWAII 96768

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Dr. Mark Sheehan
P. O. Box 429
Makawao, HI 96788

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Dr. Sheehan:

Thank you for your letter of August 20, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

In response to your specific questions, medical doctors are being consulted and, to the best of our knowledge, none of the persons preparing the reports have any relationships with chemical companies.

Very truly yours,

Libert K. Landgraf
Administrator

Haiku 14. august 1986

To Division of Forestry and Wildlife
Department of Land and Natural Resources.

RECEIVED
'86 AUG 21 P1:38
FOR
STATE

Attention: Libert Landgraf

I felt very angry hearing about your plan to spray in the forest, of the land on the islands of Hawaii. I think it is very upsetting and highly disrespectfull towards the land and it's people, who love and enjoy and live with it. These areas will suffer unknown consequenses sprayed with Weed oil, Round up maybe Diesel oil.
Who really knows all the details, spraying leads to. It will mean something not only to the plants; but trees, animals and insects. All is at a balance. You should preserve it.
There must be other ways to deal with your problem.

Do NOT SPRAY OUR LAND

Sincerely Jette Slater
1827 Wells
Wailuku, HI 96793

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Jette Slater
1827 Wells
Wailuku, HI 96793

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Slater:

Thank you for your letter of August 14, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of health and the environment. Specific measures to ensure that spraying is restricted to target areas will be identified and discussed in the environmental impact statement.

Very truly yours,

Libert K. Landgraf
Administrator

Aug. 15, 1986

RECEIVED

'86 AUG 21 P1:39

FOR STATE OF HAWAII

Division of Forestry & Wildlife
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809
Attn: Libert Landgraf, Administrator

This is a most alarming proposal! The use of "Weed Oil" and Round-Up on YOUR National Trust, OUR Water Table!

1. "Weed, (Diesel) Oil" is going to taint the ground water. This will of course have an effect on the delicate ecosystem. THIS AREA IS OUR WATER TABLE! The upper regions of Maui are laced with under ground passages and pourous lava rock. How does a helicopter crew know from their perspective, if they are about to spray an area which drains directly into one of these input arteries of OUR WATER SUPPLY. Diesel Oil is extremely toxic, the effects of Round-Up are unknown. I CANNOT ACCEPT EVEN SMALL AMOUNTS CONTAMINATION MY CHILDREN'S WATER SUPPLY.

2. The real victims of your short sightedness will be young inexperienced adolescents, who are anxious to try marijuana. Anything sprayed on Marijuana, will strike the plant in a variety of concentrations. Areas of certain plants may be only minutely covered, not enough to kill the plant, but enough to damage the user.

Some growers will inevitably sell even the dead brown flowers of their harvest, calling it "Gold" or whatever. I'm sure there will be severe damage and probably deaths as a result of your proposed laziness. If you want Marijuana removed, DO IT BY HAND! Do not compromise our children's water. Don't create DISCOUNT POISONED MARIJUANA, which the children of our community will be tempted to try. (More than 50% of the young people of this country have tried Marijuana, their health must not be compromised because they are experiment with something "illegal". You don't put out oil slicks to kill speeders.

3. Less than 8% of Native Hawaiian Species have survived our "Land Management". Many of these proposed spray areas, contain the last examples of Endangered Species. We can't allow the faulty judgment of the applicators from their poor vantage point in the air to further devastate the remaining Endangered Species. It is impossible to lump together the environmental impact of a program so destructive of so many different ecosystems into ONE Blanket Report!

Don't taint our water, don't create poisoned marijuana, don't circumvent the environmental impact of our endangered species!

I hereby request a written response to the concerns I have raised here! We don't want any experimenting with our community's health. The only acceptable removal method is MANUAL ERADICATION!

I for one will be taking legal action if this proposal is implemented!

Steve Slater

575 Ulumalu Rd.
Haiku, HI 96708

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Mr. Steve Slater
575 Ulumalu Rd.
Haiku, HI 96708

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Slater:

Thank you for your letter of August 15, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of sensitive ecological areas. Specific measures to protect native habitats will be identified and discussed in the environmental impact statement.

Very truly yours,

for: Libert K. Landgraf
Administrator

STATTON
Box 1683
Makawao, Maui 96768

Aug. 21st 1986

Dear Mr. Landgraf - I am a Maui resident & quite dismayed over the proposed plans for spraying toxic chemicals & weed oils over our precious islands in an effort to eradicate marijuana plants. As you know we are blessed with an extraordinary ecosystem here in the islands with many endangered species - plants & birds extraordinaire. I fear for their survival while we bombard their environment (and ours) with extremely toxic poisons. Our trade winds will spread these poisons beyond the intended targets and it is impossible to foresee the full impact of this. Once the chemicals reach the soil they are absorbed into the earth & undoubtedly will reach our precious water tables - the source & continuation of all life. I urge you to reconsider this & all spraying for the continued health & survival of our lands and inhabitants

Division of Forestry & Wildlife
Dept. Land & Nat. Resources
Box 621
Honolulu 96809

Attn: Libert Landgraf

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

October 8, 1986

Mr. Statton
P.O. Box 1683
Makawao, HI 96768

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Statton:

Thank you for your postcard of August 21, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

We will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

We share your concern for the protection of water resources and sensitive ecological areas. Specific measures to protect public health and the environment will be identified and discussed in the environmental impact statement.

Very truly yours,

Libert K. Landgraf
Administrator

SR 93
Haiku, Hawaii 96708
August 1, 1986

KBP Information Services
Attn: J. Parnell
PO Box 27506
Honolulu, Hawaii 96827

Dear Ms. Parnell:

I wish to be a consulted party in the EIS process for the proposed Eradication of Marijuana on ~~State~~ - owned & managed conservation district lands (Hawaii, Maui & Molokai). Please send me a copy of the Environmental Assessment via 1st class mail, as well as any other publications & information which become available concerning this proposal, including copies of the draft & final EIS and engineering reports and the EIS preparation notice.

Thank you.

Sincerely,
Elaine S. Wender

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

October 8, 1986

Ms. Elaine S. Wender
SR 93
Haiku, HI 96708

Re: Eradication of Marijuana on Conservation Lands,
Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Ms. Wender:

Thank you for your letter of August 1, 1986 concerning the subject Notice of Preparation. Your interest and comments are appreciated.

A copy of the Notice is being sent to you, and we will be pleased to include you as a consulted party in the preparation of the environmental impact statement. A copy of the Draft EIS will be sent to you for your review and comments upon completion.

Very truly yours,

Jr., Libert K. Landgraf
Administrator

Attachment

APPENDIX E
PART 2

COMMENT LETTERS AND RESPONSES TO DRAFT EIS

cc: J. Parnell

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. BOX 50004
HONOLULU, HAWAII
96850

November 20, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Dear Ms. Uyehara:

Subject: Eradication of Marijuana on State-owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai

We reviewed the draft environmental impact statement for the proposed program and have no comments to make.

Thank you for the opportunity to review the document.

Sincerely,

RICHARD N. DUNCAN
State Conservationist

cc:
Mr. Libert K. Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

✓ Ms. Jacqueline Parnell
KRP Information Services
P.O. Box 27506
Honolulu, HI 96827

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Richard N. Duncan
State Conservationist
U.S. Soil Conservation Service
300 Ala Moana Blvd.
P.O. Box 50004, Room 3120
Honolulu, HI 96850

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P O BOX 50167
HONOLULU, HAWAII 96850

ES
Room 6307

NOV 1 4 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

The Service has completed its review of the Draft Environmental Impact Statement (DEIS) for the eradication of marijuana on State-owned and managed conservation district lands on Hawaii, Maui, and Molokai. We believe that the DEIS adequately addresses the concerns expressed in our August 9, 1986 letter to Mr. Susumu Ono, and have no further comments to offer at this time.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka
Project Leader
Office of Environmental Services

cc: HDF&W (L. Landgraf)
EPA, San Francisco
KRP Information Service (Ms. Parnell)

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Ernest Kosaka
Project Leader
U.S. Fish and Wildlife Service
Office of Environmental
Services/Endangered Species
P.O. Box 50167
Honolulu, HI 96850

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

CONSERVE AMERICA'S ENERGY
Save Energy and You Serve America!

United States Department of the Interior

NATIONAL PARK SERVICE
HAWAII VOLCANOES NATIONAL PARK
HAWAII 96718

RECEIVED
'86 DEC 10 P2:05
FORESTRY & WILDLIFE
STATE OF HAWAII

IN REPLY REFER TO:
L7621(HAVO)

December 8, 1986

Division of Forestry and Wildlife
Department of Land and Natural Resources
Attention: Libert K. Landgraf, Administrator
P.O. Box 621
Honolulu, HI 96809

Ladies and Gentlemen:

This is in response to your November 8, 1986 letter submitting the Environmental Impact Statement Draft of November 1986 with which you requested our comments.

We appreciate the magnitude of the problem with marijuana cultivation on State lands, and concur with the State's desire to develop and utilize a range of methods for eradicating plants grown in remote areas. Selective use of the herbicide, glyphosate, is reasonable among alternatives. We appreciate the State's expression of concern over non-target plants and the extent to which the State has gone in developing spot treatment methods.

The State has recognized the sensitivity of using herbicide on selected marijuana plots. EIS commits the State to a follow-up program which will assess treatment effectiveness and herbicide effects on the local plants, soils, water, and animals. We think this is a necessary process and strongly suggest a well planned and adequately funded monitoring program. This does not need to be expensive, but it does need to be credible in order to resolve the controversial aspects of using herbicide. The The results should be published in the form of a technical report.

Although preventive law enforcement and other approaches may be beyond the scope of this EIS, we hope apprehension of growers, interdiction of shipments in the postal and parcel systems and public education will continue to be part of the total State effort to manage the problem of marijuana growing and distribution.

Sincerely,

David B. Ames
Superintendent

cc:
Director, Pacific Area
KRP Information Services
Attention: Jacqueline Parnell
P.O. Box 27506
Honolulu, Hawaii 96827

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMAS
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. David B. Ames, Superintendent
National Parks Service
Hawaii Volcanoes National Park
Volcano, Hawaii 96718

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement.

To provide additional assurance of its safety in a forest environment, a special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

C&A
FJ

441

UNITED STATES DEPARTMENT OF JUSTICE
DRUG ENFORCEMENT ADMINISTRATION
HONOLULU RESIDENT OFFICE
300 ALA MOANA, ROOM 3129
P. O. BOX 50163
HONOLULU, HAWAII 96850
(808) 546-8391

RECEIVED
'86 DEC -9 P12:03
FORESTRY & WILDLIFE
STATE OF HAWAII

'86 DEC 8 AM:55
STATE OF HAWAII

December 8, 1986

Honorable Susumu Ono, Chairperson
Department of Land & Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Chairperson:

Re: State of Hawaii
EIS - Weedoil

I have been following with interest the activity of the Department of Land and Natural Resources dealing with the Environmental Impact Statement (EIS) as it relates to the application of Chevron Weedoil on illegally grown marijuana on "state" lands. I strongly support this initiative by the State of Hawaii. As you know, the Drug Enforcement Administration went through a similar process relating to other herbicides.

This action is in line with the national policy to apply herbicidal eradication against marijuana in a legitimate and responsible manner. Chevron Weedoil is a registered herbicide with the U. S. Environmental Protection Agency (EPA) and in recent tests has been proven to be very effective in the destruction of marijuana.

The destruction and damage to Hawaii's natural resources by marijuana growers requires a strong response. Your approach is one which is tailored to the needs of Hawaii and one which gives a high degree of concern and attention to adverse impact on the environment.

I wish you success and offer our support in your continuing efforts.

Sincerely,

Joseph P. Brzostowski

Joseph P. Brzostowski
Resident Agent in Charge

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASE
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Joseph P. Brzostowski
Resident Agent-In-Charge
Drug Enforcement Administration
300 Ala Moana Blvd.
P.O. Box 50163
Honolulu, HI 96850

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest and the assistance that your agency has provided us in developing this program.

Sincerely,

Libert K. Landgraf
Administrator

U.S. Department of Transportation
United States Coast Guard

Commander (dpl)
Fourteenth Coast Guard District

Prince Kalanianaole
Federal Building
300 Ala Moana Blvd
Honolulu, Hawaii 96850-4982
Phone (808) 541-2078

16475.2/7-86
Serial No. 7/011
19 November 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, room 104
Honolulu, HI 96813

Re: Draft EIS, Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai

Dear Ms. Uyehara:

The Fourteenth Coast Guard District has reviewed the subject document, and agrees with the goals and methods of the project. We have no other comments at this time, but would like to be kept informed of program developments/changes as they occur.

Thank you for the opportunity to comment on this document.

Sincerely,

Jay Silberman
Environmental Protection Specialist
District Planning Office
By direction of Commander,
Fourteenth Coast Guard District

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Jay Silberman
United States Coast Guard
300 Ala Moana Blvd.
P.O. Box 50166
Honolulu, HI 96850-4982

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

Enclosures

DEPARTMENT OF THE NAVY
COMMANDER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860-5020

IN REPLY REFER TO:
5090
Ser 002B/6443

19 NOV 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

DRAFT ENVIRONMENTAL IMPACT STATEMENT
ERADICATION OF MARIJUANA ON STATE-OWNED AND MANAGED
CONSERVATION DISTRICT LANDS

The Draft EIS for the Eradication of Marijuana on State-Owned and Managed Conservation District Lands has been reviewed and we have no comments. Since we have no further use for the EIS, it is being returned to your office.

Thank you for the opportunity to review the Draft.

Sincerely,

P. O'CONNOR
Captain, U. S. Navy
Chief of Staff

Enclosure

Copy to:
Mr. Libert K. Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land & Natural Resources
P. O. Box 621
Honolulu, HI 96809

Ms. Jacqueline Parnell
KRP Information Services
P. O. Box 27506
Honolulu, HI 96827

(P)2058.6

NOV 17 '86

Ms. Letitia N. Uyehara
Director
Office of Environmental
Quality Control
State of Hawaii
Honolulu, Hawaii

Dear Ms. Uyehara:

Subject: Eradication of Marijuana on State-Owned and Managed Conservation District Lands Draft Environmental Impact Statement

We have reviewed the subject document and have no comments to offer.

Very truly yours,

T. Tominaga

TEUANE TOMINAGA
State Public Works Engineer

/mkk
cc: Mr. Libert K. Landgraf
Ms. Jacqueline Parnell

GEORGE R. ARIYOSHI
GOVERNOR

RECEIVED
'86 DEC 10 P2:05
FORESTRY & WILDLIFE

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17907
HONOLULU, HAWAII 96817

RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

IN REPLY REFER

TO:

86:PLNG/7049

December 3, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Thank you for the opportunity to review and comment on the Draft Environmental Impact Statement for the Eradication of Marijuana on State-Owned and Managed Conservation District Lands.

We have reviewed the document and do not have any specific comments to offer at this time.

Sincerely,

Original Signed By

RUSSELL N. FUKUMOTO
Executive Director

cc: Mr. Libert K. Landgraf, Administrator
Department of Land and Natural Resources

Ms. Jacqueline Parnell
KRP Information Services

HIENG

MAY 19 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Eradication of Marijuana on
State-Owned and Managed
Conservation District Lands

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

Jerry M. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

Enclosure

cc: DLNR, Div. of Forestry & Wildlife
KRP Information Services

John Waihee
GOVERNOR

DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST, HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 • TELEX: 7430250 HIDPED

DIRECTOR
MURRAY E. TOWILL
Acting DIRECTOR

DEPUTY DIRECTOR

DIVISIONS
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION
ENERGY DIVISION
FOREIGN TRADE ZONE DIVISION
LAND USE DIVISION
PLANNING DIVISION
RESEARCH AND ECONOMIC ANALYSIS DIVISION

OFFICES
ADMINISTRATIVE SERVICES OFFICE
INFORMATION OFFICE

Ref. No. P-5547

RECEIVED
'86 DEC -9 P2:04
FORESTRY & WILDLIFE
STATE OF HAWAII

December 5, 1986

MEMORANDUM

TO: Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control

FROM: Murray E. Towill *Murray E. Towill*

SUBJECT: DEIS for Eradication of Marijuana, Islands of Hawaii, Maui and Molokai

We have reviewed the subject draft environmental impact statement (DEIS) and have the following comments.

The use of chemical sprays to eradicate marijuana near streams or rare and endangered species of flora and fauna may result in detrimental effects on these resources and lead to violations of the Hawaii Coastal Zone Management law, Chapter 205A, HRS. Hawaii's coastal zone includes all land areas except State forest reserves and Federal land. Even though eradication efforts may occur entirely on State forest reserves, there could be spillover effects on coastal zone resources.

The proposed safeguards and mitigation measures should prevent adverse effects if all precautions are exercised. Implementation of the proposed monitoring program should be made a priority.

Thank you for the opportunity to review this document.

cc: Mr. Libert K. Landgraf,
Div. of Forestry & Wildlife,
Dept. of Land & Natural Resources
Ms. Jacqueline Parnell,
KRP Information Services

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Murray E. Towill
Deputy Director
Department of Planning
and Economic Development
Honolulu, Hawaii

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement.

We appreciate your interest and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

RECEIVED
'86 DEC 9 P12:52
FOREST & WI...
STATE OF ...

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
EPHSO

December 8, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 S. King St., Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Environmental Impact Statement - Eradication of Marijuana on State Owned and Managed Conservation District Lands, Islands of Hawaii, Maui, & Molokai

Thank you for allowing us to review and comment on the subject EIS. We provide the following comments regarding drinking water.

Drinking Water

Although we are supportive of efforts to eradicate marijuana from the State, the Drinking Water Program continues to have reservations concerning this proposal. The establishment of an operations plan to delineate sensitive areas is a positive step. However, it is unrealistic to assume that no contamination to surface or groundwater supplies will occur as a result of the application of glyphosphate, weed oil, and diesel oil to large areas of vegetation.

Please recognize that contamination to surface and groundwater sources is possible and probable. Glyphosphate is a water soluble liquid. Weed oil emulsifies in water. Both weed oil and diesel oil are a mixture of hydrocarbons - paraffins, aromatics, olefins, and napthalenes. The exact composition of these is not well known and both could contain impurities which may present a greater environmental hazard than the oils themselves. This possibility was not addressed in the EIS.

The Drinking Water Program's concern is primarily with existing and future water sources. Maui and Molokai are especially vulnerable because of their extensive reliance on surface water supplies. Mapping sensitive areas may not be adequate protection. Experience has shown that groundwater is not immune from contamination by ground application of chemicals. Underground spring sources are particularly susceptible since they are generally located just below the surface of the ground. On the Island of Hawaii, several water systems have spring intakes adjacent to mountain springs. Also, in areas of Waimea, Piihonua, and Kohala on the Big Island, surface water is periodically used as drinking water sources. The respective County Department of Water's clearance should be obtained prior to any application of herbicide in all areas where drinking water sources are at risk.

As much as possible, spray the plants and not the groundwater when applying these compounds. Of the three application methods, (1) spraying by helicopter, (2) spraying by potable knapsack units, and (3) manual eradication, the helicopter method creates the most concern. Winds will inevitably carry the drift of the spray to non-target areas. With heavy foliage, water sources may be easily camouflaged.

We urge that you proceed with this project with caution. All precautions should be taken to minimize the risk to water resources.

Sincerely yours,

LESLIE S. MATSUBARA
Director of Health

cc: DHO, Hawaii
DHO, Maui
Mr. Libert Landgraf
Ms. Jacqueline Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Dr. James K. Ikeda
Deputy Director for Environmental Health
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement.

Prevention of water contamination is addressed in three ways in the draft EIS. The first is by avoidance of spraying near any water body with a buffer of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the each County Department of Water Supply and the Department of Health's Drinking Water Program will be asked to assist us in making certain all water areas, including water catchment basins, are identified on the sensitive area maps.

The second is by utilizing only non-persistent chemicals which are known to break down readily in soils.

Finally, a special test of Weed Oil is being arranged in two different forest environments, a dry area and a wet area, to provide futher assurance that this substance behaves as it is supposed to. Soil samples will be taken before spraying, immediately after, and again in two weeks, to determine the residual amounts of Weed Oil in the soils. A control area will also be sampled. A botanist will also do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made available to the public upon completion.

Only Weed Oil is planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. Spraying is done only on marijuana plants. The helicopter stays well above the forest canopy. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also creates a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

We would appreciate your assistance in providing us with any monitoring data that you have on groundwater pollution caused by the application of oil sprays and glyphosate to agricultural crops in Hawaii. We understand that Roundup especially is used widely for weed control by homeowners and others.

We appreciate your interest in this project.

Sincerely,

Robert K. Landgraf
Administrator

GEORGE R. ARIYOSHI
GOVERNOR

RECEIVED
'86 DEC -5 P2:31
FORESTRY & WILDLIFE
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

WAYNE J. YAMASAKI
DIRECTOR

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, Ph.D
WALTER T.M. HO
CHERYL D. SOON
ADAM D. VINCENT

IN REPLY REFER TO:

STP 8.1705

December 1, 1986

MEMORANDUM

TO: The Honorable Letitia N. Uyehara, Director
Office of Environmental Quality Control

FROM: Director of Transportation

SUBJECT: DRAFT EIS - ERADICATION OF MARIJUANA ON STATE OWNED AND MANAGED CONSERVATION DISTRICT LANDS
ISLANDS OF HAWAII, MAUI, AND MOLOKAI

We find that the eradication of marijuana on State-owned and managed Conservation District lands as proposed will not directly affect our agency's plans or facilities.

Thank you for this opportunity to provide comments.

Wayne J. Yamasaki

RECEIVED
'86 DEC -9 P2:01
FORESTRY & W...
STATE OF H...

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

December 8, 1986
RE:0450

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
4654 South King Street, Room 104
Honolulu, Hawaii 98613

Dear Ms. Uyehara:

Draft Environmental Impact Statement
Eradication of Marijuana
State-Owned and Managed Conservation District Lands
Islands of Hawaii, Maui, and Molokai

The above cited document addresses the potential environmental impacts related to the proposed marijuana eradication program on state-owned and managed Conservation District lands on the islands of Hawaii, Maui and Molokai. This review was prepared with the assistance of Clifford Smith, Botany; Arthur Kodama, School of Public Health; Frank Scott, Agricultural Economics; Barry Brennan and John Hylin, Agricultural Biochemistry; Ted Norton, Emeritus Professor of Pharmacology; James Parrish, Hawaii Cooperative Fisheries Unit; Richard Mayer, Maui Community College; and Walington Yee, Environmental Center.

General Comments

At the public hearings by the Department of Land and Natural Resources in November of this year, as part of their permit process for the above cited project, we submitted a summary of the key issues that have been identified in our previous reviews of marijuana erradication projects in Hawaii. Copies of these reviews are appended as part of this current review, for your information (except for the Kauai Draft EIS review which was submitted at the preparation stage). Many, if not most, of the comments remain applicable to the present proposal and Draft EIS.

Serious concerns continue to be expressed as to the potential environmental impacts to non-target species, water resources, and public health associated with the proposed aerial application of herbicides.

AN EQUAL OPPORTUNITY EMPLOYER

Results of Eradication Program on Kauai

The Draft EIS makes several references to procedures being used on Kauai to mitigate deleterious effects to non-target species through special modifications to the aerial application methods. Photographic examples are provided in the Draft EIS of actual spraying operations on Kauai and the provision for monitoring of the effects of the sprays is noted. Because the primary concern with the general eradication programs focuses on the environmental risks associated with the use of aerial applications of the herbicides, we strongly urge that a full evaluation of the monitoring program being undertaken on Kauai be documented and the technical report produced be appended to this EIS in its entirety. The report should include not only the basic plan of the monitoring program but also the methods for its implementation, the results, an evaluation of the impacts on the environment and an evaluation of the effectiveness of the methods to the goals of the eradication program. In preparing this technical report, we suggest that diagrams including dimensions and map scales be provided, instead of photographs, since the reproduction of photographs in the EIS is of such limited quality as to make an objective or visual evaluation of the effectiveness and impacts of the sprays quite impossible. A full evaluation of the impacts, consequences, and effectiveness of the marijuana eradication program on Kauai should be required prior to implementation of any similar program on the other islands.

Weed Oil and Diesel Oil

We are also concerned with the lack of definitive studies on the environmenatal effects of weed oil and diesel oil. In this regard the statement about the negligible effects of oil vapors in the atmosphere needs to be discussed in the context of warm tropical climates and the potential for production of photochemical oxidants such as Peroxyacetylnitrates (PAN) and other air polutants.

Wildlife

The Final EIS should discuss the impact of helcopter noise and downwash on wildlife, particularly nesting birds, that live in the forested areas. The noise/fright impacts to rare or endangered avian fauna in remote areas may not be insignificant. The significant effects of helecopter operations over bird sanctuaries are widely recognized and legal prohibition of flights in those areas are well established. Low flights for spraying, such as are proposed, could have serious consequences to already endangered fauna. Young birds could even be dislodged from their nests due to the downwash created.

As a matter of scientific protocol, the full generic and specific name (if known) are written out the first time they are cited. Abbreviation of the generic name to the single capitalized (and underlined) first letter is permitted in subsequent citations when the intended genus is clearly understood.

Economic Elements

The EIS states that "the use of oil sprays has already been demonstrated to be cost-effective ...." Since costs are being incured with no direct finacial returns, a more appropriate economic statement would read "least costly" to reflect the actual economic situation, if that is what is intended.

Glyphosate Registration Information

We note that the "Complete Directions for Use" of Roundup (glyphosate) by Monsato emphasize the need to avoid drift and state that "The likelyhood of injury occurring from the use of this product is greatest when winds are 'gusty' or in excess of '5 miles per hour' or when other conditions, including lesser wind velocities, will allow spray drift to occur." The Draft EIS states that aerial spraying will not be used when wind velocity exceeds 8 miles per hour, and no estimates of the significant downwash velocities are provided which are likely to create drift conditions equally or more serious than "gusty" winds.

A discussion of these apparent inconsistencies between the application methods proposed in the Draft EIS and the registered "Directions for Use" is needed.

The Directions for Use of Roundup mention that the product has been approved for use in California except as stated otherwise. We see no mention of Hawaii. Are the same application conditions appropriate for Hawaii and has the product and its method of application been officially reviewed and approved for use in Hawaii?

