

September 6, 1978

MEMORANDUM

To: Honorable William Y. Thompson, Director
Department of Land and Natural Resources

Subject: Environmental Impact Statement for Kekaha Game Management
Area Noxious Shrub Control Project, Kekaha, Kauai

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes, and the Executive Order of August 23, 1971. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

When you make your decision regarding the proposed action itself, I hope you will 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, will provide you with a useful analysis of alternatives to the proposed action.


George R. Ariyoshi

bcc: Mr. Richard O'Connell
✓ Environmental Quality Commission



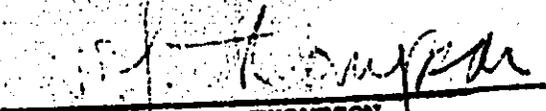
FINAL
ENVIRONMENTAL IMPACT STATEMENT

KEKAHA GAME MANAGEMENT AREA
NOXIOUS SHRUB CONTROL PROJECT

DIVISION OF FISH AND GAME
Department of Land and Natural Resources

Office of Environmental Quality Control
Office of the Governor
550 Halekauwila Street
Tani Office Building, Third Floor
Honolulu, Hawaii 96813

July 1, 1978


W. Y. THOMPSON
Chairman

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

LAND MANAGEMENT DIVISION
LAND ACQUISITION SECTION

LAND ACQUISITION SECTION
DEPARTMENT OF LAND AND NATURAL RESOURCES

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TABLE OF CONTENTS

	<u>Pages</u>
A. SUMMARY	i - iii
B. PROJECT DESCRIPTION	1 - 5
1. Map (see Appendix I)	1
2. Statement of Objectives	1
3. Description of the Action's Technical, Economic, Social and Environmental Characteristics	1 - 2
4. Use of Public Funds	3
5. Phasing and Timing of Action	3
6. Summary of Technical Data	3 - 4
7. Historic Perspective	4 - 5
C. DESCRIPTION OF ENVIRONMENTAL SETTING	6
D. RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS	7 - 8
E. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT	8 - 12
1. Area Affected and Vegetation	8 - 9
2. Effects on Wildlife	9 - 10
3. Effects on Fish and Aquatic Organisms	10
4. Effects on Agriculture	10
5. Effects on Ranching	10
6. Effects on the Natural Environments and Ecosystems	11
7. Effects on Recreation	11
8. Effects on Soils	11
9. Effects on Archaeological and Historic Sites	11
10. Effects on the Economy	12
11. Effects on Public Health	12
12. Secondary Environmental Impacts	12
F. UNAVOIDABLE ADVERSE IMPACTS	12
G. ALTERNATIVES TO THE PROPOSED ACTION	12 - 13
H. SHORT-TERM VS. LONG-TERM RELATIONSHIPS	14
I. MITIGATION MEASURES	14
J. IRREVERSIBLE COMMITMENT OF RESOURCES	14
K. OFFSETTING BENEFICIAL EFFECTS, INTERESTS OR CONSIDERATIONS	14
L. ORGANIZATIONS AND PERSONS CONSULTED	14 - 16

TABLE OF CONTENTS

	Pages
M. REPRODUCTION OF COMMENTS AND RESPONSES MADE DURING THE CONSULTATION PROCESS.	Appendix V
N. REPRODUCTION OF COMMENTS AND RESPONSES ON DRAFT EIS . .	Appendix VI
O. SUMMARY OF UNRESOLVED ISSUES.	16
P. LIST OF NECESSARY APPROVALS REQUIRED FOR ACTION	16
Q. LITERATURE CITED	16 - 18
APPENDIX.	I - V
- Maps of Southwestern Kauai and Project Area. . .	I
- Copies of Herbicide Labels	II
- List of Plants Found at Kekaha G.M.A., Kauai . .	III
- List of Animals Found at Kekaha G.M.A., Kauai. .	IV
- Reproduction of Comments and Responses Made During the Consultation Process	V
- Reproduction of Comments and Responses on the Draft E.I.S..	VI

A. SUMMARY SHEET:

b. Project Description

The Division of Fish and Game, Department of Land and Natural Resources proposes to control noxious shrubs, primarily lantana and aalii, in Kekaha Game Management Area, Kauai to improve game bird and mammal habitat for recreational hunting. The project area involves 500 acres of non-cropland consisting of specific target sites between 5 and 75 acres each, which will be sprayed with herbicides by helicopter. Two hundred acres, predominantly infested with lantana, will be sprayed with 1 lb. Tordon 22-K plus 3 lbs. 2,4-D in 10 gallons of water per acre. Three hundred acres, predominantly infested with aalii, will be sprayed with 3 lbs. of 2,4-D in 10 gallons of water per acre. Drift control measures including drift suppressants, wind speed limitations and specialized spray equipment will be employed. All specifications on the state registered labels of the herbicides used will be adhered to.

The Department of Hawaiian Home Lands and Kekaha Sugar Co., Ltd., who have vested interests in the land area involved, have no objections to the proposed project.

The entire project will be accomplished with public C.I.P. appropriations on Hawaii State government lands.

The project will involve a one-time application of herbicides to the target sites, during the peak period of vegetative growth (spring months) to produce the maximum benefits.

Experimental studies beginning in 1969 with the cooperation of the University of Hawaii Agriculture Experiment Station were carried out to determine the best herbicide treatments to use. Larger scale trials were carried out in 1971 and 1974. In 1975 an environmental assessment and negative declaration was prepared for the currently proposed 500 acre project. An environmental impact statement was subsequently required.

c. Description of the Environmental Setting

Vegetation in the project area is highly altered from past fires, over-grazing and noxious shrub invasion. Slopes on the target sites are gentle and soils only moderately susceptible to erosion. Rainfall averages 22 to 35 inches annually. Seven exotic mammals, 15 exotic birds and one indigenous bird are found in the area. No endangered species exist within or near the project area.

d. Relationship of Proposed Action to Land Use Plans, Policies and Controls

The proposed project is consistent with the Hawaiian Home Lands General Plan of 1976, County of Kauai General Plan, Department of Land and Natural Resources Cooperative Game Management Agreement with Kekaha Sugar Co., Ltd., and there is no apparent conflict with the Kekaha Watershed Environmental Assessment Plan objectives.

e. Probable Impact of Proposed Action on the Environment

The project will affect only the 500 acres of specific target sites within the greater 20,000 acre Kekaha Game Management Area, so long as prescribed drift control measures are taken. Only under extremely careless use of the herbicides could environmentally sensitive areas be affected.

Most broad-leaf woody plants, including lantana and aalii will be replaced by existing grasses and herbs which are resistant to the chemicals used.

No probable effects on fish or aquatic organisms, native ecosystems, agriculture, archaeological sites, or public health are evident, due to the remoteness of the project area.

Ranching, wildlife populations and public hunting will benefit from the project, since habitat that is currently infested with noxious shrubs will be converted to semi-open and productive pasture.

Only minor effects on the economy would be realized, which would result from increased sale of recreational hunting supplies, and possible improvement in the carrying capacity of rangelands for cattle production.

There are no identifiable secondary environmental impacts.

f. Unavoidable Adverse Effects

Temporary displacement of some cattle and wildlife from the 500 acres to be treated, as a result of the odor of the chemicals used, would be the only unavoidable adverse impact.

g. Alternatives to the Proposed Action

Mechanical clearing, burning, use of alternative chemicals, biological controls and no action have been considered as alternative actions and found unsuitable because of ineffectiveness, excessive expense, or possible unacceptable adverse environmental effects.

h. Short-term vs. Long-term Relationships

On the short-term, there will be temporary displacement of wildlife and cattle from the 500 acres to be treated with herbicides because of the odor involved with the chemicals used. Benefits from the project will be realized within one year after treatment, as noxious shrubbery is converted to semi-open pasture. Improved game bird and mammal productivity and use of the area by hunters should be apparent for at least ten years after treatment.

i. Mitigation Measures

No mitigation measures are deemed necessary as no permanent adverse effects are envisioned.

j. Irreversible Commitment of Resources

The manpower, funds and most of the broad-leaf plants within the 500 acres to be treated will be irreversibly committed by the proposed project.

k. Offsetting Beneficial Effects

None can be identified, except the previously cited benefit to cattle.

l. Organizations and Persons Consulted

Eighteen organizations and persons having expertise, or interest in various aspects of the project were consulted by letter. A list of those consulted is presented on pages 15 and 16.

m. Reproduction of Comments and Responses Made During the Consultation Process

Comments from those who responded to the form letter are attached, in Appendix V.

n. Summary of Unresolved Issues

There are no unresolved issues.

o. List of Necessary Approvals Required for Action

See page 16.

p. Literature Cited

See pages 16, 17 and 18.

B. PROJECT DESCRIPTION

1. A 1:62,500 scale topographic map of the project area and surrounding environs is attached as Appendix I-b.

2. Statement of Objectives

To improve recreational game bird and mammal hunting in the Kekaha Game Management Area (G.M.A.), Kauai, by the aerial application of herbicides to control noxious shrubs which have reduced game carrying capacity and hunter access.

3. Description of the Action's Technical, Economic, Social and Environmental Characteristics

The project area is located within highly altered scrub brush land on western Kauai, three to nine miles north-northwest of Kekaha Town. The specific project site consists collectively of 500 total acres within the greater 20,000 acre Kekaha Game Management Area. The 500 acres to be treated with herbicides include selected localities ranging between 5 and 75 acres each, where slope, soil and vegetation potentials are best for game bird habitat improvement.

Two hundred (200) acres of the total 500, are predominantly infested with lantana, Lantana camara, and will be treated with a mixture of 3 lbs. 2,4-D (dichlorophenoxyacetic acid) plus 1 lb. Tordon 22-K (4 amino 3,5,6 trichloropicolinic acid) in ten gallons of water per acre, by agricultural spray helicopter. Nalco-trol (trade name), a polyvinyl polymer (thickening agent) will be used in conjunction with the herbicides to control spray drift. The specific localities where this mixture will be applied are shown on the topographic map in Appendix I.

The remaining 300 acres of the total 500 acre project, proposed for herbicide treatment, is primarily infested with aalii (Dodonaea eriocarpa, variety waimeana), a widespread and common native range plant. This area will be treated by the aerial application of 3 lbs. 2,4-D (dichlorophenoxyacetic acid) in 10 gallons of water per acre with Nalco-trol type drift suppressant. These areas proposed for treatment are likewise shown on the attached topographic map in Appendix I.

Helicopter application of the proposed herbicides will be strictly monitored by an individual holding a commercial pesticide applicator's permit and the necessary State Department of Agriculture aerial application permit. Control of herbicide drift will be employed by the use of standardized proven techniques as described by Gratkowski (1974). This includes the employment of a drift suppressing chemical additive, use of D-6 straight jet, non-restrictive nozzles fixed on the spray boom at 45° to horizontal, and controlling the speed and altitude of flight during application. Wind speed at the site of application will be monitored by the use of a "Dwyer" wind meter. Wind direction will be determined by the

use of a smoke canister. Under no circumstances, will herbicides be applied when the wind speed exceeds eight miles per hour. No herbicide application will be permitted if the wind approaches the direction of sensitive crop areas to the west or wind speed exceeds 8 m.p.h. All instructions on the State approved labels printed for the herbicides used, will be adhered to, regarding application, handling and disposal of containers. (See Appendix II for herbicide labels.)

The individual sites, which range between 5 and 75 acres, which are to be treated, will be marked with flags, and the application will be supervised from the ground. Chemicals will be mixed and loaded at a centrally located helispot within Kekaha Game Management Area (see Appendix I map). Flight paths between the helispot and the individual target areas will be direct, and not cross croplands, bodies of water or other herbicide sensitive areas.

Herbicides will be applied when the target species, lantana and aalii, are most sensitive to the treatment. The herbicides used are most effective when applied to plants with abundant foliar surface; therefore, application of the chemicals will coincide with the period of new growth during the spring months.

The project site is far removed from urban or residential areas. The nearest location inhabited by humans is Mana Village, which lies two miles west and upwind of the nearest herbicide target area.

Kekaha Game Management Area, within which the project is planned, is State, Hawaiian Homes land, that is leased to Kekaha Sugar Company by the Department of Land and Natural Resources (D.L.N.R.) for range cattle pasturage. The Division of Fish and Game, D.L.N.R., manages public hunting on approximately 15,000 acres of this land by cooperative agreement with the land lessee. Both the Hawaiian Homes Department and Kekaha Sugar Company concur with our proposal to control noxious shrubs with herbicides in the area (Beamer 1977 and Fay 1977).

The economic aspects of the proposed project involve only the purchase of chemicals, equipment and hire of a commercial spray helicopter to apply it. It involves only a few products and services. Minor impact to the economy might be realized in increased sale of hunting licenses, sporting equipment and supplies associated with the improved hunting that is expected to follow. Improved forage conditions are expected, due to the removal of noxious shrubs, and thereby improving the productivity of the area for game mammals and cattle.

The chemicals proposed for use: Tordon 22-K and 2,4-D, are effective, wide spectrum, broad leaf herbicides that provide good control of the target species, lantana and aalii. Grasses and many beneficial forbs including Japanese tea, indigo, haole koa, narrow leaf plantain and waltheria, are tolerant of these chemicals, and rapidly replace noxious shrubs when removed (Telfer 1972).

4. Use of Public Funds

The entire project will be accomplished with public funds provided by Capital Improvement Project appropriations: Act 218/74, Item III-A-2, B74-409-C, and Act 195/75, Item B1-1, B75-513-C. The proposed action will take place on Hawaii State government lands leased to Kekaha Sugar Co., Ltd., but managed for public hunting by the Department of Land and Natural Resources, Division of Fish and Game by cooperative agreement. This land area is zoned for agricultural use. The chemicals to be used in the project have already been purchased at a total cost of \$10,015. An additional \$5,000 expenditure will be needed to apply the herbicides and cover supervision costs for the job. The estimated total cost per acre treated will be \$30.00.

5. Phasing and Timing of Action

The proposed project involves a single phase operation, whereby herbicides will be mixed, and applied to the entire 500 acres of specific sites, ranging in size from 5 acres to 75 acres each within a two week period or less. No followup or repetitive treatments will be applied within a ten year period. The time of year that the project will be accomplished must coincide with maximum foliar development of the target plants, and would most likely occur during April, May or June depending on optimal weather conditions for safe and effective application. Herbicide application will be made after the heavy rainy season has passed, so that there will be little risk of runoff of herbicides into streams or ditches.

6. Summary of Technical Data

Area of Project:	Island of Kauai, Waimea District: TMK 1-2-02 (=20,000 ac.) Kekaha Game Management Area.
Specific Project Site:	500 total acres, consisting of selected sites ranging between 5 and 75 acres each (see map Appendix I).
Target Plant species:	Lantana (<u>Lantana camara</u>) Aalii (<u>Dodonaea eriocarpa</u> , variety <u>waimeana</u>)
Herbicides to be Used:	<u>Lantana infested areas (200 total acres):</u> 1 lb. Tordon 22-K (4 amino 3,5,6 trichloropicolinic acid) plus 3 lbs. 2,4-D (dichlorophenoxyacetic acid) in 10 gallons of water per acre. <u>Aalii infested areas (300 acres):</u> 3 lbs. 2,4-D (dichlorophenoxyacetic acid) in 10 gallons of water per acre.
Method of Application:	Commercial Spray Agricultural Helicopter/ fixed boom.

Drift Control Measures:

Use of Nalco-trol thickening agent and surfactant:
Application will be permitted with wind speeds less than 8 m.p.h. only.

Wind direction will be monitored with a smoke canister. Spray will not be applied with winds blowing towards sensitive crops to the west of target sites.

Shortest Distance Between Sensitive Areas and Herbicide Target Sites:

Human Habitations (Mana Village) = 2 miles west.
Agricultural Crops (sugar cane) = 2,000 feet.
Sensitive Crops (Soy beans, Sunflower and Watermelon) = 1 mile west.
Remnant Native Ecosystem = 4 miles northeast.

Number of Animal Species in Project Area:

Mammals (all exotic) 7
Birds: exotic 15
 indigenous 1 (Hawaiian short-eared owl)
Reptiles: 1
Amphibians: 1

Dominant Vegetation:

Vegetation Zone B - Ripperton and Hosaka 1942
Lantana (Lantana camara)
Aalii (Dodonaea eriocarpa, variety waimeana)
Silk Oak (Grevillea robusta)
Klu (Acacia farnesiana)
Yellow Guava (Psidium guajava)
Yellow Foxtail (Setaria glauca)
Pitted Beardgrass (Andropogon pertusus)
Natal Redtop (Tricholaena repens)
Pili grass (Heteropogon contortus)

Threatened or Endangered Plants or Wildlife:

None

Average Annual Rainfall:

22 to 35 inches (U.S.D.A. 1972)

Soils Description:

Makaweli-Wahiawa-Niu Association/Niu Silty Clay Loam
Permeability = moderate
Runoff = medium
Erosion Hazard = moderate.

7. Historical Perspective

Early importations of domestic livestock to Kauai and their subsequent overpopulation in the rangelands, caused severe alteration of the native vegetation. Heavy soil erosion resulted, and later, large numbers of exotic plants became firmly established, many of which are classed as noxious.

Since the opening of Kekaha Game Management Area to public hunting by cooperative agreement with the land lessee, Kekaha Sugar Co., Ltd., in 1954, its potential for game bird hunting has not been reached due

to a serious problem with noxious shrubs. Lantana, aalii, klu, and silk oak have spread throughout the rangeland portions of the area, developing impenetrable stands unsuitable for game bird habitat, cattle pasturage or any other use. The noxious shrubs are tolerant of the dry, poor soil habitat and have outcompeted grasses and forbs for space.