Yours truly,

Jacquelin N. Miller
Acting Associate Director

Enclosure

cc: Libert K. Landgraf, DLNR
Jacqueline Parnell, KRP Information Services
Patrick Takahashi
Stephen Lau
UH Reviewers

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948 7361

Conservation District Use Application
Eradication of Marijuana on State-Owned Properties
Island of Hawaii, Maui, Molokai

Statement for Public Hearing
Board of Land and Natural Resources
75 Aupuni Street, Hilo, Hawaii
November 17, 1986

By

Jacquelin N. Miller, Environmental Center
Barry Brennan, Agricultural Biochemistry
Shiela Conant, General Sciences
Joe Halbig, Maui Community College
John Hylin, Agricultural Biochemistry
Kenneth Kaneshiro, Entomology
Arthur Kodama, School of Public Health
Richard Mayer, Geology
Ted Norton, Pacific Biomedical Research Center
James Parrish, Hawaii Cooperative Fishery Research Unit
Frank Scott, Agricultural Economics
Sanford Siegel, Botany
Clifford Smith, Botany

The Division of Forestry and Wildlife of the Department of Land and Natural Resources proposes to eradicate, by chemical and physical means, including spraying of diesel fuel or glyphosate from helicopters, marijuana illegally grown on Conservation District lands owned by the State of Hawaii on the islands of Hawaii, Maui and Molokai. We have previously reviewed the Environmental Impact Statements prepared for the Eradication of Marijuana on State-Owned and Managed Conservation District Lands on the island of Kauai, the EIS Preparation notice for the Marijuana Eradication Program on the islands of Hawaii, Maui, and Molokai, and the Federal EIS for Marijuana Eradication on Non-Federal lands in Hawaii. Copies of these previous reviews are appended to this statement for your information and incorporation into the record.

You will note in the information appended, that we have raised many significant questions and concerns regarding the use of herbicides to control the illegal farming of marijuana. In the interest of time, we will not orally repeat in detail all of the information provided in the appended written statements. However, we do want to emphasize and reiterate the key concerns.

AN EQUAL OPPORTUNITY EMPLOYER

1. We continue to be concerned and want to stress the potential hazard that any aerial spraying will impart to native ecosystems. The importance of the synergistic effects associated with spraying and drift to non-target species can not be over emphasized. The EIS preparation notice for this project cites the potential effects of the sprays to endangered bird and plant species. We also call attention to the endangered tree snails and endemic biota in the streams. The difficulty, if not impossibility, of spotting young plants from the air further emphasizes the need to restrict the use of glyphgosate or weed oil to non-aerial applications. The only way to avoid significant impacts to native ecosystems is to limit the application methods to backpack sprayers and swab applications. Furthermore, the risk to human life during aerial applications is considerable. Not only is the helicopter pilot at risk but there is considerable danger of spraying individuals who may be hiking, camping, farming, or that live near the "target area". Aerial spraying should not be permitted and we concur with the comments submitted by the U.H. Botany Department in this regard.

2. According to the information provided in the notice for the current EIS in preparation, only Chevron Weed Oil and Glyphosate (Roundup) will be used in the eradication program on Hawaii, Maui, and Molokai. Weed Oil is effective immediately and easily recognized by its odor which should greatly impair the marketability of the sprayed product. Glyphosate, on the other hand, is not likely to be a significant deterrant to the industry when used on mature plants. The response time for plants to show physical signs ("knock-down") from glyphosate is about 2 weeks. During that time sprayed, mature plants could easily be harvested and sold. Therefore, glyphosate may have minimal impact on the sale of mature plants. Its use on young plants, if they can be located, should be effective.

3. Water supplies in Hawaii are now being jeopardized by inappropriate agricultural, military or industrial chemical practices of 20 or more years ago. The ongoing problems and potential for contamination of water supplies due to the use of herbicides in watershed areas should be examined with extreme care. As a corolary to this concern, we strongly urge that adequate baseline information on water quality characteristics be gathered for each area where herbicide use is proposed. Because the deleterious chemicals may not reach the ground waters for several years, a longterm monitoring program should be instituted to assure that ground water pollutants, if present, are identified as soon as possible.

We appreciate the opportunity to provide comments at this hearing and welcome your questions or comments.

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Jacquelin Miller
Environmental Center
317 Crawford Hall
University of Hawaii
2550 Campus Rd
Honolulu, HI 96822

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We are responding to the points in your letter in order they are presented.

1. Results of eradication program on Kauai.

The inaccessibility of the terrain on Kauai (which makes aerial spraying a desirable alternative) precluded before and after soil sampling. Before and after photographs were taken and showed minimal damage to vegetation. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

To provide additional assurance of its safety in a forest environment, a special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

2. Weed Oil and diesel oil.

The hazards of oil vapors in the atmosphere associated with Weed Oil occur principally with the filling of tanks, similar to the vapors that exist at a refinery or even a service station. The warning label on Weed Oil is most important for the individual handling the material. Loading will be done in cleared areas to avoid any possibility of a forest fire should there be an accidental spark and subsequent fire.

It would be expected that there would be a potential for the production of some photochemical oxidants from the spraying operation. The amounts would be very small in relation to the large amounts of oil and gasoline vapors put into the atmosphere from other sources.

3. Wildlife.

As noted in the EIS, there will be some unavoidable adverse impacts on wildlife, just as there are using manual eradication methods. In terms of the effect of helicopter downwash and noise on birds and tree snails, it should be less of a problem than with Green Harvest operations. The helicopter that is used is of the type used for sightseeing. It is much smaller than those used for Green Harvest operations because it does not have to transport men and equipment, only the pilot and the operator (a 55-gallon drum occupies the back seat).

4. Economic elements.

"Cost-effective" was used in the sense of getting more "bang for the buck." The addition of a spraying program to manual eradication methods will probably not affect expenditures; it is anticipated that overall spending on marijuana eradication will stay the same, or even increase.

The principal reason that the spraying program has been proposed is that the Green Harvest operations are not sufficient. Despite a great increase in expenditures and effort, enforcement officers cannot keep up with the numbers of growers utilizing hundreds of small plots in scattered locations. Mr. Joseph Cravalho, Chief of Police for Maui County, testified at the public hearing on the CDUA on Maui on November 18, 1986, that manual eradication methods have proven to be time-consuming, expensive, dangerous to personnel, and an ineffective method of addressing the problem of marijuana cultivation.

He pointed out that

> . . . Manual operations involve a minimum of ten officers, a dump truck and driver, and two four-wheel drive vehicles. A larger operation requires twice the number of police officers and equipment, including helicopter, helicopter pilot, support and maintenance and crew men from the Hawaii National Guard. The necessity for the number of men and equipment are to chop or pull the marijuana plants, haul the plants away from the remote area, and finally, dispose of the plants by burning at the local dumps.
>
> On the other hand, the Department of Land and Natural Resources' proposed method of eradication requires three officers and a four-wheel drive vehicle for a mini operation. The arduous task of cutting or pulling the marijuana, hauling and disposal of same, have been eliminated. The spraying technique kills the marijuana within a few hours and prohibits the grower from using or selling the product.

His statistics are supported by other County police officers. Mr. Alan Holt of The Nature Conservancy also expressed support for the program because they feel the need for a more effective means of combatting the destruction to the natural areas they are trying to preserve.

5. Glyphosate Registration Information.

The guideline of "8 miles per hour" applies generally to any herbicide. As noted in the proposed guidelines, label directions should be strictly followed and would override any other guideline.

As noted above in Item 1., Weed Oil is the only herbicide planned for use in the near future. Glyphosate will be used for marijuana eradication only if Weed Oil is unavailable. If this should happen and glyphosate must be substituted, field tests will be made with follow-up monitoring before it is used for full-scale marijuana eradication.

Glyphosate, sold as Roundup, is a non-restricted herbicide, sold over the counter to the general public. It is used widely for weed control by both commercial agriculturalists and individual citizens. Given the concern that has been expressed by the public over its use in marijuana eradication, it might be appropriate for the University or some other governmental agency to conduct some independent investigations on its effects on the environment.

We appreciate your interest in this project.

Sincerely,

Liberty R. Landgraf
Administrator

University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 • 2540 Dole Street
Honolulu, Hawaii 96822

RECEIVED
'86 DEC -9 P2:05
FOREST & WILDLIFE
STATE OF HAWAII

5 December 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Eradication of Marijuana on State-Owned and Managed Conservation District Lands - Draft Environmental Impact Statement, November 1986

We have reviewed the subject DEIS and have the following comment. The social impact coverage of chemical application on page V-20 may be insufficient. With the stigma of heptachlor in milk and EDB, DBCP and TCP found in the drinking water at Mililani and Waipahu fresh on the public's minds, any program that requires the application of chemicals such as diesel oil and glyphosate will immediately bring public opposition from the standpoint of water contamination. Utmost care must be exercised in the application of these chemicals and any possible accidental release of chemicals into any water source, surface or groundwater, should be avoided by taking proper precautions for the handling and application of these chemicals.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

/Henry K. Liu for ETM

Edwin T. Murabayashi
EIS Coordinator

ETM:jm

cc: L. Landgraf
J. Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Edwin T. Murabayashi
Water Resources Research Center
University of Hawaii
Holmes Hall 283
2540 Dole Street
Honolulu, HI 96822

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement.

The truth of your observation on the perception of the public in regards to the proposed marijuana eradication program is evidenced by the number of letters that we have received on the subject from concerned citizens. We still believe that the majority of people will support these efforts if the program is implemented sensitively and does not appreciably harm the environment. As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

AN EQUAL OPPORTUNITY EMPLOYER

Speaker
HENRY HAALILIO PETERS
Vice Speaker
MARSHALL K. IGE
Majority Leader
RICHARD A. KAWAKAMI
Majority Floor Leader
TOM OKAMURA

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16th ... TERRANCE W. H. TOM
17th ... MARSHALL K. IGE
18th ... W[illegible] Y.T. ANDERSON
19th ... JOHN JUSTIN MEDEIROS
20th ... CAM CAVASSO
21st ... DONNA R. IKEDA[illegible]
22nd ... HAL JONES
23rd ... BARBARA MARUMOTO[illegible]
24th ... FRED HEMMINGS, JR.
25th ... CALVIN K.Y. SAY
26th ... KEN KIYABU
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39th ... ROMY M. CACHOLA
40th ... DONNA MERCADO KIM
41st ... TOM OKAMURA
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43rd ... ARNOLD MORGADO, JR.
44th ... ELOISE YAMASHITA TUNGPALAN
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48th ... HENRY HAALILIO PETERS
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50th ... ALFRED C. LARDIZABAL
51st ... RICHARD A. KAWAKAMI

*Minority Leader
**Minority Floor Leader

HOUSE OF REPRESENTATIVES
THE THIRTEENTH LEGISLATURE

STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

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'86 DEC 5 P2:33
FORESTRY & WILDLIFE
STATE OF HAWAII

TO: DLNR
State of Hawaii

FROM: Bill Pfeil
State Representative
Molokai, W. Maui, Lanai

SUBJECT: Testimony regarding the proposed spraying of chemicals on marijuana

Please include my comments in opposition to the proposed spraying of chemicals such as glyphosate on marijuana into your records.

Most of the arguments I have heard against the use of chemicals to eradicate marijuana on State lands focus on the possible negative effects the chemicals would have on the environment, and the secondary negative effects on humans. My argument to oppose the plan to use chemicals on marijuana plants focuses on the possible direct harm to humans who unsuspectedly are poisoned by consuming the tainted marijuana.

A likely scenario if chemicals were to be used to eradicate the illegal weed would be that as the plants die, some drug dealers would harvest the tainted product, sell it, and some, perhaps many, individuals would unknowingly injest the poison.

If this scenario is likely, a curious dilemma is raised: should the government knowingly cause further harm to individuals already engaging in an illegal activity? In my opinion, we are primarily trying to eradicate the illegal weed, not the individuals engaging in the illegal activity. Therefore the method of cutting and destroying marijuana plants seem to be the far superior method of eradicating the illegal weed.

Thank you.

JOHN WAIHEE
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 17, 1986

Honorable Bill Pfeil
State Capitol, Room 301
Honolulu, Hawaii

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing our draft Environmental Impact Statement.

The possibility of tainted marijuana being sold and used was addressed in the draft EIS. Only Weed Oil is planned for use in marijuana eradication in the near future. One of the advantages of using an oil spray is that a sprayed plant first wilts, then turns brown within a short time. It also has an unpleasant odor. The result is an unsalvageable product.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

STEPHEN K. YAMASHIRO
Chairman & Presiding Officer

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
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FORESTRY & WILDLIFE
STATE OF HAWAII

November 14, 1986

Mr. Libert K. Landgraf, Administrator
Division of forestry and Wildlife
Department of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96809

In reply to the notice that was received from the Office of Environmental Quality Control requesting comment on the Environmental Impact Statement for the "Eradication of Marijuana on State-Owned and Managed Conservation District Lands--Islands of Hawaii, Maui, and Molokai", enclosed is a copy of my testimony that will be presented to the Board of Land & Natural Resources at the hearing to be held in Hilo on November 17, 1986.

Stephen K. Yamashiro
COUNCIL CHAIRMAN

Encl.

STEPHEN K. YAMASHIRO
Chairman & Presiding Officer

COUNTY COUNCIL
County of Hawaii
Hawaii County Building
25 Aupuni Street
Hilo, Hawaii 96720

November 13, 1986

Mr. Susumu Ono, Chairperson
Board of Land & Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Thank you for this opportunity to testify on the State's proposal to use herbicides to eradicate marijuana plants on State conservation lands.

The Hawaii County Council has long been supportive of the efforts of the Hawaii Police Department as well as other agencies of the State and Federal governments in their effort to eradicate marijuana on the island of Hawaii as well as within the State of Hawaii.

We view the cultivation and distribution of marijuana as a serious problem on this island because of the many social-welfare problems created by the drug culture, as well as the growing tendency toward the use of force in disputes between growers and others.

The Congress, the State Legislature, the State Administration and the County Administration have also expressed such concerns. We understand that the spraying will be on a "spot application" basis with the use of knapsack sprayers or helicopters with spraying equipment. We also understand that there are no residents in the areas proposed for spraying.

COUNTY COUNCIL
COUNTY OF HAWAII
HAWAII COUNTY BUILDING
HILO, HAWAII 96720

Because of the size of our island, and because there is a tremendous amount of land to be covered in the efforts to eradicate marijuana, we support this method of helping curb a growing problem in law enforement in Hawaii County.

Thank you.

Stephen K. Yamashiro
COUNCIL CHAIRMAN

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Hawaii County Council
Stephen K. Yamashiro, Chair
25 Aupuni Street
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

POLICE DEPARTMENT
COUNTY OF HAWAII
349 KAPIOLANI STREET
HILO, HAWAII 96720

GUY A. PAUL
CHIEF OF POLICE

WAYNE G. CARVALHO
DEPUTY CHIEF

OUR REFERENCE

YOUR REFERENCE

November 21, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Re: Eradication of Marijuana on State-Owned and
Managed Conservation District Lands
Islands of Hawaii, Maui, and Molokai

The Hawaii Police Department is in hearty support of the eradication of marijuana on state-owned and managed conservation district lands on the Islands of Hawaii, Maui, and Molokai, and testified at the recent hearing held on Hawaii. A copy of my testimony is enclosed.

If we can be of further assistance, please do not hesitate to call on us.

GUY A. PAUL
CHIEF OF POLICE

Wayne G. Carvalho
WAYNE G. CARVALHO
DEPUTY CHIEF OF POLICE

WGC
sf

Enc.

cc: Mr. Libert K. Landgraf w/enc.
Ms. Jacqueline Parnell w/enc.
Lieutenant Wendell Paiva

Deputy Chief Wayne Carvalho
Hawaii Police Department
November 17, 1986

State Board of Land and Natural Resources Hearing
RE: CDU Application No. SH-1952 by
Division of Forestry & Wildlife for Eradication
of Marijuana on State Property
Islands of Maui, Hawaii, and Molokai

We concur with, and appreciate, the testimony presented by Managing Director Eugene Tiwanak.

More than just the sheer numbers involved, the Police Department is concerned with the grave danger confronting the public who enter State land "protected" by weapons-carrying marijuana growers. Our land and our forests are not free to the public because of the fear of this confrontation.

We have had reports of harassment and intimidation involving hikers, hunters or maile pickers who have been told by marijuana growers to keep out of certain areas, often involving State land. There have been several incidents where booby traps were set for unsuspecting individuals. We have found on our marijuana eradication missions fish hooks hung at eye level on near-invisible line designed to injure or even blind someone who walks in these forested areas.

We have also noticed more and more incidents of violence connected to the marijuana industry and have seized a large number of firearms resulting from search warrants executed on marijuana-producing residences.

We have spent thousands of man hours in the battle against the growth and distribution of this illegal drug and will spend many thousands more. The fight is a never-ending one.

We have, in recent years, concentrated our efforts on private land, because of the tremendous amount of marijuana grown in the various subdivisions in Puna and Ka'u.

We know also that there is a great deal of marijuana being grown on State land, much of it in areas that have limited access. Often, in order to reach large patches of marijuana in areas inaccessible by motor vehicles, we must rappel officers into the area by helicopter. This is an expensive and occasionally hazardous operation.

The proposal by your Division of Forestry and Wildlife to use herbicides for the eradication of marijuana on State property is a welcome addition to our fight to eradicate marijuana.

As we understand it, the spraying would be done by direct, spot application from a helicopter or by knapsack. It would not be a mist type of spray as is used by cropdusters and would present little if any danger to the water supply or to nearby residences. It is our understanding, also, that there are very few if any residences on State conservation land.

In summary, then, we have tried to describe to you the serious problem that marijuana cultivation on our island represents. The problem has been recognized by the Congress, which has appropriated funds to help us in this battle, by the State administration, which has cooperated by providing assistance from the National Guard, and by our County Council and administration, which have provided manpower and funding for this continuing effort.

We would appreciate your support and urge early approval of this application by your own Division of Forestry and Wildlife.

Thank you.

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Guy A. Paul
Chief of Police
Hawaii Police Department
349 Kapiolani Street
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

COPY

PLANNING DEPARTMENT
25 AUPUNI STREET
COUNTY OF HAWAII
HILO, HAWAII 96720

RECEIVED
'86 DEC 9 P12:46
FORESTRY & WILDLIFE
STATE OF HAWAII

December 4, 1986

Ms. Getitia Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Dear Ms. Uyehara:

Draft EIS
Eradication of Marijuana on State-Owned
and Managed Conservation District Lands,
Islands of Hawaii, Maui and Molokai

Thank you for the opportunity to review this draft EIS. The document includes measures which address our areas of concern. The panel selected by the Chairperson to implement the Operations Plan must face the challenge of preserving the character and resources of the affected areas while eradicating the marijuana.

Sincerely,

ALBERT LONO LYMAN
Planning Director

ALL:aeb

cc: Mayor
✓Libert Landgraf
KRP Information Services

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Albert Lono Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

Eugene N. Tsvanak
Managing Director

Director

Ronald Okamura
Deputy Director

DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

November 13, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Subject: Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Hawaii, Maui and Molokai

Dear Ms. Uyehara:

The project's EIS has been reviewed and we have no adverse comments to offer.

Thank you for the opportunity to review the report.

Sincerely,

Pat Engelhard

Patricia Engelhard
Director

PE:GM:ai

cc: Mr. Libert K. Landgraf
Ms. Jacqueline Parnell

• 25 AUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE 961-8311

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII · 25 AUPUNI STREET · HILO, HAWAII 96720 · TELEPHONE (808) 961-8321

HUGH Y. O
Chief Engi

BRUCE C. McC
Deputy Chief Engi

November 17, 1986

MS LETITIA N UYEHARA DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
465 SOUTH KING STREET ROOM 104
HONOLULU HI 96813

SUBJECT: DRAFT EIS
ERADICATION OF MARIJUANA ON STATE-OWNED AND MANAGED CONSERVATION DISTRICT LANDS
ISLAND OF HAWAII, MAUI AND MOLOKAI

We acknowledge receipt of the subject document. Our comments, if any, will be sent through our Planning Department.

HUGH Y. ONO
Chief Engineer

DHM:cso

cc: Planning Department

DI-LK/DJA

November 18, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

ERADICATION OF MARIJUANA ON STATE-OWNED
AND MANAGED CONSERVATION DISTRICT LANDS

We have reviewed the material on the above-mentioned subject and do not have any objections to the proposed project. The Honolulu Police Department wholeheartedly supports the marijuana eradication program as a means of curtailing illegal activities and the spread of contraband.

Sincerely,

DOUGLAS G. GIBB
Chief of Police

cc: Mr. Libert K. Landgraf
Ms. Jacqueline Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Douglas Gibb
Chief of Police
Honolulu Police Department
1455 Beretania Street
Honolulu, HI 96814

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

HANNIBAL TAVARES
Mayor
TELEPHONE 244-7855
CMO

OFFICE OF THE MAYOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

December 5, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Dear Ms. Uyehara:

We have reviewed the November, 1986 Draft Environmental Impact Statement regarding Eradication of Marijuana on State-Owned and Managed Conservation District Lands on the Islands of Hawaii, Maui and Molokai.

Thank you for implementing my suggestion, made in response to the previously submitted environmental assessment, that a representative of the Maui County's Department of Water Supply be included on the panel established to prepare a sensitive-areas map, as shown in Item 1 on Page V-2 of the Draft. To further clarify this I would suggest that the second sentence in the middle paragraph on Page I-9 be changed to read: "DLNR will consult with the U.S. Fish and Wildlife Service and the other(s) agencies listed in Item 1. on Page V-2 to identify essential habitats and other sensitive areas". (Deleted portions are bracketed and added portions underlined).

I appreciate your submitting the Draft EIS for this very important program to us for comments. I am very much in favor of whatever action can be effectively taken to eradicate the growing of marijuana on Maui provided that it is done in such a manner that the environment is protected, particularly the quality of our drinking water sources.

Very truly yours,

Hannibal Tavares

HANNIBAL TAVARES
Mayor, County of Maui

cc: Chief of Police
Water Supply Director
W.S. Haines, Executive Assistant

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Honorable Hannibal Tavares
Mayor, County of Maui
200 South High Street
Wailuku, HI 96793

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. The clarification you suggest will be made in the Final EIS.

We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

Council Chairman
Goro Hokama

Council Vice-Chairman
Howard S. Kihune

Council Members
Abraham Aiona
Linda Lingle
E. Lee Liu
Bob H. Nakasone
Wayne K. Nishiki
Charles S. Ota
Velma M. Santos

COUNTY COUNCIL
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

Gwen Yoshimi-Ohashi
Director of Council Services

November 12, 1986

Ms. Letitia N. Uyehara
Director
Office of Environmental Quality Control
465 South King Street, Rm 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Thank you for transmitting a copy of the Draft Environmental Impact Statement (November 1986) on the Eradication of Marijuana on State-Owned and Managed Conservation District Lands (Islands of Hawaii, Maui and Molokai).

Please be advised that the members of the Council will be informed of the Draft EIS and the deadline for submittal of comments.

We were also informed of the public hearing regarding the Conservation District Use Application for the subject proposal. In acknowledging receipt of the public hearing notice, I asked Mr. Susumu Ono whether or not there is a marijuana problem on the island of Lanai and whether there is a need for an eradication program. I am interested in hearing your thoughts on the matter.

Again, I appreciate receiving a copy of the Draft EIS.

Very truly yours,

GORO HOKAMA
Council Chairman

GH:GYO:tv

cc: Mr. Libert K. Landgraf
Ms. Jacqueline Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Maui County Council
Goro Hokama, Chair
200 South High Street
Wailuku, HI ^6793

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

HANNIBAL TAVARES
Mayor
OMO

FRED MATSUMOTO
Coordinator

COUNTY OF MAUI
OFFICE OF ECONOMIC DEVELOPMENT
WAILUKU, MAUI, HAWAII 96793
TELEPHONE 244-7710

November 12, 1986

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, HI 96813

Dear Ms. Uyehara:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT ON ERADICATION OF MARIJUANA ON STATE-OWNED AND MANAGED CONSERVATION DISTRICT LANDS

The Office of Economic Development have reviewed the subject Environmental Impact Statement and find that, in general it has adequately identified and assessed the major environmental impacts which can be anticipated to result from the proposed project.

We have no other comments to offer at this time; however, we thank you for the opportunity to review the Environmental Impact Statement.

Very truly yours,

FRED MATSUMOTO
Economic Development Coordinator

cc: Mr. Libert K. Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources

Ms. Jacqueline Parnell
KRP Information Service

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Fred Matsumoto
Economic Development Coordinator
Office of Economic Development
Wailuku, HI 96793

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui, and Molokai.

Thank you for reviewing our draft Environmental Impact Statement. We appreciate your interest in and support of this project.

Sincerely,

Libert K. Landgraf
Administrator

HANNIBAL TAVARES
Mayor

ALVIN K. FUKUNAGA
Director of Public Works

BRIAN HASHIRO, P.E.
Deputy Director of Public Works

MELVIN HIPOLITO
Acting Superintendent of Highways

FRED ARAKI, P.E.
Engineering Chief

EDWIN KASHIRO, P.E.
Waste Ma... ...ment Chief

AARON SHINMOTO, P.E.
Land Use Administrator

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

November 18, 1986

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STATE OF HAWAII

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Thank you for allowing us to comment on Eradication of Marijuana on State-Owned and Managed Conservation District Lands. At present we do not have any comments to offer.

Sincerely yours,

ALVIN K. FUKUNAGA
Director of Public Works

Center for World Peace

Star Rt., Box 372 Molokai, Hawaii 96748

Dear People: Nov. 25, 1986

I live on the East End of Molokai in an intentional community. Our location is in a valley with a perennial stream and is relatively remote. I speak for six people in my negative response to the proposal to use glyphosate, weed oil and deisel oil to attempt to eradicate marijuana plants on state preservation land.

I attended the public hearing held on Molokai on Nov. 24, 1986. Previous to this meeting, I also had the opportunity to look at the lone copy of the EIS on Molokai, located in the public library. I found the structure of the meeting to be much too rigid and uninformative for the public. There was no written material available to the public and no opportunity for questions or discussion except from the board, whose responsibility or function in the EIS process was not made clear. A speaker for the state agency proposing this project gave some information and background data to the board, and three or four questions were then directed to him by this board. The public was tehn finally allowed to make statements. The response was unanimously against the proposal, for a variety of reasons.

I now take this opportunity to give my opinion and observations, and pose some questions for your consideration. One issue which was not brought out at the hearing was the question of guidelines. My memory, from reading the EIS, is that 8 m.p.h. winds are to be the maximum allowed for aerial spraying due to drift possibilities. Now much of the land under proposal is "upcountry" or higher elevation. Hawaii is not a windless environment and my experience is that as one goes higher in elevation, general wind speeds increases. The wind is also generally variable on county. The only occasions I recall of normal wind speeds under 8 m.p.h. would be winter months in periods between Kona storms. But the majority of the marijuana cultivated in Hawaii is apparently during the summer months. Does this guideline not dramatically limit the practicality of this method of eradication? Or will the guideline simply be ignored, in the field? And how is windspeed measured through helicopter prop wash?

Other guidelines mention proximity to dwellings, streams, and other environmentally sensitive areas. At best, these guidelines are inadequate in distance. At worst, they are impractical and virtually unenforcible. I plated pot plants next to a stream are more conven-

tently sprayed from a helicopter than by having a man rappel down to destroy them. And private and public lands sometimes form a patchwork quilt pattern, making for a monumental task of discriminating between them in the field. The EIS also mentions adequate training for personnel involved in the erradication. But, with time, people become lax and careless even regarding their own health and safety, much less that of some unknown public. Finally, higher elevations get higher amounts of rainfall - which is often unpredictable. This will lead to runoff problems, almost inevitably.

This proposal has been given to various state and private agencies for their input. An example of such was read at the hearing, when one such agency expressed preference for spraying over manual methods of erradication as it would have less impact on archeological sites. But anyone who has planted or harvested anything knows the major impact is made in site p[illegible], e.g., clearing, grubbing, planting, and fertilizing. The additional impact of harvesting, which is not manual erradication is, is virtually nil!

The representative of the state agency proposing the chemical poisoning did not mention the statement in the EIS to the effect that glyphosate is a relatively new herbicide of vitually untested environmental and health hazards. Two members of the public did make this point. And one person asked if there is any data on the results of using this method of erradication on Kauai. There was not a satisfactory response. These two incidents are blatant examples of bias and/or negligence!

I have a few questions concerning the whole process to pose at this time. I would appreciate any response to them anyone has time to give. They are:

1) What is done with the minutes of the public hearning? Are they available to the public?
2) Who chooses the board? What is their function, exactly? Do they have a say as to the outcome of this process?
3) What is the value of the public input? Does anyone tally positive and negative responses? Does anyone care?
4) Do the people writing the EIS and its guidelines ever leave their fifth floor offices and go out into the field?
5) Has any study of the spraying on Kauai been done? If so, is it available to the public?
6) Why is there no opportunity for discussion and questions at the public hearings?
7) Why are there no copies of the EIS available at the hearings?

In closing, I want to make it clear that I neither grow nor smoke marijuana, because I believe it is a poison. I have not yet [illegible] mi-

nated all poisons from my lifestyle, but marijuana is one that I have been able to stop using.

The state of the Earth is such that we are poisoning it and ourselves. We cannot alleviate this problem by killing one form of poison with another. We can only do it by example and [illegible]. Kawaii is one of the few places ideally suited to living close to and in harmony with nature. It is the experience of that harmony which can help attune us to the potential of harmony within ourselves and peace on Earth. Please do not contribute to the diminishment of that opportunity with another poison.

As sincerely as is possible,

James Victor Henderson

JVH:cs

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

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STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Center for World Peace
c/o Mr. James Victor Henderson
Star Rt., Box 372
Kaunakakai, Hawaii 96748

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Your letter of November 25, 1986 raises a number of questions and concerns. We are responding to your points in the same order as they are presented in your letter.

1. Wind conditions.

Several weather conditions affect drift. In addition to wind, these are low humidity and high temperature which affect the size of the droplets. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

The Operation Plan for Kauai contains the following requirement:

> To minimize drift and volatilization, do not use aerial spraying when any of the following conditions exists on the spray areas:
>
> Wind velocity exceeds 8 miles per hour.
> Raining or rain imminent.
> Foggy weather.
> Low relative humidity, and temperature exceeds 95 degrees Fahrenheit (applies to water-based sprays only).
> Air turbulence (thermal updrafts, etc.) is so great as to seriously affect the normal spray pattern.
> Temperature inversions are present which could lead to offsite movement of the spray.

Although these conditions do place limits on aerial spraying, there are many suitable times, particularly in the early morning hours. Weather conditions will be checked with the National Weather Service on the day an aerial operation is planned. If they are unfavorable, the operation will be cancelled and other eradication measures used or postponed until conditions are suitable.

2. Training and field operations.

We appreciate your concern that guidelines may not be followed during actual field operations. DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts. Direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was observed upon inspection one month later.

3. Archaeological sites.

Your comment seems to indicate that any additional impacts created by manual harvesting would not further disturb an archaeological site which had already been disturbed by planting. DLNR's State Parks Division disagrees and indicates they would prefer to minimize the risk by utilizing a spray method provided that other conditions would not preclude spraying.

4. Use of glyphosate.

Glyphosate is a relatively new chemical. However, it is approved by the EPA for general use, meaning anyone can purchase and apply it without any training. It should be noted that no glyphosate was used in marijuana eridication on Kauai. Weed Oil is the preferred herbicide and DLNR intends to use glyphosate only if Weed Oil is unavailable for purchase.

5. Spraying on Kauai.

As indicated above, a visual inspection of the Kauai operation was made and the results reported. Because the inaccesibility of the terrain (which makes aerial spraying a desirable alternative) precludes before and after soil sampling, a special test is being arranged for such a study in a more accessible area. The results of these tests will be made public upon completion.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

EAST MAUI IRRIGATION COMPANY, LIMITED
P.O. BOX 152 • PAIA, MAUI, HAWAII 96779 • TELEPHONE (808) 579-9116

RECEIVED
'86 DEC 10 P2:03
FORESTRY & WILDLIFE
STATE OF HAWAII

December 8, 1986

Mr. Libert K. Landgraf, Administrator
Division of Foresty and Wildlife
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Landgraf:

Draft EIS for the Eradication of Marijuana Grown on State-Owned and Managed Conservation Lands on the Islands of Hawaii, Maui, and Molokai

Thank you for providing us with a copy of the draft environmental impact statement for the proposed eradication of marijuana grown on state-owned and managed conservation district lands on Hawaii, Maui, and Molokai.

The East Maui Irrigation Company (EMI) supports the state's efforts to implement an eradication program for the illegal cultivation of marijuana on Maui. EMI owns and operates an extensive water collection and transmission system which traverses both state and privately owned conservation district lands in East Maui. In addition, EMI manages the Waiakamoi watershed and water system for the County of Maui Department of Water Supply. We concur with your observation that marijuana cultivation in conservation areas has led to the destruction of native vegetation and the uncontrolled use of herbicides and chemical fertilizers, actions which are harmful to watershed areas. In addition, the presence of marijuana crops poses a threat to the safety of legitimate users of these lands, such as our employees, since the growers do attempt to protect the illegal crops from intruders. Thus, we approve of your efforts to eradicate marijuana by chemical and physical means.

Our major concern is the protection of the water sources and facilities located on these state-owned conservation lands during the eradication process. Surface waters collected and transported by EMI are utilized for domestic purposes and must be strictly protected from any contamination. We urge the state to ensure that chemicals are applied carefully and judiciously around all water sources (streams, pools, etc.) and water facilities (ditches, tanks, reservoirs, etc.) in order to prevent contamination of the water.

Thank you for this opportunity to comment. Again, we commend the state for its efforts.

Very truly yours,

for Robert L. Warzecha, Vice President and General Manager

A WHOLLY OWNED SUBSIDIARY OF ALEXANDER & BALDWIN, INC.

JOHN WAIHEE
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 17, 1986

Mr. Robert L. Warzecha
Vice-President & General Manager
East Maui Irrigation Co.
P. O. Box 152
Paia, Hawaii 96779

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your support of our efforts to eradicate marijuana. We share your concern for protection of the watershed and water resources.

The operational guidelines for chemical eradication precludes aerial spraying nearer than 100 feet from any water body, including streams, pools, irrigation ditches, tanks, reservoirs, or rain catchment system. Manual spraying will not be allowed closer than 25 feet.

To ensure that these areas are clearly defined and avoided, a representative of the Maui Department of Water Supply will participate in the development of the maps that will become part of the Operation Plan for Maui.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Dr. Carl C. Christensen
Conservation Chairman
Hawaiian Malacological Society
P.O. Box 10391
Honolulu, HI 96816

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your support for this project, and for your expressions of concern. We are responding to your points in the order they are presented in your letter.

1. Use of glyphosate.

Weed Oil is the preferred herbicide. Glyphosate will be used for marijuana eradication only if Weed Oil is unavailable. If this should happen and glyphosate must be substituted, field tests will be made with follow-up monitoring before it is used for full-scale marijuana eradication.

2. Alternative enforcement actions.

Adequate manpower to address varying program needs is always a problem. Even if there were a considerable increase in personnel, the high-risk aspects of manual eradication would remain unchanged. A major reason chemical alternatives are being considered is to provide an additional method of marijuana eradication that would lessen the danger to enforcement officers. We would like to emphasize that this is an additional method. Manual eradication will continue to be employed as well as other enforcement efforts, including the apprehension and arrest of persons involved in growing and selling marijuana and confiscation of property by many other federal, state and local agencies. It is our understanding that this includes the Internal Revenue Service.

3. Invertebrates.

Invertebrates listed by the U.S. FWS as candidates for classification as endangered or threatened species will be included in the Final EIS. In response to your specific question on hihiwai in streams on the north shore of Molokai, we do not feel that there will be a problem since spraying will not take place near streams or other water bodies.

4. Operations Plan panel

The panel that will prepare the sensitive areas map will include both qualified botanists and biologists. The Operations Plan will specify that they will be consulted if there are any questions about a specific area before a field operation takes place.

5. Monitoring.

The effects of spraying on native plants are well known, since herbicides are intended to destroy plants. What is important is to ensure avoidance of non-target vegetation, and to keep the herbicides away from animals and humans to the extent possible.

DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. The helicopter stays well above the forest canopy. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

On Kauai, direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

As noted in the EIS, there will be some unavoidable adverse impacts on non-target vegetation, just as there is in manual eradication methods. There will also be some unavoidable adverse impacts on small animals, although this is of a much smaller concern because of the types of chemicals proposed have low toxicity to animals. This must be weighed against the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Liberty K. Landgraf
Administrator

KE'ANAE-WAILUANUI COMMUNITY ASSC.
SR 71, Ha'iku, Hawai'i 96708 248-8006
December 3, 1986

Susumu Ono, Chairperson
BLNR
1151 Punchbowl Street
Honolulu, Hawai'i 96813

Libert Landgraf, Administrator
Division of Forestry & Wildlife
DLNR
1151 Punchbowl Street
Honolulu, Hawai'i 96813

Re: CDUA and Draft EIS for Eradication of Marijuana on State-Owned Properties on the Islands of Hawaii, Maui and Molokai

Dear Mr. Ono and Mr. Landgraf:

The following comments are submitted both as testimony on the CDUA and as comment on the Draft EIS (DEIS). We regret that we were unable to testify orally at the public hearing.

The Ke'anae-Wailuanui Community Association is an incorporated association of residents of Ke'anae-Wailuanui, representing most of the residents of the area. We are specifically mandated by our Charter of Incorporation:

> (a) to promote the general welfare of the people residing in the community of Ke'anae-Wailuanui in social, spiritual, educational and economic affairs;
> (b) to preserve and protect, and enhance the quality of the existing life of the people within the Ke'anae and Wailuanui valleys;
> (c) to provide and improve communication and mutual understanding among the residents of Ke'anae-Wailuanui themselves and with other community associations concerning their mutual welfare;
> (d) to provide a formal voice and cooperative organization through which the residents of the community can participate fully and more meaningfully in the determination and development of policies and decisions affecting their destiny.

Although we have not been provided with a copy of the CDUA, we have reviewed the subject Environmental Assessment (EA) and DEIS, and we support the use of manual eradication methods only. We are opposed to all chemical eradication methods.

Although you are well aware of our concern for Conservation lands, especially those in our area, we were not sent a notice of the public hearing. However, we understand that numerous persons and organizations presented testimony concerning the hazards of using chemical eradication in our Conservation zone. We will not comment in detail on the specifics of the health and environmental hazards, as we believe that you have received and will receive expert testimony on these matters from such organizations as Safe Solutions, Sierra Club, Dr. Steve Blake and Dr. Steve M. Moser, and others. We endorse their comments.

You are of course aware from previous dealings with our Association of our deep concern for the protection of our wilderness and watershed areas (all Conservation lands subject to this proposal) which literally form the "backyard" of our community. We gather plants and animals for food, medicinal and cultural purposes from these areas. We hunt there. We use them for spiritual and recreational purposes. We use the water of the streams for irrigation and drink either county water (well water and sometimes stream water) or untreated spring water. Some of us rely completely on untreated stream water for all of our needs. We thus have a very personal and direct interest in maintaining a chemical-free watershed.

We are also concerned about what might occur if we happen to be in the watershed when you decide to spray. How will you assure that all of us will be aware of your presence? You state that you will post warnings that the area will be sprayed. This conflicts with your statements that the maps of the areas to be sprayed must be kept secret. How will you assure that the warnings stay posted? What about minor points of access? What if we are already in the area when you post warnings (obviously, you would not plan to give much warning, since this would allow growers to pull out their plants). The use of chemicals would constitute a violation of our rights of access to the area. We are not afraid of the marijuana growers, and do not curtail our legitimate use of the mountain because of their presence. We are afraid of the proposed chemical spraying and its effect on us directly and on our environment.

You state (p. I-13) that:

> Applying the herbicide when it is raining or when rain is imminent could contribute to runoff or dilution of herbicide and leaching through the soil. Therefore, spraying is allowed only under favorable weather conditions.

As residents of this area, we can inform you that under normal conditions it rains every day in the watershed. Rain is always imminent.

You admit that offsite drift can be a problem when winds exceed 8 mph (p. I-13). As the Chairman of the U.H. College of Tropical Agriculture and Human Resources pointed out, wind velocity under a helicopter will be more than 8 mph. (Appendix D)

How do you define "essential habitat?" What are "other sensitive areas?" You discuss only endangered or threatened plants. You should also consider plants that are cultural resources.

A benefit-cost analysis should be presented. Although you state that manual eradication is expensive, dangerous, and requires considerable personnel, no benefit-cost comparison is made with chemical eradication. This analysis should include monetary and environmental and other factors. There does not appear to be any justification for ground crews using knapsack sprayers. There would be no additional danger in manual eradication. Details of the alleged dangers should be presented. How many officers have been injured, in what manner, and on which islands? What has been the cost of these injuries (physical and economic). The amount of funds available from the federal government for this program should be discussed.

We endorse and incorporate by reference the comments made by Elaine S. Wender dated December 3, 1986, along with her attached Exhibit A. In addition to the procedural deficiencies pointed out in those comments, we bring to your attention our attached Exhibit A. In this letter from Mr. Ono to a former CDUA applicant, Mr. Ono chastised the applicant who had failed to provide individuals who had requested to be consulted parties with copies of the EA, and granted a 30-day extension for the consultation period. We believe the same standards should apply here. Unfortunately, the remedy of extending the consultation period does not exist in this case.

Although the OEQC Bulletin states that copies of the DEIS are available at State Branch Libraries that are in proximity to the site of a proposed action, no copy has been provided to the Hana Library, which is closest to the areas under consideration.

Although a number of consultants made substantive comments on the EA, none of these comments received other than very general replies. This was true even for comments which had been previously submitted for the EIS for Kaua'i, and were resubmitted for this DEIS.

All of these procedural violations of the EIS Rules make the EIS unacceptable.

You state (p. I-19) that you don't really know how these chemicals work, and that the environmental fate and potential ecological effects of the use of these chemicals in forests have yet to be studied extensively. This in itself is reason enough not to proceed with this proposal. The field test described on p. V-5 should be completed before the Final EIS is published.

We note with approval that the Department of Water Supply of the County of Hawaii has stated in its comments on the EA that chemical spraying of its watersheds shall be prohibited due to possible contamination of surface water sources. We urge you to follow the recommendation of the State Department of Health and not use chemical methods of eradication in Conservation land areas. Protect the integrity of our waters of life and our wilderness.

Sincerely,

Ruth Hanson

Ruth Hanson
President
Ke'anae-Wailuanui Community Association, Inc.
As authorized by a unanimous vote of the Board of Directors

Encl.

cc.: Jacqueline Parnell
John Arisumi

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

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DEPUTY TO THE CHAIRMAN

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MAY 9 1986

FILE NO.: MA-2/20/86-1852
REF. NO.: CPO-0509

Mr. Randolph Rowland, Project Engineer
Associated Engineering Consultants
124 Oakwood Drive, Suite D
Auburn, CA 95603

Dear Mr. Rowland:

Subject: Thirty day Extension to the Consultation Period on the Environmental Impact Statement (EIS) for Conservation District Use Application (CDUA) for a Hydroelectric Project on the East and West Wailuaiki Streams at Nahiku, Maui, Hawaii

We have received three letters dated May 4, 1986, from individuals who have requested that the EIS consultation period for your subject project be extended an additional thirty-days (30) from the May 8, 1986 deadline.

These individuals indicated that the reason for this extension request is that they had not received the copy of the Environmental Assessment that they had asked for in their request to be a consulted party. Thus, they felt that they were not given sufficient opportunity to review and comment on your project.

As we have discussed with you from the beginning of this process, the purpose to the EIS is to serve as a "public disclosure document." The EIS process allows the public the opportunity to critique a particular project.

Therefore, pursuant to Section 11-200-15(b) of Chapter 200 of Title 11, Administrative Rules, and as the accepting authority responsible for the processing of your EIS, we find that the thirty day consultation period be extended an additional thirty days to allow for public input on your EIS. Thus, the new deadline for the consultation period is June 7, 1986.

Exhibit A

Furthermore, we wish to reemphasize our position that additional copies of all documents for your project should be sent to, and kept at, a particular location(s) within the Ke'anae Community where individuals, affected by the project, may review these documents. We feel that this would alleviate much of the community concerns regarding access to pertinent information regarding your project.

Should you have any further questions regarding this matter, please feel free to contact Dean Uchida of our Office of Conservation and Environmental Affairs in Honolulu, at (808) 548-7837.

Very truly yours,

SUSUMU ONO, Chairperson
Board of Land and Natural Resources

cc: OEQC
Garratt-Callahan

CEA
FJ

RECEIVED
'86 DEC 10 P2:07
FORESTRY & WILDLIFE
STATE OF HAWAII

'86 DEC 9 P1:29

KE'ANAE-WAILUANUI COMMUNITY ASSC.
SR 71, Ha'iku, Hawai'i 96708 248-8006
STATE OF HAWAII
December 5, 1986

Susumu Ono, Chairperson
BLNR
1151 Punchbowl Street
Honolulu, Hawai'i 96813

Re: CDUA and Draft EIS for Eradication of Marijuana on State-Owned Properties on the Islands of Hawaii, Maui and Molokai

Dear Mr. Ono:

In our comments of December 3, 1986 we stated incorrectly that the notification in the OEQC Bulletin of November 23, 1986 did not indicate a deadline date for comments on this DEIS. In fact, the date was published in the Bulletin.

Sincerely,

Ruth Hanson

Ruth Hanson
President
Ke'anae-Wailuanui Community Association, Inc.

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Ruth Hanson, President
Ke'anae-Wailuanui Community Association
SR 71
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your points in the order they are presented in your letter.

1. Chemical-free watershed.

We concur with your desire to have a "chemical-free watershed." However, this is not possible since chemicals are already being introduced to the watershed areas by the marijuana growers. The Maui County Police Department reports that malathion containers, snail and slug pellets, mouse and rat poison, and commercial fertilizers have been found at various sites.

2. Effects on people.

We believe that there is very little likelihood of an individual being affected by aerial spraying because of the method that is being used. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants.

It is the purpose of an environmental impact statement to consider the "worst case scenarios". It is certainly possible that drift may occur. However, DLNR's experience on Kauai indicates that this method is very successful in directing the spray to just the marijuana plants. An individual would have to be right next to the plants, in which case he would be seen by the helicopter operator, and would also be aware of the helicopter's presence.

The posting of notices that was mentioned in the Draft EIS would be applicable only to areas frequented by numbers of people such as parks and other recreation areas.

3. High rainfall areas.

In the high rainfall areas that you describe, aerial spraying would not be done.

4. Wind and helicopter downdraft.

As noted in 1. above, the spray mechanism used in the eradication process is unlike those customarily used to apply herbicides. It is true that the downdraft from a helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward. On Kauai, there was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was observed upon inspection one month later.

5. Cost-benefits.

It is very difficult to do a cost-benefit analysis of chemical eradication vs. manual eradication because of the great number of variables involved, and injuries to law enforcement officers cannot be measured simply by medical bills and days lost to work. The most appropriate measure of cost-benefits is by comparison.

Mr. Joseph Cravalho, Chief of Police for Maui County, testified at the public hearing on the CDUA on Maui on November 18, 1986, that

> Currently, our manual eradication method has proven to be time-consuming, expensive, dangerous to personnel, and an ineffective method of addressing the problem of marijuana cultivation.
>
> . . . Manual operations involve a minimum of ten officers, a dump truck and driver, and two four-wheel drive vehicles. A larger operation requires twice the number of police officers and equipment, including helicopter, helicopter pilot, support and maintenance and crew men from the Hawaii National Guard. The necessity for the number of men and equipment are to chop or pull the marijuana plants, haul the plants away from the remote area, and finally, dispose of the plants by burning at the local dumps.
>
> On the other hand, the Department of Land and Natural Resources' proposed method of eradication requires three officers and a four-wheel drive vehicle for a mini operation. The arduous task of cutting or pulling the marijuana, hauling and disposal of same, have been eliminated. The spraying technique kills the marijuana within a few hours and prohibits the grower from using or selling the product.

Chief Cravalho also described the numerous complaints that the Maui Police Department has received from hunters, hikers, and nature lovers who are confronted and threatened by suspected marijuana growers in state forests open to the public.

According to the federal EIS on eradication of marijuana on non-federal lands, the latest published figures available, federal funds for marijuana eradication allocated to the State of Hawaii for 1985 were $303,000. The only state to receive more funds was California, an indication of the significance of the marijuana problem in Hawaii.

6. Potential ecological effects of chemicals.

We agree that there is always a need for additional ecological studies of the effects of any chemical. However, the chemicals selected have been chosen deliberately because they are the least damaging. Weed Oil is unique in that it has a long history of use but has not been the subject of scientific studies. It has fallen into disuse by farmers mainly because more toxic herbicides have been made available. No spraying will be done on Maui until the field tests described in the draft EIS are completed.

Glyphosate is newer, and has less history. However, it is approved by the EPA for general use, meaning anyone can purchase and apply it without any training. It should be noted that Weed Oil is the preferred herbicide and DLNR intends to use glyphosate only if Weed Oil is unavailable for purchase.

We ..reciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED
'86 DEC 10 P1:47

LIFE OF THE LAND

8 December 1986

Libert Landgraf
Division of Forestry & Wildlife
Dept. of Land & Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Landgraf,

Re:Eradication of Marijuana on Conservation Lands, Islands of Hawaii, Maui,Molokai. Draft Environmental Impact Statement.

We object to the use of Weed Oil as a means of chemical eradication precisely because "there is no empirical data". It does not make good sense to use our fragile island ecosystems as experimental agricultural stations to "provide data for further evaluation of the safety and efficacy of these chemicals".

Diesel oil falls into the same category as Weed Oil in that there is no empirical data since its intended use is as a fuel and not as a herbicide. According to the EPA, diesel oil may not be used in this manner and registration as a herbicide would take years. The statements in the DEIS about diesel oil are misleading in this respect as are your replies to Chief Guy Paul and Mayor Tavares about the use of diesel oil in this project. As we understand the EPA's comments on diesel oil, there are very specific circumstances in which diesel oil may be tested. We would like clarification on your use of diesel oil.

Roundup is not an alternative. Monsanto had to be taken to court to reveal the health and environmental effects of their product. The studies they published were biased and erroneous. Has the DLNR obtained the confidential test results through the Freedom of Information Act? Has the DLNR instructed KRP to do so? When we contacted Citizens for a Better Environment (an original litigant in the People v. Monsanto) they informed us that the only way to obtain that confidential information about Roundup was through FOIA. Is the DLNR aware that Roundup is, in fact, persistent and reaches its maximum effects two years after application?

We suggest that no chemical eradication be used as they have costly, invisible price tags. Manual eradication seems the best alternative. Perhaps more stringent fines and jail terms should be imposed on growers who use public lands and especially "critical habitat" areas.

We further object to chemical eradication because as it will be used in non-critical habitat areas, the marijuana growers are likely to enter and farm in the critical habitat areas, causing extensive damage in these vulnerable areas.

We urge you to exact the punishment on the growers and not the land. Take it out where it hurts them-- in the pocketbook.

Thank you for your attention and consideration of our comments, in advance.

Sincerely,
Anne Sturgis
Anne Sturgis

250 S. Hotel St. Rm. 211, Honolulu, Hawaii 96813. Tel. 521-1300

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Anne Sturgis
Life of the Land
250 S. Hotel Street #211
Honolulu, HI 96813

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your points in the order they are presented in your letter.

1. Use of Weed Oil and Diesel Oil

The chemicals selected have been chosen deliberately because they are the least damaging. Both Weed Oil and Roundup are approved by the EPA for use in marijuana eradication. Weed Oil is an "old-fashioned" herbicide, approved for use in weed control when the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was enacted by Congress and regulations were adopted by EPA. Like diesel oil, it has a long history of use but has not been the subject of scientific studies. It has fallen into disuse by farmers mainly because more toxic herbicides have been made available.

Diesel oil was the original choice for marijuana eradication by DLNR because it is the least toxic of the three chemicals proposed to be used. It has been used for several decades for weed control, by farmers and government officials. A major use in Hawaii was to kill weeds near the sugarcane train tracks so that the sparks from the steam engines would not start fires. Weed Oil was created to provide farmers with a diesel oil-like substance that was convenient to purchase for herbicidal use.

It is our understanding that the emphasis of FIFRA is on sale and purchase rather than use. Since no manufacturer of diesel oil has submitted an application for its registration as an herbicide, or is likely to do so, it can be sold by the manufacturer or purchased for specific use as an herbicide only with special permission of EPA under another provision of FIFRA. This possibility will continue to be explored.

2. Glyphosate.

Glyphosate is a non-restricted herbicide, sold under the name Roundup over the counter to the general public. It is used widely for weed control by both commercial agriculturalists and individual citizens. Much concern has been expressed by the public about the dispute between Monsanto, the manufacturers of Roundup, and EPA over earlier tests that resulted in retesting. Before including glyphosate as an herbicide to be considered for potential use in the DLNR marijuana eradication program, EPA was contacted to determine the status of the retesting program. Thomas Adamczyk of the Herbicide and Pesticide Branch of the Registration Division of EPA in Washington, D.C. stated that retesting had been completed, that nothing out of the ordinary had been discovered, and that no change in Roundup's registration status was planned. He also stated that final approval was expected in early 1987. This contrasts to other cases where retesting has been required and the testing has indicated discrepancies. In these cases, EPA has recalled the product. Mr. Adamczyk stated further that EPA has and continues to approve the use of glyphosate by the U.S. Drug Enforcement Agency for eradication of marijuana on non-federal lands, including Hawaii.

Weed Oil is the preferred herbicide. Glyphosate will be used for marijuana eradication only if Weed Oil is unavailable. Glyphosate has not been used by DLNR in the marijuana eradication program on Kauai or any other place.

3. Chemical eradication vs. other methods.

As noted in the EIS, the use of chemical methods of eradication will result in some unavoidable adverse impacts, just as there are in manual eradication methods. This must be weighed against the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

4. Enforcement Alternatives.

We concur that increased enforcement is desirable. Additional penalties were enacted into law by the 1986 State Legislature to take effect January 1, 1987. A $10,000 fine can now be imposed for possession or cultivation of 25 or more plants.