In 1969, a request for assistance was made to the University of Hawaii Agricultural Experiment Station, Wailua, Kauai to find an effective and economical method for controlling lantana and aalii. Through cooperation of the Wailua Branch Station, an experimental application of eight different herbicide mixtures was made on 10' x 40' test plots on Mana Ridge, Kekaha Game Management Area. The sprays were applied with a back-pack type hand sprayer, to an area heavily infested with lantana and aalii. Three replications were applied. The plots using various concentrations of Tordon, Banvel, 2,4-D and 2,4,5-T showed the greatest promise for the control of the target species.

In 1971, these four chemicals were applied to two acre test plots on Mana Ridge in eight different mixtures by commercial spray helicopter. A mixture of 4 lbs. 2,4-D plus 1 lb. Tordon 22-K per acre in 10 gallons of water with surfactant was found to produce suitable results for the control of lantana. An application of 4 lbs. 2,4-D alone in 10 gallons of water per acre with surfactant was found to produce effective results where aalii was the primary target species (Telfer *ibid*).

In February 1974, forty acres on Mana Ridge was sprayed with the 1#:4# Tordon+2,4-D mixture by fixed wing aircraft. An additional forty acres was sprayed with the 2,4-D mixture only. Helicopter application was found to be more effective than by airplane, since the helicopter was capable of better drift control, but the treatments produced satisfactory results.

In April 1975, an environmental impact assessment and negative declaration was prepared for the currently proposed 500 acre noxious shrub control project in Kekaha Game Management Area. Two hundred acres, primarily infested with lantana were proposed for treatment with the Tordon + 2,4-D mixture, and 300 acres of primarily aalii, were proposed for treatment with 2,4-D alone. In January 1976, supplemental information on the project proposal was submitted. This information explained that the Hawaii State label for Tordon 22-K, permits aerial application of the herbicide, whereas the E.P.A. label prohibits it. Authorization of the State label was obtained from the E.P.A., since local conditions justified the more liberal application mode of aircraft use. The State Department of Agriculture authorizes the use of the State label on a case by case basis, issuing a permit only to those users able to justify it. Several previous applications of the herbicide (Tordon) by private concerns on Kauai by air were cited as precedents, with no adverse effects reported. After the negative declaration was published by the Environmental Quality Commission and comments were received, it was decided that an environmental impact statement was necessary.

C. DESCRIPTION OF ENVIRONMENTAL SETTING

The greater 20,000 acre Kekaha Game Management Area consists of several ridges extending seaward from approximately 2,500 feet elevation to near sea level. Between each of the ridges are steep sided canyons, becoming rocky cliffs at the seaward ends. The target sites for herbicide application are located on the ridge tops, where the slope is gentle, and vegetation is dense.

Vegetation on the project area is highly altered from native conditions by past fires, overgrazing and noxious shrub invasion. Dominant plants in the area are typical of Vegetation Zone B (Ripperton and Hosaka 1942) which include: Lantana, Lantana camara; aalii, Dodonaea eriocarpa; silk oak, Grevillea robusta; klu, Acacia farnesiana; yellow guava, Psidium guajava; yellow foxtail grass, Setaria glauca; pitted beardgrass, Andropogon pertusus; natal redtop, Tricholaena repens; and pili grass, Heteropogon contortus. Only the most hardy and widespread native plants, such as aalii have survived in the area. For a complete list of known plants on the project site, refer to Appendix III.

Soils are classified in the Makaweli-Wahiawa-Niu Association, and more specifically the Niu silty clay loam series (NcC). Slopes range between six and twelve per cent. Rainfall amounts to 22 to 35 inches annually, 70 per cent of which falls between November and April. Permeability is moderate, runoff is medium and erosion hazard is moderate (U.S.D.A. 1972).

Wildlife and other animals found in the area include: 7 exotic mammals, 15 exotic birds, one indigenous bird, the Hawaiian Short-eared owl (Asio flammeus). Amphibians and reptiles are represented by the marine toad (Bufo marinus) and the snake-eyed skink (Alblepharus boutoni poecilopleurus). No threatened or endangered wildlife species are known to exist within the project area, or the area's immediate vicinity (D.L.N.R. 1974). Of the fifteen exotic birds in the area, eight are introduced game birds, including: ring-necked pheasants, chukar partridge, black francolin, erckel's francolin, Japanese quail, California quail, lace-necked dove and barred dove. A complete list of fauna known to exist within the project area is shown in Appendix IV. Wildlife species in the project area are predominantly exotic, due to the marked alteration of habitats caused by past overgrazing, fires and noxious shrub invasion.

The proposed noxious shrub control work using herbicides is designed to complement a 500 acre tree thinning and clearing project in Kekaha Game Management Area, where once open pasture has become overgrown with scrub silk oak. The tree clearing project is a separate job from the noxious shrub control project, but they are related to each other in terms of overall hunting area improvements in the area.

There are no significant archaeological sites or areas of historical importance that are within the project sites or immediate vicinity of them.

D. RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS,
POLICIES AND CONTROLS

The Department of Hawaiian Home Lands, the County of Kauai, the U.S.D.A. Soil Conservation Service, Kekaha Sugar Company, Ltd. and the Department of Land and Natural Resources all have interests in the project area, which are referred to in their respective planning documents.

The Department of Hawaiian Home Lands has declared the greater Kekaha homesteads land area to have "low cattle carrying capacity", primarily because of lack of water. The Hawaiian Home Lands General Plan (April 1976) calls for the following policy: Retain 800 acres in general lease; retain 500 acres in present pastoral lease. The Kekaha area has been given low priority for conversion of marginal pasture to homesteads, due to the high cost of developing water supply, utilities and access roads. The proposed noxious shrub control project by the Division of Fish and Game, using herbicides, does not conflict with the goals and policies of the Hawaiian Home Lands General Plan policies or goals, since it will improve the land area for pastoral purposes by the conversion of noxious shrubbery to pasture grasses.

The U.S. Soil Conservation Service has initiated a study and assessment under P.L. 83-566 entitled "Kekaha Watershed Environmental Assessment". This assessment is not completed to date but is in draft form. Tentative objectives of the project are: Watershed protection and flood prevention. Basically, problems with flooding near Kekaha Town are related to watershed problems in the Kekaha uplands. Soils have been heavily eroded in the past, and lack vegetation on steep slopes. Heavy storms which occur during the winter produce large amounts of water which flow to the lowlands. Flooding and siltation occur. Possible solutions to the problems include: plantings in critical areas, gradient terraces, diversions, dikes, debris basins, enlarged drainage canals and outlet structures. The proposed herbicide control of noxious shrubs will not be in conflict with the objectives of the watershed plan. Those few areas to be treated which are in the Kekaha watershed, are on gently sloping lands which are not prone to erosion. Previous study with the use of herbicides to control noxious shrubs, indicate that range grasses are present in the understory. When the noxious shrubs are defoliated, these grasses become well established by the increased light made available. The dead stems and branches of the noxious shrubs remain for several months, providing protection for the grasses while they become established. After a year's time the noxious shrubs dessicate and are trampled by cattle, producing improved pasture (Telfer *ibid*). There should be no conflict between the noxious shrub control project and the Kekaha Watershed plan.

The project area is zoned for agriculture, is far removed from urban areas and conservation lands, and is not identified in the Kauai County General Plan for any near or long term alternative uses. Because the area lacks water, and access routes into the area are limited, the area is only suited for rangeland use.

D. RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS,
POLICIES AND CONTROLS

The Department of Hawaiian Home Lands, the County of Kauai, the U.S.D.A. Soil Conservation Service, Kekaha Sugar Company, Ltd. and the Department of Land and Natural Resources all have interests in the project area, which are referred to in their respective planning documents.

The Department of Hawaiian Home Lands has declared the greater Kekaha homesteads land area to have "low cattle carrying capacity", primarily because of lack of water. The Hawaiian Home Lands General Plan (April 1976) calls for the following policy: Retain 800 acres in general lease; retain 500 acres in present pastoral lease. The Kekaha area has been given low priority for conversion of marginal pasture to homesteads, due to the high cost of developing water supply, utilities and access roads. The proposed noxious shrub control project by the Division of Fish and Game, using herbicides, does not conflict with the goals and policies of the Hawaiian Home Lands General Plan policies or goals, since it will improve the land area for pastoral purposes by the conversion of noxious shrubbery to pasture grasses.

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The project area is zoned for agriculture, is far removed from urban areas and conservation lands, and is not identified in the Kauai County General Plan for any near or long term alternative uses. Because the area lacks water, and access routes into the area are limited, the area is only suited for rangeland use.

Kekaha Sugar Co., Ltd. has long term potential plans for increasing sugar cane acreage within Kekaha Game Management Area in the lower portions of Pulehua, Kaunalewa and Makahoa Ridges, pending the availability of additional irrigation water saved by the employment of drip irrigation systems. This may involve the conversion of an additional 200 acres of rangeland into sugar cane. The areas proposed for possible additional sugar lands are not in conflict with the areas proposed for noxious shrub control. Kekaha Sugar Co., Ltd. will likely continue to use the rangeland portions of Kekaha Game Management Area for range cattle production, since irrigation water transmission and storage facilities necessary for cane production are included with the land lease. Noxious shrub control in the rangeland portions of the lease would complement future use of the area by Kekaha Sugar Co., Ltd. for cattle production, since it would increase the carrying capacity of the pasture.

The Department of Land and Natural Resources, Division of Fish and Game manages public hunting within Kekaha Game Management Area by cooperative agreement with the land lessee, Kekaha Sugar Co., Ltd. The purpose of the agreement is to permit the Division of Fish and Game to preserve, protect, conserve and propagate birds and mammals and to maintain, manage and operate public shooting grounds and game reserves. The Division of Fish and Game has identified noxious shrub invasion within Kekaha Game Management Area as a hinderance to gamebird productivity and harvest, and therefore has proposed this project. The project is considered safe for all wildlife species involved (Taylor 1977) and is consistent with both non-game and game programs within the Division of Fish and Game.

E. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

1. Area Affected and Vegetation

Should the herbicide treatments be applied as proposed, the area of impact would be confined specifically to those localities comprising the 500 acres identified for treatment. By use of a drift suppressant, and the designated spray equipment and adherence to limits of wind speed, there is low probability that areas outside the target sites would be affected by herbicide drift. Since the herbicides will be applied in areas far removed from standing water, ditches or streams, and after the heavy rainy season, the likelihood of runoff contaminating water, which in turn could affect other areas, is remote. Rainfall is very low in the area, and the slope is gentle; therefore, runoff of the chemicals to adjacent areas would be minimal.

Should the prescribed drift suppressants, spraying procedures or wind limit considerations not be adhered to, the area affected could involve the non-target rangeland which surrounds the target sites. If this were to occur, the effectiveness of the spray on the target sites would be reduced, and the drifting spray would affect sensitive broad-leaf plants in adjacent areas. Adjacent vegetation within 2,000 feet of the target sites is nearly identical to the areas intended for spraying. There are no known endangered plants or animals within these adjacent areas.

Only under the most careless application conditions, would spray drift reach environmentally sensitive areas. The nearest area of sensitive crops is over one mile upwind from the target site. The nearest forest area that is composed of largely native plants is over three miles northeast of the closest target site, and contains no known ecologically sensitive or rare species.

The chemicals proposed for use, Tordon 22-K and 2,4-D are wide spectrum broad-leaf herbicides used for the control of annual and deep rooted perennial weeds. In trial applications made on the project area in 1969, 1971 and 1974, the proposed herbicide concentrations effectively controlled the target species, lantana and aalii (Telfer *ibid*) (see attachment to Appendix VI-f). Silk oak and klu, the other prominent shrub and tree species in the area were found to be relatively resistant to the spray mixtures used. Many annual weeds are sensitive to these chemicals, but rapidly invade the treated sites from surrounding areas after the noxious shrubs are defoliated. Japanese tea, Cassia leschenaultiana and koa haole, Leucaena glauca beneficial plants to wildlife and livestock are not sensitive to the spray mixtures proposed, and persist. A large variety of exotic grasses, which occurs in sparse stands beneath the noxious shrubbery is not affected by the herbicides used. These grasses grow rapidly after lantana and aalii defoliation, and replace the shrub overstory. A semi-open pasture results which supports seed bearing grasses, forbs and browse which is far superior habitat for game birds, mammals and livestock than the pre-existing noxious shrub covered rangeland.

2. Effects on Wildlife

A complete list of known and probable wildlife species on the project area is shown in Appendix IV. The chemicals proposed for use are relatively safe for animals when used in the concentrations specified. The LD 50 oral toxicity rating for mallards and pheasants is greater than 2,000 milligrams per kilogram for both Tordon and 2,4-D (Tucker and Crabtree 1970). The herbicides 2,4-D and Tordon 22-K are registered for rangeland application in the State of Hawaii.

Previous experience with the use of these chemicals in Kekaha Game Management area herbicide trials has indicated no observable adverse effects to wildlife, but in conjunction with other habitat improvements such as water units, has increased game bird density (D.L.N.R. 1975). The composition of birds using the habitat and their densities will likely change as a result of the vegetation changes caused by herbicide treatment. Those species, such as: quail, pheasants, partridges, doves and seed eating passerines will increase after conversion from shrub to grassland type. Very few bird species now thrive on the dense lantana-aalii habitat type, since it lacks variety in food items and restricts movement. Feral pigs and blacktail deer will be favored by the openings created in the shrublands, since it will permit the establishment of palatable food plants (Coulter 1972). Shrub removal will have a minor effect on smaller animals, such as rats, mice and feral cats.

Since only 2.5 percent of the total noxious shrub covered rangeland in Kekaha Game Management Area will be treated with herbicides, the few advantages these shrubs provide, if any, will be reduced by only a small degree. The benefits to wildlife by removal of 500 acres of noxious shrubs far outweigh the detriments.

3. Effects on Fish and Aquatic Organisms

Since the target areas are far removed from standing water, streams or ditches, the likelihood of water contamination is very remote. Rainfall is generally below 30 inches annually and runoff would unlikely reach water supplies, streams or ditches (Taylor *ibid*). There are no known unique fishes, or invertebrates within waters that could conceivably be contaminated by the herbicides if used as proposed.

4. Effects on Agriculture

The intended herbicide application would unlikely affect agriculture. Sugar cane fields do exist as close as 2,000 feet from the proposed herbicide target sites. This crop, however, is not sensitive to the herbicide mixtures to be used. By employment of the specified drift control measures there is little chance that sugar cane or irrigation water would be contaminated.

Sensitive truck and seed crops are located at the two sites within five miles of the project area, but both are further than one mile from the target sites and lie upwind. These sensitive crop areas are small in size and would not be affected, so long as the described drift control precautions are taken. The potentially sensitive crops include: sunflower, soybeans and seasonally, watermelon.

5. Effects on Ranching

There would be a beneficial effect upon the ranch operation which co-exists with game management in the project area. Present range conditions are very poor, due to lack of suitable forage. Noxious shrub cover is increasing, and what available forage there is, is overgrazed during the dry season. The proposed herbicide treatment would produce considerable new forage which will benefit livestock in the area. The herbicides used are registered for range use, and pose no threat to the health of livestock using the area. Areas that will receive the bulk of the spray are heavily infested with noxious shrubs, and support only small amounts of palatable forage. Transport of the chemicals in the urine of cattle would be minimal since very little palatable forage will be sprayed.

Cattle may temporarily be displaced from those areas where herbicides are applied because of the odor involved. Any disadvantages that would result from the herbicide application would be far outweighed by the long term pasture improvement that would result.

6. Effects on the Natural Environments and Ecosystems

The project area is so highly altered by past fires, overgrazing and weed invasion, that no remnant of a native ecosystem exists within several miles of the target area. No adverse effect to native ecosystems is likely to occur.

7. Effects on Recreation

The only authorized recreational use of the area by the public is hunting. Herbicide control of noxious shrubs would benefit recreational hunting by increasing the carrying capacity of game birds and mammals in the area. The project would improve hunter access into the field, and permit better utilization of the game resource. Hunting dogs would be more effective after the removal of dense stands of noxious shrubs. Additional hunting opportunity could be provided, due to the increased area made available for successful hunting, thereby reducing the safety hazard of crowded hunting conditions.

The project area has little value for other forms of recreation, yet if hiking, picnicking or other recreational uses were permitted, the removal of noxious shrubbery would benefit these too.

8. Effects on Soils

The proposed project is designed to modify the vegetation in selected areas so as to reduce woody brush cover, and replace it with grasses and annuals. Brush removal with herbicides has the potential for causing increased soil erosion in the area. However, those sites selected for treatment were chosen to avoid this possibility. Slopes in the target areas are gentle, and not adjacent to erosion prone areas. Past experimental applications of the chemicals to be used in the same area have shown that abundant grass and forb seeds are present beneath the noxious shrub overstory. Upon defoliation of the shrubs after herbicide application, these grasses and forbs produce abundant ground cover as a result of the light and moisture made available to them. It takes approximately one year for the woody material to dessicate, and during this time the woody remains act as a barrier to range cattle, while the grasses and forbs are becoming established. In experimental test plots, where the same chemicals were used, there was no indication that soil erosion was a problem. Other methods of noxious shrub removal such as mechanical clearing or burning would remove all ground cover, and thereby contribute to soil erosion.

9. Effects on Archaeological and Historic Sites

There are no known archaeological or historic sites in the immediate herbicide target areas that could be affected by the proposed noxious shrub control project (Niitani 1977). The nearest identified archaeological site is located more than 2,000 feet upwind from any herbicide target site.

10. Effects on the Economy

The purchase of chemicals, equipment and the hire of a commercial spray helicopter to apply the herbicides will have a very minor effect on the economy, involving only a few products and services. Direct economic impact would be minimal. Minor secondary economic impacts would be realized by the increased sale of hunting supplies, increased recreational benefits to the public and increased value of the range for cattle production. The method of proposed noxious shrub control is the most economical of all the alternatives available.

11. Effects on Public Health

There is no significant hazard to public health so long as all precautions on the established labels on the chemicals to be used are adhered to. There are no sensitive food or water sources that are likely to be contaminated by the application of herbicides as proposed, nor is contamination of the air a significant risk, provided drift suppressing measures are taken as stated. The Department of Health, Environmental Health Specialist on Kauai visited the project site, and found no foreseeable environmental health problems with the use of herbicides as proposed (D.O.H. 1977).

No public water supply is likely to be affected because of the remoteness of the area to the nearest public water source (County of Kauai, Department of Water 1977).

12. Secondary Environmental Impacts

There are generally no secondary impacts apparent, other than the expected increase in the use of Kekaha Game Management Area by hunters, and minor increase in cattle carrying capacity that would result from range quality improvement.

F. UNAVOIDABLE ADVERSE IMPACTS

The only identifiable unavoidable adverse effect might be the temporary loss of feeding area for range cattle and wildlife, caused by the odor of the chemicals used. This would be minimal however, since most of the area to be treated with herbicides produces no palatable feed anyway, and the total 500 acres to be treated is less than 3 percent of the total area available to animals in Kekaha Game Management Area.

G. ALTERNATIVES TO THE PROPOSED ACTION

1. Mechanical Clearing has been tried, but has several significant disadvantages: It is very expensive, consumes a great quantity of fuel, exposes soil to wind and water erosion and is not effective unless rapid and dense revegetation can be accomplished with suitable forage grasses. Fencing of cleared areas would be necessary to provide protection for developing forage plants from range cattle.

Disturbance of the soil tends to stimulate invasion and re-growth of noxious shrubs, since an abundant seed supply already exists, and grasses and forage plants are unable to outcompete them for available water and light. The combined cost of clearing, seeding and fencing 500 acres from cattle would be prohibitive, and not justifiable as a means of game habitat improvement from a cost-benefit standpoint.

2. Burning is not an acceptable means of clearing noxious shrubs for similar reasons. Burning stimulates the re-growth of noxious shrubs, by eliminating competition of grasses. Lantana and aalii, the target plants are fairly resistant to fire. Burning has the added disadvantage of posing a threat to forest lands if it escaped control. It would produce atmospheric pollution by smoke, expose soil to wind and water erosion, and provide open sites for widespread establishment of weed grasses, such as sourgrass (Trichachne insularis) which is unpalatable to livestock or wildlife.
3. Alternative Chemicals: There are no known chemical alternatives to Tordon 22-K and 2,4-D which will produce satisfactory results and are registered for range use in Hawaii. The herbicide 2,4,5-T did produce satisfactory results in test trials (Telfer *ibid*), but is on the list of prohibited chemicals by the U.S. Fish and Wildlife Service.
4. Biological Control: The Hawaii Department of Agriculture has experimentally released over twenty-three host specific insect pests for the control of lantana in Hawaii (Hilton and Osgood 1970). Even though some success has been achieved in localized areas within the State, Kauai's lantana problem persists. Insect pests are present on lantana in the project area, but have not achieved any level of satisfactory control. If an effective biological control existed, it would not be site selective, and in some instances might eliminate noxious shrubs on steep slopes, where they are of some value in arresting soil erosion. It would be unadvisable to introduce a plant pest to control aalii, since it is a native plant which has other varieties that are uncommon, and which could conceivably become extinct.
5. No Action: Taking no action is not an acceptable alternative, since noxious shrub stands are increasing and continue to crowd out the last remaining areas of pasture suitable for game, livestock and recreational use in Kekaha Game Management Area. Kekaha G.M.A. is the only potentially productive public game bird hunting area on Kauai which can satisfy the demand for this form of recreation. It is the purpose of the Division of Fish and Game to preserve and develop it to its potential. Even by the employment of other methods of increasing game populations, such as introducing new game birds or mammals, the habitat to support them or hunt them in must be maintained or the efforts would be fruitless. Kekaha G.M.A. provides year-round hunting opportunities on Kauai and a great portion of the total hunter trips made to Kauai's public hunting areas. It is the responsibility of the Division of Fish and Game to maximize the potential of its areas for public hunting.

H. SHORT-TERM VS. LONG-TERM RELATIONSHIPS

On the short-term, the noxious shrub control project using aerially applied herbicides will temporarily displace wildlife and livestock from the 500 acres to be treated because of the herbicide odor. This would involve very few animals. The change from shrub cover to predominantly grass pasture will be required about one year. The maximum return in benefits will be realized over a longer period of time, as the game species respond to the habitat manipulation and hunter use increases correspondingly. The herbicide control work can be expected to effectively control noxious shrubs for a minimum of ten years. More permanent control could be obtained by encouraging the land lessee, Kekaha Sugar Co., Ltd. to manage their livestock numbers carefully, so as to eliminate overgrazing and permit good forage grass establishment. Planting of xerophytic grass species and forbs may also help extend the life of the noxious shrub control. To date, no suitable plants have been found for introduction, but a cooperative effort with the U.S.D.A. Soil Conservation Service, on testing xerophytic forage plants is in progress.

I. MITIGATION MEASURES

No mitigation measures are proposed, since the only unavoidable adverse impact, displacement of wildlife and livestock from the 500 acres treated because of the odor involved with herbicides, is very minimal and temporary.

J. IRREVERSIBLE COMMITMENT OF RESOURCES

The manpower and funds expended for herbicides and their application on the 500 acre area in Kekaha G.M.A. would be irretrievably committed. The majority of those plants which are sensitive to the herbicides Tordon 22-K and 2,4-D (most woody broad-leaf plants) in the 500 acre area sprayed will be lost. Yet the potential for their re-establishment in the areas treated in the long term, by seeding or re-invasion is not completely removed.

K. OFFSETTING BENEFICIAL EFFECTS, INTERESTS OR CONSIDERATIONS

None can be identified, except improvement of cattle range.

L. ORGANIZATIONS AND PERSONS CONSULTED

This Environmental Impact Statement was prepared by the Division of Fish and Game, Department of Land and Natural Resources. Basic preparation and assimilation of materials was done by Thomas C. Telfer, Wildlife Biologist, Island of Kauai. Review and coordination within the Division of Fish and Game was provided by Ronald L. Walker, Chief, Wildlife Branch, and Michio Takata, Director of the Division of Fish and Game.

A form letter dated January 7, 1977 (copy attached) explaining the proposed project was sent to eighteen (18) agencies or groups which conceivably could be affected by the project, or which had expertise in various related fields. The letter requested their comments and response. Several did not respond.

An Environmental Impact Statement Preparation Notice was filed with the Environmental Quality Commission on May 20, 1977. Six requests were made by individuals for a copy of the Preparation Notice. One letter was received which asked for additional information. A response was made to answer questions asked.

Comments and responses from those agencies and individuals interested are attached in Appendix V.

The following is a list of all agencies and groups who were contacted:

Mr. Lindsay A. Faye, Manager
Kekaha Sugar Co., Ltd.
Kekaha, Kauai, HI 96752

Department of Hawaiian Home Lands
3060 Eiwa Street
Lihue, HI 96766

Mr. Ralph E. Daehler
Kauai District Forester
Division of Forestry
Department of Land and Natural
Resources
Lihue, HI 96766

Mr. George Niitani, Superintendent
Division of State Parks, Kauai
Department of Land and Natural
Resources
Lihue, Kauai, HI 96766

Robert J. Melton, M.D., M.P.H.
District Health Officer, Kauai
Department of Health
P. O. Box 1408
Lihue, HI 96766

James Y. Kim, Chief
Pesticide-Weed Control Branch
Department of Agriculture
1428 S. King Street
Honolulu, HI 96814

John W. Beardsley, Chairman
Animal Species Advisory
Commission
1151 Punchbowl Street
Honolulu, HI 96813

Kauai Fish and Game Advisory
Committee
P. O. Box 1671
Lihue, HI 96766

Mr. Eugene Kridler
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Room 606-1311 Kapiolani Blvd.
Honolulu, HI 96814

Mr. Maurice H. Taylor
Field Supervisor
Division of Ecological Services
U.S. Fish and Wildlife Service
821 Mililani Street
Honolulu, HI 96813

Dr. William L. Theobald
Director
Pacific Tropical Botanical
Garden
Lawai, Kauai 96765

Mr. Akira Fujita
County Engineer, County of Kauai
Dept. of Public Works
4396 Rice Street
Lihue, HI 96766

John R. Blalock
County Extension Chairman
University of Hawaii
Cooperative Extension Service
3060 Eiwa Street
Lihue, HI 96766

Mr. Brian Nishimoto
Planning Director
County of Kauai
4280 Rice Street
Lihue, HI 96766

Bill Forrest
District Conservationist
U.S.D.A. Soil Conservation Service
P. O. Box 1012
Lihue, HI 96766

Mr. Walter L. Briant Jr.
Manager and Chief Engineer
County of Kauai
Department of Water
P. O. Box 1708
Lihue, HI 96766

John W. Hoxie, Chairman
West Kauai Soil & Water
Conservation District
Kalaheo, HI 96741

Mr. Vincent Cosner, President
Garden Island Shooting Club
P. O. Box 401
Hanapepe, HI 96716

M. REPRODUCTION OF COMMENTS AND RESPONSES MADE
DURING THE CONSULTATION PROCESS

Attached in Appendix V.

N. REPRODUCTION OF COMMENTS AND RESPONSES
ON DRAFT EIS

Attached in Appendix VI.

O. SUMMARY OF UNRESOLVED ISSUES

There are no unresolved issues.

P. LIST OF NECESSARY APPROVALS REQUIRED FOR ACTION

Status

- | | |
|---|----------------------------|
| 1. Advice of the Animal Species Advisory Commission | To be obtained |
| 2. Dept. of Agriculture Aerial Application Permit | Follows approval
of EIS |
| 3. Review of E.I.S. by Office of Environmental
Quality Control | To be completed |
| 4. Acceptance of E.I.S. by Governor | To be obtained |

Q. LITERATURE CITED

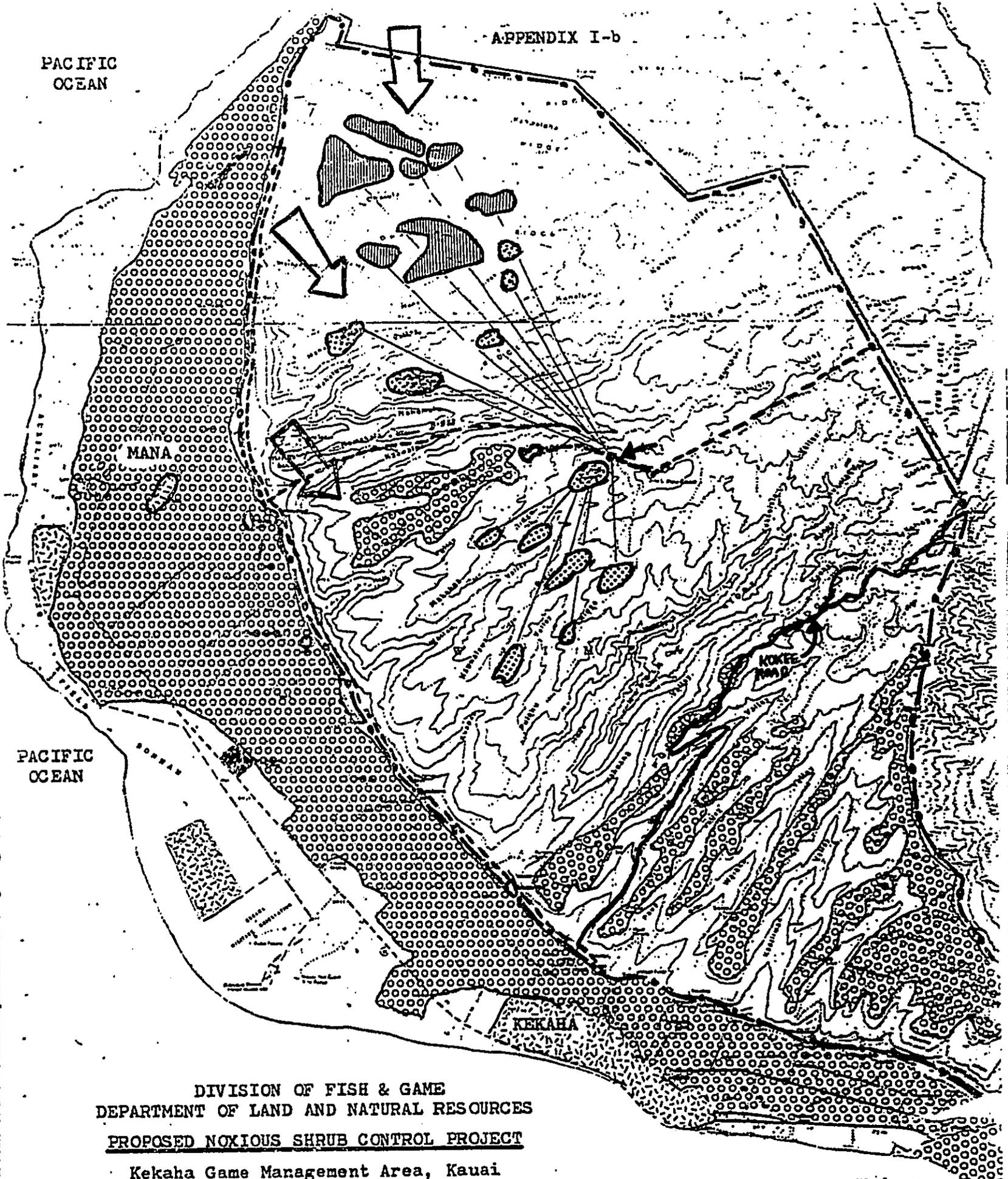
1. Beamer, B. 1977. (Letter dated January 25 to Mr. Thomas C. Telfer) A response to proposal for noxious shrub control project. Kekaha Game Management Area, Kauai. (Attached in Appendix V.)
2. Coulter, L. L. 1972. The Role of Herbicides in Wildlife Production Through Creation and Stabilization of Habitats. Industrial Vegetation Management (Vol. 4 No. 1) Dow Chemical Co. 25pp.

3. County of Kauai Dept. of Water. 1977. (Letter dated January 21, from Manager and Chief, Walter L. Briant Jr., to Thomas C. Telfer.) A response to proposal for noxious shrub control project, in Kekaha Game Management Area, Kauai (Attached in Appendix V.)
4. Department of Hawaiian Home Lands. 1976. Hawaiian Home Lands General Plan April 1976.
5. Department of Health. 1977. (Letter dated January 28 from Reynold W. Matsuo to Thomas C. Telfer in response to request for comments on Kekaha Game Management Area Noxious Shrub Control Project.) (Attached in Appendix V.)
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7. -- 1975. Quantitative Surveys of Game Birds on the Island of Kauai. State of Hawaii, Division of Fish and Game, Project W-15-5, Job V-E (24), 10 pp.
8. Faye, L.A., Jr. 1977. (Letter dated January 24 to Thomas C. Telfer in response to Proposed Noxious Shrub Control Project, Kekaha Game Management Area.) (Attached in Appendix V.)
9. Gratoski, H. 1974. Herbicidal Drift Control: Aerial Spray Equipment, Formulations and Supervision. U.S.D.A. Forest Service Technical Report PNW-14. 12 pp.
10. Hilton, W.H. and R.V. Osgood. 1970. Weed Control Manual for the Hawaiian Sugar Industry (Revised). Hawaiian Sugar Planters' Association Experiment Station.
11. Niitani, G. 1977. (Memo dated April 5, 1977 to J. M. Souza in response to Proposed Noxious Shrub Control Project, Kekaha Game Management Area.) (Attached in Appendix V.)
12. Reimer, C.A., B.C. Byrd and J.H. Davidson. 1966. An Improved Helicopter System for the Aerial Application of Sprays Containing Tordon 101 Mixture Particulated with Norbak. Down To Earth Magazine, Vol. 22, No. 1. 32 pp. Dow Chemical Co.
13. Ripperton, J.C. and E.Y. Hosaka. 1942. Vegetation Zones in Hawaii. Hawaii Agricultural Experiment Station Bulletin No. 89. 60 pp.
14. Taylor, M.H. 1977. (Letter dated February 4, 1977 to Thomas C. Telfer in response to Noxious Shrub Control Project, Kekaha Game Management Area.) (Copy attached in Appendix V.)
15. Telfer, T.C. 1972. An Evaluation Report on the Use of Herbicides for Noxious Shrub Control at Mana Ridge, Kauai. Unpublished Report, Division of Fish and Game, D.L.N.R.

16. Tucker, R.K. and D.G. Crabtree. 1970. Handbook of Toxicity of Pesticides to Wildlife. Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Center Resource Publication No. 84. U.S. Govt. Print. Office, Washington, D.C. 131 pp.
17. U.S.D.A. 1972. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii. U.S. Govt. Print. Office, Washington, D.C. 232 pp.