5. Critical habitats.

We also share your concern that growers may seek out sensitive habitat areas, thinking that they will then not be subject to eradication efforts. This is why the sensitive area maps that will be developed prior to spraying will not be publicly available. Unfortunately, according to Mr. Alan Holt of The Nature Conservancy of Hawaii, marijuana growers have already invaded its nature preserves. We are in complete agreement with his comment that the addition of chemical methods to the eradication program is an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

We appreciate your interest in this project.

Sincerely,

Liberti K. Landgraf
Administrator

November 18, 1986

RECEIVED

'86 NOV 21 A11:13

FORESTRY & WILDLIFE
STATE OF HAWAII

Division of Forestry and Wildlife
Department of Land & Natural Resources
Attention: Libert K. Landgraf, Administrator
P. O. Box 621
Honolulu, HI 96809

Ladies and Gentlemen:

Thank you for sending us a copy of the draft Environmental Impact Statement for the Eradication of Marijuana on State-Owned and Managed Conservation District Lands on the islands of Hawaii, Maui and Molokai.

One possible consequence of the proposed program is that it will increase the pressure by illegal marijuana growers on privately-owned lands. While this may place additional burdens on owners of private lands such as ourselves, we are nevertheless fully supportive of your efforts to eradicate marijuana on state-owned lands.

We appreciate the opportunity to review the draft environmental impact statement.

Sincerely,

Randolph G. Moore
President

RGM:ts

cc: KRP Information Services
Attention: Jacqueline Parnell
Box 27506
Honolulu, HI 96827

MOLOKAI RANCH
LIMITED
P.O. BOX 4039 / HONOLULU, HAWAII 96813 / (808) 531-0158

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Randolph G. Moore
President
Molokai Ranch, Ltd.
P. O. Box 4039
Honolulu, HI 96813

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We appreciate your interest and support of this project.

We recognize that increased pressure on growers on public lands may cause the activity to shift to private lands. We would be pleased to dicuss joint eradication efforts with you at your convenience.

Sincerely,

Libert K. Landgraf
Administrator

THE NATURE CONSERVANCY OF HAWAII

• 1116 SMITH STREET • SUITE 201 • HONOLULU, HAWAII • 96817 • (808) 537-0508 •

November 20, 1986

RECEIVED
'86 NOV 24 P4:06
FORESTRY & WILDLIFE
STATE OF HAWAII

Mr. Libert K. Landgraf
Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Landgraf:

Thank you for this opportunity to comment on the Draft Environmental Impact Statement for the eradication of marijuana on state-owned and managed Conservation District lands on the islands of Hawaii, Maui, and Molokai. As you know, the Conservancy has established several nature preserves on these islands and is dedicated to the protection of the full array of Hawaii's natural heritage. While we generally regard the application of any pesticide to the environment as an action to be treated with great care, we also recognize the serious threat which marijuana growing poses to our state's remaining native ecosystems and vital watersheds.

We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands. The Conservancy's efforts to effectively protect native forest on Maui have been complicated by damage to our preserve and threats against our staff and volunteers by marijuana growers. Our vegetation recovery studies in former marijuana patches in the Waikamoi Preserve show that exotic weeds previously not found in Hawaiian forests are being introduced during marijuana cultivation, and that several noxious exotic species which already threaten these areas may be favored by cultivation activities.

We wish to offer our support of the proposed use of manual and chemical means for the eradication of marijuana as described in the EIS, with a request that due consideration be given to the suggestions listed below:

1. Special field testing of the effects of potential herbicide drift during helicopter spraying operations should be completed in native forest prior to the adoption of this method in native

Samuel A. Cooke, Chairman
William E. Aull
Kenneth F. Brown
Zadoc W. Brown, Jr.
Colin C. Cameron
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Edward MacNaughton
Frank J. Manaut
Fuso Matsuda
H. M. Monte Richards
William H. Stryker
Edward D. Sultan, Jr.
Laura L. Thompson
Laurence Vogel
Gaylord H. Wilcox

areas. Tests should be conducted for all three proposed chemicals, in dry as well as wet forest habitats, and the data collected should include species-specific information on herbicide effects and recovery after spraying. The results of these tests should be published in a widely available scientific journal--such as the newsletter of the Hawaiian Botanical Society. These studies will provide important information applicable to the general topic of herbicide use in native areas, and will reveal any unwanted vegetation effects from spraying which may require an adjustment in operations.

2. On page V-3 of the EIS, the authors state that artificially high levels of nutrients and soil moisture maintained by irrigation and fertilizer in marijuana patches "should provide ideal conditions for natural plant succession" in revegetating sprayed plots. We believe this to be otherwise, especially in wet forest habitats where soil nutrient regimes are generally very poor. Addition of limiting nutrients through fertilizer may favor establishment of exotic species in these widespread soil types. Because of large fertilizer and potting soil stockpiles in many marijuana patches, the effects on native nutrient regimes can be expected to be extreme and long-lasting. A similar situation has occurred in Conservancy preserves in California, where soil and fertilizer carried into a site by growers altered native soils so markedly that native scrub vegetation was heavily invaded by exotic species until these materials were removed. Therefore, we strongly suggest that, wherever possible, stockpiled fertilizers be removed from eradicated patches in high quality native areas, and that all irrigation systems be destroyed.

3. In delineating critical native habitat in which helicopter spraying is to be prohibited, we ask that high quality natural communities be given consideration together with critical habitat for threatened and endangered species. While critical species habitat will set aside many of the state's most pristine areas, exceptionally intact or diverse examples of native ecosystems merit similar treatment even where these do not include listed species. Examples include native pukiawe-aalii shrubland on leeward Molokai or diverse mesic and wet forests on West Maui where no listed species may occur but where any damage to the native

ecosystem should be minimized. Manual methods should be used in eradication programs in such areas. We will be happy to discuss ways in which the Conservancy may be able to help in identifying exceptional native areas.

4. In cases where chronic or large-scale growing occurs in critical habitat for listed species or in exceptionally rich or intact native areas, we suggest that a qualified botanist be among the members of the site assessment team prior to any committment to employ chemical methods. It is unreasonable to expect enforcement officers to recognize sensitive or rare native species in the field, whereas any field-experienced Hawaii botanist can do this from a low-flying helicopter. Also, many trained botanists are experienced in helicopter operations and can operate as an effective part of the assessment team.

5. Finally, as an editorial note, we wish to point out that the statement on page III-18 describing the Conservancy as owner of the Kamakou Preserve is in error. This preserve is managed by the Conservancy under a perpetual conservation easement, but is owned by Molokai Ranch, Limited.

Once again, we appreciate this opportunity to comment, and look forward to discussing this project further with you at any time.

Sincerely,

Alan Holt
Director
Science and Stewardship

cc: Rydell, Misaki, Taketa

AH/11

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Alan Holt
Director, Science and Stewardship
The Nature Conservancy
1116 Smith Street, #201
Honolulu, HI 96817

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We appreciate your interest and support of this project. We are responding to your specific concerns in the order they are presented in your letter.

1. Field testing.

Monitoring of the Kauai operation was confined to a visual inspection because the inaccessibility of the terrain precluded before and after soil sampling. The special test of Weed Oil that is being arranged will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botonist will do the before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion, although it has not yet been determined in what manner.

We have no immediate plans to test glyphosate because we intend to use it only if Weed Oil becomes unavailable. Diesel oil will not be tested because it cannot be used at this time. If either of these two chemicals are planned for use, additional tests will be made before they are employed in a large-scale operation.

2. Nutrient levels in forest soils.

We agree with your observation that exotic species are most likely to predominate when the area revegetates after spraying and will clarify this in the Final Environmental Impact Statement. The point that was intended was that the soil would not remain bare.

Your suggestion that stockpiled fertilizers be removed from marijuana cultivation sites is very good but may be impossible to accomplish in conjunction with aerial spraying operations. We will request DOCARE to do this during manual eradication efforts where equipment will be available on site for removal.

3. Sensitive habitats.

We have tried to use "sensitive" rather than "critical" habitats in delineating special areas of concern because the word "critical" has come to apply only to endangered and threatened species. Sensitive areas may also include cultural and historic resources. We would appreciate your assistance in identifying and delineating the boundaries of any areas that you think might be overlooked by our botanists and biologists.

4. DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. Fortunately, the green color of the marijuana plants, usually surrounded by a cleared bare area, is distinctive from the air. The pilot keeps the helicopter well above the forest canopy. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts, principally because the spraying mechanism utilized is designed to produce large droplets and a spray circle small in diameter. This minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

The panel that will prepare the sensitive areas maps will include both qualified botanists and biologists. The Operations Plan will specify that they will be consulted if there are any questions about a specific area before a field operation takes place.

5. Kamakou Preserve.

Your correction is noted and will be made.

Sincerely,

Libert K. Landgraf
Administrator

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'86 DEC 10 P2:11
FORES[illegible]

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Division of Forestry and Wildlife
Department of Land and Natural Resources
Attention: Libert K. Landgraf, Administrator
P.O. Box 621
Honolulu, Hi. 96809

Aloha,

I would like to be informed as to the results of the field test to monitor the effects of spraying weed oil by helicopter on soils and the degree of drift to nearby vegetation being undertaken by DLNR.

I would like to know the tests that have been done on Kauai since spraying began there in the marijuana eradication attempt. I would like to know who is doing the tests and what the results are as far as either glyphosate or either oil getting into the water, and/or soil and how fast it really breaks down.

EMI has used Roundup along its ditches. No one has ever tested our water to see if we are already drinking this untested and questionable chemical. WE NEED TO KNOW WHAT WE HAVE IN OUR WATER NOW, BEFORE WE RISK MORE CHEMICAL CONTAMINATION.

Will chemicals be used on steep ledges in the forest where manual eradication would be difficult and where the runoff from the dense and frequent rain would almost certainly end up in our drinking water?

How will a helicopter pilot know if what is being sprayed by a 100 foot hose is an endangered bird or plant or species?

P.O. BOX 11634 LAHAINA, MAUI, HI 96761 (808) 667-1986

The DEIS speaks of developed recreation areas being one of the environmental factors which will determine selection of spraying or manual eradication. What about undeveloped recreation areas, like Twin Falls and many of the other falls and swiming pools that are frequented by nature loving citizens of Maui? Will we be surprised one day to have helicopers hovering above us? Will the drift get into the pools or on the children that we have brought for an outing?

It says in the DEIS that the herbicide selected (glyphosate) is considered to be the least toxic and persistent of those available. "Considered to be the least toxic and persistent" is the important phrase here. Glyphosate has not been studied enough yet to really know How persistent it is or how toxic. It has caused tumors in the kidneys of mice.

It makes no sense to use a chemical that is completely soluable in water as is glyphosate in a rainforest where 300 inches of rain can fall in a year. It is a joke to think this will not end up in our water supply and rain catch. The people of Maui will not be laughing if we get rid of the marijuana only to end up with a much more serious problem and one that affects all of us because it is in our drinking water.

How can a helicopter pilot even see an overgrown stream from his vantage point? How will we ever keep these sprays from our streams and homes?

Please reconsider this plan and study Kauai long and hard before you risk the rainforest of Maui, Molokai and Hawaii.

Thank you.

Sincerely,

Karma Dechen Dronkar

Karma Dechen Dronkar
P.O. Box 1551
Kihei, Maui, Hi. 96753

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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December 17, 1986

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EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
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WATER AND LAND DEVELOPMENT

Safe Solutions
c/o Ms. Karma Dronker
P.O. Box 1551
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your specific concerns in the order they are presented in your letter.

1. Field testing.

The special test of Weed Oil that is being arranged will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do the before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

We have no immediate plans to test glyphosate because we intend to use it only if Weed Oil becomes unavailable. Diesel oil will not be tested because it cannot be used at this time. If either of these two chemicals are planned for use, additional tests will be made before they are employed in a large-scale operation.

2. Kauai operation

Monitoring of the Kauai operation was confined to a visual inspection because the inaccessibility of the terrain precluded before and after soil sampling. Before and after photographs of the initial spraying operation on Kauai indicate very little drift occurred outside the target vegetation area. Regrowth of vegetation was apparent one month later.

3. Steep terrain and runoff.

The herbicides are applied directly to the plants. Only a small amont is needed and would not result in pools that would flow down a steep terrain. It can be expected that there

will be sufficient soil to absorb drip from the plant because marijuana will not grow well in thin soils. In dense and frequent rainfall areas, aerial applications will not be made.

4. DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. Fortunately, the green color of the marijuana plants, usually surrounded by a cleared bare area, is distinctive from the air. The pilot keeps the helicopter well above the forest canopy. Direct spraying is done only on marijuana plants. On Kauai, there was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas upon inspection one month later. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts, principally because the spraying mechanism utilized is designed to produce large droplets and a spray circle small in diameter. This minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

The panel that will prepare the sensitive areas map will include both qualified botanists and biologists. The Operations Plan will specify that they will be consulted if there are any questions about a specific area before a field operation takes place.

5. Effects on people.

We believe that there is very little likelihood of an individual being affected by aerial spraying because of the method that is being used. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants.

It is the purpose of an environmental impact statement to consider the "worst case scenarios". It is certainly possible that drift may occur. However, DLNR's experience on Kauai indicates that this method is very successful in directing the spray to just the marijuana plants. An individual would have to be right next to the plants, in which case he would be seen by the helicopter operator, and would also be aware of the helicopter's presence.

No spraying will be done within 100 feet of any water body.

6. Weed Oil is the preferred herbicide. Glyphosate, sold as Roundup or Rodeo, will be used for marijuana eradication only if Weed Oil is unavailable. It has not been used by DLNR in the marijuana eradication program on Kauai or any other place.

Roundup is a non-restricted herbicide, sold over the counter to the general public. It is used widely for weed control by both commercial agriculturalists and individual citizens. There has been considerable concern about the dispute between Monsanto, the manufacturers of Roundup, and EPA over earlier tests that resulted in retesting. Before including glyphosate as an herbicide to be considered for potential use in the DLNR marijuana eradication program, EPA was contacted to determine the status of the retesting program. Thomas Adamczyk of the Herbicide and Pesticide Branch of the Registration Division of EPA in Washington, D.C. stated that retesting had been completed, that nothing out of the ordinary had been discovered, and that no change in Roundup's registration status was planned. He also stated that final approval was expected in early 1987. This contrasts to other cases where retesting has been required and the testing has indicated discrepancies. In these cases, EPA has recalled the product. Mr. Adamczyk stated further that EPA has and continues to approve the use of glyphosate by the U.S. Drug Enforcement Agency for eradication of marijuana on non-federal lands, including Hawaii.

7. Location of streams.

As noted earlier, there will be no indiscriminate spraying. Spraying is done only on well-defined cleared areas where the marijuana plants are readily visible from the air. In low rainfall areas, the growers construct irrigations systems to carry the water to their plants. These, and the stream or spring sources, are also readily visible. In very high rainfall areas, where stream and springs are spontaneous and poorly defined, aerial spraying will not take place.

As noted in the EIS, there will be some unavoidable adverse impacts on non-target vegetation, just as there are using manual eradication methods. There will also be some unavoidable adverse impacts on small animals, although this is of a much smaller concern because of the types of chemicals proposed have low toxicity to animals. This must be weighed against the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Robert K. Landgraf
Administrator

Final EIS to me at this address

272 Humupaa Pl.
Kihei, HI 96753

'86 DEC 10 P2:01
FORESTRY & WILDLIFE
STATE OF HAWAII

TESTIMONY BEFORE THE DLNR
for C.D.U.A. ERADICATION OF MARIJUANA

I am Leslie Skillings, Jr. of Kihei and this evening I will be speaking for the Maui Group of the Sierra Club. P.O. Box 2000, Kahului, HI 96732.

The Maui Group recognizes the problem growers are causing in the State Forest and watershed areas of Maui and the other islands. We have no problem with the manual eradication of marijuana. Our concern is over the use of herbicides in the watershed both from the standpoint that the forest maybe damaged further and over long-term health effects which could result from these herbicides entering our water supply. The draft Environmental Impact Statement(DEIS) fails to adequately address these concerns.

Problems with the DEIS

One of the first problems encounter with the DEIS are the photographes. They are intended to be used to illustrate the text. They are worthless.

The DEIS makes many unsupported assertions which should either be documented or removed. For example it states that spraying is faster and more economical of both time and money than manual eradication which is labor intensive and time consuming. This should be demonstrated with possible long-term cost figured in. Clean up and disposal of mistakes should be factored in, also. The DEIS assumes no mistakes will be made or that they will not cost anything. The danger and injuries as a result of manual eradication should be documented.

Where are the EPA approved disposal sites called for in the DEIS. They should be listed by island. I don't think Maui has any sites approved for toxic waste disposal.

The DEIS asserts and assumes GLYPHOSATE is safe even with limited and questionable testing of the chemical in dissimilar environments. I beleive others here tonight will cover this in more detail. We should be certain what will become of these chemicals before they are used. Its too late after the fact to decide you made a mistake.(see Part VII Unresolved Issues)

The Operations Plan should be available. Members of the public, medical and environmental groups should be represented on the group which may draw up this plan.

The topic of ENFORCEMENT is totally missing in the DEIS. If a

problem were to be detected would the public be notified immediately or would it be like heptachor eight months or more before the public is told?

Monitoring is discussed several times in the DEIS, but no monitoring of near shore waters, surface waters or drinking water is planned. It is difficult to fine what you are not looking for.

The spraying will adversely affect native forest. The DEIS assumes this will be limited and the plants will recover. Again, there is no documentation to support this claim. This also runs counter to the second objective of the proposed plan: That of protecting and preserve the character of the resource.

"sensitive areas" is used but not defined. It should be.

No documentation is available to support the "no-drip nozzle" or the "large uniform droplet size" called for by the DEIS. DLNR is studying the presistence of Weed Oil in soil. Is the DLNR also studying the no-drip nozzle?

The DEIS assumes growers will NOT resume growing on a sprayed plot.(V-7) Which means the impact on the forest will be spread to new sites with the introduction of more alien plants. This problem most be address in either manual or spray eradication. Better estimates need to be made on the frequence of repeat spraying.

The health effects for someone consuming products sprayed by these chemicals is totally inadequate. This most be clarified. Does Monsanto know glyphosate is being proposed for use in a watershed area? Would they recommend this use given the possible litigation which could result?

On the face of it the Maui Group of the Sierra Club ask that the C.D.U.A. be denied. We plan to join with others to ask for a contested case.

Thank You

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. NAMASU
DEPUTY TO THE CHAIRMAN

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STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Sierra Club, Maui Group
c/o Leslie Skillings, Jr.
272 Humupea Place
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your specific concerns in the order they are presented in your letter.

1. Photographs

We agree that the quality of photographic reproduction was unsatisfactory. They were made from black and white negatives made from 35 mm color slides. Even in the color slides, it is difficult to see certain things such as the hose below the helicopter. The photographs of the spray nozzle showing the size and diameter of the discharge are much more clear. We will try a different process in printing the Final Environmental Impact Statement.

2. Cost comparisons.

It is very difficult to do a cost-benefit analysis of chemical eradication vs. manual eradication because of the great number of variables involved, and injuries to law enforcement officers cannot be measured simply by medical bills and days lost to work. The most appropriate measure of cost-benefits is by comparison.

Mr. Joseph Cravalho, Chief of Police for Maui County, testified at the public hearing on the CDUA on Maui on November 18, 1986, that

> Currently, our manual eradication method has proven to be time-consuming, expensive, dangerous to personnel, and an ineffective method of addressing the problem of marijuana cultivation.
>
> . . . Manual operations involve a minimum of ten officers, a dump truck and driver, and two four-wheel drive vehicles. A larger operation requires twice the number of police officers and equipment, including helicopter, helicopter pilot, support and maintenance and crew men from the Hawaii National Guard. The necessity for the number of men and equipment are to chop or pull the marijuana plants, haul the plants away from the remote area, and finally, dispose of the plants by burning at the local dumps.
>
> On the other hand, the Department of Land and Natural Resource's proposed method of eradication requires three officers and a four-wheel drive vehicle for a mini operation. The arduous task of cutting or pulling the marijuana, hauling and disposal of same, have been eliminated. The spraying technique kills the marijuana within a few hours and prohibits the grower from using or selling the product.

Chief Cravalho also described the numerous complaints that the Maui Police Department has received from hunters, hikers, and nature lovers who are confronted and threatened by suspected marijuana growers in state forests open to the public. Police officers of the other counties have also reported injuries sustained during Green Harvest operations and similar confrontations with growers.

The draft Environmental Impact Statement does not assume that no mistakes will be made and that they will not cost anything. Accidents can always take place and the document presents some "worst-case scenarios" including accidental spills and a helicopter crash.

3. EPA-approved disposal sites.

We cannot locate a reference to EPA-approved disposal sites in the DEIS. Toxic waste disposal is not an issue in this project.

4. Glyphosate

Glyphosate is a relatively new chemical. However, it is approved by the EPA for general use, meaning anyone can purchase and apply it without any training. It is used widely for weed control by both commercial agriculturalists and individual citizens. It should be noted that no glyphosate was used in marijuana eradication on Kauai. Weed Oil is the preferred herbicide. DLNR intends to use glyphosate only if Weed Oil is unavailable for purchase, and then only after additional testing in Hawaii.

5. Operations Plan and monitoring.

As noted in the DEIS, the Operations Plan will not be made public because of the danger that marijuana growers will use the maps delineating sensitive areas to direct their operations to those areas.

The panel that will prepare the sensitive areas map for Maui will include both qualified botanists and biologists and a representative of the Maui Department of Water Supply. The Operations Plan will specify that special consultation must take place with the appropriate experts if there are any questions about a specific area before a field operation takes place.

The planned field tests on Weed Oil to monitor the persistence and movement of residual Weed Oil in soils, in both a dry and a wet forest area, should provide valuable information on any potential threat to ground and surface water areas. There will also be follow-up observations made on each field operation, as there were on Kauai. If any problems are discovered that will affect people, appropriate public notifications will be made.

6. Damage to native forest.

As noted in the EIS, there will be some unavoidable adverse impacts on non-target vegetation, just as there are using manual eradication methods. This must be weighed against the damage caused to native ecosystems by the growers. According to Mr. Alan Holt of The Nature Conservancy, testifying in support of the chemical eradication program at the public hearing on Maui, the damage to native forests created by marijuana growers is extensive. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

7. Sensitive areas.

As noted in Item 5 above, sensitive areas are deliberately not defined to avoid geographical specificity. They would generally include valuable ecosystems, habitats, and cultural resources.

8. No-drip nozzle.

The mechanism especially designed by DLNR to ensure minimum drift is described in the DEIS. It includes a shut-off mechanism to prevent accidental dripping of spray on non-target vegetation.

9. Repeat spraying.

The DEIS states that marijuana growers may replant their crops in the same area, but that it would be unlikely because the area would be known to enforcement officers. It is certainly possible that a grower would repeatedly replant the same area. However, the more likely outcome would be that this would lead to his apprehension and arrest, rather than repeated spraying of the same area.

10. Health effects.

The data cited in the DEIS were taken from the federal environmental impact statements on marijuana eradication. The conclusions were summarized and the studies and supporting data incorporated by reference. Copies of the federal EIS's are available if you would like to review the studies in detail.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

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'86 DEC 10
FORE... WILD... HAW...

December 8, 1986

Division of Forestry and Wildlife
Department of Land and Natural Resources
P.O. 621
Honolulu, HI 96804

Sir:

The Conservation Committee of the Sierra Club, Hawaii Chapter, Moku Loa Group, has reviewed the Draft Environmental Impact Statement for the proposed project entitled Erradication of Marijuana on State-owned and Managed Conservation District Lands, Islands of Hawaii, Maui, and Molokai.

The Sierra Club joins the State of Hawaii in opposing the cultivation of marijuana. The club further encourages police action to curtail its cultivation. In forested lands, marijuana cultivation poses a threat to the native bird, plant and animal habitat for a number of reasons. Native vegetation is removed or damaged to make way for cultivation. The clearing of ground for cultivation opens these areas up to invasion by exotic weed species introduced inadvertantly by the grower. The aggressive introduced weeds are likely to spread and inhibit revegetation by native species following harvest. Standing water used for irrigation provides a breeding ground for mosquitoes which harbor avian bird malaria, endangering susceptible native bird populations. The recreational safety of hikers, bird lovers, scientists and others are also affected.

In studying the Draft EIS we find a number of continuing concerns reletive to the use of chemical weed control agents. These include 1) water contamination of runoff areas, 2) sensitivity of native species to drift of glyphosate and weed oil, 3) residual effects on native species including birds and eggs in the vicinity.

We find in particular that the Draft EIS does not adequately address concerns about aerial spraying of these chemical herbicides.

Section III: Climate and Weather The section does not fully describe the specific meterological conditions that exist for the conservation lands in question. These include

1) average wind velocity
2) number of hours/ days per year the average wind is lessthan 8 mph

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3) average temperature and reletive humidity
4) average number of hours/ days per year that rain, imminent rain or fog would not be a limiting factor
5) frequency of thermal inversions or unstable air that would limit spray operations.

We suspect that the limits of ambient conditions alone would curtail the number of hours or days that aerial spraying could be applied as described in the draft EIS.

Table V-3 Weather Conditions This section does not describe the methods to be used to monitor ambient weather conditions, instruments of measurement,or location of personnel during the monitoring procedures.

We have concerns that the "prop wash" effect cannot be adequately mitigated under any conditions, and that the spray delivery specifications allowing 50 feet for the system to achieve driplese shutoff is too hazardous to nontarget organisms.

The guidelines outlined for the intermittent ground application of the nonpersistant chemicals, Chevron weed oil and glyphosate, appear to be adequate to safeguard against harm to plants and wildlife. The Sierra Club urges that the training of operators be rigorous to insure that the guidelines are met. Wind conditions, nozzle calibration and turbulance must be carefully ascertained by trained personnel prior to spraying. The operations should be closely monitored to assure that spray drift is minimized to avoid damage to non-target plants, birds and other organisms.

The Sierra Club, Moku Loa Group, recommends continued police surveillance, apprehension of marijuana growers, and manual erradication and disposal. Intermittant ground application of chemicals may be appropriate in certain cases, but we do not find that there are satisfactory mitigative approaches to aerial spraying to make this alternative acceptable.

The Sierra Club, Moku Loa Group, appreciates the concern of the State of Hawaii about marijuana cultivation in State owned and managed conservation district lands and thanks the Department for the opportunity to comment on the proposed project.

Sincerely,

Deborah Ward

Deborah Ward, Co- Chair
Conservation Committee
Moku Loa Group,

P.O. BOX 1137, HILO, HAWAII 96721 Chapter

JOHN WAIHEE
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
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DEPUTY TO THE CHAIRMAN

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 17, 1986

Ms. Deborah Ward, Co-Chairman
Conservation Committee
Moku Loa Group, Sierra Club
P. O. Box 1137
Hilo, HI 96721

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your specific concerns in the order they are presented in your letter.

1. Water contamination of runoff areas.

Prevention of water contamination is addressed in three ways. The first is by avoidance of spraying near any water body with a buffer of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Hawaii County Department of Water Supply will be asked to assist us in making certain all water areas, including water catchment basins, are identified.