APPENDIX I

Maps of Southwestern Kauai
and Project Area



DIVISION OF FISH & GAME
 DEPARTMENT OF LAND AND NATURAL RESOURCES
PROPOSED NOXIOUS SHRUB CONTROL PROJECT

Kekaha Game Management Area, Kauai

-  Sugar Cane
-  Reservoirs
-  Sensitive Croplands
-  Urban Areas
-  Area to be Treated w/ 2,4-D only
-  Area to be Treated w/ 2,4-D + Tordon 22K
-  Perennial Streams & Ditches
-  Kekaha G.M.A. Boundary
-  Helispot: Herbicide Mixing & Loading Site



Map Scale = 1:62500
 (1 inch = 1 mile)

Prevailing
 Local
 Wind Direction



APPENDIX II

Copies of Herbicide Labels

RESTRICTED-USE PESTICIDE

REGISTERED

HAWAII
DEPT. OF AGRICULTURE

Reg. No. 6197.76
Year 1976

FULL NAME OF PRODUCT: TORDON 22K

PRODUCT IS: Weed Killer

MANUFACTURED BY: The Dow Chemical Company
Midland, Michigan

GENERALLY DISTRIBUTED IN PACKAGE SIZE:

1 ounce, 1 pint, 1/2 gallon, 1 gallon, 5 gallons

INGREDIENT STATEMENT:

Active Ingredient:

4-amino-3,5,6-trichloropicolinic acid*
as the potassium salt ----- 24.9%

Inert Ingredients: ----- 75.1%

Acid Equivalent:

4-amino-3,5,6-trichloropicolinic acid ----- 21.5%
(contains 2 pounds of TORDON per gallon)

*Known under the trademark TORDON

LABELS OR LABELING (copies attached) BEAR THE FOLLOWING INFORMATION:

1. Name, brand or trademark under which the article is sold.
2. Ingredient statement.
3. Directions for use.
4. Caution statement.
5. Name and address of the registrant.
6. Net weight or measure of the contents.

APPENDIX II-b

TORDON 22K
Weed Killer

For use only in the State of Hawaii to control certain troublesome woody plants in RANGELANDS and PERMANENT GRASS PASTURES.

RESTRICTED TO PERMIT HOLDERS

CAUTION: KEEP OUT OF THE REACH OF CHILDREN
Read Complete Precautions on Following Page.

Active Ingredient:

Picloram, (4-amino-3,5,6-trichloropicolinic acid)
as the potassium salt. 24.9%

Inert Ingredients: 75.1%
Acid Equivalent: 4-amino-3,5,6-trichloropicolinic
acid - 2 pounds/gallon 21.5%

USE DIRECTIONS

Use TORDON 22K weed killer to control troublesome woody plants, such as lantana, melastoma, guava, Java plum, pamakani, cat's claw, Humuula gorse, firebush, and hau, as well as many other woody plants, broadleaf weeds, and vines infesting rangelands and permanent grass pastures in the State of Hawaii. Treat any time during the year when the plants are actively growing.

Spot Treatment: Mix TORDON 22K at the rate of 2 quarts per 100 gallons of water. Add 2 quarts of surfactant to the spray mixture. Apply as a low-pressure (10 to 30 psi) spray to wet thoroughly the leaves, stems, and trunks of the brush. For smaller amounts of spray mixture, mix 2½ fluid ounces of TORDON 22K and 2½ fluid ounces of surfactant into 4 gallons of water and apply as above.

Re-treat areas in subsequent years as needed.

Broadcast Treatments:

Ground Applications: Use TORDON 22K at the rate of 2 quarts per 40 to 100 gallons of water per acre. Add 2 quarts of surfactant per 100 gallons of spray mixture. Apply at low pressure (10 to 30 psi) and keep the spray boom as low as possible consistent with good coverage.

Aerial Application: Use TORDON 22K at the rate of 2 quarts per 7 to 12 gallons of water per acre. Add 2 quarts of surfactant per 100 gallons of spray mixture. Conform to the aerial application regulations of the State of Hawaii.

Re-treat areas in subsequent years as needed.

Do not graze dairy animals on treated areas within 2 weeks after application. Do not slaughter meat animals grazing on treated areas until 2 weeks have elapsed after application.

Cut Surface Treatments: For the control of firebush, hau, Java plum, and guava with trunks of 3 inches in diameter or larger. Use TORDON 22K diluted 1 to 4 in water as directed below:

Tree Injector: Application should be made by injecting 1 milliliter of the diluted solution through the bark at intervals of 3 inches between edges of the injector wound. The injections should completely surround the tree at any convenient height.

APPENDIX II-c

Frill or Girdle: Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with the diluted solution.

USE PRECAUTIONS

Do not allow spray drift. TORDON herbicides are highly active. Very small amounts may cause damage to plants if applied during either growing or dormant periods. Do not apply or otherwise permit TORDON 22K or sprays containing it to contact desirable plants, such as pineapple, papaya, macadamia, coffee, vegetables, flowers, grapes, fruit trees, ornamentals, tomatoes, potatoes, beans of all types, and other valuable broadleaf plants, or the soil containing roots of nearby valuable plants. Apply TORDON 22K only when there is little or no wind or no hazard from spray drift.

Do not contaminate water. To avoid injury to crops or other desirable plants, do not contaminate irrigation ditches or water intended for irrigation or domestic purposes. Do not treat or allow spray drift to fall onto inner banks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes.

Do not transfer livestock directly from treated areas onto broadleaf crop areas without allowing 7 days on untreated grass pastures. Urine may contain enough picloram to cause crop injury.

Do not use manure from animals grazing treated areas on land used for growing broadleaf crops, ornamentals, orchards, or other valuable plants. Manure may contain enough picloram to cause crop injury.

Do not mix with other pesticides except other herbicides in accordance with University of Hawaii suggestions.

Other precautions. Do not store near food, feedstuff, fertilizer, seeds, insecticides, fungicides, or other pesticides.

Empty containers. Rinse with water, pour in spray tank. Repeat twice. Dispose of containers by punching holes in them and burying in non-cropland away from water supplies or in approved sanitary land fills.

Cleaning spray equipment. Flush spray tank with water and drain completely. Follow by thorough rinsing of tank, hoses, and nozzles with soap and water. Dispose of all wastes by burying in non-cropland away from water supplies.

BE SURE THAT ALL USE OF TORDON 22K WEED KILLER CONFORMS TO LOCAL REGULATIONS.

CAUTION

KEEP OUT OF THE REACH OF CHILDREN
MAY CAUSE IRRITATION - COMBUSTIBLE LIQUID
AVOID CONTACT WITH SKIN AND EYES
AVOID BREATHING SPRAY MIST - KEEP CONTAINER CLOSED
KEEP AWAY FROM HEAT AND OPEN FLAME

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions for use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, expressed or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use.

U. S. Patent No. 3,285,925

The Dow Chemical Company
Midland, Michigan 48640

TORDON WEEDKILLER

ACTIVE INGREDIENT

Picloram (4-amino-3,5,6-trichloropicolinic acid) as the potassium salt.....24.9%
 Inert Ingredients:.....75.1%
 Acid Equivalent: Picloram (4-amino 3,5,6-trichloropicolinic acid) 21.5%—2 lbs. / gallon.
 E.P.A. Registration No. 464-323-AA
 E.P.A. Est. 464-MI-1

CAUTION

KEEP OUT OF THE REACH OF CHILDREN
 MAY CAUSE IRRITATION
 Avoid Contact with Skin and Eyes
 Avoid Breathing Spray Mist
 Keep Container Closed
 Keep Away from Heat and Open Flame
 COMBUSTIBLE

AGRICULTURAL CHEMICAL

Do Not Ship or Store with Food, Feeds, or Clothing
 PRECAUCION AL USUARIO: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.
 TRANSLATION: (TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.)

18.9 L / 5 GAL

86-1165 PRINTED IN U.S.A. IN AUGUST, 1975
 REPLACES SPECIMEN LABEL 86-1165 PRINTED IN FEBRUARY, 1975
 DISCARD PREVIOUS SPECIMEN LABELS
 REVISIONS INCLUDE: (1) DOT HAZARDOUS SYMBOL DELETED. NO OTHER CHANGES.

SPECIMEN LABEL
(BACK)
REDUCED TO 75%



TORDON* 22K

WEED KILLER

NOV 24 1973

ACTIVE INGREDIENT

Picloram (4-amino-3,5-trichloroacetic acid) 24.9%
as the potassium salt 75.1%
Inert Ingredients:
Acid Equivalent: Picloram (4-amino-3,5-trichloroacetic acid)
21.5% — 2 lbs. / gallon.

E.P.A. Registration No. 464-323-AA

E.P.A. Est. 464-M-1

GENERAL INFORMATION

Use TORDON 22K Weed Killer to control annual and deep rooted perennial weeds such as Canada thistle, field bindweed (perennial morning glory), leafy spurge, bur ragweed, Russian knapweed, milkweed, dock, saw thistle, larkspur, toadflax and white horse nettle growing in non-cropland areas such as fence rows, around farm buildings and outer banks of ditches.

TORDON 22K Weed Killer is highly potent, persistent and water softible. Tiny amounts can kill or injure many broadleaved plants. To prevent damage to desirable crops and plants follow all directions and precautions.

USE DIRECTIONS

Mix with water and apply as a coarse, low pressure spray (20 to 40 lb. per sq. in.). Apply anytime during the growing season (when frost leaves soil in spring until ground freezes in fall), and preferably when rainfall can be expected soon after application. For General Use on Perennial Weeds on Non-Cropland, use 1 to 1½ gallons of TORDON 22K Weed Killer per acre in 50 to 100 gallons of water and spray to wet weed foliage and soil. NOTE: Local conditions may affect the use of herbicides. State agricultural experiment stations or extension service weed specialists in many states issue recommendations to fit local conditions. Be sure that use of this product conforms to all applicable regulations.

For Use As A Spot Treatment on Perennial Weeds. Mix at the rate of 1 gallon of TORDON 22K per 100 gallons of water. Apply at the rate of 100 gallons of spray mixture per acre. This will provide a rate of 2 pounds of TORDON herbicide per acre. For small amounts use 2½ fluid ounces TORDON 22K per 2 gallons of water. For round patches apply as indicated in the table.

Feet across Round Patch to be treated (weed area plus 10 foot border)	Gallons of spray mixture to apply
25.....	1.0
50.....	4.5
75.....	10.0
100.....	18.0
235 or (1 acre).....	100.0

Be Sure You Follow All Use Precautions Given on This Label and Remember These Key Points.

1. Use only the recommended amounts.
2. TORDON 22K is persistent. It will carry over in the soil.
3. TORDON 22K is water soluble. It can move with water in irrigation or drainage ditches.
4. Spray drift can damage crops.

USE PRECAUTIONS

Do Not Allow Spray Drift. TORDON herbicide is highly potent. Tiny amounts may cause damage to plants if applied during either growing or dormant periods. Do not use high pressure sprays. Do not apply by aerial equipment. Do not apply or otherwise permit TORDON 22K or sprays containing it to contact desirable plants

such as vegetables, flowers, grapes, fruit trees, ornamentals, cotton, tobacco, tomatoes, potatoes, beans of all types including soybeans, and other valuable broadleaved plants, nor the soil containing roots of nearby valuable plants. Apply TORDON 22K only when there is little or no wind or no hazard from spray drift. Coarse sprays are least likely to drift.

Do Not Contaminate Water. To avoid crop or other plant injury, do not treat or allow spray drift to fall onto inner banks or bottom of irrigation and drainage ditches. Dig around and do not irrigate through treated areas. Do not contaminate water used for drinking or other domestic purposes.

Do Not Move Treated Soil. Do not go over treated areas with land levelers, cultivation or harvesting equipment, or move the soil by any other means. Mark off treated areas with stakes, posts or fencing.

Do Not Graze Or Use Treated Areas For Crop Production.

Do Not Mix with Other Weedkillers or Other Pesticides.

Other Precautions: Do not store near food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides. To avoid injury to desirable plants, containers and sprayers used for TORDON 22K should not be reused to contain or apply other materials. Be sure that all use of TORDON 22K conforms to local regulations.

NOTICE: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purposes stated on the label when used in accordance with directions under normal conditions of use, but neither this warranty nor any other warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, express or implied, extends to the use of this product contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable to seller, and buyer assumes the risk of any such use.

U. S. Patent No. 3,285,925

10687-008-2

A775

THE DOW CHEMICAL COMPANY

REGISTERED

HAWAII
DEPT. OF AGRICULTURE

Reg.
Year 1974 No. 6197-88

FULL NAME OF PRODUCT: 2,4-D ACID

PRODUCT IS: A Herbicide

MANUFACTURED BY: The Dow Chemical Company
Midland, Michigan 48640

GENERALLY DISTRIBUTED IN PACKAGE SIZE:

50 Lb. Bags

INGREDIENT STATEMENT:

Active Ingredient:
2,4-D (2,4-Dichlorophenoxyacetic acid) 99.0%
Inert Ingredients: 1.0%

LABELS OR LABELING (copies attached) BEAR THE FOLLOWING INFORMATION:

1. Name and address of the registrant.
2. Name, brand or trademark under which the article is sold.
3. Net weight or measure of the contents.
4. Ingredient statement.
5. Caution statement.

NOV 24 1973



FORMULA 40

HERBICIDE

CONTAINS ALKANOLAMINE SALTS OF 2,4-D
EQUVALENT A POUNDS PER GALLON

FOR THE SPECIFIC CONTROL OF MANY BIENNIAL WEEDS IN NON-CROP AREAS SUCH AS
PARKS, RANGELANDS AND IN CERTAIN TYPES OF FORESTS

ACTIVE INGREDIENTS:
Alkanolamine Salt of 2,4-Dichlorophenoxyacetic acid - 59.7%
propanol series)

INERT INGREDIENTS: 40.3%

2,4-Dichlorophenoxyacetic Acid Equivalent - 38.6%
E.P.A. Registration No. 484-1-AA E.P.A. Est. No. 484-MI-1

TSalts are the least volatile form of 2,4-D and do not release enough vapors from treated areas to reduce yield of adjacent susceptible crops.

AGRICULTURAL CHEMICAL
Do Not Ship or Store with Food, Feeds, or Clothing

CAUTION
KEEP OUT OF REACH OF CHILDREN
HARMFUL IF SWALLOWED
CAUSES IRRITATION OF SKIN AND EYES
Do Not Get in Eyes, on Skin or on Clothing
If contact occurs, flush eyes with plenty of water for at least 15 minutes and get medical attention; wash skin with soap and plenty of water. Remove and wash contaminated clothing before reuse. Do not wear contaminated shoes.

5 GAL/18.9 L

86-1142 PRINTED IN THE U.S.A. IN SEPTEMBER, 1974

REPLACES SPECIMEN LABEL 86-1142 PRINTED IN SEPTEMBER, 1973.

- REVISIONS INCLUDE:
- (1) E.P.A. ESTABLISHMENT NUMBER ADDED
 - (2) AGRICULTURAL CHEMICAL SHIPPING STATEMENT ADDED
 - (3) SPANISH WARNING ADDED (4) COMPLETE PRECAUTIONS MOVED TO FRONT PANEL.

FORMULA 40 HERBICIDE



SPECIMEN LABEL (BACK)

WILD CORN: In corn, see Table for recommended use rates. Apply to the top...

WILD CORN: In rice, see Table for recommended use rates. Apply to the top...

WILD CORN: In sorghum, see Table for recommended use rates. Apply to the top...

WILD CORN: In sorghum, see Table for recommended use rates. Apply to the top...

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WILD CORN: In sorghum, see Table for recommended use rates. Apply to the top...

WILD CORN: In sorghum, see Table for recommended use rates. Apply to the top...

THE DOW CHEMICAL COMPANY

INDIANAPOLIS 41610 USA, ZURICH, SWITZERLAND, HONG KONG, BCC, CORAL GABLES, FLORIDA 33134 USA, SARNIA, ONTARIO, CANADA

MONEY BACK GUARANTEE

FORMULA 40 herbicide is guaranteed by The Dow Chemical Company to...

NOTE: Before use, read the product literature for chemical description and...

APPENDIX III

List of Plants Found at Kekaha G.M.A., Kauai

APPENDIX III

LIST OF PLANTS FOUND AT KEKAHA GAME MANAGEMENT AREA, KAUAI

On Site of Proposed Noxious Shrub Control Project
by the Division of Fish and Game, D.L.N.R.

Scientific Name	Common Name	Relative Abundance*
<u>Trees</u>		
<u>Eugenia cuminii</u>	Java plum	U
<u>Grevillea robusta</u>	Silk oak	V
<u>Prosopis pallida</u>	Kiawe	U (lower elev.)
<u>Psidium cattleianum</u>	Waiawe	U
<u>Psidium guajava</u>	Yellow guava	S
<u>Shrubs</u>		
<u>Acacia farnesiana</u>	Klu	S
<u>Dodonaea eriocarpa</u> var. <u>waimeana</u>	Aalii	V
<u>Lantana camara</u>	Lantana	V
<u>Opuntia megacantha</u>	Panini	U
<u>Pluchea odorata</u>	Sour bush	U
<u>Stachytarpheta cayennensis</u>	False vervain	U
<u>Styphelia tameiameia</u>	Pukiawe	M (higher elev.)
<u>Forbs</u>		
<u>Acanthospermum australe</u>	Star-burr	U
<u>Bidens pilosa</u>	Spanish needle	S
<u>Cassia leschenaultiana</u>	Japanese tea	A
<u>Desmodium uncinatum</u>	Spanish clover	S
<u>Erigeron canadensis</u>	Canada fleabane	M
<u>Erigeron bonariensis</u>	Hairy horseweed	M
<u>Indigofera suffruticosa</u>	Indigo	M
<u>Malvastrum coromandelianum</u>	False mallow	S
<u>Plantago lanceolata</u>	Narrow-leaf plantain	M
<u>Pteridium aquilinum</u>	Bracken fern	S
<u>Sida cordifolia</u>	Ilima	A
<u>Sonchus oleraceus</u>	Pualele	S
<u>Vernonia cinerea</u>	Little ironweed	S
<u>Waltheria americana</u>	Hialoa	A
<u>Grasses</u>		
<u>Andropogon pertusus</u>	Pitted beardgrass	A
<u>Chrysopogon aciculatus</u>	Pilipiliula	A
<u>Cynodon dactylon</u>	Bermudagrass	S
<u>Heteropogon contortus</u>	Pili grass	M
<u>Melinis minutiflora</u>	Molasses grass	M
<u>Paspalum orbiculare</u>	Ricegrass	S
<u>Setaria glauca</u>	Yellow foxtail	V
<u>Sporobolus capensis</u>	Smutgrass	U
<u>Trichachne insularis</u>	Sourgrass	S
<u>Tricholaena repens</u>	Natal redtop	V

* U = Uncommon, S = Sparse, M = Moderately Abundant, A = Abundant,
V = Very Abundant

APPENDIX IV

List of Animals Found at Kekaha G.M.A., Kauai

APPENDIX IV

LIST OF ANIMALS FOUND AT KEKAHA GAME MANAGEMENT AREA, KAUAI

On Site of Proposed Noxious Shrub Control Project
by the Division of Fish and Game, D.L.N.R.

Scientific Name	Common Name	Relative Abundance*
<u>Lophortyx californicus</u>	California quail	U
<u>Coturnix coturnix japonica</u>	Japanese quail	U
<u>Phasianus colchicus</u>	Ring-necked pheasant	M
<u>Alectoris graeca</u>	Chukar partridge	U
<u>Francolinus erckelii</u>	Erckel's francolin	M
<u>Francolinus francolinus</u>	Black francolin	S
<u>Streptopelia chinensis chinensis</u>	Lace-necked dove	M
<u>Geopelia striata striata</u>	Barred dove	M
<u>Asio flammeus</u>	Short-eared owl	M
<u>Mimus polyglottus</u>	Mockingbird	S
<u>Acridotheres tristis</u>	Mynah	S
<u>Zosterops palpebrosus japonica</u>	White-eye	S
<u>Lonchura punctulata</u>	Ricebird	M
<u>Passer domesticus</u>	House sparrow	U
<u>Richmondia cardinalis</u>	Red cardinal	M
<u>Carpodacus mexicanus frontalis</u>	House Finch	M
<u>Rattus rattus</u>	Black rat	?
<u>Rattus norvegicus</u>	Norway rat	?
<u>Rattus exulans</u>	Polynesian rat	S
<u>Mus musculus</u>	House mouse	S
<u>Felis catus</u>	Feral cat	S
<u>Sus scrofa</u>	Feral pig	M
<u>Odocoileus hemionus columbianus</u>	Blacktailed deer	M
<u>Bos taurus</u>	Feral cattle	A
<u>Bufo marinus</u>	Marine toad	S
<u>Alblepharus boutoni</u>	Snake-eyed skink	S

* U = Uncommon, S = Sparse, M = Moderately Abundant, A = Abundant,
V = Very Abundant

APPENDIX V

Reproductions of Comments and Responses
made during the Consultation Process

APPENDIX V

REPRODUCTIONS OF
COMMENTS AND RESPONSES MADE DURING THE CONSULTATION PROCESS

- Appendix V-a. . .Form letter from Thomas C. Telfer, Wildlife Biologist, Kauai sent to eighteen organizations or persons with interests in Kekaha Game Management Area, or expertise in environmental fields involved.
- V-b. . .Comments on Project by L.A. Faye, Jr., Executive Vice President, Kekaha Sugar Co., Ltd.
- V-c. . .Comments on Project by Mrs. Billie Beamer, Chairman, Department of Hawaiian Home Lands.
- V-d. . .Comments on Project by Ralph E. Daehler, District Forester, Division of Forestry, D.L.N.R., Kauai.
- V-e. . .Comments on Project by George Niitani, Kauai District Superintendent of State Parks, D.L.N.R.
- V-f. . .Comments on Project by Reynold W. Matsuo, Environmental Health Specialist, Department of Health, Kauai.
- V-g. . .Comments on Project by James Y. Kim, Chief, Weed, Seed and Pesticide Branch, Department of Agriculture.
- V-h. . .Comments on Project by Bill Forrest, District Conservationists, U.S.D.A., Soil Conservation Service.
- V-i. . .Response to Mr. Bill Forrest from Thomas C. Telfer on item V-h.
- V-j. . .Comments on Project by Maurice Taylor, Field Supervisor, U.S. Fish & Wildlife Service, Division of Ecological Services.
- V-k. . .Response to Mr. Maurice Taylor from Thomas C. Telfer on item V-j.
- V-l. . .Comments on Project by Akira Fujita, County Engineer, County of Kauai, Department of Public Works.
- V-m. . .Comments on Project by Brian Nishimoto, Planning Director, County of Kauai Planning Department.
- V-n. . .Comments on Project by Walter L. Briant, Jr., Manager and Chief Engineer, County of Kauai Department of Water.
- V-o. . .Letter from James W. Morrow, Director, Environmental Health, American Lung Association of Hawaii, requesting additional information.
- V-p. . .Response to Mr. J.W. Morrow from Thomas C. Telfer, answering questions in item V-o.
- V-q. . .Comments from Ms. Carolyn Corn, Botanist, State Division of Forestry to Ronald L. Walker, Wildlife Branch, State Division of Fish and Game

(Note: Comments were not received from the remaining agencies or persons consulted, that are listed on pages 15 and 16.)

APPENDIX V-a

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LIHUE, KAUAI 96786

January 7, 1977

(FORM LETTER)

The Division of Fish and Game is in the process of drafting an environmental impact statement for a proposed noxious shrub control project in Kekaha Game Management Area, Kauai. We are seeking your comments on the proposal, so that we can adequately assess all potential effects to the environment, which may result from our action.

Our proposed plans call for chemical herbicide control of two target plant pests: lantana, Lantana camara; and aalii, Dodonaea eriocarpa. These plants have rapidly encroached open rangelands in Kekaha Game Management Area, making many areas useless for game bird habitat, hunting, and range cattle pasturage. A total of 500 acres within the greater 20,000 acre Kekaha G.M.A. is presently suitable for noxious shrub control work. Two hundred acres primarily infested with lantana are to be treated with a mixture of 1 lb. Tordon 22-K plus 4 lbs. 2,4-D herbicide in 10 gallons of water per acre, with foam-type drift suppressant and surfactant additives. Three hundred acres, primarily infested with aalii will be treated with 4 lbs. 2,4-D in 10 gallons of water per acre, with drift suppressant and surfactant added. Herbicide applications will be made by a commercial spray helicopter adhering to the specifications and restrictions set forth on the registered State labels of the herbicides used. The attached map shows the locations of the planned herbicide applications. A list of plants and animals known to exist on the project site is also attached for your review.

Experimental studies conducted cooperatively with researchers at the Wailua Branch Station, University of Hawaii Agricultural Experiment Station in Kekaha G.M.A., indicated that satisfactory results can be obtained with the chemicals and methods proposed. Previous study plots up to 40 acres in size on Mana Ridge have been applied with no measurable adverse effects to the environment.

APPENDIX V-a

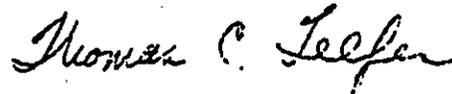
There are no viable alternatives to the use of herbicides for effective control of lantana and aalii in the Kekaha area. Biological controls tried, have thus far been unsuccessful. Burning and mechanical clearing have proven to actually stimulate re-growth of noxious shrubs, and reduce the competition by beneficial plants. Mechanical clearing would be prohibitively expensive, as it would require fencing out cattle and replanting with forage plants, as well as the cost of clearing.

Much game bird habitat in our public hunting areas is being lost to rapid encroachment by noxious shrubs. Game habitat improvement is the only feasible alternative available for maintaining and improving the quality of game bird hunting on Kauai's public hunting areas.

I would appreciate your comments on our proposed project as it relates to your particular realm of expertise or interest.

If you need further information on our proposal, please feel free to contact me.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

APPENDIX V-b

KEKAHA SUGAR COMPANY, LIMITED

P. O. BOX AA
KEKAHA, HAWAII 96752
TELEPHONE: (808) 337-1511

AN Amfac COMPANY

January 24, 1977

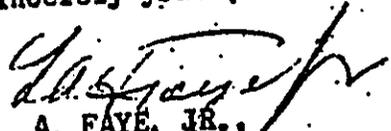
Mr. Thomas C. Telfer,
Wildlife Biologist, Kauai
State of Hawaii
Department of Land & Natural Resources
Division of Fish and Game
Lihue, Hawaii 96766

Dear Mr. Telfer:

RE: Proposed Noxious Shrub Control
Project, Kekaha Game Management Area

The Division of Fish and Game's proposed plans to use chemical herbicide to control noxious shrub was reviewed and discussed by Management and key personnel of the Company. The West Kauai Soil and Water Conservation District agrees with Kekaha that the proposed project is sound and would be a benefit to all concerned on conservation.

Sincerely yours,


L. A. FAYE, JR.,
Executive Vice President

PROJECT OFFICES

WAIMEA OFFICE
P O BOX 125
KAMUELA HAWAII 96743

KEAUKAHA OFFICE
P O BOX 633
HILO, HAWAII 96720

APPENDIX V-c



STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96808

PROJECT OFFICES

MAUI OFFICE
P O BOX 22
KAHULUI, MAUI 96732

MOLOKAI OFFICE
P O BOX 198
MOOLEHUA, MOLOKAI 96720

KAUAI OFFICE
P. O. BOX 332
LIHUE, KAUAI 96766

January 25, 1977

Mr. Thomas C. Telfer, Wildlife Biologist
Department of Land and Natural Resources
Division of Fish and Game
P. O. Box 1671
Lihue, Kauai, Hawaii 96766

Dear Mr. Telfer:

Subject: Proposal for Noxious Shrub Control Project,
Kekaha Game Management Area, Kekaha, Kauai

A review of the proposed noxious shrub control project shows that there are adequate safeguards and it appears that there is not any apparent adverse effect on the environment. Since this Department will also benefit from this project, we foresee no objections and, therefore, concur with the proposal.

Thank you.

Owau no me ka ha'aha'a,
(I am, humbly yours)

A handwritten signature in cursive script that reads "Billie Beamer".

(MRS.) BILLIE BEAMER, CHAIRMAN

MSJ:OA:yk

cc: Juliett Aiu, Project Manager

APPENDIX V-d



HAWAII DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY
KAUAI DISTRICT
P. O. BOX 1671
LIHUE, KAUAI, HAWAII 96766

March 11, 1977

IN REPLY REFER TO
A-13

Mr. Thomas C. Telfer, Wildlife Biologist
Division of Fish and Game
Lihue, Kauai, HI 96766

Dear Tom:

The noxious plant control project that the Division of Fish and Game is planning in the Kekaha Game Management area is outside of state forest reserve and conservation district land. It is far enough away and down wind of the forest reserve that I do not foresee any chance of effect on lands that have Division of Forestry responsibilities.

Concerning the project, I also feel that it is desirable to combat the take over of noxious brush in the dry Kekaha G.M.A. as long as the grasses will be able to take advantage of the reduced brush competition and prevent wind and water activated soil erosion.

Tordon has proven to be the most effective and lasting herbicide that we have used in the past to combat lantana.

I have no objection to the project if it is approved by Hawaiian Homes, the land owner, and Kekaha Plantation, the land lessees.

Very truly yours,

A handwritten signature in black ink, appearing to read "Ralph E. Daehler".

Ralph E. Daehler
District Forester, Kauai

cc: State Forester
H. Munechika

APPENDIX V-e
STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 1571 • LEE, KAILUA, HAWAII 96754

APR 10 11 37 AM '77
10/11/77

MESSAGE

TO J. M. Souza
Div. of State Parks
Honolulu, HI
ATTN: J. Yamashita

SUBJECT Re Attached - Fish & Game
Herbicidal Program
DATE April 5, 1977

Fish & Game would like to invite State Parks to comment on subject.

Should we have any comments, it would be in the area of archaeological sites.

In a brief research, it may be in the areas described by Bennett -
sites 10, 11, 12 and 13, though I doubt it.

As far as I am concerned I see no problem and would like to recommend
approval.

Please comment.

[Handwritten signature]
BY *[Handwritten signature]*
G. HIRAHARA

REPLY

DATE

[Handwritten note:] To [unclear] for comments

[Handwritten signature]

2, 4 D fails up carbon dating, so our archaeologists should be
asked to comment. They should be asked if anyone has checked
these areas for possible rare and endangered plants.

[Handwritten note:] To [unclear] for comments

Recommend recommit survey of areas to be
herbicides so that no sites will be affected. Rare and endangered plants: check w/ NARS people

SIGNED

[Handwritten signature]

~~GOVERNOR OF HAWAII~~
GOVERNOR OF HAWAII
GEORGE R. ARIYOSHI



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 1402
LIHUE, KAUAI, HAWAII 96766
January 28, 1977

~~DIRECTOR OF HEALTH~~
DIRECTOR OF HEALTH
GEORGE A. L. YUEN
~~DEPUTY DIRECTOR OF HEALTH~~
DEPUTY DIRECTOR OF HEALTH
AUDREY W. HERTZ, M.D.
~~DEPUTY DIRECTOR OF HEALTH~~
DEPUTY DIRECTOR OF HEALTH
JAMES S. KUMAGAI, Ph.D.
~~DEPUTY DIRECTOR OF HEALTH~~
DEPUTY DIRECTOR OF HEALTH
HENRY N. THOMPSON

Mr. Thomas C. Telfer
Wildlife Biologist, Kauai
Division of Fish and Game
Department of Land and Natural Resources
P. O. Box 1671
Lihue, Hawaii 96766

Dear Mr. Telfer:

Thank you for allowing this office to comment on your proposed project to use herbicides to control noxious shrub in the Kekaha Game Management Area.

We have no objection to the use of the herbicides you have listed to control the noxious shrub in the subject area. Due to the remoteness of the area to be sprayed we do not foresee any Environmental Health problems with the use of herbicides in the subject area.

Sincerely,

Reynold W. Matsuo
Environmental Health Specialist, Kauai

RWM/mk

FORWARDED:

Theodore Inouye
Chief Sanitarian, Kauai

FORWARDED:

Robert J. Melton, M.D., M.P.H.
District Health Officer, Kauai

GEORGE R. AHIYOSHI
GOVERNOR



JOHN FARIAS, JR.
CHAIRMAN, BOARD OF AGRICULTURE
YUKIO KITAGAWA
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

February 1, 1977

Mr. Thomas C. Telfer
Dept. of Land and Natural Resources
Division of Fish and Game
P. O. Box 1671
Lihue, HI 96766

Dear Mr. Telfer:

Mr. Donald Sugawa of our Kauai office has referred to me your letter of January 7th regarding Fish and Game's proposed noxious shrub control project within the Kekaha Game Management Area.

The following are comments to the proposed project:

The Department of Agriculture sees no objection to the use of 2,4-D and Tordon 22K for noxious shrub control within the confines of the Kekaha Game Management Area. These products are EPA- and State-registered and are cleared for use against noxious plant pests including a special supplemental state registration of Tordon 22K by aircraft application.

Both products have a low order of toxicity to fish and wildlife and there have been no unusual health problems in the handling of these products. We are of the opinion that their usage should not pose any problems or cause any unreasonable adverse effects to desirable plant and animal life found within the confines of the Game Management Area.

However, because 2,4-D and Tordon 22K can be injurious to sensitive crops and plant life outside of the Game Management Area, an aerial permit must be obtained from the Department of Agriculture before any operation takes place. This permission may be obtained from the Kauai office by filing a written application.

We also note that the map attached to your letter lacked information as to scale or the prevailing wind direction. This information is desirable to assess the risks of drift to sensitive crops and waterways and should be submitted with your application.

The Kauai office should be notified at least 72 hours in advance of the aerial application date and time so that monitoring can be made.

This office may be contacted for further information. Our phone number is 941-3071, extension 137.

Sincerely yours,

JYK:hf

James Y. Kim, Chief

APPENDIX V-h

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

P. O. Box 1012; Lihue, Hawaii 96766

January 24, 1977

Mr. Tom Telfer
Wildlife Biologist
Division of Fish and Game
Department of Land & Natural Resources
P. O. Box 1671
Lihue, Hawaii 96766

Dear Mr. Telfer:

Received your letter of January 7, 1977 outlining the Fish and Game Division proposal to chemically control Lantana camara and aalii; Dodonaea eriocarpa on 500 acres of the Kekaha Game Management Area.

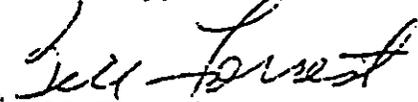
The questions that I have concerning the proposal are:

1. Assuming 100% control of Lantana and aalii and a reduction in Broad-leaf plants, is there sufficient grass understory to provide ground cover?
2. If the chemically controlled areas are successfully vegetated by the grass understory, will the livestock congregate in these areas and overgraze them?
3. If overgrazing takes place, what value will the chemically controlled area be to wildlife?

Other than the above mentioned concerns, the intent of the proposal is good. Lantana and aalii are indeed worthy of control in the Kekaha Game Management Area.

If this office can be of further assistance to you, please feel free to call on us.