The second is utilizing only non-persistent chemicals known to break down readily.

Finally, a special test of Weed Oil is being arranged in two different forest environments, a dry area and a wet area. Soil samples will be taken before spraying, immediately after, and again in two weeks, to determine the residual amounts of Weed Oil in the soils. A control area will also be sampled. A botanist will also do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

2. and 3. Effects on native species from drift.

The effects of spraying on native plants are well known, since herbicides are intended to destroy plants. What is important is to ensure avoidance of non-target vegetation, and to keep the herbicides away from animals and humans to the extent possible.

DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. The helicopter stays well above the forest canopy. Before and

after observations of the initial spraying operation on Kauai show minimal adverse environmental impacts. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

On Kauai, direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

As noted in the EIS, there will be some unavoidable adverse impacts on non-target vegetation, just as there are using manual eradication methods. There will also be some unavoidable adverse impacts on small animals, although this is of a much smaller concern because of the types of chemicals proposed have low toxicity to animals. This must be weighed against the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

4. Weather conditions

We do not agree that a detailed description of climate and weather on each island is necessary or would improve the EIS because the data are not available on a site-specific basis. Most important is the weather on the day and at the place an eradication operation is planned.

The Operation Plan for Kauai contains the following requirement:

> To minimize drift and volatilization, do not use aerial spraying when any of the following conditions exists on the spray areas:
>
> Wind velocity exceeds 8 miles per hour.
> Raining or rain imminent.
> Foggy weather.
> Low relative humidity, and temperature exceeds 95 degrees Fahrenheit (applies to water-based sprays only).
> Air turbulence (thermal updrafts, etc.) is so great as to seriously affect the normal spray pattern.
> Temperature inversions are present which could lead to offsite movement of the spray.

Similar provisions will be included in the Operation Plans for Hawaii, Maui and Molokai. Weather conditions will be checked with the National Weather Service on the day an aerial operation is planned. If they are unfavorable, the operation will be cancelled and other eradication measures used or postponed until conditions are suitable.

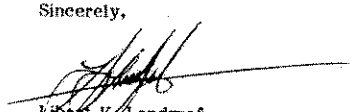
5. Helicopter prop wash and spray delivery specifications.

As noted above, the experience on Kauai indicated no problems from the helicopter prop wash, probably because of the small size of the helicopter that is used and the height at which it is flown. We recognize that helicopter prop wash could be a problem in other areas. Sensitive areas will be delineated in the Operations Plan, and the use of helicopters for either aerial spraying or manual operations will be avoided as much as possible in areas where this could be a problem.

The spray delivery specifications mentioned in the DEIS are met or exceeded by the device being utilized by DLNR.

We appreciate your interest in this project and hope that this response adequately addresses your concerns.

Sincerely,



Robert K. Landgraf
Administrator

November 22, 1986

Aloha,

I know that if we really get silent and look deep inside that in our hearts we would not spray 76,000 acres of Maui's rainforest with poisons, disbursing into the ethers and precious Earth Ecological disaster of all living form.....

We should highly consider the alternatives of manual and mechanical means of eradicating marijuana, it gets the job done and keeps Nature ALIVE.....

Lehua Altemus
Olinda

RECEIVED
'86 DEC -9 A11:59
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STATE OF HAWAII

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Lehua Altemus
P. O. Box 1284
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Hawaii.

Thank you for your comments.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air.

Only Weed Oil is planned for use at the present time. Glyphosate will be used only if Weed Oil becomes unavailable for purchase.

Given the methods that will be used in spraying, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft Environmental Impact Statement, there will be some unavoidable adverse impacts on non-target vegetation, insects, and possibly on birds and small animals, just as there are using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the marijuana growers.

Our agency is responsible for the protection of Conservation District lands. We have no intention of destroying our natural resources. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that any possible adverse effects are kept to a minimum.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED

'86 DEC -9 P1:09

FORES... STAT...

PO Box 1596
Kihei, HI 96753
December 3, 1986

Libert Landgraf
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl St.
Honolulu, HI 96813

Dear Mr. Landgraf:

This letter is in regard to the Eradication of Marijuana on State-owned and managed conservation district lands, Islands of Hawaii, Maui and Molokai: Draft Environmental Impact Statement, November 1986. My comments will be focus on issues raised within this document, and in general will follow the page sequence of the D.E.I.S. As a concerned citizen, I urge you to opt for Alternative 1 as described on page I-21.

I agree with the statement on page vii, "Marijuana growing is harmful to sensitive environmental areas." The conservation of forestry areas requires that all environmentally detrimental activities be prohibited. To ascertain the best method to eradicate marijuana cultivation on conservation areas, the highest consideration should be given to the most ecologically sound methods.

On page viii, a general assumption is presented: "Because the Green Harvest operations are expensive, dangerous, and require considerable personnel, law enforcement officials have sought alternative methods of eradication." This might be a true statement, but in the context of the D.E.I.S. it is an unsupported statement. How expensive? How dangerous? How many injuries? How many personnel? What is the total cost of this manual operation, as compared with the potential cost of the chemical operations? Without a cost/benefit analysis, it cannot be assumed that other methods of eradication will be cheaper. Bear in mind, the D.E.I.S. proposes to have trained personnel to scientifically evaluate weather conditions, to recognize environmentally sensitive areas, including native habitat areas, to provide water and fire fighting equipment in remote areas, and to safely operate the herbicide application equipment. How much will such training and hiring of special personnel cost?

On pages viii-ix, the objective of the program is described as "to make these areas safe for public recreation and other uses, and to protect native plant and animal habitats from further destruction by people engaged in the cultivation of marijuana." Inotherwords, there is an implicit assumption that the users of conservation areas will not be affected by the spraying of herbicides, and that native species will in some way benefit from herbicide use. However, any hiker who breathes drift from the spray program, and any native species that is accidentally destroyed as a result of the herbicides, will certainly not be better served by chemical rather than manual eradication. There is an element of grave risk being introduced to those who are supposed to be served by this program, without any assurance that such a chemical program will reduce the likelihood of marijuana cultivation and its consequent adverse impact.

On page I-13, the D.E.I.S. states "Offsite drift can be a problem when winds exceed 8 mph, when the humidity is low, or when the temperature is high enough to reduce the size of the droplets. Applying the herbicide when it is raining or when rain is imminent could contribute to runoff or dilution of herbicide and leaching through the soil." Perhaps you can confirm this for me: Won't the blades of the helicopter create winds exceeding 8 mph?

Also, I think when the question of drift, which is a critical problem, is studied in greater detail, we would all have a firmer idea of the potential environmental impact. Since such herbicides are already being used on Kauai, and, I hear, are also used by E.M.I. on Maui (in areas very similiar to state-controlled areas), the Department of Land and Natural Resources should study what the drift impact actually is, and how often there are mistakes made on the part of the herbicide applicators. We need to have more specific data, i.e., how much runoff, how much leaching, in the event of unexpected rain. I am interested in seeing the results of the test described on page V-2.

I cannot see in the photos what is described in the caption on page I-17. Perhaps these photos can be reproduced in more clarity in your final E.I.S.

On I-19, a revealing statement is made: "The environmental fate and potential ecological effects of the use of glyphosate have yet to be studied extensively." Mr. Landgraf, since it is your charge, as head of the Division of Forestry, to to perserve the forests, wouldn't you agree it is somewhat imprudent to proceed to use a chemical whose effects on forests and wildlife are not at all understood? On page V-10, the D.E.I.S. fails to mention that the

long-term effects of gyphosate and the compound it degrades into are not known and need to be studied further. The long-term effects of oil sprays are also not known. When faced with a choice, with one path having the potential to be devastating in the longrun, isn't it wisest, from the point of view of conservation, to err on the side of least potential adverse effects?

Regarding Weed Oil, the D.E.I.S. on page I-20, recognizes that the chemical should be kept out of all lakes, streams or ponds. However, in testimony presented by Rob Rydell of the Nature Conservancy on Maui to the Sierra Club, every area that was found to have marijuana growing on it was adjacent to a stream bed. The marijuana growers, apparently, prefer to grow along streams, in case rainfall is scarce. This contradicts the assumption made on page V-14 of the D.E.I.S. regarding "the unlikely occurrence of marijuana plants closer enough to water to enable a direct application to a water body." This information about the habits of marijuana cultivators casts a shadow on the assumption that weed oil can be sucessfully kept out of the stream beds.

On the Dec. 2nd science program, *Nova*, mention was made of recent studies on the effects of aromatic hydrocarbons on fish. These laboratory studies show that aromatic hydrocarbons are converted into another extremely carcinogenic compound by the fish, leading to liver tumors. Since weed oil contains aromatic hydrocarbons, and may be accidentally introduced into streams, the potential introduction of disease into fish populations might lead to some of the native species becoming endangered, or in the case of the Lentipes concolor, already an endangered species, destroy them entirely.

Also on page I-20, "breathing the vapors at concentrations above the exposure standard can cause central nervous system depression." I submit to you that such a increase in breathing of vapors creates a potential that the helicopter operator will be impaired in his or her job performance, and such impairment could have tragic results, i.e., a helicopter crash. I believe such a risk of higher than allowed breathing of vapors be assessed in the final impact statement.

Weed oil vapors can also "burn with explosive violence." Such a risk is, in my mind, quite unexceptable, given the large number of endangered species that live in conservation areas. Also, the forest itself is an invaluable resource that needs our utmost protection and conservation. How do you propose to get fire fighting equipment in such areas? Will each helicopter be supplied with adequate supplies of water for dousing fires?

In consideration of Chemical Eradication combined with Manual, on page II-2, another unsubstantiated assumption is made: "The number of personnel and consequently the risks to health and safety will be reduced considerably by the use of chemicals on marijuana plants." While simply reducing the number of personnel may be some assurance of greater safety, it has not been clearly established that manual methods as currently used are dangerous. Clearly, law enforcement personnel believe manual eradication is dangerous, but again, I must ask for the statistics to support such a belief. We know that law enforcement always entails risk, and yet we don't believe, to use an analogy, that because a shoplifter may be armed or boobytrapped that police are justified in bombarding the shoplifter with tear gas.

Page V-22 mentions the danger to police and hikers posed by booby traps and other weapons. Yet there is no comparison drawn between the dangers posed by such hazards, and the potential for health effects from the inhalation of chemicals known to depress the central nervous system. While the incidence of accidents due to booby traps may decrease, I am not convinced that the growers who are militant enough to take up arms would necessarily retreat in the face of a chemical assault. In fact, such a tactic on the part of law enforcement officers may lead to more terroristic tactics as retaliation, rather than less.

Under the heading Legalizing the Use of Marijuana, also page II-2, it is stated "If the State of Hawaii should legalize marijuana usage, it is unlikely that the Legislature would authorize it for sale on state Conservation district lands." I believe it could at least be acknowledged at this point, that if marijuana use were decriminalized, in a manner similiar to the statutes in the State of Alaska, that the ability of growers to conduct their activities on private lands might significantly reduce the marijuana growing activity in the more remote conservation lands.

On page II-4, it is asserted that "The herbicide (sic) selected for use are considered to be the least toxic and persistant of those available." This is simply a comparison, not an assessment. How toxic, and how persistant, are the questions and concerns that need to be addressed. Given the general lack of scientific studies on these chemicals, such questions cannot be adequately answered at this time.

On page III-12, the D.E.I.S. notes "Since the Waiakamoi Watershed has been noted as a major site of marijuana growing, special care should be given to

this area." I suggest that the special care given to that watershed area be that all chemicals be banned in that locale.

On page IV-2, the State Conservation Lands Function Plan proclaims first of all, the policy goal "Exercise an overall conservation ethic in the use of Hawaii's resources by protecting, preserving, and conserving the critical and significant natural resources of the State of Hawaii and controlling use of hazardous areas." I would suggest to you that the conservation ethic means that one is inclined to err on the conservative side, that is, to make those decisions that are most likely to conserve the natural resources. I am particularly concerned about the native species and pristine areas that may be contaminated by chemical use. The eradication of marijuana, either through chemical or manual means does not repair the damage done, but simply curtails the damaging activity. In that respect, chemicals do not do a better job than the manual method, that is they don't restore native species. In fact, herbicidal chemicals could potentially lead to the eradication of endangered species that the Department of Land and Natural Resources is supposed to be protecting. On page V-9, "With manual eradication impacts to offsite vegetation would be minimized." Isn't that clearly the path that conforms most with the "conservation ethic" it is your charge to follow?

I don't believe the D.E.I.S. microbiology analysis is adequate. The lay article quoted on page V-5, states "The bugs convert the hydrocarbons into harmless carbon dioxide and water." That is fine, but do Maui, Molokai, and Big Island soils contain these micro-organisms in sufficient numbers to de-activate the hydrocarbons? The data about bottom sediments, on page V-13, must be re-tested as well. No assumptions can be drawn regarding the degradation of hydrocarbons until there have been thorough soil and bacteriological testing in sample conservation areas on each island.

I believe that the worst case scenerio described on page V-6 is an unacceptable risk. Also, the description of the ability to clean up spills is inadaquate. "Large spills should be absorbed with aborbant clay, diatomaceious earth, or other suitable material" does not address how much of these substances are necessary, and does not make clear whether said substances will be required to be on each helicopter. Glyphosate should be "picked up by suction or vacuum truck" does not indicate whether each helicopter will be equipped with special suction equipment. Such extra equipment on each helicopter will add to the cost of a chemical program.

On page V-11, step #3 implies that "reasonable likelihood" can be agreed upon by all concerned. However, I believe it is reasonable to assume that sooner or later there will be a helicopter crash or an accidental spill. Since reasonable people don't always agree on what is reasonable probability, I submit that the term is too vague to be used as any assurance that there will be "no case . . .of an endangered or threatened species being adversely affected."

On the same page, recovery of worst-case scenerio accident areas is discussed. Although it is likely the area will re-vegetate, unless there is a conscious effort to replant native species in areas where natives predominate, the recovery will be only partial. The risk of permanent damage to an endangered species from a worst case scenerio is a serious one, and should not be treated as an acceptable risk. I also question where the supporting data is for the assessment on page V-14 that effects on aquatic life will be reversible. I also believe the impact on surrounding human populations of the worst case scenario needs study.

I don't know where you get the proposition on page V-17 that herbicides are less toxic to humans and other animals. I submit that the long-term effects are not really known for the majority of chemicals in use.

There are no references given on page V-18 for the glyphosate health studies.

The unresolved issues are not adequately addressed by the statement about monitering programs for further evaluation (page VII-1). Since Kauai has already been a site for such a spray program, I do not see why it is deemed necessary to include Hawaii, Maui, and Molokai in this experiment. How many ecosystems are needed to serve as a living laboratory for this monitering program?

Thank you for your time. I hope my arguments convince you to reject the concept of chemical eradication in conservation areas.

Sincerely,

Kelly Arbor

Kelly Arbor

cc: Gov. John Waihee, Mayor Hannibal Tavares,
Letitia Uychara, Jacqueline Parnell, Anthony Rankin

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Kelly Arbor
P.O. Box 1596
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Hawaii.

Thank you for reviewing the draft Environmental Impact Statement. We are responding to your specific concerns in the order they are presented in your letter.

1. Costs and benefits of chemical eradication.

It is very difficult to do a cost-benefit analysis of chemical eradication vs. manual eradication because of the great number of variables involved, and injuries to law enforcement officers cannot be measured simply by medical bills and days lost to work. The most appropriate measure of cost-benefits is by comparison.

Mr. Joseph Cravalho, Chief of Police for Maui County, testified at the public hearing on the CDUA on Maui on November 18, 1986, that

> Currently, our manual eradication method has proven to be time-consuming, expensive, dangerous to personnel, and an ineffective method of addressing the problem of marijuana cultivation.
>
> . . . Manual operations involve a minimum of ten officers, a dump truck and driver, and two four-wheel drive vehicles. A larger operation requires twice the number of police officers and equipment, including helicopter, helicopter pilot, support and maintenance and crew men from the Hawaii National Guard. The necessity for the number of men and equipment are to chop or pull the marijuana plants, haul the plants away from the remote area, and finally, dispose of the plants by burning at the local dumps.
>
> On the other hand, the Department of Land and Natural Resource's proposed method of eradication requires three officers and a four-wheel drive vehicle for a mini operation. The arduous task of cutting or pulling the marijuana, hauling and disposal of same, have been eliminated. The spraying technique kills the marijuana within a few hours and prohibits the grower from using or selling the product.

Other law enforcement officers concur with Chief Cravalho on the dangers and high costs of Green Harvest operations. Some of these costs and risks will continue to be borne, as the draft EIS points out, because chemical spraying is not appropriate for many areas. However, utilizing this method in addition to manual eradication methods will reduce overall costs and risks of injury.

No additional personnel are expected to be hired by DLNR for the proposed chemical eradication program. Training has already been completed.

2. Risks to people and native species.

At the Maui public hearing, Chief Cravalho also described the numerous complaints that the Maui Police Department has received from hunters, hikers, and nature lovers who are confronted and threatened by suspected marijuana growers in state forests open to the public.

This was confirmed by testimony from Mr. Alan Holt of The Nature Conservancy who also expressed his concerns about the damage being done to native forests by the growers.

At the Hilo hearing, Hawaii County Deputy Police Chief Wayne Carvalho stated that

> There have been several incidents where booby traps were set out for unsuspecting individuals, and also we have found in our marijuana missions fish hooks hung at eye level on near-invisible line designed to injure or even blind someone who walks in a forested area.

As noted in the DEIS, there will be some unavoidable adverse impacts on non-target vegetation, just as there are using manual eradication methods. There will also be some unavoidable adverse impacts on small animals. Given the methods that will be used to spray, the risk of an occurrence of exposure and injury to a hiker from breathing Weed Oil vapors would be very low. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

3. Herbicide drift.

The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

On Kauai, there was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was observed upon inspection one month later.

Monitoring of the Kauai operation was confined to a visual inspection because the inaccessibility of the terrain precluded before and after soil sampling. The special test of Weed Oil that is being arranged will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to

document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

Although it is not directly relevant to this EIS, because of your interest in the subject of pesticide drift we would like to draw your attention to an interesting and informative document on pesticide drift prepared recently by OEQC as part of its ongoing responsibilities to develop recommended improvements to pesticide management programs. You may wish to obtain a copy for your information and use.

4. Glyphosate

Glyphosate is a relatively new chemical. However, it is approved by the EPA for general use, meaning anyone can purchase and apply it without any training. It should be noted that no glyphosate was used in marijuana eradication on Kauai. Weed Oil is the preferred herbicide and DLNR intends to use glyphosate only if Weed Oil is unavailable for purchase.

5. Contamination of lakes, streams, and ponds.

As noted earlier, there will be no indiscriminate spraying. Spraying is done only on well-defined cleared areas where the marijuana plants are readily visible from the air. Where plants are grown adjacent to a stream or in very high rainfall areas, where stream and springs are spontaneous and poorly defined, aerial spraying will not take place.

6. Breathing of vapors.

The danger of inhaling vapors from Weed Oil comes when it is being handled, as in filling tanks. These fumes are similar to those present at a service station when vehicle tanks are being filled. The fumes dissipate very quickly when exposed to air and are only dangerous when a person is in close proximity to the source. The helicopter pilot would be in danger of impairment only if there is poor ventilation in the aircraft.

7. Fire hazards.

The hazards of an explosion and fire associated with Weed Oil are also associated principally with filling of tanks, again similar to those that exist at a service station. It is important to avoid smoking and the generation of sparks in such an area.

Loading will be done in cleared areas to avoid any possibility of a forest fire. A fire hazard would also be presented in the case of an accidental spill or crash, although the amount of hazard would be small relative to the crash of a commercial airliner or larger helicopter which carry large quantities of fuel.

8. Dangers to law enforcement personnel and hikers.

This is addressed in Items 2. and 6. above. As noted in the DEIS, it is very difficult to predict how marijuana growers will respond to increased eradication efforts. Any assessment of risks associated with their possible future behavior would be purely speculative.

9. Legalization of marijuana.

We agree that it is probable that legalization of marijuana would probably reduce the pressure to grow it on public lands.

10. Herbicide toxicity.

Considerable data exists on the toxicity of glyphosate. This is contained in the federal environmental impact statements on marijuana eradication and was summarized and incorporated by reference in the DEIS.

Weed Oil is unique in that it has a long history of use but has not been the subject of scientific studies. It has fallen into disuse by farmers mainly because more toxic herbicides have been made available. No spraying will be done on Maui until the field tests described in the draft EIS are completed.

11. Waiakamoi watershed.

The Waikamoi watershed area will be reviewed in the development of the Operation Plan for Maui, and a determination of where spraying should or should not take place will be made at that time.

12. Conservation policies.

As noted earlier, the risks to the environment from spraying must be traded off against the risks to the environment from not using available methods to eradicate marijuana plots. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

13. Microbiological data.

We disagree with your assessment on the adequacy of the discussion on microbiology. As noted in the DEIS, there will be no indiscriminate spraying, only spraying of marijuana plants. The literature indicates that the presence of sufficient soil microbes to breakdown petrochemicals is a function of the pH level of the soil, not its geographical location. If the pH level is too high or too low to support microbe colonies, it will also be too high or too low for marijuana growing. The special tests being made on Weed Oil in Hawaiian soils will include an analysis of the breakdown of Weed Oil in soils.

14. Worst case scenario on recovery.

There is no intention of carrying equipment on the helicopter to handle spills. The craft would need to be too large, creating other environmental problems. If a spill should occur, special equipment will be flown in to handle it. The scenario involving a helicopter crash would also apply to Green Harvest operations, where, in fact, crashes have occurred. We don't think the contents of a 55 gallon drum of Weed Oil, even if completely full at the time of an accident, would be more significant than the crash of the larger aircraft used in Green Harvest operations which carry both more men and fuel.

15. Glyphosate health studies.

The reference for all the glyphosate studies on p. V-18 of the draft EIS is the federal Drug Enforcement Administration's EIS, as indicated.

16. Monitoring.

No spraying will be done on Hawaii, Maui, or Molokai until the planned field tests are completed and the data evaluated.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED
'86 DEC 10 P2:02
FOR. & WILDLIFE
STATE OF HAWAII

Division of Forestry & Wildlife
Department of Land and Natural Resources
Attention: Libert K. Landgraf, Administrator
P.O. Box 621
Honolulu, Hi. 96809

Aloha:

Why do you want to kill the rainforests by spraying poisons when Hawaii's forests are the source of almost all the state's water? This water is used for drinking, for bathing, for recreation, so the productivity of the forest lands for water and the protection value of forest cover on these watersheds are of basic importance.

All I just said is backed up by a booklet about a program for the state forests of Hawaii called "The Banana Poka Caper." Here is a quote from the Honorable George R. Ariyoshi, in the book: "There is no means of measuring the value of the forests in Hawaii, for they represent not only an integral part of our habitat, but also a part of the legacy we recieved from the old Polynesians and from our own fore fathers."

He also goes on to say that the Federal Professionals should effectively insure the availability of our forests for our children and all who follow. I am against spraying glyphosate or chemicals or diesel oil or weed oil into the forests. Why wouldn't these chemicals seep into the ground? There is no reason why they won't because it has already happened before. Why spray deadly chemicals with unknown effects without testing them first?

Sincerely,
Doobie Basztura

Doobie Basztura
P.O. Box 1551
Kihei, Maui, Hi. 96753

CC: Jacqueline Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Doobie Basztura
P. O. Box 1551
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We share your concern for the protection of Maui's environment.

The Department of Land and Natural Resources has no intention of killing the rain forest. This Division is responsible for forest management and protection. In fact, the booklet that you quote, "The Banana Poka Caper," was written by us.

The purpose of the proposed project is to fulfill our responsibility and protect the forested areas from the destruction caused by marijuana growers.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air. To provide additional assurance of its safety in a forest environment, a special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

Given the methods that will be used in spraying, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft Environmental Impact Statement, there will be some unavoidable adverse impacts on non-target vegetation, insects, and possibly on birds and small animals, just as there are using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the marijuana growers.

The Operation Plan guidelines are intended to ensure that any possible adverse effects are kept to a minimum.

Sincerely,

Libert K. Landgraf
Administrator

Division of Forestry and Wildlife

FORESTRY & WILDLIFE
STATE OF HAWAII
'86 DEC -9 P1:09

FORESTRY & WILDLIFE
STATE OF HAWAII

Dear Mr. Landgraf,

Our beautiful Island of Maui is almost too polluted to live on now, and we are asked, "How do we feel about more chemicals to be used in the Marijuana eradication program."

The Federal and state government are shaking hands on this issue, and for this I am disappointed in the State government, because I don't feel it is serving the people and protecting the state ecology.

My main concern here is for the water. How many of us drink bottled water or use filters in our homes?

The suggested herbicides would all effect the water.

Roundup, Glyphosate is water soluable. It has not been tested efficiently by the EPA labs. It is presents could persist in the environment for 2 years, say some studies.

The label on weed oil says that it should not be used near streams or aquatic life. And Diesel oil has not been sufficiently been tested for its effects on ecology and as an herbicide. In fact Diesel oil is not even licensed as an herbicide by the EPA.

I feel the water monitoring system suggested in the DEIS could not possibly be effective here on Maui.

Also the public would not have access to the map of areas marked for spraying according to the DEIS. Maps should be made available for people using water catchment systems.

There is one alternative that would not effect the water or air quality, and that is Manual and Mechanical Eradication of Marijuana

The DEIS states that it is more offensive and difficult. I would rather see the offense of the operation go towards manual and mechanical Eradication than towards buying chemicals.

I think the people of the Hawaiian Islands deserve the safest possible solution.

Sincerely,
Ronnie Bressler

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Ronnie Bressler
P. O. Box 1354
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We share your concern for the protection of Maui's water supplies.

Prevention of water contamination is addressed in three ways. The first is by avoidance of spraying near any water body with a buffer of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Maui County Department of Water Supply will be asked to assist us in making certain all water areas, including water catchment basins, are identified.

The second is utilizing only non-persistent chemicals known to break down readily. We would like to note here that we plan to use only Weed Oil at this time. Glyphosate will be used only if Weed Oil is unavailable for purchase. Diesel oil cannot be used without EPA approval.

Finally, a special test of Weed Oil is being arranged in two different forest environments, a dry area and a wet area. Soil samples will be taken before spraying, immediately after, and again in two weeks, to determine the residual amounts of Weed Oil in the soils. A control area will also be sampled. A botanist will also do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

We believe that the guidelines that will be contained in the Operation Plan will provide adequate protection of water resources. If we find any evidence that the protection systems are not working, the operation will cease.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC -8 P1:34

FORESTRY & WILDLIFE
STATE OF HAWAII

Dec 1, 1986

Aloha –

After reading of the planned proposal to spray herbicides and diesel oil to help eradicate marijuana growing on our state lands I attended the public hearing and found it very informative and have felt that I would like you to know my humble opinion on the matter. I support the eradication ~~proposal~~ program by manual means and agree that the use of state lands for private profiteering is not in our best interests especially because of the disruption of the ecology and the fear it causes in casual nature hikers of stumbling into someone's patch.