Sincerely,


Bill Forrest
District Conservationist



GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LIHUE, KAUAI 96766

February 7, 1978

Bill Forrest
District Conservationist
U.S. Dept. of Agriculture
Soil Conservation Service
P. O. Box 1012
Lihue, Hawaii 96766

Dear Mr. Forrest:

This letter is in response to your letter dated January 24, 1977, which commented on our initial consultation with you regarding the Kekaha Game Management Area Noxious Shrub Control Project. Even though I verbally discussed your concerns with you, we are required to attach a copy of our written responses to your questions in the E.I.S. draft. Therefore, please consider this a response to your January 24, 1977 comments.

My responses to your three numbered questions are:

1. We have found in our previous herbicide trials that there is abundant grass understory released, as the lantana and aalii defoliation takes place. The dry stems of the dead lantana and aalii persist for several months, and protect the new grass growth from being overgrazed by livestock. By the time the shrub stems decompose, the grass understory is well established. We do not achieve 100% control of lantana or aalii, but do create considerable open space intermingled with a few persistent plants that provide excellent game bird cover.
2. The open areas that will be created by herbicide treatments create pasture very similar to what exists elsewhere. Grazing pressure will not be any heavier in the treated areas than in adjacent areas of open grassland. The grasses that are released are not particularly the most palatable to cattle, and would not be overused. The creation of 500 acres of "improved" pasture would ease the heavy grazing that exists elsewhere within the area.
3. The open spaces produced by herbicide treatment will at least produce more feed than exists beneath solid shrub stands at present, even if they do become over-grazed. Additionally, these open areas will make more area accessible to hunters, who otherwise could not use the sites. It would promote less crowded hunting conditions and increase

Bill Forrest
2/17/78

- 2 -

the hunter's chance of finding game.

Thank you for your comments to our noxious shrub control proposal.
I hope that these responses adequately answer your questions.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch



United States Department of the Interior

FISH AND WILDLIFE SERVICE
 Division of Ecological Services
 821 Mililani Street
 Honolulu, Hawaii 96813

Reference: ES

February 4, 1977

Mr. Thomas C. Telfer
 Wildlife Biologist
 Division of Fish and Game
 P. O. Box 1671
 Lihue, Kauai 96766

Dear Mr. Telfer:

This replies to your letter of January 7, 1977, concerning a request for comments on the noxious shrub control project proposed by the Division of Fish and Game, in Kekaha Gama Area, Kauai, Hawaii.

According to your letter, the herbicides 2,4-D and Tordon 22-K will be used to control 500 acres of lantana and aalii which are rapidly encroaching on open rangelands. A combination of 4 lbs. of 2,4-D and 1 lb. of Tordon 22-K per 10 gallons/acre will be applied by helicopter as spot treatment on lantana. Only applications of 2,4-D, at the rate of 4 lbs. in 10 gallons of water/acre will be used to treat aalii by similar means. Foam-type drift suppressants and surfactants will be added to each treatment.

The herbicides proposed for use and rates and methods of application in the Kekaha Gama Management Area are satisfactory from a wildlife standpoint, however, a range management plan for habitat improvement may be necessary to insure that the treated areas are not reinfested by undesirable plant species. It should be noted that neither 2,4-D nor Tordon are recommended for application to, or near, aquatic systems. In this regard, we do not expect it to be a problem, due to the absence of perennial waters and the relatively dry characteristics of the project area during much of the year. Also, with the use of drift suppressants/surfactants, the problem of contaminating water systems and adjacent areas should be remote if proper application procedures are followed. It should be emphasized that all label restrictions, specifications, and directives be strictly adhered to, and pesticide application be conducted by certified pesticide applicators in accordance with Section 4 of the Federal Environmental Pesticide Control Act of 1972 (P.L. 92-516).



2.

If we can be of any additional assistance, please let us know.

Sincerely yours,

Maurice H. Taylor
Maurice H. Taylor
Field Supervisor

cc: ECE (Lenhart)
ARD, AE
HA

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LILUO, KAUAI 96766

February 7, 1978

Mr. Maurice H. Taylor
Field Supervisor
Division of Ecological Services
U.S. Fish & Wildlife Service
P. O. Box 50167
Honolulu, HI. 96850

Dear Mr. Taylor:

This letter is in response to your letter dated February 4, 1977, which commented on our initial consultation with you regarding the Kekaha Game Management Area Noxious Shrub Control Project. Even though I verbally discussed your concerns with your staff, we are required to attach a copy of our written responses to your questions in the E.I.S. draft. Therefore, please consider this a response to your February 4, 1977 comments.

In our initial noxious shrub control studies with herbicides between 1969, and 1974, we have had the chance to study the re-infestation of pest plants, and have found that significantly improved hunting areas will be available for at least ten years after treatment. Tordon, in particular is a persistent chemical, which does effect some residual control after the initial application.

We have considered the hazzards of Tordon and 2,4-D to aquatic systems, and anticipate no problem, since we propose to apply the chemicals just after the rainy season when the risk of runoff would be slight.

I can assure you that all herbicide applications will be done in accordance with E.P.A. approved label restrictions and directions, by certified commercial pesticide applicators.

Thank you for your comments. I hope that these responses to your comments answer your questions regarding the project.

Sincerely yours,

Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch

APPENDIX V-1

EDUARDO E. MALAPIT
Mayor



AKIRA FUJITA
County Engineer
Telephone 245-3313
HENRY MORITA
Dep. County Engineer
Telephone 245-3602

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS
4396 RICE STREET
LIHUE, KAUAI, HAWAII 96766

January 17, 1977

Mr. Thomas C. Telfer
Wildlife Biologist, Kauai
Division of Fish and Game
P.O. Box 1671
Lihue, Hawaii 96766

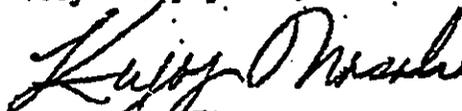
Dear Mr. Telfer:

This confirms receipt of your letter dated January 7, 1977 in regards to a proposed noxious shrub control project in the Kekaha Game Management Area.

We have no objections to your proposal to control the target plant pests. However, we are concerned about the potential erosion problems that may arise with the elimination of the vegetation.

Thank you for the opportunity to comment on your project.

Very truly yours,


AKIRA FUJITA
County Engineer

KK:mm

APPENDIX V-m

EDUARDO E. MALAPIT
MAYOR



BRIAN K. NISHIMOTO
PLANNING DIRECTOR

COUNTY OF KAUI
PLANNING DEPARTMENT
4280 RICE STREET
LIHUE, KAUI, HAWAII 96766

January 19, 1977

Mr. Thomas C. Telfer
Wildlife Biologist, Kauai
Department of Land and Natural Resources
State of Hawaii
P. O. Box 1671
Lihue, Hawaii 96766

Subject: Proposed Noxious Shrub Control Project
Kekaha Game Management Area, Kauai

We support your program for protecting and increasing game management areas on Kauai, but inasmuch as we are not knowledgeable about the impact of the chemical herbicides to be used, essentially we have no comments to offer on this project.


for BRIAN NISHIMOTO
Planning Director

APPENDIX V-n
DEPARTMENT OF WATER
COUNTY OF KAUAI
P. O. BOX 1706
LIHUE, HAWAII 96766

January 21, 1977

Mr. Thomas C. Telfer
Wildlife Biologist, Kauai
Division of Fish and Game
Dept. of Land & Natural Resources
Lihue, Kauai, Hawaii 96766

Re: Chemical Herbicide Control of Lantana and
Alii Plants - Kekaha Game Management Area,
Kauai, Hawaii

We have no water system in the concerned area.
Our nearest water source facility is located at
the foot of Paua Valley, just makai of Kekaha
town.

We have no objections to this proposal.


Walter L. Briant Jr.
Manager and Chief Engineer

GF:at

AMERICAN  LUNG ASSOCIATION of Hawaii

July 18, 1977

Mr. Thomas Telfer
Wildlife Biologist
P. O. Box 1761
Lihue, Hawaii 96766

Dear Mr. Telfer:

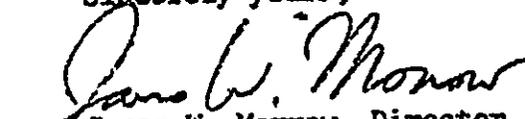
Subject: Noxious Shrub Control With Herbicides,
Kekaha Game Management Area, Kauai

As I am sure you are aware, Mr. Walker of DLNR's Wildlife Branch referred me to you for further information regarding the proposed spraying with Tordon and 2, 4-D. I have read the EIS Preparation Notice Mr. Walker sent to me and found it quite complete and more informative than many others that I have reviewed. I do, however, have a few questions which I hope you will be able to answer. These are listed below.

1. At what altitude and speed will the helicopter be flying?
2. Approximately how many acres can the aircraft treat in one hour?
3. In what manner does the "specialized spray equipment" minimize drift?
4. What is the approximate size (range) of droplets produced by the spray equipment?

Your cooperation and patience in responding to these questions will be greatly appreciated.

Sincerely yours,


James W. Morrow, Director
Environmental Health

JWM:ct

cc: Dr. Richard E. Marland, OEQC
Mr. Donald L. Walker, DLNR

APPENDIX V-p

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1871
LIHUE, KAUAI 96766

July 29, 1977

James W. Morrow
Director, Environmental Health
American Lung Association of Hawaii
245 North Kukui Street
Honolulu, HI. 96817

Dear Mr. Morrow:

Subject: Noxious Shrub Control With Herbicides,
Kekaha Game Management Area, Kauai

The following are answers to your questions stated in the letter to me dated July 18, 1977:

1. The helicopter will be flown between five and twenty feet above the ground while actually spraying, but would average ten feet most of the time. The helicopter speed will be 45 m.p.h. during the application of spray.
2. The helicopter will have the capacity to spray 218 acres per hour (40 foot swath at 45 m.p.h.) while actually spraying; however, this does not include loading time and travel time between the loading site and the target sites. In all actuality, the total 500 acre project will take three or four days, depending on wind conditions or other factors which might require us to halt spray application.
3. "Specialized spray equipment" involves the use of "Spraying Systems Inc." spray nozzles with a D-6 tip. A straight jet, non-restrictive (no whirl plates or atomizers) fixed on the spray boom at a 45° angle to horizontal will be used. The spray equipment will be calibrated to apply 10 gallons of spray mixture per acre. The above described equipment has been accepted by the State of California for aerial applications of phenoxy herbicides, where sensitive areas are adjacent to spray operations. A recently developed drift control additive, Nalco-trol (trade name), a poly vinyl polymer (thickening agent) will be added to help control drift. This product eliminates droplets smaller than 150 microns. A copy of a report on this product is enclosed for your review.

Mr. James W. Morrow
July 29, 1977

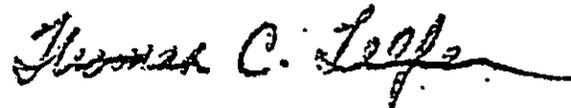
- 2 -

4. The approximate size range of the droplets produced by the equipment described above, without the use of a thickening agent, would be 250 to 300 microns. With the thickening agent, the "volume median diameter" of droplets would be 700 microns.

The above technical information was provided me by Mr. Ed Kohls, of EDCO Helicopters, a local commercial spray applicator here on Kauai, who has had considerable experience with the type of spraying we have planned. He has participated in tests of various spray equipment and chemicals used for the control of drift in the State of California.

Please feel free to contact me if you should have further questions on our proposed herbicide project.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: Dr. Richard E. Marland, OEQC
Mr. Ronald L. Walker, DLNR

enclosure

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

July 28, 1977

MEMORANDUM

TO: MR. RONALD WALKER, Wildlife Branch Chief
Division of Fish and Game

FROM: CAROLYN CORN, Botanist

SUBJECT: Noxious Shrub Control with Herbicides
at Kekaha Game Management Area, Kauai

In response to your impact statement preparation notice about the noxious shrub control with herbicides at Kekaha Game Management Area on Kauai, I spent Friday, 22 July 1977, with Tom Telfer visiting some of the proposed areas for herbicide control. We were able to visit, by vehicle, Mana and Kolo Ridges. By foot, we explored remnant portions of the native dry forest on the north facing slope of Kahelunui Valley, from 1400 to 1800 feet elevation, and parts of Mana and Kolo Ridges. My major concern for visiting the area was to see if there might be endangered plants in the area where you are proposing the helicopter spray program.

No endangered plants were found in the immediate mesa areas where herbicide treatment is proposed. However, it should be noted that not all areas could be visited in a day's time. This area is composed of such things as lantana, a'ali'i (*Dodonaea*), bracken fern, introduced grasses and weeds, and silk oak (*Grevillea robusta*). Some areas along the steep canyon walls, especially the north facing slopes, have portions of native forest that could harbor rare species. Some of the native trees seen along our foot inspection of two more forested areas along the north slope of Kahelunui Valley include koa (*Acacia koa*), lama (*Diospyros ferrea*), ohia (*Metrosideros collina* subsp. *polymorpha*), ie'ie (*Freycinetia arborea*), and iliau (*Wilkesia gymnoxiphium*). Very few native understory plant species have survived under these remnant trees. One *Bidens* sp., not in flower or fruit, and a fern (*Asplenium* sp.) was seen. Under the koa a remnant forest, guava and lantana were the most common species.

Mr. Ronald Walker
Page 2
July 28, 1977

These observations lead me to believe that the only areas that may harbor rare and endangered plants in the area would be in and around rock outcrops and along the steeper slopes of the valleys that dissect the mesas especially within the remnant native forest areas. If you can assure that your spray program does not damage these areas, there should not be a conflict between your proposed program and the Endangered Species Act.

Several items in regard with management that crossed my mind while I talked with Tom and saw the area, are the following.

The area only receives 10 to 15 inches of rainfall per year with scraggly silk oak as the dominant tree species, and lantana and a'ali'i as the dominant two shrubs on the ridge areas where you would be applying the herbicide. Erosional scars are already painfully evident along the slopes of these ridges, caused by animal overgrazing. Since this area receives so little rainfall, forestry may not be able to find plants that will grow in these scars that may stop the additional soil loss. Although eucalyptus and pine are used higher on the hillside where the temperatures are lower and there is a little more moisture, they probably would be ineffective in this area. Therefore, it behooves us to prevent accelerating this process further. If herbicides are applied too close to the edge of these slopes, the remaining grasses may not penetrate the soil deep enough to prevent erosion with rains. The deeper roots of shrubs and trees should probably be encouraged in these areas.

The removal of foliage with herbicide spray would cause more sun radiation to reach the ground layer and produce more heat. Although this extra sunlight and heat may produce more grasses with rain, it will also cause these areas to lose their soil moisture faster in drought periods and cause seed production of the remaining plants to become more cyclic, causing longer periods of drought and limited feed supply for the birds. Whereas shaded areas with shrubbery and trees can cause a delay in herb fruiting of a month or more, these areas would be reduced or eliminated with the spray. Diversity of habitat may be beneficial for your bird species.

Although fire danger becomes greater with more grasses, my visit during this dry period would make me suspect that grasses are probably grazed about as fast as they grow. Increased hunters in the area could cause a higher fire potential.

One reason, I understand, for clearing the shrubby using herbicides is to facilitate accessibility for the hunters. The fact that lantana is common in the southern part of the Kekaha Management Area

Mr. Ronald Walker
Page 3
July 28, 1977

and a'ali'i is common in the northern part of the area makes me wonder if the grazing impact upon the area may have been greatest in the southern region with the spread of lantana replacing a'ali'i with time. Since lantana is thorny, if I had a choice, I would rather walk thru a'ali'i. Since they are both shrubs of the same heights, it may be that by eradicating a'ali'i, lantana is able to establish itself faster if seed is introduced into the area upon eradication and control of the a'ali'i.

These are some of my thoughts that you might mull over while writing your EIS. Hopefully, Tom will keep his eyes open for any trends he may see that are developing from past herbicide treatments of the area.

Carolyn Corn
CAROLYN CORN

CAC:sna

cc: Tom Telfer
Ralph Daehler

APPENDIX VI

Reproduction of Comments and Responses
on Draft E.I.S.

APPENDIX VI

REPRODUCTIONS OF
COMMENTS AND RESPONSES ON DRAFT E.I.S.

- Appendix VI-a. . .Comments on draft E.I.S. by Mr. William Matthews for
Kisuk Cheung, Chief Engineering Division, U.S. Army Engineers.
- VI-b. . .Response to Mr. Kisuk Cheung from Thomas C. Telfer on
item VI-a.
- VI-c. . .Comments on draft E.I.S. by Dr. Bert Y. Kimura, Leeward
Community College.
- VI-d. . .Response to Dr. Bert Y. Kimura from Thomas C. Telfer on
item VI-c.
- VI-e. . .Comments on draft E.I.S. by Dr. Doak Cox, Director,
Environmental Center, University of Hawaii
- VI-f. . .Response to Dr. Doak Cox from Thomas C. Telfer on item VI-e
including "An Evaluation Report on the Use of Herbicides
for Noxious Shrub Control at Mana Ridge, Kauai."
- VI-g. . .Comments on draft E.I.S. by Dr. Richard E. Marland, Director
Office of Environmental Quality Control.
- VI-h. . .Response to Dr. Richard Marland from Thomas C. Telfer on
item VI-g.
- VI-i. . .Response to Dr. Richard Marland (through Ms. Helene
Takemoto) from Thomas C. Telfer on item VI-g.
- VI-j. . .Comments on newspaper article in "The Garden Island"
referring to draft E.I.S. by Ms. Mele Stokesberry-Skillings.
- VI-k. . .Response to Ms. Mele Stokesberry-Skillings from
Governor George Ariyoshi on item VI-j.
- VI-l. . .Response to Ms. Mele Stokesberry-Skillings from
Thomas C. Telfer on item VI-j.
- VI-m. . .Comments on draft E.I.S. from Dr. Kenneth Nagata, Research
Associate, Harold Lyon Arboretum, University of Hawaii.
- VI-n. . .Response to Dr. Kenneth Nagata from Thomas C. Telfer on
item VI-m.
- VI-o. . .Comments on draft E.I.S. by Mr. Maurice Taylor, Field
Supervisor, Division of Ecological Services, U.S. Fish and
Wildlife Service.
- VI-p. . .Response to Mr. Maurice Taylor from Thomas Telfer on
item VI-o.
- VI-q. . .Comments on draft E.I.S. by Dr. James W. Morrow, Director,
Environmental Health, American Lung Association.
- VI-r. . .Response to Dr. James W. Morrow from Thomas C. Telfer on
item VI-q.