I do <u>not</u> support any program which puts herbicides into the environment. If they are to be sprayed by helicopter, it seems obvious to me with the downdraft ~~and~~ and winds and frequent rains that a large part of these chemicals will kill surrounding vegetation leaving an area where undesireable "exotic" rather than native ~~plants~~ plants will take over which will degrade the quality of the forest. also the chemicals will undoubtably enter streams and water supplies and private cisterns because of the wind drift and frequent rains. The ~~poisoned~~ poisoned marijuana will no doubt be harvested and sold (probably to children rather than off-island connoisseurs who might better detect the herbicide) with the obvious repercussions to their health.

If the poisons are to sprayed by backpack units from land then wouldn't it be easy enough to just chop them down and burn them on the site or possibly spray them with a foul smelling substance to make it unusable?

I have little faith that helicopter pilots who are paid by the gallon sprayed are going to be discreet in how they apply the poisons so these distances from water supplies and residences are ludicrous when it comes to practice.

I hope you will not let such short-sighted "economics" add to the rumination of our environment with the levels we already have of toxins I say "ENOUGH ALREADY"

Sincerely,
Stephen P. Broos

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Steven Broos
877 Kauhikoa Road
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

There will be no widespread indiscriminate spraying. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual marijuana plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

Monitoring of the Kauai operation was confined to a visual inspection because the inaccessibility of the terrain precluded before and after soil sampling. The special test of Weed Oil that is being arranged will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

We appreciate your concern that guidelines may not be followed during actual field operations. Application is not made by commercial operators but by DLNR's conservation and enforcement officers who are well-trained in conservation practices as well as enforcement. Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts. Direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was observed upon inspection one month later. As you observe, the regrowth in an area is usually of exotic species. However, that is a function of the disturbance of the soil and the addition of fertlizers by the growers, not because of the spraying. It is happening everywhere marijuana is planted in the forest, and a major reason for the stepped-up eradication program.

We also share your concern for prevention of water contamination. Spraying will not be done near any water body. There will be a buffer zone of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Maui County Department of Water Supply will be asked to assist us in making certain all water areas, including water catchment basins, are identified.

As noted in the DEIS, there will be some unavoidable adverse impacts on non-target vegetation, insects, and possibly on birds and small animals, just as there are using manual eradication methods. Given the methods that will be used to spray, the risk of an occurrence of exposure and injury to a hiker would be very low. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

Plants sprayed with Weed Oil, the only herbicide planned for use in the near future, wilt, then turn brown and die. They also have an unpleasant odor. One of the advantages of using an oil spray is that the plants cannot be harvested and sold.

Whether they are removed manually or sprayed, plants are not burned on the site because of the fire dangers. Plants that are chopped down are removed, and those that are sprayed are left on the site.

We appreciate your interest in this project.

Sincerely,

Gilbert K. Landgraf
Administrator

RECEIVED

'86 DEC 11 P12:35

FOR

8 December 86
P.O. Box 1282
Makawao, Hi
96768

Libert K. Landgraft, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hi 96813

Dear sir:

In regards to the proposed spraying of Maui Reinforests with diesel oil, glyphosate, and weed oil one is appalled that such a plan would even be considered, let alone implemented on other islands. To introduce such pollutants into the only virgin regions of the Islands spells ecological disaster. I am apprised of the damage done by marijuana growing to the environment: it is minuscule and short term compared to herbicides.

The cancer risk assessment of glyphosate,

as stated in the Environmental Impact Statement is misleading because it is based on a single exposure per a seventy year period. Any person in repeated contact with the herbicide compounds has cancer risk. All of us probably have more than single exposures to more than one herbicide, living here in Hawaii amidst the roadside sprayings.

Not only can we not pollute our virgin lands; we must begin immediately to limit greatly poisons from our environment. Is the "War on Drugs" worth the increase in risk to the life of the land, the water, and animal and human life, as well? Surely more cost-effective means can be found to rid the forests of pakalolo patches. As a tax paying, nature-loving citizen I expect 1) more cost effective studies on positive ways we as a species may impact our environment, 2) more research on the long range effects of pesticides and herbicides, and 3) less misleading justifying

in documents from government agencies. Has our society really degenerated to the point where greed and special interest can hold sway over reason and fairness? Only the chemical companies and the like stand to profit.

As a teacher I fervently want to believe in the future ... of my students, of our society, and of the Earth. The glyphosate issue is a thread in a much bigger blanket relating to pollution. We must stop and take stock of our methods and intentions now. What future do you want?

I am respectfully awaiting a reply.

Most sincerely,

Diana Loomis Dahl

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Diana Dahl
P. O. Box 1282
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We appreciate your interest in this project.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. A special test of Weed Oil will be made in two different types of forest area, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

There will be no widespread indiscriminate spraying. The spraying mechanism utilized by DLNR is designed to produce large droplets and minimize drift, the exact opposite of most spraying operations where the applicators are trying to produce a fine mist to maximize coverage. With this mechanism, the spray can be concentrated on individual marijuana plants. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

Before and after photographs of the initial spraying operation on Kauai show minimal adverse environmental impacts. Direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was observed upon inspection one month later.

The damage down to the forests and particularly to native ecosystems is not miniscule. Risks to the environment from spraying must be traded off against the risks to the

environment from not using available methods to eradicate marijuana plots. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC -9 P1:25

Dec. 1986

Michael
P.O. Box
Makawao, HI. 96768

FORESTRY & WILDLIFE
STATE OF HAWAII

Dear Mr. Landgraf,

This letter is in reply to the DEIS "Eradication of Marijuana on State-owned and Managed Conservation District Lands," and to the Public Hearing held on Maui. In fairness to the high bias and emotional loading of this issue, I must confess my views were pro-no spray, or at least I was very closed to you as you spoke. But, I took copious notes and have studied much. My comments on the DEIS come from a scientific and practical frame, and my previous bias is not included. Excerpts and objections used herein are mine--if not original, I have failed in deleting repetitive arguments. This is my own work! I do not use marijuana, and have tried persuading those who do to only use that which does not come from theconservation lands in question. I know that at least 2 growers have ceased a years-long occupation, just from being at your public hearing. If there is no "we", there is no "we-them" confrontation. Pass the word around, that growing it on public land is no longer "cool" in my circle of friends. Thank you! for bringing a new awareness to me. The following is condensed from 10 pages.

First, what is the reason forthe deviation from eradication as has been done under "Green Harvest"? If you spray, then you must still dispose of the waste. Seems like the spraying plan actually adds an extra step to the process. Pg.ix=" The proposed action will add chemical eradication methods and on-site disposal to current practices." Leaving the wilted plants will result in reseeding, and concentrate the residues in the roots into the soil again.Wouldn't the huge marijuana forests still need cut down to lay on the ground for recycle? And this will reduce incidence of injuries to eradication personnel? Pg II-1="A number of personnel have received serious injuries during Green Harvest operations". This extremely relevant argument for pro-sprayers receives only casual mention! I would like to see these statistics in writing in the EIS! By the way, why use expensive law enforcement officers to chop marijuana? Why not use pro-conservation volunteers like me? I use all the tools now,

am experienced in Mountain Rescue, know that kids rappel out of helicopters,and I've jumped out the doors of almost every size helicopter and plane (including passenger jets 727)-- in storms, dark of night, onto concrete, trees, and onto the wrong place (US Army). And, if your personnel "receive many serious injuries", you better get people who don't make so many errors. IN regard to important human safety statistics, please also list the incidence of "grower violence" mentioned on Pg. I-5.

Second main point-- Suppose we establish that due to budgetary concerns, growers efforts exceeding that possible by manual eradication, and the human safety factor, that "Operation Wilt" needs to be repeated on Maui. What followup statistics are available? Only the ridiculously poor photos (Pg. I-18) yield what should be good pro-sprayer argument. I will not bother to include the 100% diametrically opposed opinions, scientific evidence, that even the Weed Oil is safe to use, yet actual post "Operation Wilt" facts on residual, drift, etc. are lacking. Pg VIII If it is so blatantly safe, why don't you make it easier for us to believe? I have statements like Pg. I-14="spraying is precise", "as can be seen from the photos." Well, I can't even see if that's bamboo or marijuana. Pg. V-33 mentions Monitoring, yet specifics such as who-when-how are lacking. My "faith" feeling notes the lack of evidence from followup of the Kauai spray, although "exotic" species and "residuals in the soil and water" will be vastly different in those cane fields, than in the Waikamoi Preserve.

Third point--Pg. V-32 lists four points under "Public Notification." Yet, I remember at the Hearing , officially "no public notification" which drew "Ooohs and Aahs". Pg. V-2, #4="The map shall not be made public." Having seen these plots, and knowing the sophisticated surveillance used, Iknow that the growers know that "next year it's gonna be different" Why not delete the clandestine nature of these operations? Let the public know how much you know, and keep the newer growers from going into business on public lands.

Fourth point--Pg. VII-1="Monitoring programs that are undertaken as part of the eradication program will provide data for further evaluation of the safety and efficacy of these chemicals",; is this to be done on previous programs, or after the current one is carried out? The results should be in the EIS, before any spraying begins. I concur with the Hi. Dep't. of Health that "use of chemical be restricted to cane lands," and withthe UH College of Tropical Agriculture that "if quick breakdown of the chemical is a consideration, then Glyphosate not be used." Also, if Glyphosate is only sprayed on one side of a waterway at a time (a condition of its use), how will this be incorporated into the eradication plan? And, are there statistics (the Pg V-7 "map keepers") to show that previously eradicated plots are not reused by the growers? This is another easily demonstrated fact from law enforcement records, yet only conjecture supports this in the DEIS. My concern here is the repeated spraying necessary, with the resultant contaminated inferior product (probably to be sold to tourists and young school kids). Pg. I-19="Glyphosate is a relatively new herbicide. The environmental fate and potenti ecological effects of the use of glyphosate in forests have yet to be studied extensively." I will not reiterate the adequate scientific, quantitative evidence given to the BLNR which shows Glyphosate to be a poorer choice than Weed Oil. Even the DLNR is undertaking a "special field test to monitor the effects of spraying weed oil by helicopter on soils and the degree of drift. "The results of the tests will be made availabe to interested parties when completed." I am now an interested party, and when is it to be available?--(must be included in the EIS). My last point on Glyphosate is that the FIFRA (most reputable source on this chemical) recently recommended that it be labeled now a "Group D" (not classified) carcinogen. A 1978 report issued by the President's Council of Environmental Quality states "most researchers agree that 70 to 90 percent of all cancers are caused by environmental influences and are hence theoretically preventable." Most environmental chemicals proliferated since the 50's, and I just don't trust the "Haole Hoe"(Roundup) to be

safe 20 years from now. Every chemical used on Maui can be found in breast milk of any Mom who has been here long enough. Neither the State nor County can extract the chemicals (from water) considered in the DEIS. Little soil exists in the slated areas of the Waikamoi watershed, and some will inevitably be consumed in the 4.5 million gallons used annually. Yes, Monsanto shows us a rapid breakdown of Glyphosate in ideal biosystems, yet this does not exist in the bogs of the upper slopes (7 weeks). Even bottom sediments require 2 weeks to degrade it. In those 2 weeks, rain probably would occur, with resultant runoff. the County Water Department doesn't test for all the chemicals used NOW on the island; but, no worry for lack of statistics, just look at the abnormally high birth defects rate.

In conclusion, my vote is for increased surveillance of the egress used by the growers, enforce stiffer penalties for trespassing (those not having proper use-permits), stiffer penalties for repeat offenders (those who do not believe that they will be caught, or do not fear the penalty). I cannot believe that proper use (do you really want to apprehend the growers?) of surveillance equipment on the lower slopes of Haleakala would not result in many surprised growers--put a few convicts on the front page of the Maui News. Put fear into the hearts of those who wholesale destroy our conservation lands.

If spraying is approved, only use Weed Oil, or aromatics (would skunk oil work?),and only in areas where water quality not be compromised nor manual eradication be feasible (though these two points probably often exist together). Try not to use law enforcement personnel to chop weeds. If you have to respray the same areas again, then I think that be a failure point.

Let's join Gov. Waihee in desiring Hawaii to become an "international center of health." I'll help.

Kokua,
Michael L. Glaze (aka "Green")

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Michael L. Glaze
P. O. Box 1211
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your long and thoughtful letter. We appreciate your interest in this project and respect your concerns.

We are responding to the points in your letter in the order in which they appear.

1. Why not just use Green Harvest.

The principal reason that the spraying program has been proposed is that the Green Harvest operations are not sufficient. Despite a great increase in expenditures and effort, enforcement officers cannot keep up with the numbers of growers utilizing hundreds of small plots in scattered locations. Mr. Joseph Cravalho, Chief of Police for Maui County, testified at the public hearing on the CDUA on Maui on November 18, 1986, that manual eradication methods have proven to be time-consuming, expensive, dangerous to personnel, and an ineffective method of addressing the problem of marijuana cultivation.

He pointed out that

> . . . Manual operations involve a minimum of ten officers, a dump truck and driver, and two four-wheel drive vehicles. A larger operation requires twice the number of police officers and equipment, including helicopter, helicopter pilot, support and maintenance and crew men from the Hawaii National Guard. The necessity for the number of men and equipment are to chop or pull the marijuana plants, haul the plants away from the remote area, and finally, dispose of the plants by burning at the local dumps.
>
> On the other hand, the Department of Land and Natural Resource's proposed method of eradication requires three officers and a four-wheel drive vehicle for a mini operation. The arduous task of cutting or pulling the marijuana, hauling and disposal of same, have been eliminated. The spraying technique kills the marijuana within a few hours and prohibits the grower from using or selling the product.

It is not that the addition of a spraying program to manual eradication methods is cheaper; it is anticipated that overall expenditures will stay the same, or even increase. It is more a question of getting more "bang for the buck."

Plants sprayed are not removed. They also do not reseed. If marijuana reappears it is because plants have been missed or the area has been replanted.

Your offer to volunteer to assist is appreciated. Unfortunately, liability problems make it very difficult for government agencies to utilize volunteers as much as they would like, even in low risk jobs. There are other programs that can use volunteer efforts, for example, the Sierra Club's Hawaii Service Trip Program which has made outstanding contributions to both the Division of Forestry and Wildlife and The Nature Conservancy by clearing trails and building fences to keep goats and pigs away from sensitive habitats.

Chief Cravalho also described the numerous complaints that the Maui Police Department has received from hunters, hikers, and nature lovers who are confronted and threatened by suspected marijuana growers in state forests open to the public. Other County police departments and The Nature Conservancy also have reported similar experiences.

2. Data on spraying.

We agree that the quality of photographic reproduction was unsatisfactory. They were made from black and white negatives made from 35 mm color slides. Even in the color slides, it is difficult to see certain things such as the spray line below the helicopter. The photographs of the spray nozzle showing the size and diameter of the discharge are much more clear. We will try a different process in printing the Final Environmental Impact Statement.

However, even if the photographs are hard to see, the facts as stated are still true. The operation on Kauai was in a high forest area, not on a cane field. Monitoring consisted of a visual inspection because the inaccessibility of the terrain precluded before and after soil sampling.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. A special test of Weed Oil will be made in two different types of forest area, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage, if any. The results of these tests will be made public upon completion. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

3. Operations Plan maps.

We would like the situation to be as you describe it, that publication of sensitive area maps would deter future growers from these areas. Unfortunately, commercial marijuana growers do not have your respect for the environment as is evidenced by the damage they are doing. We are concerned that the most valuable endangered and threatened species areas might be sought out by growers who would then feel safe from any eradication effort. While these growers may find these areas on their own, it is not the intention of the Department to assist them.

4. Monitoring.

As noted above, only Weed Oil will be used. We agree that there is always a need for additional environmental studies of the effects of any chemical. However, the chemicals selected have been chosen deliberately because they are the least damaging. Weed Oil is unique in that it has a long history of use but has not been the subject of scientific studies. It has fallen into disuse by farmers mainly because more toxic herbicides have been made available. No spraying will be done on Maui until the field tests described in the draft EIS and above are completed.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC -9 P12:35

FORESTRY & WILDLIFE
STATE OF HAWAII

Patricia Dillberg
SR Box 370
Kaunakakai, Molokai
Hawai'i 96748

Dec. 5,1986

To whom it may concern,

I am concerned about the intended use of Round-Up, Rodeo and Diesel fuel on Marijuana crops here on the island of Molokai or anywhere in Hawai'i.

I live on the east end of Molokai in a secluded valley, surrounded by State lands. We use the stream water for agriculture and drinking water. My main concern is that there have been no independent studies done of the effects of the chemicals that are to be used. We really do not know what the long term affects on our eco-system or on ourselves will be. We don't know what these chemicals can do to our fragile paradise.

The erradication of marijuana can only be accomplished by finding alternative economic means for the growers. Spraying the patches will only make the growers use more secluded areas. The problem is a blight on our population, but, I believe that the use of dangerous chemicals is the wrong approach. Wrong for the land the flora and fauna and for the people.

I do not advocate the use or abuse of marijuana, but neither can I condone the use of dangerous chemicals as a way to end the problem. I do not believe that the spraying will stop the growers.

We here in Hawai'i are blessed with a unique environment. Assulting the land with dangerous chemicals is, to me, a dangerous, fool hardy, assult on a fragile environment and on the residents of this fine state.

Please, just say NO to chemicals.

UA NAU KE KA O HA'AINA I KA PONO

Sincerely Yours,
Patricia Dillberg
Patricia Dillberg

Letters submitted to;
Ms. Letitia N. Uyehara
Director, Office of Environmental Control

Mr. Libert K. Landgraf
Division of Forestry and Wildlife
Dept. of Land and Natural Resources

Ms. Jacqueline Parnell
KRP Information Services

Mr. John Waihee Govenor of Hawai'i

Mr. Susuni Ono
Director of Land and Natural Resources

JOHN WAIHEE
GOVERNOR OF HAWAII

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 17, 1986

Ms. Patricia Dillberg
SR Box 370
Kaunakakai, HI 96748

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air. Only Weed Oil is planned for use at the present time. Glyphosate will be used only if Weed Oil becomes unavailable for purchase.

Given the methods that will be used in spraying, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft Environmental Impact Statement, there will be some unavoidable adverse impacts on non-target vegetation and wildlife just as there are using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the marijuana growers.

Our agency is responsible for the protection of Conservation District lands. We have no intention of destroying our natural resources. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that any possible adverse effects are kept to a minimum.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

November 8 '86

Dear Libby

I was shocked to read of the proposed spraying of Roundup and/or deisel oil on State land where marijuana is found. New research is showing that Roundup is a highly toxic, cancer- causing substance which persists in the environment up to two years. There are extreme warnings on the label.

Our fragile eco-system is already overloaded with pollutants, without having to unnecessarily add more. I say "unnecessarily" because there is already a highly sophisticated Green Harvest program being deployed on Maui. This year, the law enforcement agencies confiscated more marijuana plants than ever before. The growers were hit hard by increasingly effective technologies and methods of dectection. What difference does it make if the pot plants are sprayed or cut and burned? It will make a lot of difference to the environment and to the health and welfare of all its inhabitants if this insane (and unnecessary) program is carried out. There may be a slight savings in the cost of the spray program, as compared to the labor intensive "cut and burn" method. But are the long term effects on the health of ourselves, our grandchildren and the ecology worth it?

In your campaign platform, you spoke of protecting the environment. If that is truly the case, you will surely vote against this program! And if you want my continued support, and that of all my friends and assocaites, please vote against the spraying.

Thank you very much,

Bonnie Fish

PO 1555

Mak. Maui

96768

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
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WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Bonnie Fish
P. O. Box 1555
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We appreciate your interest in this project.

Aerial spraying will be limited to marijuana patches clearly visible from the air. Only Weed Oil is planned for use at the present time. Glyphosate will be used only if Weed Oil becomes unavailable for purchase.

There will be no widespread indiscriminate spraying. Utilizing the methods that are described in the draft Environmental Impact Statement, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft EIS, there will be some unavoidable adverse impacts on non-target vegetation and wildlife just as there are using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the marijuana growers.

Our agency is responsible for the protection of Conservation District lands. We have no intention of destroying our natural resources. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that any possible adverse effects are kept to a minimum.

Sincerely,

Liberty K. Landgraf
Administrator

DEC 4, 1986

Ms. Letitia Uyehara, Director
Office of Environmental Quality Control
465 S. King Street, room 104
Honolulu, HI 96813

Dear Ms. Uyehara;

I wish to comment on the Draft EIS prepared to evaluate the "Eradication of Marijuana on State-Owned and Managed Conservation District Lands".

Since use of Roundup (glyphosate) leaves a plant apparently well looking for a few days,I would suspect that marijuana plants might well be harvested thereafter by the grower. In this case one would expect that sprayed marijuana could become commonly found in the product used by members of the community who do smoke marijuana.

Page V-19 of the Draft EIS states that " The risk of someone smoking the marijuana after it has been sprayed and the potential health effects of such an action are difficult to assess." This apparently refers to spraying with oil. Later on the same page the EIS remarks that "The risk associated with glyphosate is very low." An explanation of the basis for the low risk conclusion refers the reader to the "section of the EIS on Analysis of Risk to Marijuana Smokers." I did not find any such section in the copy of the EIS which I reviewed at the Waimea Public Library.

Please accept my apologies if my comment stems from a lack of thoroughness in reviewing the document. However, if the section I refer to is indeed missing, I hope the omission will be corrected since this is an important issue in my opinion.

sincerely,

William Graham
Box 155
Hawi, HI 96719

RECEIVED
'86 DEC -9 P2:03
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JOHN WAIHEE
GOVERNOR OF HAWAII

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December 17, 1986

Mr. William Graham
Box 155
Hawi, HI 96719

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

To answer your question about the location of the Analysis of Risk to Marijuana Smokers, it was not included in the draft EIS. The information on glyphosate was a summary of the conclusions of studies contained in the Federal Drug Enforcement Administration's EIS and incorporated by reference. The Risk Study described on page V-19 is in the federal Final EIS, not DLNR's draft EIS. A statement will be added to our Final EIS to make this clear. A copy of this federal EIS can be made available for your review if you wish to read the cited study.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC -9 P1:24

FORESTRY & WILDLIFE
STATE OF HAWAII

David & Lori Grace-Charry
Star Route 1, Box 161
Haiku, HI 96708

December 8, 1986

Mr. Libert K. Landgraft, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Re: Protest against spraying state land with diesel oil, glyphosate and weed oil.

Dear Mr. Landgraft,

We are land holders on Huelo Point on the island of Maui and tax payers in the state of Hawaii and County of Maui. Agriculture and healthy land are important and vital to us. After going to the public hearing on Maui at the Wailuku School recently and listening carefully to all sides presented, we feel absolutely against the proposed plan to spray Hawaii's forests with the above mentioned chemicals. It is very clear that inadequate supervision of spraying is inevitable.

Mechanical and manual means of removing unwanted jungle growth, such as marijuana appears to be the only responsible way of furthering your ends of saving the forests from further destruction. Please note our request. Additionally, **Safe Solutions** should be consulted on all further proposals.

We would appreciate hearing from you as to the action that the state finally decides to do. With kindest regards, we remain

Very truly yours,

David & Lori Grace-Charry

David and Lori Grace-Charry

DGC:sf

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

David & Lori Grace-Charry
SR 1, Box 161
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. Diesel oil cannot be used until approval is received from EPA.

As noted in the DEIS, the risks to the environment from spraying must be traded off against the risks to the environment from not using available methods to eradicate marijuana plots. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC 10 P2:06

FORESTRY & WILDLIFE
STATE OF HAWAII

Division of Forestry & Wildlife
Department of Land & Natural Resources
Attention: Libert K. Landgraf, Administrator
P.O. Box 621
Honolulu, Hi. 96809

December 7, 1986

Dear Sir:

I am urging you to use only mechanical and manual eradication of marijuana from the State Conservation District Lands and Hawaiian Rainforests. Rainforests are more than a local blessing, they are a planetary resource. Between 40%and 50% of all living things dwell in the tropical rainforests. We are extremely fortunate to have rainforests in Hawaii. Rainforests cover less than 2% of the globe. Boundlessly fertile and the source of undiscovered foods, medicines, and materials, rainforests house millions of species of plants and animals, the vast majority of which are unstudied by science. Fewer than 1% of tropical plant species have been screened for chemical compounds.

Rainforests provide the earth with oxygen, air conditioning and weather patterns. I believe preserving the Hawaiian rainforests should be our top state priority. I am very disturbed by this plan to erradicate marijuana with chemicals and oils. "Roundup" is claimed to break down rapidly, yet data shows that the active ingredient, glyphosate, moved readily from the treated leaves of lower branches, to other leaves, buds and developing fruit on the same branch...and after 90 days, after 3 months 92% to 98% was still present as unaltered glyphosate. The effects of glyphosate reached their maximum about 2 years after application, which proves that Roundup or glyphosate is much more persistent than generally believed by the herbicide users. Where is this informaion in the DEIS? Nowhere. Why are we taking the word of the chemical company who makes this stuff that

it is safe for the environment? Why is the Department of Land and Natural Resources?

I would like to direct your attention to the letter from the Department of Health Deputy Director, James Ikedea, which is printed in the DEIS. He recommended that the use of chemicals to control marijuana cultivation NOT BE USED on Conservation District Lands. Surely you will consider this opinion as one who looks to the health of all the citizens of Hawaii and value his opinion.

Vince Bagoyo, Director of the Department of Water Supply on Maui cautions that Chevron Weed Oil or phyphosate must be kept from our water sources to avoid contaminating them. These sources include rain catchment, streams, water pools or holes, wells, tanks, reservoirs, open cisterns, etc. Many of Maui's citizens depend on the rainforest water to drink and we do not want to have chemical contamination in it.

I think that the Department of Health and the Department of Water Supply should test the water NOW for chemical residue in the water to see if any traces of Glyphosate is there now. The people of Maui have a right to know what they are drinking. The water of Maui is not tested for the many pesticides used here in great amounts each year. We need to know what residues are in water that flows from Conservation District Rainforests now!

What monitoring systems are developed to determine the effects of this chemical eradication on soil, ground water, surface water, wildlife and non-target vegetation?

Please include a list of all substances including the impurities in the weed oil, diesel oil and glyphosate.

In the DEIS it outlines operations flexibility. It states: " Selection of manual methods, ground spot or ariel spot chemical application methods will depend on environmental factors, some of

which are: proximity to water bodies, proximity to human habitation and developed recreation areas, topography, soil type and the presence of endangered plants, signigicant cultural resources or other unique resources. THE RAINFOREST ITSELF IS A UNIQUE AND SPECIFIC RESOURCE AS WELL AS A PRECIOUS PLANETARY COMMODITY.