(NOTE: No responses were prepared for the following letters as they did not raise serious questions or they provided no comments.)

- Appendix VI-1. . .Letter from Mr. Jack P. Kanalz, State Conservationist,
U.S. Soil Conservation Service
- VI-2. . .Letter from Mr. Robert Q. K. Ching, Chief, Eng. Const. and
Environmental Planning Div., Department of the Air Force.
- VI-3. . . Letter from Captain R. P. Nystedt, District Civil
Engineer, Fourteenth Naval District.
- VI-4. . .Letter from Dr. James S. Kumagai, Deputy Director for
Environmental Health, State Department of Health.
- VI-5. . .Letter from Dr. Reginald H. F. Young, Asst. Director,
Water Resources Research Center, University of Hawaii.
- VI-6. . .Letter from E. Alvey Wright, Director, State Department
of Transportation.
- VI-7. . .Letter from Ms. Jane Silverman, Historic Preservation
Officer, Division of State Parks.
- VI-8. . .Letter from Mr. Andrew I. T. Chang, Director, Department
of Social Services and Housing, State of Hawaii.
- VI-9. . .Letter from Mr. Hideo Murakami, State Comptroller,
Department of Accounting and General Services
- VI-10 . .Letter from Mr. John Farias, Jr., Chairman, Board of
Agriculture, State Department of Agriculture.
- VI-11 . .Letter from Mr. Henry Morita, County Engineer, Kauai
Department of Public Works.
- VI-12 . .Letter from Colonel Carl P. Rodolph, Director of Facilities
Engineering, Department of the Army, Ft. Shafter.
- VI-13 . .Letter from Mr. Raymond Sato, Deputy Manager-Engineer,
Department of Water, County of Kauai.
- VI-14 . .Letter from Brian Nishimoto, Planning Director, County of
Kauai Planning Department.
- VI-15 . .Letter from Captain Wayne R. Tomoyasu, Contract and
Engineering Officer, State Department of Defense.
- VI-16 . .Review form response from Colonel Patricia A. Greene, Chief,
Health and Environment Activity, U.S. Army, Schofield.



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

PODED-PV

11 January 1978

Chairman
Department of Land and Natural Resources
Division of Fish and Game
1151 Punchbowl Street
Honolulu, Hawaii 96813

CHIEF	X
FISH	
WILD	X
ENR	
FISH	
WILD	
ENR	
OP	
PL	
PER	

Dear Sir:

We have reviewed the Draft Environmental Impact Statement for the Kekaha Game Management Area, Noxious Shrub Control and find that the project does not conflict with any Corps of Engineers action or affect any areas of Corps jurisdiction. However, we offer the following comments concerning potential secondary impacts for your consideration.

There is a potential hazard in the use of picloram and 2,4-D compounds if herbicide applications are followed by heavy, intense rainfall. Small but significant amounts of these toxic substances are transported in surface runoff and may contaminate irrigation waters for a short distance below the site of application. When the herbicides are absorbed by soils, residual concentrations may be released slowly with continuous flushing. Because of the possible damage to sensitive, non-target plants served by a contaminated irrigation system, herbicide labels specifically warn against application to "inner banks or bottom of irrigation ditches, either dry or containing water, or other channels that carry water that may be used for irrigation purposes."

There is a possibility of contamination, either by accidental spillage, excessive spray drift or accidental application, as the helicopter passes over Wailau, Kuapaa, Waiakamoo, Ohaiula and Kahoaloha gulches enroute to the target sites. Although these sites are on land of relatively low relief, freshet runoff can reach the watercourses in a short time. Each of these streams flow into the extensive Kekaha Sugar Company irrigation systems and ultimately enter Mana wetland areas and reservoirs. It is

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Chairman

11 January 1978

conceivable that herbicide residues in these water ways may damage important cover and food plants which are utilized by several species of endangered Hawaiian waterbirds (primarily the stilt and the Koloa).

Since the herbicide manufacturer states that successful application may be made "at any time during the year when plants are actively growing", we suggest that treatments be made during the dry season and that operations be carefully coordinated with available weather data to avoid the hazards associated with surface water contamination.

We thank you for the opportunity to provide our comments on this proposal.

Sincerely yours,



1 Incl
Draft Environmental Impact
Statement



KISUK CHEUNG
Chief, Engineering Division

Copy furnished:
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

APPENDIX VI-b

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LILUOKE, KAUAI 96766

February 6, 1978

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Fort Shafter, HI. 96858

Dear Mr. Cheung:

This letter is in response to your comments on the Draft Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai, dated 11 January 1978.

Your first statement of concern, that "There is a potential hazard in the use of picrolam and 2,4-D compounds if herbicide applications are followed by heavy, intense rainfall", is true. The application of picrolam and 2,4-D is planned for that period when maximum plant foliage is available to absorb the herbicides. This period will occur just after the heavy rainfall season is completed, and there is a flush of new growth. Therefore, if we consult available weather data, and plan accordingly, there should be no runoff problem.

Nevertheless, the weather is not always that predictable. The areas we intend to spray are on gently sloping land, not immediately adjacent to the steep slopes, where runoff would be greatest. Furthermore, it is a regular practice of the sugar plantations to spray their ditches with wide-spectrum herbicides anyway, which kill all but bermuda grass, and nutgrass.

There is always a "possibility" of accidental contamination of the gulches as the helicopter passes over them to the target sites. Ecological accidents do happen, but not without the element of carelessness. The entire project will be carried out by professional certified applicators with considerable experience in the handling of spray equipment and the hazards of accidents.

The following are answers to your handwritten notations on the portion of the draft returned to us:

(Pg. 7) Soil erosion problems in the Kekaha uplands involve only those areas of steep gradient. We propose to remove shrub cover only in

K. Cheung
2/6/78

- 2 -

selected areas of very gentle slope, where erosion hazard is low. The U.S. Soil Conservation Service has reviewed our draft E.I.S., and has no question as to the advisability of the project.

(pg 8) As Kauai District Wildlife Biologist, I am personally very familiar with the flora and fauna within Kekaha Game Management Area, and have made reconnaissance surveys within the area over the past ten years. Ms. Carolyn Corn, D.L.N.R. Division of Forestry Botanist made a field trip into the area with me on July 22, 1977. She found no endangered plants on the ridge tops, or in the valleys surveyed. If endangered plants do occur, she said that they would be found in the rock out-crops and along the steeper slopes, where we do not intend to spray. I am confident that we can adequately control the spray with the methods planned for use.

(pg 9) 2,4-D on the average, persists in the soil from 4 to 6 weeks, and is actively broken down by bacteria, sunlight and chemical oxidation/reduction reactions. Tordon is more persistent in the soil, and has a residual phytotoxicity of 6 to 12 months, depending upon soil conditions. The herbicides can be expected to provide beneficial results (maintaining beneficial openings for game birds for a period of at least 10 years).

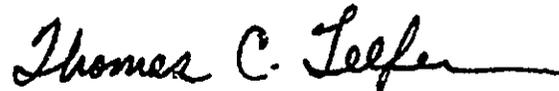
A "forb" is generally a non-woody, small annual or perennial forage plant other than grass. "Browse" is generally the leaves, shoots and twigs of trees or shrubs.

(pg 10) No specific survey of the streams or ditches was made for fish or invertebrates due to the high cost of hiring an expert and the unavailability of such an expert on Kauai. These streams are dry during much of the year. It would be very unlikely that significant rare fauna exists there.

(pg 11) "Dessicate" means to dry up. Decay and complete deterioration occur after a years time when livestock trample the dry stems.

I hope that these responses adequately answer your questions. Thank you for your comments. We will clarify the seasonal weather constraints regarding problems with run-off in our revised E.I.S. draft.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. Walker
Wildlife Branch Chief

REC-110

UNIVERSITY OF HAWAII

JAN 9 1978

LEEWARD COMMUNITY COLLEGE

DIVISION OF FIS	
DIRECTOR	<input checked="" type="checkbox"/> Rept. 1
FISH. CHIEF	<input type="checkbox"/> Suscep. 2
WLD. CHIEF	<input checked="" type="checkbox"/> Draft 3
ENF. CHIEF	<input type="checkbox"/> Rept. 4
FISH. BR.	<input type="checkbox"/> Comment 5
WLD. BR.	<input type="checkbox"/> Information 6
ENF. BR.	<input type="checkbox"/> Comp. Act. 7
OFF. SERV.	<input type="checkbox"/> Return for 8
SECRETARY	<input type="checkbox"/> Remarks: 9
FED. AID	<input type="checkbox"/>

6 January 1978

Governor, State of Hawaii
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Sir:

I have reviewed the Kekaha Game Management Area Noxious Shrub Control Project EIS and wish to offer comments. The proposed project is interesting in that it involves a large scale destruction of a single plant species. Endemism in Hawaiian plants, of course, is the primary reason why botanists worldwide have come to Hawai'i to study them intensely. I have some doubt as to whether this action is appropriate. These are my concerns:

1. Kenneth M. Nagata, Harold L. Lyon Arboretum, has communicated to you (16 December 1977) that identification of the species in question as D. eriocarpa may be incorrect. Thus its botanical identity should be verified. Perhaps the Pacific Tropical Botanical Garden at Lawai may be helpful. This should be of highest priority.
2. What is the range and distribution of this species? How many plants will be destroyed? Although locally abundant to a degree of noxious proportions for hunters, the elimination of 300 acres of its native habitat could comprise a sizable percentage of the world's population, especially if it is of limited range.
3. Can other areas be stocked with game (or transferred) so that the a'ali'i abundant acreage be reserved for botanical research? Indeed it is highly unusual for native vegetation to dominate and re-establish itself in direct competition with exotic flora. It would be of great scientific value as a study area.
4. How long will this one-time application be effective? The probability of a'ali'i re-establishing itself over the long-term has not been discussed.
5. Could succession by other plants result in an exotic plant species becoming dominant and begin spreading outward into surrounding areas? Over the long-term, the a'ali'i dominated areas may be serving a useful purpose as a buffer zone to discourage exotic plants from gradually encroaching upon native forest areas in the vicinity.

88-045 Ala Ika - Pearl City, Hawaii 96782 / Cable Address: UNTHAW

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Kekaha GMA Noxious Shrub Control EIS---page 2

6. What will happen to game populations when cover from broad leaf plants is reduced? How is gamebird productivity (page 8) defined? The movement of birds and mammals into unsprayed areas which provide more cover could offset benefits obtained from spraying. In fact, what is the current game density and what new levels are anticipated as a result of cover reduction and new forage development?

Your response to my questions will be greatly appreciated.

Aloha,



Bert Y Kimura
Division of Mathematics and
Natural Sciences

cc: DLNR, Division of Fish and Game

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

APPENDIX VI-3



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LILUOUE, KAUAI 96766

February 6, 1978

Dr. Bert Y. Kimura
Div. of Mathematics and
Natural Sciences
University of Hawaii
Leeward Community College
96-045 Ala Ike
Pearl City, HI. 96782

Dear Dr. Kimura:

This letter is in response to your comments on the Draft Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai, dated 6 January 1978. I will refer to each numbered paragraph of your comments as follows:

1. We will obtain verification on the identification of the Dodonaea species in question before the final draft of the EIS is prepared.
2. Though we cannot afford to perform a large scale botanical survey on the distribution of the Dodonaea species in question, we will try to determine its relative abundance and range through cooperation with a qualified botanist, and discuss this in the next draft.
3. Kekaha Game Management Area is zoned for agriculture. The aalii on western Kauai enjoys very wide-spread distribution and happens to be unpalatable to livestock or game mammals. In my opinion, the aalii has not "re-established" itself, but has persisted in spite of land abuses and exotic plants. The science of wildlife management has learned from much experience that hunting areas cannot merely be "stocked" with game to improve hunting potentials. Improving the habitat, so that it can support greater populations is the only effective means at hand. Pure stocking is wasteful, and puts additional stress on the meagre but extant wild populations of game. The area we propose to treat with herbicides represents only two and one half percent of the total area within Kekaha Game Management Area.
4. From past experimental tests, it appears that we will have beneficial effects (for public hunting) for a period of at least ten years after herbicide treatment. Lantana and aalii do re-invade the treated areas. The rate of re-invasion depends upon several variables; weather, soils, density of sod formation, grazing pressure and adjacent seed sources. Lantana is less persistent as a re-invader, since its seeds are rendered largely unviable, due to exotic insect pests.

Dr. Bert Y. Kimura
2/6/78

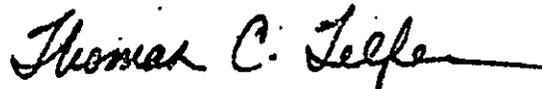
- 2 -

5. We have found aalii to be one of the most aggressive species to re-invade treated sites, since there is an abundant reservoir of viable seeds in the plants surrounding treatment sites. Aalii has proven itself to be an adequate competitor with all other existing plants in the area.
6. Game birds primarily feed on seeds of grasses, guava fruits and to a lesser extent upon insects. Food habit studies indicated that these birds, deer or feral pigs make little if any use of lantana or aalii for food. Replacement of these shrubs with seed producing grasses will increase the game food supply. Our herbicide treatments do not achieve 100 percent shrub kill: A few survivors remain. Game birds prefer broken cover, such as results from our proposed treatments. Solid stands of shrubbery provide very poor game habitat. Furthermore, the herbicide treatments will open the area so that hunters and their dogs can find birds and harvest them.

The current game bird density in Kekaha G.M.A. is low, less than 20 pheasants per square mile. We can expect the density of pheasants to at least double in the areas treated as a result of the creation of open areas which produce feed. Besides increasing the bird populations, we will be maintaining open areas suitable for access by hunters. Noxious shrubs are ever-spreading in the area, and we are losing effective hunting space by accepting the status quo.

I hope that these responses have answered your questions. Thank you for your comments on the E.I.S. draft.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. Walker
Chief, Wildlife Branch



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7381

Office of the Director

January 6, 1978

RE:0238

MEMORANDUM

TO: Richard E. Marland, Director

FROM: Doak C. Cox, Director

SUBJECT: Review of Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai

The Environmental Center review of this project has been prepared with the assistance of John Hylin, Agricultural Biochemistry Department; Charles Lamoureux, Botany Department; Darro Thuet and Jacquelin Miller, Environmental Center.

In our earlier review of the environmental assessment submitted with the negative declaration for this project (December 1, 1975) we had identified a number of significant environmental concerns which needed to be addressed and recommended that an EIS be prepared on the project. We are pleased to note that the Environmental Impact Statement has been prepared and appreciate the opportunity to comment on its adequacy.

There are three major concerns which have been expressed by our reviewers and which should be addressed in the revised EIS. The first deals with the adequacy of the preliminary surveys of the area with regard to the existing flora and fauna. Lists of plants and animals are given in Appendix III and IV. There is however no indication of how these lists were prepared. References are made, in the case of plants, to a study conducted in 1942. If the plant list has, in fact, been compiled on the basis of the 1942 study, we seriously question its applicability to the present conditions. Previous correspondence on the environmental assessment prepared for this project indicated that the current spraying operation was "the first phase of incremental noxious shrub control using the herbicides ...". We assume therefore that additional spraying of other areas will be planned for the future. It is essential for future safe environmental management that precise quantitative data be acquired, if it does not presently exist, on the flora and fauna of the areas to be treated. Otherwise the efficacy of the proposed herbicide treatment cannot be adequately evaluated and future useage of herbicides for game management areas may be jeopardized. The documentation of the methods by which the species lists are obtained should include season or time of year that the observations were made, specific methodology employed (ie transects, quadrants, etc.) and specific areas examined. In connection with

Memo to Richard E. Marland
RE:0238

-2-

January 6, 1978

this baseline information it would be helpful if the results of the earlier studies or "trial applications" were presented. Specifically, what herbicides were applied in what concentrations to what areas at what times of the year? What was the vegetation like in those areas before spraying (list of species, and indication of cover or abundance or biomass of each)? What changes were observed in these parameters after spraying? How long was the observation period in the trial applications? Did lantana or a'ali'i come back at some time after spraying? How is the improvement of recreational hunting measured? Can the relative effects of the cleared areas on the game population be differentiated from the greater hunter access and visibility so as to determine if the herbicide is in fact contributing to a greater population of game animals?

The second concern applies to the use of 2, 4-D acid. We note in the Appendix II-b that complete label specifications including use directions and precautions are quite fully and adequately given for Tordon 22K. However, that is not the case for 2, 4-D acid. The Specimen Labels provided are "For Manufacturing Purposes Only" and do not contain any information as to use or precautions. In our previous review of the assessment, we noted that our labeling information indicated that the rate and concentrations proposed for 2, 4-D acid (4 lbs/acre in 10 gallons of water), was too high and therefore in violation of labeling statutes. A sample label with use instructions and precautions should be included in the revised EIS.