Every year 11 million acres of rainforest are destroyed. It took 100 million years to create the tropical rainforests and only 40 years to destroy half of them. Many people and many countries of the world are worried about this. The Ninth World Forestry Congress declared: "If the world's rainforests are destroyed, half the population of the earth will lack adequate food, drinking water, and fuel to cook their food, while desertification, soil erosion, floods and famine will spread misery, many native peoples of the forest will perish, together with at least half of the species of flora and fauna now alive, know and unknown. Even the stability of the world's climate will be threatned and our major source of healing drugs lost.

Since 1945 nearly half of all rainforests have been wiped out. With them went countless unique and exotic wild creatures, and every day at least one more species becomes extinct. Hawaii has more endangered species than any other state in America. We must protect our gifts from God, not poison our land with this insane plan.

We could preserve our rainforests for years to come. If only we will use our common sense, the sense of logic the Good Lord gave us. Is it doing Mother Nature a favor to pour any Petrochemical into a tropical rainforest? If we don't act responsibly now, in 40 years there will be no tropical forests. Hawaii's fragile and unique eco-system deserves respect. The forest has a right to be here. Its life is our life.

I deeply care about the people of Hawaii. I care that our weather patterns are not destroyed. I want there to be rain for our lands and our food. I want to avoid chemical action now that will create adverse health effects in the future. Don't you? By manual eradication the police pulled up 95,000 plants this year, a record harvest. Let's continue to use manual and mechanical means to rid Hawaii's forests of marijuana. Let's not make a big mistake by using chemicals and oils that our children and their children will regret. I urge you KEEP OILS AND CHEMICALS OUT OF THE RAINFORESTS!!!

Sincerely,

Mary K. Groode

Mary K. Groode
P.O. Box 1551
Kihei, Maui, Hi. 96753

CC: The Maui News Editor
Jacqueline Parnell
Lahaina News
Govenor John Waihee
Maui County Council
Ms. Letitia N. Uychara

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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AQUATIC RESOURCES
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Mary K. Groode
P. O. Box 1551
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

The Department of Land and Natural Resources has no intention of killing the rain forest. This Division is responsible for forest management and protection. The purpose of the proposed project is to fulfill our responsibility and protect the forested areas from the destruction caused by marijuana growers.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air. To provide additional assurance of its safety in a forest environment, a special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

Weed Oil is the only herbicide planned to be used for marijuana eradication at this time. Glyphosate will be used only if Weed Oil is unavailable. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

The ingredients in Weed Oil and the other herbicides are identified as required by EPA. This information is in the Appendix B of the Draft EIS. The only way to know the impurities in any pesticide is do a laboratory analysis of the contents of each container.

We share your concern for prevention of water contamination. Spraying will not be done near any water body. There will be a buffer zone of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Maui County Department of Water Supply will be asked to assist us in making certain all water areas, including water catchment basins, are identified. The Department of Health will also be consulted in the development of the Operation Plan for Maui.

Given the methods that will be used in spraying, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft Environmental Impact Statement, there will be some unavoidable adverse impacts on non-target vegetation and wildlife, just as there are using manual eradication methods.

The risks to the environment from spraying must be traded off against the risks to the environment from not using available methods to eradicate marijuana plots. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Lubert H. Landgraf
Administrator

FORESTRY & WILDLIFE
STATE OF HAWAII

Mr Gilbert Sinigasa Adm
Division of Forestry + Wildlife
Department of Land and Natural Resources.
PO Box 621
Honolulu, Hi 96809

Attn Mr Sinigasa:

I have read the Draft EIS NOV 1986 Eradication of Malaguena on State-owned and Managed Conservation District Lands.

- Some points I'd like to bring up. letter from College of Tropical Agric Univ of Hawaii

1. Method of Application
Wind Velocity under a helicopter will be more than 8 mph meaning that drift will occur regardless of nozzle pressure.

- In your operations plan a buffer zone of 100 ft from any open body of H_2O in regards to helicopter - Aerial spraying is ridiculous. Mr Sinigasa, let me see you drink from that body of H_2O after the chemical spray job with accompanying drift.

I am concerned about the adverse and unavoidable impacts such a foolhardy courses of action may set in motion.

I am concerned for the quality of

I am prepared to join in a class action legal suit against the D.L.N.R. if the proposed action is approved.

Please keep me informed as to the outcome of your final decision.

Margaret Kelleher
PO Box 483
Kaunakakai Hi 96748

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Margaret Kelleher
P. O. Box 483
Kaunakakai, HI 96748

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. Our response is presented in the same order as the points presented in your letter.

Several weather conditions affect drift. In addition to wind, these are low humidity and high temperasture which effect the size of the droplets. The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants. The downdraft from the helicopter also produces a wind. However, its effect is different from the effect of a cross wind. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

Before and after photographs of the initial spraying on Kauai show minimal adverse environmental impacts. Direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

Given the method of spraying, we believe a 100-foot buffer zone from bodies of water is more than adequate, since the 100-foot width is normally applicable to pesticide application using a wide spray swath.

Asnoted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication, just as there are in using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Lloyd A. Landgraf
Administrator

November 20, 1986

To Ms. Letitia N. Uychara

Spraying oil & water soluable chemicals from the ground and air into our mountainous rain forest is asking for ecological disaste. I request only manual & mechanical means be used.

The reality of marijuana growing and drug abuse in our culture & specifically on the island of Maui is long standing, chronic. The concept of eradication is erroneous. It is a lie. To heal this sickness takes time, money, hard work. It is our problem - every single person living on this island, children included.

It is appalling that the water cannot be consumed without labyrinthian & expensive procedures to purify it, & it is immoral to add to this pollution even in thought let alone in deed. Maui is a living organism like a human being. Watching a human being pollute himself with drugs is painful, tragic. Watching another person encourage this human being to take drugs is unbearable. The chemicals, herbicides are Maui's drugs, & this beautiful organism is without choice. The community of Maui is the enabler in Maui's destruction. Maui, the community, is asleep to the incredible harm it is causing. Maui gives & gives & gives. When are we going to give back? "Mankind is the only animal that fouls his own nest!" When will we wake up?

The marijuana growers that grow in the national forest are selfish, and have caused this issue of spraying. If they can't find a way to grow on their own land, they have no business abusing the forests. This is barbaric & greedy. It is as greedy as all of the officials who could drop their conscience in order to "save" money (how economical is it to fly helicopters) & find a shortcut that potentially will ruin the water further. They, too, are barbaric & greedy & have no appreciation for the generous gifts of this island.

This culture is so afraid of physical work. What's wrong with giving people jobs pulling marijuana plants manually, replanting trees? A bit more civilized, perhaps?

The drug problem is not going to be solved with one round of eradication of marijuana plants. Where is the concern & money for more rehabilitation programs, half-way houses, jobs. No drug users - no consumers.

It would be a glorious day when the tremendous energy of the political body might shift to the real problems, the real sickness of Maui, the physical organism & Maui, the community of people, from the preoccupation with poisoning plants. Please choose health. Please care. Caitlin LaBoyteaux

JOHN WAIHEE
GOVERNOR OF HAWAII

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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STATE OF HAWAII
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HONOLULU, HAWAII 96813

December 17, 1986

Ms. Caitlin LaBoyteaux
P. O. Box 1033
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. The Department of Land and Natural Resources has no intention of damaging the rain forest. This Division is responsible for forest management and protection. The purpose of the proposed project is to fulfill our responsibility and protect the forested areas from the destruction caused by marijuana growers.

The addition of a spraying program to manual eradication methods is not being done simply because it is cheaper. It is anticipated that overall expenditures will stay the same, or even increase. It is being proposed as a way to provide a more effective program.

The risks to the environment from spraying must be traded off against the risks to the environment from not using available methods to eradicate marijuana plots. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED

'86 DEC -8 P1:36

FORESTRY & WILDLIFE
STATE OF HAWAII

November 15, 1986

Testimony on Eradication

of Marijuana on State Owned and Managed Lands

Islands of Maui, Molokai, and Hawaii

I, James McCall am a party to the contested case. I am a regular hiker in the wilderness parks in the conservation districts where the spraying of chemicals and oil is proposed.

I am highly sensitive to chemical residue on my skin and to low level pollutants in water and air. I have experienced skin irritation, and respiratory problems from pesticide sprays including glyphosate while hiking in water shed areas on Maui. Maui needs clean undisturbed areas to hike in, and conscious monitoring of the locations and types of chemicals allowed into our environment.

I request that alternatives to chemical spraying be used for marijuana eradication.

I would like to offer the following:
1) Use a drop down suspended brush cutter similar to those used on farm tractors in open areas which would thrash usable portions of the plants. Compare the cost of retrofitting a helicopter with a cutter, vs. the cost of chemicals, spray equipment and potential adverse effects of the chemicals resulting in clean-up proceedures.

2) Spray plants with an organic spray of "skunk oil" or other long lasting olfactory and gustatory deterent, along with a non-toxic, organic dye or color pigmentation.

3) How many and how serious are the injuries to personnel in the Green Harvest operation in the past year on Kauai. Please document. How many law enforcement, or narcotic agents have ever been injured in the "booby traps" or by marijuana growers themselves? Please document.

4) Why not use search and destroy methods and employ army training personnel. They would get experience for jungle tactics training and the local drug enforcement people would appreciate the additional help.

What is the full criteria for determining sensitive sites. Please give full details. Who will moniter the sensitive sites? Who will enforce that the water will not be contaminated?

James A. McCall

James McCall

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. James McCall
P. O. Box 11634
Lahaina, HI 96761

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments on the proposed program. Our response follows the order of the points made in your statement.

1. Drop-down brushcutter

This is an interesting suggestion which begs research and development. Thank you.

2. Use of other types of sprays.

The alternative you suggest will be investigated. However, it does not seem that using something like "skunk oil" would be that much different from using diesel oil or Weed Oil. One of the reasons oil sprays were selected is that not only does the marijuana plant wilt and die, it has an unpleasant odor and is rendered unsuitable for use or sale. Also, we would expect to run into the same problem that we have had with diesel oil. No matter how innocent or widely used a substance is, once a government agency announces its intention to purchase it for use as an herbicide, the manufacturer must go through the lengthy and costly EPA registration process. The alternative is to get special permission which we have discovered is difficult.

3. Injuries to personnel.

We do not have precise statistics on injuries to enforcement personnel involved in marijuana eradication, although each individual agency would have records. The statement in the Draft EIS is based on information contained in the 1984 Annual Report of the Select Committee on Narcotics and Control of the Ninety-Eighth Congress, and reports by local law enforcement officers.

Injuries to enforcement officers is only one concern. In his testimony at the public hearing on the CDUA on Maui on November 18, 1986, Mr. Joseph Cravalho, Chief of Police for Maui County, described the numerous complaints that the Maui Police

Department has received from hunters, hikers, and nature lovers who are confronted and threatened by suspected marijuana growers in state forests open to the public.

This was further confirmed by testimony from Mr. Alan Holt of The Nature Conservancy who also expressed his concerns about the damage being done to native forests by the growers.

At the Hilo hearing, Hawaii County Deputy Police Chief Wayne Carvalho stated that

> There have been several incidents where booby traps were set out for unsuspecting individuals, and also we have found in our marijuana missions fish hooks hung at eye level on near-invisible line designed to injure or even blind someone who walks in a forested area.

The addition of a spraying program to manual eradication methods is not being done simply because it is less dangerous. It is being proposed as a way to provide a more effective program.

4. The Green Harvest operations are search and destroy and they frequently utilize military personnel. The Hawaii National Guard has provided important support for this program, which will continue. Chemical eradication is being proposed as an additional method.

The criteria for defining sensitive areas has been deliberately left vague for the same reason maps will not be made public. Marijuana growers may use this information to seek out the most fragile environmental areas in the belief they will then be free from eradication efforts. They may still do this based on existing information, but we have no intention of assisting them.

Monitoring measures are described in the draft EIS in the guidelines for the development of the Operation Plans. Monitoring will be accomplished as a joint interagency effort, by the agencies most interested and affected.

As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

November 15, 1986

TESTIMONY ON
ERADICATION OF MARIJUANA
ON STATE OWNED AND MANAGED
CONSERVATION DISTRICT LANDS

ISLANDS OF HAWAII, MAUI, MOLOKAI

Safe Solutions requests a contested case.

The comments given in this testimony are applicable to :

a) the CDU applications

b) the draft EIS .

According to the EIS rules the section 11-200-23 (b)(1), any individual or group requesting to be a consultant, must be notified and sent the EA in time to comment on it. Elaine S. Wender Esq. an associate of Safe Solutions requested to be a consultant but did not recieve notice of the EA nor a copy of it until it was to late to comment. Due to this EIS rules violation the DEIS and EA must be withdrawn. Kelly Arbor a member of Safe Solutions requested to be a consulted party in order to notify the members of same. Ms. Arbor recieved no reply, and therefore our membership of doctors, attorneys, ecologists and health professionals and others were unable to participate in responding to the EA.

Why was Safe Solutions not notified as a consented party to the E A ? Our previous involvement has been highly visible with many letters of testimony from our 100 plus members on the bFederal EIS to eradicate marijuana in the past two years. Our organization worked with the public, mayors, and county councils of Maui, Kauai and Hawaii, the DOA, DOH and our congressmen to

prevent the chemical eradication of Hawaii's Federal and non Federal lands. I, the president of Safe Solutions, recieved the Environmentalist of the Year Award from the Maui chapter of the Sierra Club for my involvement in these Federal Marijuana EIS's .Again, why was Safe Solutions not asked to consult on the preparation of the State EIS?

How do you propose to keep the chemicals from being washed off the marijuana plants after heavy rains; which form streams and carry the chemicals into the drinking water?

How do you plan to keep from killing the life forms at and below the surface of the soil in the immediate area; and down stream from the site once heavy rain has carried the chemicals into these areas?

How do you plan to keep birds and other wildlife from eating contaminated seeds?

How do you plan to prevent hikers and naturalists from picking and eating herbs and berries in the immediate area?

How do you plan to prevent potential forest fires? What is your plan to replant any potentially damaged areas? How much money is budgeted to cover these expenses?

In areas where backpack spraying is considered, why not instead use steel blade weed eaters and tree eaters which create compost?

What financial retribution will be made if oil products contaminate and interfere with the dating process on unmapped archaelogical sites?

How many and how serious are the injuries to personnel in the Green Harvest operation in the past year on Kauai? Please document

Since diesel fuel is not registered for use as an herbicide for marijuana eradication by the EPA, how do you plan to respond to a potential EPA investigation?

How do you plan to keep the pristine quality of our basil aquifers and important watershed areas used for domestic purposes from contamination from the planned chemical sprays?
How are helicopter operator sprayers paid, if they are paid by the amount of volume spray discharged, what assurance do do we have that the operators are not "dumping" or overspraying simply to increase profits? What kind of monitoring will be used to assure appropriate distribution of the proposed chemicals on the sites?

How are the helicopter pilots selected and what criteria is used to select them for this highly specialized spraying operation?
Who is training them and what is the trainer's background in spraying toxic chemical's in watershed areas ?

Who specifically is responsible for determining which areas are to be sprayed and which are sensitive areas and who is

responsible for assuring that the determination is carried out accurately?

How long will the program continue, if it is implimented and during what months would spraying occur?

How often could the same site be sprayed and still support naturally occuring flora?

To protect and preserve the conservation lands, what is your plan to replant natural vegetation to prevent harmful weeds from taking over once eradicatrion has taken place?

Respectfully Submitted,

Eve Clute

1/5/86

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

December 17, 1986

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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AQUATIC RESOURCES
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Ms. Eve Clute
P. O. Box 11634
Lahaina, HI 96761

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for you comments on the draft EIS. Our response follows the order of the points made in your statement.

1. Runoff and effects on soils.

Prevention of water contamination from runoff is addressed in several ways. The first is by avoidance of spraying near any water body with a buffer of at least 100 feet for aerial spraying and 25 feet for hand spraying, and by spraying will during clear weather. The oil sprays volatilize rapidly, and the residue clings to the plants. Rain would have to fall right after spraying to wash it away.

The second is utilizing only non-persistent chemicals known to break down readily.

Finally, to provide addtional assurance that Weed Oil actually behaves as it is supposed to, a special test is being arranged in two different forest environments, a dry area and a wet area. Soil samples will be taken before spraying, immediately after, and again in two weeks, to determine the residual amounts of Weed Oil in the soils. A control area will also be sampled. A botanist will also do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

Note that the tests are only being done on Weed Oil. Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

2. Effects on wildlife.

There is no way to prevent birds and other wildlife from eating contaminated seeds if they choose to do so. One of the advantages of using an oil spray is that a sprayed plant first

wilts, then turns brown. It also has an unpleasant odor. It seems unlikely that many birds or other wildlife would choose a seed sprayed with Weed Oil over an untainted seed unless they were starving.

3. Effects on humans.

The comment above on wildlife would also apply to humans.

4. Forest fires and accidents.

The principal potential fire hazard of Weed Oil is associated with filling containers, a hazard similar to those that exist at a service station. It is important to avoid smoking and the generation of sparks in such an area. Loading will be done in cleared areas to avoid any possibility of a forest fire.

A fire hazard would also be presented in the case of an accidental spill or crash, although the amount of hazard would be small relative to the crash of a commercial airliner or larger helicopter which carry large quantities of fuel.

Control of forest fires is an ongoing mission of the Division of Forestry and Wildlife. No special budget is planned.

5. Use of weed eaters for eradication.

This method is used now in manual eradication and will continue to be where appropriate. The material is is hauled away, and not left to decompose, to prevent regermination of marijuana.

6. Effect on archaeological sites.

DLNR's State Parks Division has researched the potential effects of the proposed chemicals on archaeological sites and informed us that these particular herbicides would not affect carbon dating.

7. Injuries to personnel.

We do not have figures on injuries sustained during Green Harvest Operations on Kauai. These are probably available from the Kauai County Police Department.

8. Use of diesel oil.

See Item 1. above.

9. Protection of ground water.

See Item 1. above.

10. Helicopter operators.

Aerial spraying operations are conducted by DLNR's conservation and enforcement officers who are well-trained in conservation practices as well as enforcement. Training in pesticide application is provided statewide through the Pesticide Applicator Training Program and other certified training programs. The State Department of Agriculture can provide more information on this subject.

11. Delineation of sensitive areas.

A description of the agencies named in the Operations Plan for Kauai is on page V-2 of the draft EIS. A similar group would be expected to be named to assist in developing operation plans for the other islands. DLNR is responsible for monitoring and enforcement of whatever guidelines are finally adopted.

12. Duration of program.

The program is planned to continue as long as it is needed and is proven effective. The months in which it will take place are determined by the marijuana growers.

13. Site respraying.

Unfortunately, as has been pointed out by many reviewers, naturally occurring flora are rarely seen again in areas where marijuana is grown because disturbance of the soil and the addition of fertilizers encourage more agressive exotic species. Spraying would not affect this. There are no plans to replant any areas except as part of ongoing reforestation and revegetation programs.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC 10 P1:54

FORESTRY & WILDLIFE
STATE OF HAWAII

Dec. 6, 1986

Dear Mr Landgraff,

Please send me a copy of the final Environmental Impact Statement of the Eradication of marijuana on State Owned Lands. (Hawaii, Maui, Molokai)

Thank You,

Kathleen W. Moser
575 Ulumalu Rd.
Haiku, Maui

KATHLEEN W. MOSER
575 ULUMALU RD
HAIKU. MAUI 96708

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Kathleen W. Moser
565 Ulumalu Road
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your communication. We appreciate your interest in this project, and will send you a copy of the Final Environmental Impact Statement when it is printed.

Sincerely,

Libert K. Landgraf
Administrator

Mr. Libert K. Landgraf, Administrator
Division of Forestry and Wildlife
Dept. of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii

5 December, 1986

Dear Mr. Landgraf;

This community is concerned about the method(s) now being proposed for the eradication of Cannabis sativa on Moloka'i.

Yes, agreed, it is highly probable that at least several, if not the majority, of those who spoke out at the informational session held in Kaunakakai, Nov. 24, did so because of narrow and illegal self-interest. On the other hand, I wish to speak for the majority of us, myself included. We have never used mind-altering substances beyond fermented hops and/or nicotine: we believe your ends are fine and justified, we are disturbed by your means to this end.

I wish to make three points regarding what your agency has in mind, the third point to be prefaced by a short parable.

1) How ironic. This past week, I was notified by Maui's Department of Water Supply that my "water (system had been) violated". Ualapue had exceeded the allowable "maximum containment level for coliform bacteria". Yet, at the same time this notice arrives in the mail, I hear that your agency proposes to use chemical defoliants which could leach into the aquifers drawn upon by our people.

   There is another irony. Well intended, but weak, is the argument that the seeds of exotics are introduced on the footwear of marijuana growers. (Ergo, halt the activities of these growers, and the replacement of our native flora by exotics will be slowed down, if not halted?)

   Please. As one who has followed the national news of these past two weeks, I've had my fill of fallacious reasoning.

   What's to be done with those of us who just plain like to hike? What about hunters, who range far more afield that pot growers? What about fact; that marijuana does best with maximum radiation, and hence is planted in lowland areas where exotics, with the exception of some grasses and ferns, have almost entirely replaced the native flora?

2) One of your proposed defoliants, ROUNDUP, is essentially non-discriminatory. To speak of its use in an aerial spray disregards the caution on page 13 of the manufacturer's booklet: "The likelihood of injury occurring from the use of this product is greatest when winds are gusty or in excess of 5 miles per hour or when other conditions, including lesser wind velocities, will allow spray drift to occur". You are using helicopters which have no downdraft?

5 December, 1986

   You are concerned with seed introduction but are not concerned by the potential damage by wind drift?

   We have possible introduction of a pollutant into our water supplies and we, should your own arguments re seeds/exotics/native flora apply, are liable to lose more than we gain.

3) Speaking of liability, here the parable.

   "And the Lord spoke unto Moses, saying: 'There is both good news and bad news. The good news is that plagues shall smite your Egyptian oppressors. The Nile shall be turned to blood, and frogs and locusts shall cover the fields, and gnats and flies shall infest the Pharaoh's people, and their cattle shall die and rot in the pastures, and hail and darkness shall visit punishment upon the land of Egypt! Then will I lead the children of Isreal forth, parting the waters of the Red Sea so that they may cross, and thereafter strewing the desert with manna so that they may eat.'

   And Moses said, 'O Lord, that's wonderful! But tell me, what's the bad news?'

   And the Lord God replied, 'It will be up to you, Moses, to write the environmental impact statement."

   An EIS.

   Gods have a higher authority than most of us -- they can make a decision, even take action, before the necessity to care for tidier aspects. However, it is my understanding that defoliatnts were used for this same purpose on Kauai, and it is only now that an EIS is in process. This seems strange timing. According to the National Environmental Policy Act of 1969, upheld by Latham versus Volpe, that an EIS must "be prepared early in the administrative process leading to the approval of a project", something is tardy.

   We of Moloka'i trust that you will abide by this directive and, furthermore, (Section 102-2-D), "study, develop, and describe appropriate alternatives to (the) courses of action" you have in mind.

The first sentence of this letter is worth repeating. This community is concerned about the method(s) now being proposed for the eradication of Cannabis sativa on Moloka'i.

Yours sincerely,

Jan Ashhouse, PhD

cc: Governor John Waihee
Representative Bill Pfeil
Ms. Letitia F. Uyehara
Ms. Jacqueline Parnell

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Roz Ritter
P. O. Box 652
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. The Department of Land and Natural Resources has no intention of damaging the rain forest. This Division is responsible for forest management and protection. The purpose of the proposed project is to fulfill our responsibility to protect the forested areas from the destruction caused by marijuana growers.

As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

LAW OFFICES OF
JACK F. SCHWEIGERT & ASSOCIATES

250 SOUTH HOTEL STREET, SUITE 200
HONOLULU, HAWAII 96813
TELEPHONE (808) 536-7401

OF COUNSEL
DR. GERRY M. FLICK
CABLE: MEDLAW

RECEIVED
'86 DEC -5 P12:00
FORESTRY & WILDLIFE
STATE OF HAWAII

December 8, 1986

Libert K. Landgraf
Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

RE: Eradication of Marijuana on State-owned and managed Conservation District lands = **COMMENTS**

Dear Mr. Landgraf:

Please note that the statistics were shown in The Honolulu Advertiser, October 10, 1986, @ p.1, that read as follows regading marijuana consumption:

> An estimated 62 million Americans have tried marijuana **AT LEAST ONCE** in their lives.
>
> The number of people who use marijuana on a **REGULAR BASIS** is estimated at 18.2 million as of 1985.
>
> An estimated 6 million Americans smoke marijuana **DAILY**.

Based on the foregoing as well as a change in Administration, it seems clear that an EIS should consider an alternative to eradication, to wit: promulgation of rules designed to legalize the substance. In view of the number of Americans that we are dealing with (the figures almost seem

ERRATA PAGE

Libert K. Landgraf
December 8, 1986
Page 2

staggering) to ignore the choice of so many people without **CLEAR AND CONVINCING EVIDENCE** of a danger to one's health from the substance is undemocratic.

Regards,

Jack F. Schweigert

JFS:dwr3
EIS.lt
PS: Please comment to the above and incorporate your answer in the final environmental impact statement to be issued in this case.

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Jack Schweigert
250 S. Hotel St., S. 200
Honolulu, HI 96813

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

The Department of Land and Natural Resources has no authority to promulgate rules legalizing marijuana. The State Legislature would have to change the laws first.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED

DEC 10 P1:53

FORESTRY & WILDLIFE
STATE OF HAWAII

Dear Mr. Libert Landgraf, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources

I am feeling [illegible] from your plan about spraying chemicals and [illegible] to [illegible] marijuana. Think it is a very [illegible] thing to do. It is a known fact that the poison not only [illegible] the target, but whatever else grows around and [illegible] goes drifting. It is not the solution. We have enough problems with polluted water and air already, please don't add to it. For our children's sake, for the future, we must be more [illegible] with what we do.

Please send me the final [illegible] of the [illegible] of Marijuana on state owned lands

Sincerely [illegible]

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Jette Slater
575 Ulumalu Rd.
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

We share your concern for prevention of water contamination. Spraying will not be done near any water body. There will be a buffer zone of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Maui County Department of Water Supply will be asked to assist us in making certain all water bodies, including water catchment basins, are identified. The Department of Health will also be consulted.

We appreciate your interest in this project, and will send you a copy of the Final Environmental Impact Statement when it is printed.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC 10 P1:54

FORESTRY & WILDLIFE
STATE OF HAWAII

Dec. 4, 1986

Libert K. Landgraft, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

After attending the Public Hearing on Maui, it is obvious that this is a very reckless and badly thought out solution to the problem of Marij uana cultivation on State Land.

The idea of spraying the rugged areas of East as well as West Maui from helicopter is not compatable with the distances given out at the Hearing, which should protect open water, endangered species, etc. There appears to be no basis for estimating actuall drift over this type of canyon terrain. Likewise we hear of no real expertise as to the actual nature of the water flow in these specific areas.

Our water is already tainted by agricultural chemicals, this is now documented. There is no discussion as to any of the possible reactions which could take place between the proposed compounds (diesel especially) and the existing trace polutants. We are just finding out the extent of existing polutants. There is no president for studying possible reactions between many of these compounds. Besides the reactions which could take place in the water, there is also the obvious danger of adding any level of toxins to the bodies of people who have already been subjected to various pollutants.

The consequences of tainted Marijuana being sold after tratment were not addressed. The several days involved for glyphosphate to react (documented by the Big Island Police Dept.) insure that there will be poisoned Marijuana sold with the state as an accomplace. The possibility of distillates made from the diesel tainted plants was not addressed. This type of thing has been done elsewhere, producing a type of poisoned "Hash Oil".

This program risks having the same final result as the U.S. resent attempts to stop cocain cultivation in Columbia, simply causing a relocation of cultivation areas (in this case toward National and County lands).

The presidents set by such a plan as this are awsome. Over the past years we have been presented by our state and Federal Governments proporals to pollute our watershed with Malathion in the name of the fruit fly, 2,4,D in the name of Federal Marijuana Eradication. The county has sprayed the edges of Irregation Ditches for cosmetic value? The Government is here to protect the health of the people as its first priority.

I hereby demand a copy of the final Environmental Impact Study of " Eradication of Marijuana on State-Owned and Managed Conservation District Lands, Islands of Hawaii, Maui and Molokai.

Sincerely,

Steve Slater
575 Ulumalu Rd.
Haiku, HI 96708

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Steve Slater
575 Ulumalu Rd.
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We are responding to the points you raised in the order they are presented in your letter.

1. Herbicidal drift.

There will be no widespread indiscriminate spraying. The spraying mechanism utilized by DLNR is designed to produce large droplets and minimize drift, the exact opposite of most spraying operations where the applicators are trying to produce a fine mist to maximize coverage. With this mechanism, the spray can be concentrated on the individual marijuana plants. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

On Kauai, direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

2. Water contamination.

Spraying will not be done near any water body. There will be a buffer zone of at least 100 feet for aerial spraying and 25 feet for hand spraying. A representative of the Maui County Department of Water Supply will be asked to assist us in making certain all water areas, including water catchment basins, are identified.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. A special test of Weed Oil will be made in two different types of forest area, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion. Before glyphosate is used, field tests will be made

with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

3. Sale of contaminated marijuana.

The possibility of tainted marijuana being sold and used was addressed in the draft EIS. One of the advantages of using an oil spray is that a sprayed plant first wilts, then turns brown. It also has an unpleasant odor. The result is an unsalvageable product.

We do not understand your point on the possibility of a distillate being produced from the dead plants and then sold and consumed. Do you mean that people drink it? We are not aware of this happening and would appreciate any specific information that you could provide us.

3. General concerns

As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project, and will send you a copy of the Final Environmental Impact Statement when it is printed.

Sincerely,

Libert K. Landgraf
Administrator

'86 DEC 10 P2:30
FORESTRY & WILDLIFE
STATE OF HAWAII
FORESTRY & WILDLIFE
STATE OF HAWAII

December 8, 1986

Dear Mr. Landgraf:

I recently became aware of the plan to spray 76,000 acres of Maui's rainforest with diesel oil, glyphosate, and weed oil. In my judgement, there is no proof that this would be a safe solution to the problem. There is not enough knowledge and research regarding the possible effects on the water, wildlife, and environment.

I believe that one of our basic rights is to enjoy clean, safe water, and an environment unthreatened by chemicals. The threat to our environment from improper use of chemical herbicides and pesticides is

just beginning to be understood.

If eradication of marijuana must be enacted, for the sake of my family I request that only manual and mechanical means be used.

Thank you for listening, and I urge you not to allow this spraying.

Sincerely,

Julie Sutton
Star Rt #32 Hana Hwy
Hana, HI 96713

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Julianne Sutton
SR #32, Hana Hwy.
Hana, Hawaii 96713

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

There will be no widespread indiscriminate spraying. The spraying mechanism utilized by DLNR is designed to produce large droplets and minimize drift, the exact opposite of most spraying operations where the applicators are trying to produce a fine mist to maximize coverage. With this mechanism, the spray can be concentrated on the individual marijuana plants. The small diameter of the spray circle minimizes lateral drift and the downdraft of the helicopter tends to direct the spray downward.

Weed Oil is the only herbicide planned to be used for marijuana eradication in the near future. Glyphosate will be used only if Weed Oil is unavailable. A special test of Weed Oil will be made in two different types of forest area, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion. Before glyphosate is used, field tests will be made with follow-up monitoring prior to its use for full-scale marijuana eradication. Diesel oil cannot be used until approval is received from EPA.

As noted in the DEIS, there will be some unavoidable adverse impacts on non-target vegetation, insects, and possibly on birds and small animals, just as there are using manual eradication methods. Given the methods that will be used to spray, the risk of an occurrence of exposure and injury to a hiker would be very low. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

RECEIVED
'86 DEC -5 P2:35
FORESTRY & WILDLIFE
STATE OF HAWAII

12/2/86

This testimony is in regards to the state of Hawaii's plan to spray herbicides on marijuana patches in state conservation lands. I am opposed to the proposed use of herbicides, and would like to bring the following considerations to your attention.

In the innitial tests of these marijuana-eradication techniques on Kauai and the Big Island, where is the actual field-tested data on wind drift and runoff? Was there any actual testing downwind and downstream from the sprayed areas, and was such testing done at a time that corresponds with wind speed and rate of runoff? Or was such testing done at a random time that may not actually indicate the extent the herbicides spread into the surrounding environment? Were the wildlife and native vegitation monitored for damage during the test spraying?

Would the state monitor the air and water for herbicide drift in potentially susceptible areas? Would the time of testing correspond to the times that spraying is occuring? Would native flora and fauna be monitored during future spraying operations? Or is the state sufficiently satisfied with the innitial tests that it deems future monitoring unnecessary? At present, there is no provision in this plan to cease spraying of herbicides in conservation lands once the plan is operational, should future monitoring show that the proposed practices are unsafe for a specific watershed or an entire region . The provision in the EIS for identification of sensitive watersheds is too vague to effectvely protect the public interest. There should be some recourse if the program prove to have undesirable sideaffects.

Given that the safety testing for glyphosate, done by International Biotest Labs, was fraudulent, what other sources does the Dept. of Land and Natural Resources rely upon to show that this herbicide can be safely used? How does the DLNR respond to other studies, presented at the Maui hearing, which show that glyphosate is both carcinogenic and persistent in the environment? What is the active herbicidal ingredient of weed oil, besides the oil itself? What information do you have about the toxicity and decomposition of this compound?

The preceeding questions must be answered inorder to weigh the impact of the proposed herbicide spraying. Without these answers, the EIS for the proposed program is incomplete. Equally important as the technical data on winddrift and toxicity, is the social impact of this program.

The bottom line is that this program is undemocratic. The proposed spraying would subject thousands of people to the potential contamination of their drinking water in a way that they could do nothing about. The DLNR would be subjecting the people of this state to a very direct risk for the sake of a very indirect benefit . If someone chooses to grow marijuana, he does so knowing that there are personal risks, like being arrested or losing his crop to thieves. Likewise, a police officer takes on his job with the understanding that there are personal risks involved. Both sides are voluntary participants. If you bring herbicides into this ongoing battle, you force people to be involved,in a negative way, who need not be effected otherwise.

The people of Maui, at least, seem to recognize this as a matter of simple common sense. No matter how you juggle the statistics about toxicity and runoff, it doen't change what will actually happen: If you spray herbicides all over a rainforest, they will eventually get into the streams, which in this case feed our public water system for upcountry Maui and Hana.

In addition, it seems that the so-called "test" spraying on Kauai and the Big Island was more for the purpose of assessing the level of political resistance from the population than for testing the effect of these toxins on the environment. In other words, the program is due to be expanded not because it is safe, but because very few people stood up against the proposal- until the hearing on Maui.

Finally, it is important to recognize the political climate in which such decisions are made. Presently, the anti-drug sentiment in this country is very high, and politicians are vying with each other to look more "anti-drug" than their contemporaries. This leads to rash and unreasonable solutions that look good on paper, but in practice, do more harm than good. For example, this year, the U.S. congress came very close to authorizing arrests based on illegally gathered evidence, and making the death sentance possible for large-scale drug dealers. These amendments to the federal anti-drug package were deleted in the senate as a compromise to hasten

passage of the overall package. We came very close to seriously undermining our system of justice because of the pre-election zeal in congress. It is my heart-felt wish that the leaders of this state consider this, and put the long term good of the people before the short term good of their public relations.

Sincerely,

Niles Szwed
P.O. Box 850
Makawao, Maui, Hi
96768

cc: L. Landgraft, DLNR
L. Uychara, OEQC
Dept. of Health
J. Waihee, Gov.& B. Cayetano, Lt. Gov.
H. Tavarres, Mayor of Maui& Maui County Council
Honolulu Advertiser
Maui News
E. Clute, Safe Solutions

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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CONVEYANCES
FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Mr. Niles Szwed
P. O. Box 850
Makawao, HI 96768

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments. We are responding to the points you raised in the order they are presented in your letter.

1. Monitoring

Before and after photographs of the initial spraying of Weed Oil on Kauai show minimal adverse environmental impacts. Direct spraying was done only on marijuana plants. There was very little drift onto any vegetation outside the target areas - never more than a few feet - and regrowth in these areas was readily apparent upon inspection one month later.

Because the inaccessibility of the terrain on Kauai (which makes aerial spraying a desirable alternative) precluded before and after soil sampling, a special test of Weed Oil is being arranged to provide additional assurance of its safety in a forest environment. The special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

No tests are planned for glyphosate because there is no present intention to use it in marijuana eradication. If Weed Oil becomes unavailable and glyphosate must be substituted, field tests will be made with follow-up monitoring before it is used for full-scale marijuana eradication.

2. Pesticide drift.

DLNR's conservation and enforcement officers are well-trained in conservation practices as well as enforcement. Fortunately, the green color of the marijuana plants, usually

surrounded by a cleared bare area, is distinctive from the air. The pilot keeps the helicopter well above the forest canopy.

The spraying mechanism utilized by DLNR is designed to produce large droplets, the exact opposite of the fine droplets used in most spraying operations where the applicators are trying to produce a mist or fog to maximize coverage. By the use of this mechanism, spraying a foot or so above the plants and under conditions of low wind and moderate humidity and temperature, the spray is concentrated on individual plants.

3. Sensitive areas.

The criteria for defining sensitive areas has been deliberately left vague for the same reason maps will not be made public. Marijuana growers may use this information to seek out the most fragile environmental areas in the belief they will then be free from eradication efforts. They may still do this based on existing information, but we have no intention of assisting them.

The panel that will prepare the sensitive areas map will include qualified botanists and biologists, and representatives of the Maui County Department of Water Supply and the Department of Health. The Operations Plan will specify that they will be consulted if there are any questions about a specific area before a field operation takes place.

4. Program follow-up.

Monitoring measures are described in the draft EIS in the guidelines for the development of the Operation Plans. Monitoring will be accomplished as a joint interagency effort, by state and federal agencies responsible for resource protection. If there are problems, the program will either be modified to address the problems, or if that is not possible, stopped.

As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

Division of Forestry & Wildlife
Department of Land and Natural Resources
Attention: Libert K. Landgraf, Administrator
P.O. Box 621
Honolulu, Hi. 96809

December 7, 1986

RECEIVED
'86 DEC 10 P2:09
FORESTRY & WILDLIFE
STATE

Dear Mr. Landgraf:

This is my commentary on the Draft Environmental Impact Statement for the plan to spray Diesel Oil, Weed Oil and Glyphosate into State Conservation Lands in an attempt to eradicate marijuana.

Hawaii has more endangered bird species than the rest of the U.S. combined. It has more endangered species of all kinds than any other state. Our island ecology is extremely delicate. I can't bear to think of chemicals or oils sprayed into 72,000 acres of rainforest on Maui.

Visualize a helicopter hovering above a canopy of trees, with a 100 foot long hose with a nozzle on the end suspended below a thick canopy of green. How can the pilot, who the DEIS states, is in control of the spray see below a canopy of trees to specifically direct these chemical substances, much less keep them out of the water? How will he be able to tell if birds are getting sprayed with the target and non-target vegetation?

The DEIS says of weed oil, "the label notes that weed oil will damage or kill all green plant growth. It should be kept out of lakes, streams and ponds, or fish and other aquatic life may be killed."

Why is this even being considered for use in a rainforest?
In the DEIS it says: "The objective of the eradication program is to preserve the character and resources of the state-owned and managed Conservation District Lands, in order to make these areas safe for

Public recreation, and other uses, and to protect native plant and animal habitats from further destruction by people engaged in cultivation of marijuana." I would ask you why you are concerned only with damage of one group and are not concerned with the damage that would be caused by a proposal like this? It is the JOB of the Department of Land and National Resources to protect the forests and the water. The KLNR Rules of Practice and Procedure nowhere mention authority obligated to deal with illegal matters or chemical eradication procedures. Why are you involved in this?

I would like to know why you are undermining your own objectives in a way that is more harmful to the environment than that which you are trying to eradicate? How do you intent to keep sprays in a rainforest out of the water? In my opinion there is no way the chemicals sprayed in a rain forest will stay out of the water. There is no "prudent" place in the forest to spray pesticides.

The pineapple company promised us that there was no way that DBCP would get into the water of Hawaii. Now it has been found in wells that are contaminated and closed. It got there by seeping down into the water table.

Glyphosate is Water Soluable. How do you intend to keep it from seeping down into the water table, or directly landing in the water? The Department of Health in it's Oct. '86 publication names Glyphosate in a list of pesticides most likely to contaminate ground water.

The DEIS tells us "Glyphosate is a realitively new herbicide. The environmental fate and potential ecological effects of the use of glyphosate in forests have yet to be studied extensively. How can you justify making guinea pigs of Maui's residents?

Glyphosate is a broad spectrum non-selective herbicide. We do not know what it does to humans. Since these substances have already been used in Kauai, we need to study the effects for years

before we risk the remainaing rainforests of Hawaii. The DEIS states that records will be kept and monitoring programs will be established. I did not get a feeling of confidence in this when I talked to you on the phone and found out you didn't know who was carrying the program out on Kauai or who was monitoring it. You didn't know who was hiring the pilots, who have been given responsibility for the spraying. You said 3rd parth scientists were monitoring the water, yet you didn't know who they were, where they came from , the results of the tests if any. Please educate us in the final EIS as to the tests and results. How have you monitored the chemical level in the water of Kauai's Rainforest? Are the EDIS's and our own objectives of safety really furthered by experimenting on our drinking water and delicate ecological system with an herbicide whose effects are not known?

In the DEIS it states: "Diesel oil by itself cannot be sold for use as an herbicide for marijuana eradication because it is not registered for that use with the Environmental Protection Agency. Diesel oil is not approved as an herbicide and therefore, under no circumstances should it be used in our pristine rainforests.

The DEIS states that weed oil "evaporates and forms vapor fumes which can burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources" How do you intend to protect the forest from fire or put one out in hard to reach areas?

I ask, does this truly serve the stated objectives of making these areas safe for public recreation and safe for plants and animals?

With the delicacy of an environment with the most endangered species in the U.S. it may be tragic to experiment with this plan and distroy the habitat these creatures need.

I urge you to deny use of glyphosate, Chevron Weed Oil and Diesel Oil, and rely solely on manual and mechanical eradication to eliminate

FORESTRY & WILDLIFE
STATE OF HAWAII

TO WHOM IT MAY CONCERN

Please do not spray chemicals or diesel oil onto the water shed area of Maui .....or any area whatsoever. Our ecology is fragile now. There are already a dangerous amount of chemicals entering into our water and our food supply thru spray and other means. Why take chances that could be disasterous?

Look at the penalty our precious earth is paying with the ozone level being impaired thru a result of something we didn't anticipate. How crazy can we get as a people to keep poisoning the land and environment on which we live?

There are other means to control ~~xxx~~ the marijuana problem. Green harvest has been successful in the past. Let's not go off into a witch hunt to destroy every last marijuana plant and forget that in so doing we could be creating a monster so much worse than the one being destroyed.

Stop and reflect before we create another crisis!

Yours sincerely,

Jae Webster

637 Mililani Place
Kihei
November 19, 1986

FORESTRY & WILDLIFE
STATE OF HAWAII

RECEIVED
'86 DEC -9 P2:39

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Jae Webster
637 Mililani Place
Kihei, HI 96753

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air.

Only Weed Oil is planned for use at the present time. Glyphosate will be used only if Weed Oil becomes unavailable for purchase.

Given the methods that will be used in spraying, we believe the risks to the environment and to people will be very low. Even then, as noted in the draft Environmental Impact Statement, there will be some unavoidable adverse impacts on non-target vegetation, insects, and possibly on birds and small animals, just as there are using manual eradication methods. These risks must be weighed against risks of injury to hikers and the damage caused to native ecosystems by the marijuana growers.

Our agency is responsible for the protection of Conservation District lands. We have no intention of destroying our natural resources. Mr. Alan Holt of The Nature Conservancy sets forth the dilemma very well in his comments on the DEIS. He writes that

> We regard the addition of chemical methods to the eradication program as an unfortunate but necessary compromise, justified only by the greater threats posed by marijuana cultivation in conservation lands.

The Operation Plan guidelines are intended to ensure that any possible adverse effects are kept to a minimum.

We appreciate your interest in this project.

Sincerely,

Hubert K. Landgraf
Administrator

SR 93
Ha'iku, Hawai'i 96708
December 3, 1986

Susumu Ono, Chairperson
BLNR
1151 Punchbowl Street
Honolulu, Hawai'i 96813

Libert Landgraf, Administrator
Division of Forestry & Wildlife
DLNR
1151 Punchbowl Street
Honolulu, Hawai'i 96813

Re: CDUA and Draft EIS for Eradication of Marijuana on State-Owned Properties on the Islands of Hawaii, Maui and Molokai

Dear Mr. Ono and Mr. Landgraf:

The following comments are submitted both as testimony on the CDUA and as comment on the Draft EIS (DEIS). They concern procedural irregularities in the preparation of the DEIS. I also endorse the comments made by the Ke'anae-Wailuanui Community Association.

I am very concerned about the blatant flaunting of the EIS Rules which have taken place in the preparation of this EIS. DLNR is very familiar with these Rules; its Office of Conservation and Environmental Affairs is doubtless one of the experts in the state in this area. A former director of the Office of Environmental Quality Control is the consultant in this project. Nonetheless, DLNR has proceeded as if the Rules were made to be ignored.

On August 1, 1986 I wrote to the consultant and asked to be a consulted party and asked for an Environmental Assessment (EA) to be sent to me immediately via first class mail. I received no reply until October 10, 1986. In the interim I assumed that the plan had been dropped as I knew that DLNR was very well aware of the EIS Rules which required the consultant upon receipt of my letter to make a written request to me for comments and accompany that request with a copy of the EIS preparation notice, which in this case was the same as the EA. I had intended to bring the EA to the attention of other individuals and groups, such as the Sierra Club, Maui Group; Safe Solutions; and the Ke'anae-Wailuanui Community Association, of which I am a member. These groups would doubtless have informed others. Since I did not receive the EA until October 10, and the comment period had ended on August 22, I was precluded from doing so. I was not even able to ask for a 30-day extension, since the time for that had also passed.

On October 27 I wrote to Mr. Landgraf explaining the situation and cited the EIS Rule which specifies that agencies shall endeavor to develop a fully acceptable EIS prior to the time it is filed, through a full and complete consultation process, and shall not rely solely upon the review process to expose environmental concerns. (See attached Exhibit A). I requested that DLNR withdraw the EA and refile it so that the required consultations could be had, and not file the DEIS until this had been done.

The consultant who wrote the DEIS, Jacqueline Parnell, called me on November 3 and apologized. She said my interpretation of the Rules was absolutely correct and that it was her mistake that I was not sent the EA immediately. She asked if it wouldn't be sufficient if I commented on the DEIS. I told her that it would not be sufficient and that the Rules specifically required the consultation period. She told me that DLNR was very anxious to get this process completed as soon as possible so that the CDUA could be decided upon before Mr. Ono goes out of office.

On November 12 I received the DEIS along with a letter from Mr. Landgraf dated November 5. He stated that had I written him rather than the consultant, DLNR would have responded in a timely matter (I think he meant manner). The OEQC Bulletin listed both addresses, and it has been my experience in the past that I obtain a quicker response from the consultant, since that is the person who is actually doing the work and correspondence. Clearly, the consultant is an agent of DLNR, and her errors must be attributed to the agency. Furthermore, two persons who did write to DLNR and did specifically ask to be consulted parties, Kelly Arbor and Dr. Mark Sheehan, also did not receive replies until after October 8. Dr. Sheehan was not even then sent a copy of the EA. (See DEIS, Appendix D).

In addition, none of the three organizations I mentioned were sent copies of the EA, (although the EA stated incorrectly that the Sierra Club, Maui Group was sent a copy), even though DLNR is well aware of the interest of these groups in maintaining the integrity of our watersheds.

It appears that the Rules were ignored for expediency's sake. Both the spirit and the letter of the EIS Rules has been violated. The Final EIS cannot be accepted because the consultation process has not been completed satisfactorily as required by Section 11-200-23 (b)(1). It is too late to remedy these errors, unless the DEIS and the EA are withdrawn and the proper consultations held.

Sincerely,

Elaine S. Wender

cc Jacqueline Parnell
John Arrsumi

SR 93
Ma'iku, Hawai'i 96708
248-8985

October 27, 1986

Libert K. Landgraf
Administrator
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl St.
Honolulu, Hawai'i 96813

Re: Eradication of Marijuana on Conservation Lands, Islands of Hawaii, Maui, and Molokai
Environmental Impact Statement Notice of Preparation

Dear Mr. Landgraf:

On October 10, 1986 I received your October 8 reply to my letter of August 1, 1986 in which I asked to be a consulted party in the EIS process and asked for a copy of the Environmental Assessment (EA). A copy of the EA was enclosed in your October 8 letter.

As you know, the comment period for the EA ended on August 22, 1986. By sending me the EA after the conclusion of the comment period I have been precluded from commenting on it. It was also my intention to bring the matter to the attention to other individuals and groups. By not receiving the document in a timely fashion, I am not able to do that.

The EIS Rules specify that:

> agencies and applicants shall endeavor to develop a fully acceptable EIS prior to the time the EIS is filed with the office, through a full and complete consultation process, and shall not rely solely upon the review process to expose environmental concerns. (11-200-15(a))

They also specify that upon the receipt of a request to become a consulted party,

> the proposing agency or applicant shall make a written request to the agencies, groups or individuals who wish to be consulted for comments and shall accompany said request with a copy of the environmental impact statement preparation notice. (11-200-15(c))

In this case the EA and the Notice of Preparation of EIS are the same document.

The opportunity to comment on the Draft EIS is <u>not</u> a substitute for participation in the consultation process.

Section 11-200-15(b) does provide for a 30-day extension of the comment period. Unfortunately, the EA was sent so late that even this 30-day period had passed already.

Therefore I must request that you withdraw the EA which has been filed and refile it so that the required consultations may be had. Also the Draft EIS, which I understand is scheduled to be published shortly, should not be submitted until after the close of the consultation period.

I have received notice that public hearings on the CDUA application have been scheduled before BLNR for November 17, 18 and 24, 1986. In order to comply with the purposes of Ch. 343 and to afford DLNR and BLNR the opportunity for maximum imput from the public, the hearings should be rescheduled for after the publication of the Draft EIS to afford the public an opportunity to make a meaningful review prior to the hearing. The two processes of approval of the CDUA and acceptance of the EIS should be coordinated so that the purposes and intent of Ch. 343 are complied with. This is particularly true in this case since BLNR is the approving agency.

I look forward to your prompt reply.

Sincerely,

Elaine S. Wender

cc: Susumu Ono
OEQC/Environmental Council

EXHIBIT A

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

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FORESTRY AND WILDLIFE
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Elaine S. Wender
SR 93
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Dear Ms. Wender:

We can only repeat what we stated in our previous letter of November 5, 1986, that you are correct. The fact is that you did not participate in the consultation process. An error was made in not sending you a copy of the preparation notice and assessment in a timely manner. The documents intended for the Maui Group of the Hawaii Chapter of the Sierra Club were mailed from this office to Ms. Mary Evanson who is listed in Malama i ka Honua as Chair of the Maui Group.

We have tried to remedy this error and have solicited your comments and other public input through a widespread distribution of the Draft Environmental Impact Statement and by advancing the schedule of the public hearings on the CDUA. We have received many constructive and useful comments.

The question on whether this error invalidates the entire process and requires us to start over again is being investigated.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator

November 10, 1986

Dear Ms. Uychara

Regarding the proposed spraying of Roundup and/or diesel oil on State land where marijuana is grown, I am asking you to do everything in your power to stop such a program. There are enough polutants on Maui as it is, without spraying needless more into our watersheds. I say "needless" because we already have a highly successful "green harvest" program.

In your campaign you spoke of protecting the environment. If you are true to your promises, and if you want my continued support, you will vote against such a dangerous and unnecessary program here in Hawaii.

Thank you,

Sincerely,

Elaine S. Wender

November 10, 1986

Dear Ms. Parnell

Regarding the proposed spraying of Roundup and/or diesel oil on State land where marijuana is grown, I am asking you to do everything in your power to stop such a program. There are enough polutants on Maui as it is, without spraying <u>needless</u> more into our watersheds. I say "needless" because we already have a highly successful "green harvest" program.

In your campaign you spoke of protecting the environment. If you are true to your promises, and if you want my continued support, you will vote against such a dangerous and unnecessary program here in Hawaii.

Thank you, + Aloha,
Elizabeth, Yoko + David Wertheim
John + Diane Ramsey

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
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LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 17, 1986

Ms. Elizabeth Wertheim, et al.
880 Hana Hwy.
Haiku, HI 96708

Re: Draft Environmental Impact Statement for the Eradication, by Chemical and Physical Means, of Marijuana Grown on Conservation District Lands Owned and Managed by the State of Hawaii on the Islands of Hawaii, Maui and Molokai.

Thank you for your comments.

There will be no widespread indiscriminate spraying. Aerial spraying will be limited to marijuana patches clearly visible from the air. To provide additional assurance of its safety in a forest environment, a special test of Weed Oil, the only herbicide planned for use in the near future, will be made in two different forest areas, a dry as well as a wet. Soil samples will be taken before spraying, immediately after, and again in two weeks. A control area will also be sampled. A botanist will do before and after studies to document the degree and amount of drift and subsequent damage to plant life, if any. The results of these tests will be made public upon completion.

The Green Harvest operations have been effective, but not effective enough. The growers continue to proliferate and cause damage to native ecosystems.

As noted in the DEIS, there will be some unavoidable adverse environmental impacts from chemical eradication measures, just as there are using manual eradication methods. These environmental risks must be weighed against risks of injury to hikers and the severe damage caused to native ecosystems by the growers. The Operation Plan guidelines are intended to ensure that adverse effects are minimal.

We appreciate your interest in this project.

Sincerely,

Libert K. Landgraf
Administrator