Our third point of concern applies to the question of archeological sites and the comments in Appendix V-e. We note that Mr. Niitani has raised the question of 4 archeological sites possibly within the area and others (whose initials we cannot decipher), express concern over carbon dating errors resulting from spray contamination. Also we note the recommendation for a reconnaissance survey for archeological sites as well as rare and endangered plants. These concerns do not appear to have been addressed in the EIS and should be acknowledged and covered in the revised document.

We appreciate your consideration of our comments on this EIS.

Yours truly,



Doak C. Cox
Director

DCC/sa

cc: John Hylin
Charles Lamoureux
Darro Thuet
Jacquelin Miller

APPENDIX VI-f

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LIHUE, KAUAI 96766

February 6, 1978

Dr. Doak C. Cox, Director
University of Hawaii
Environmental Center
Crawford 317 - 2550 Campus Rd.
Honolulu, HI. 96822

Dear Dr. Cox:

This letter is in response to your comments on the Draft Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai, dated 6 January 1978.

In response to your first point of concern: "adequacy of the preliminary surveys of the area with regard to the existing flora and fauna", I offer the following: Our surveys of the flora and fauna within the area were admittedly "reconnaissance surveys". I personally have spent the past ten years on Kauai as Wildlife Biologist, and have spent probably more time surveying the condition of the flora and fauna in the area than any bio-scientist. In managing the wildlife in the area, I am very much concerned with the make-up of plant and animal communities involved. I have also conducted quarterly deer browse surveys within the area, which is done after the Aldous technique described in the Forestry Handbook, a publication of the American Society of Foresters 1961. These surveys were made on a quarterly basis, and reflect seasonal changes in the vegetation.

The Division of Fish and Game cannot expend the large sum of money necessary to hire a Ph.D. botanist to perform an exhaustive search of the entire area for possible rare endemic plants. Ms. Carolyn Corn, D.L.N.R. Forestry Botanist made a survey of the area with me on July 28, 1977, and found no endangered plants on the ridge tops or valleys surveyed. She stated that "the only areas that may harbor rare and endangered plants in the area, would be in and around rock outcrops and along the steeper slopes of the valleys that dissect the mesas especially within the remnant native forest areas". We do not propose any herbicide applications near these steep areas, due to the inherent erosion hazards. I am confident that we can effectively control our herbicide application to keep it within the target areas.

With regard to future phases of herbicide applications, this will be decided after completion and evaluation of the currently proposed phase.

Dr. Donk C. Cox
2/5/78

- 2 -

We do intend to document the effects of our proposed herbicide work. The subject of future possible treatments does not seem to be an appropriate discussion under the current phase of proposed work. The environmental impact of any future herbicide treatments will be assessed at that time.

Our earlier herbicide trials were accomplished in cooperation with University of Hawaii Agricultural Experiment Station scientists, namely, Dr. Donald L. Plucknett, and a Doctoral Candidate in Agronomy, Douglas Nichols. Dr. Nichols did most of the vegetation analysis, and kept records of forage response and etc.. Unfortunately, both Dr. Plucknett and Dr. Nichols left the Experiment Station shortly after our tests had been run. I attempted to track down the unpublished information of our trials from Dr. Nichols who had moved to Malaysia in early 1976, but learned of his untimely death, and was unable to obtain the information. I did record briefly the results of our herbicide trials for my own records in an unpublished report. A copy is enclosed for your review. This is not an academic paper, but a record of my subjective analysis of the test results. The Division of Fish and Game has very limited manpower and funds, and cannot afford the expenditures necessary to conduct academic studies of all of its management procedures, even though it would be desirable to do so. Our proposal to change the vegetation in two and one half percent of the total area within Kekaha Game Management Area is not a radical one. We are in the business of providing recreational hunting for the public on one hand, while also being responsible for preserving the endemic flora and fauna on the other.

Improvement of recreational hunting can be measured in terms of hunter success, (animals harvested per hunter effort made), and by the increase in opportunity for hunting. The mere creation of additional accessible hunting area satisfies many hunters, whether they harvest game or not. Creation of additional open hunting area results in less crowded hunting conditions, and increases a hunter's chance to find game. The noxious shrub problem on Kauai is not static, but ever-increasing. Our proposed herbicide treatments will protect some hunting space, that otherwise will be lost to encroaching noxious shrubs.

In response to your second point of concern: Herbicide label restrictions, we inadvertently provided the manufacturer's label in our appendix. The current label will be included in our revised draft of the E.I.S. The most recent label for 2,4-D does limit the rate of the herbicide to fewer than 4 lbs. per acre. Our original studies with University of Hawaii Agronomists, Plucknett and Nichols indicated that 4 lbs./acre provided the best results, and apparently, the 4 lb. rate was permissible at that time. Nevertheless, we will follow the herbicide label restrictions, and after consulting the Department of Agriculture authorities, we will submit revised herbicide rates to comply with the current label.

Your third point of concern, regarding possible contamination of archaeological sites with 2,4-D that might foul up carbon dating has been looked into more thoroughly. The four known archaeological sites referred

to in the memorandum appearing as Appendix V-c, do not fall within the proposed herbicide target sites (reference: Archaeology of Kauai by W. C. Bennett, B. P. Bishop Museum Bulletin 80). The closest archaeological site to any of our target areas is more than 2,000 feet away. All of the sites are upwind of our proposed target areas. Ms. Jane Silverman, Historic Preservation Officer, with the D.L.N.R. Division of State Parks, had no opposition to our spray proposal in her comments on the EIS.

The U.S. Fish & Wildlife Service Division of Ecological Services, Field Supervisor stated in his comments to us dated December 13, 1977, that "In consultation with our Endangered Species Staff, it is highly unlikely that any endangered species of plants or animals would be affected by the project. The report's appended species checklist of plants and animals is an accurate listing for the area involved". Your recommendation for further reconnaissance surveys would be very costly to our limited manpower and funds. We are confident that our surveys of the area are adequate to assess the hazard to endangered biota.

Thank you for your intensive examination of our draft environmental impact statement. Your concern about the label restrictions on the use of 2,4-D will be dealt with in the revised impact statement.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch

AN EVALUATION REPORT
ON THE USE OF HERBICIDES FOR NOXIOUS SHRUB CONTROL
AT MANA RIDGE, KAUAI

by:
Thomas C. Telfer
Wildlife Biologist, Kauai
February 16, 1972

SUMMARY:

Eight herbicide mixtures including 2,4-D, 2,4,5-T, Banvel and Tordon were tried in various combinations and rates to control the noxious shrubs lantana, aalii and klu at Mana Ridge, Kauai during 1971.

Only one of the mixtures, a 2,4-D-Tordon combination provided satisfactory control of all target species. The cost of this treatment was \$ 21.90 per acre, including helicopter application costs.

Pure 2,4-D and the Banvel-2,4-D mixtures provided satisfactory control of aalii and klu; but did not effectively control lantana. These mixtures may be useful in areas where lantana infestation is not severe. Costs of these treatments including helicopter application ranged between \$3.20 to \$10.70 per acre.

Forage release of several existing grasses occurred on all of the herbicide trial plots. A discussion of replacement vegetation is included in this report.

BACKGROUND:

Several hundred acres of potentially good pasture and game range within Kekaha Game Management Area, Kauai are choked with noxious shrubs, including lantana, Lantana camara; aalii, Dodonaea viscosa; and klu, Acacia farnesiana. In a cooperative effort, the University of Hawaii and the Hawaii Division of Fish and Game have attempted herbicide control of these weeds. Other methods such as mechanical clearing, burning and biological control appear to be ineffective, too costly or objectionable.

In April, 1970, trials of eight herbicides in twenty various mixtures and rates were applied to 10 foot by 40 foot plots of lantana-aalii scrub rangeland on Mana Ridge Kauai. The plots using various mixtures of Tordon, Banvel, 2,4-D and 2,4,5-T showed the most promise for control of the target species of these trials.

In May of 1971, these four chemicals were applied to 2 acre test plots in 8 different mixtures and concentrations. These mixtures are shown in Table I. The larger plots were necessary to get a better reading on herbicide effects and to evaluate effects on non-target species.

DESCRIPTION OF TEST SITE:

Location: Mana Ridge, Kauai. At approximately 1,500 feet elevation.

Area: Eight test plots 2 acres each in size.

Vegetation: Classified in Vegetation Zone S (Ripperton and Hosaka 1942).

Principal shrubs are: Lantana, aalii, klu, and koa haole, Leucaena glauca. Grasses include: Natal red-top, Tricholaena rosea; Yellow foxtail, Setaria glauca; Pilipiliula, Chrysopogon aciculatus; ricegrass, Paspalum orbiculare; pili grass, Heteropogon contortus; Molasses grass, Melinis minutiflora; pitted beardgrass, Andropogon

pertusus; rattail grass, Stenobolus canensis; fuzzy-top beardgrass, Andropogon barbinodus; and an unidentified bluegrass, Poa. Common forbs include: Hairy horseweed, Conyza bonariensis; narrow-leaf plantain, Plantago lanceolata; red pualele, Emilia sonchifolia; waltheria, Waltheria americana; indigo, Indigofera suffruticosa; Japanese tea, Cassia leschenaultiana; and Spanish clover, Desmodium sandwichense.

Climate: Dry and warm. Rainfall between 20 and 35 inches annually, most of which falls between October and March.

Soils: Classified as Molokai silty clay, eroded sloping phase. Fertility is generally low, and texture is fine, well compacted by livestock.

OBJECTIVES:

To improve game range by eliminating thick stands of noxious shrubs including: lantana, aalii and klu, within Kekaha Game Management Area, Kauai economically and without damaging beneficial plant species.

PROCEDURES:

Test plots for each chemical mixture were laid out on the contour at approximately 1,500 feet elevation on Mana Ridge, Kauai. Each plot measured 120 feet by 726 feet and was marked by a row of flagged poles running longitudinally thru the center of each plot. See Figure 1.

Application of herbicides was from a Bell G 47 MK 5 helicopter capable of spraying a 60 foot wide swath. One spray pass was made on each side of the marker flags, providing a full test plot width of 120 feet. A buffer zone of 100 feet was maintained as a non-treated control between each test plot. Each chemical was applied at a rate of 10 gallons per acre.

An evaluation of herbicide effects was made approximately 6 months after spraying. A five category evaluation system was used to classify the results of each herbicide on each test plot. (See Table I).

FINDINGS:

Each of the eight trials were evaluated on December 15, 1971.

Four of the eight mixtures show potential for effective use at Mana Ridge. They are: (1.) 2,4-D + Tordon @ 4 lb. to 1lb./acre, (2.) Banvel + 2,4-D @ 1 lb. to 4 lb./acre, (3.) Banvel + 2,4-D @ ½ lb. to 2 lb./acre, (4.) and pure 2,4-D at 4 lb./acre. The four unsatisfactory mixtures will not be discussed in this report as they have no potential for future use.

Lantana is by far the most persistent shrub. Only the mixture containing Tordon (Picrolam), produced satisfactory results on that species. Therefore, if eradication of all three target species is considered economical and the most desirable, then the Tordon + 2,4-D mixture is the only treatment fulfilling that requirement.

If control of only aalii and klu is more feasible and lantana can be tolerated in certain areas, then one of the other mixtures might prove satisfactory.

Each of the four potentially effective chemical treatments will be described separately below, citing their individual attributes and the economic aspects of each:

TEST NO. 3. (4 lb. 2,4-D per Acre)

This straight solution of 2,4-D provided satisfactory control of aalii. Some minor re-sprouting was noted; however, the relatively low cost of this chemical may permit a second application, perhaps 6 months

after the original application, to totally eradicate this pest.

This treatment provided only moderate control of lantana and klu. Almost total defoliation of these species occurred, but resprouting was very evident on all plants after 6 months.

The majority of land that needs rehabilitation is predominantly vegetated with aalii. Lantana is especially a problem in valleys and depressions where soil and moisture are optimal. In the areas where lantana and klu are sparse, a treatment of pure 2,4-D at 4 lb. per acre might provide beneficial results. If aalii can be eradicated and sufficient grass cover can become established in the voids without spread of lantana, then a significant improvement to the habitat can be achieved. Lantana if kept from spreading, would provide cover and some feed for game birds; However, if it spreads into the voids created by the removal of aalii, then the pure 2,4-D treatment has no value. Seeding the range after herbicide treatment with more hearty range grasses might assist in keeping the lantana from spreading, although heavy grazing by cattle would reduce the feasibility of this.

The low cost of the pure 2,4-D treatment is attractive. The cost of one treatment per acre by helicopter is \$ 5.20 (does not include our supervisory labor costs). This low price leaves open the possibility of making a second application which might improve the longevity and effectiveness of the treatment.

TEST NOS. 6 & 7 (Banvel + 2,4-D, two rates will be discussed together)

The combination of Banvel and 2,4-D provided similar results to that of the pure 2,4-D mixture, although control of the klu was somewhat improved.

There was little difference in effectiveness by using heavier rates of both chemicals, except that klu was totally controlled by the heavier one, (No. 6), and minor re-growth occurred in the lighter rate, (No. 7).

This test when compared to the pure 2,4-D treatment, indicates that the inclusion of Banvel improves the control of Klu. Klu is not presently one of the more serious pests at the test site, but has potential of becoming one. No adequate control of lantana was realized by the use of this mixture. Therefore, if this treatment were used, lantana would have to be tolerated as it exists. Perhaps, spot control of lantana would be practical after the initial aalii - Klu control has been accomplished. The spot control would have to be by picrolam, (Tordon) as this is the only chemical which satisfactorily controls lantana.

Costs of the Banvel + 2,4-D mixtures are as follows: \$12.70 for mixture No. 6, and \$7.35 for mixture No. 7 per acre treated by helicopter. Costs of this herbicide mixture are low enough to provide the possibility of applying a second application for more complete control.

TEST NO. 8 (4 lb. 2,4-D + 1 lb. Tordon per acre)

This is the only treatment which provided satisfactory control of all three target species after 6 months. Only slight re-growth of lantana occurred and almost total control of aalii and klu was achieved.

The forage release and improved accessibility of the range after this treatment was significant in this trial. Various grasses filled the voids where aalii, lantana and klu were killed. This treatment appears to have the best potential for long-range rehabilitation of the grassland. Even though considerable cover is removed by this treatment, the lack of cover can be alleviated by one of the following two techniques. 1. Treat only portions of the present range with herbicides, thereby leaving some of the existing weed shrubs for cover. This would reduce the total cost of habitat rehabilitation, since only half of the area would have to be sprayed.

2. Another, perhaps more beneficial treatment would be to spray the entire range and then provide cover by planting herbaceous seedlings of a more acceptable cover species than lantana. A bunchgrass of low palatability to cattle such as Hawaiian lovegrass, Eragrostis grandis could also be used for this purpose. The latter method would be more expensive, because it would entail spraying the entire acreage and then planting a cover species; However, the chance of lantana spreading into the treated area from adjacent untreated strips would be eliminated.

The cost of spraying the 2,4-D + Tordon treatment per acre by helicopter is \$21.90. This high cost would reduce the feasibility of a second application if deemed necessary.

DISCUSSION OF POST-TREATMENT FORAGE RECOVERY

Several grasses and forbs became vigorous following defoliation of Lantana, alii and klu. The most aggressive invader was natal red-top grass. This species, apparently not very palatable to cattle, predominated and was widespread throughout the treated test plots. It produces abundant airborne seed and reproduces rapidly. This grass does not form a dense mat capable of out-competing herbaceous vegetation. Another common grass which filled in the voids created by the death of noxious shrubs, was pilipiliula, a low mat-forming grass of little or no forage value. The spread of this grass might be effective in excluding new growth of noxious shrubs. Several other grasses released additional forage as a result of reduced shrub competition by herbicides. These are listed under the section describing the test site, on page 1.

Shrubs such as koa haole, indigo and waltheria were found within the

treated plots after herbicide application. These were apparently not affected by the herbicides used.

None of the grasses in this region are especially hearty. During the dry season, most of the grasses die back, therefore, the introduction of a dryland species such as buffel grass Cenchrus ciliaris might prove beneficial in revegetating the voids created by shrub removal.

Plants such as Japanese tea, narrow-leaved plantain, pualele and spanish clover are present in the area and provide some feed for game birds. Seed producing grasses of value to birds are somewhat eliminated by cattle consumption. It appears that any species planted for game bird feed will have to be fenced from cattle; However, additional planting of the range with spanish clover and hila hila Mimosa pudica might improve the range for game birds outside fenced cattle exclosures.

TABLE 1

EFFECTIVENESS RATING OF 8 HERBICIDE MIXTURES
 6 MONTHS AFTER APPLICATION ON LANTANA-AALII SCRUB RANGELAND
 MANA RIDGE, KAUAI
 December 15, 1971

Test No.	Herbicide Mixture	Species Control Rating*		
		Lantana	Aalii	Klu
1.	1 lb. Banvel/acre	2-	2	NS
2.	2 lbs. 2,4,5-T/acre	2	3	3
3.	4 lbs. 2,4-D/acre	3+	4+	3
4.	2 lbs. Banvel + 4 lbs. 2,4,5-T/acre	3-	4	3+
5.	1 lb. Banvel + 2 lbs. 2,4,5-T/acre	3-	3	3+
6.	4 lbs. Banvel + 4 lbs. 2,4-D/acre	3+	4-	5-
7.	½ lb. Banvel + 2 lb. 2,4-D/acre	3	4-	4
8.	4 lbs. 2,4-D + 1 lb. Torden/acre	4-	5-	4+

* Species Control Rating based on the following classes:

Class	Subjective Rating	
5	Complete control	(+ denotes superior control within rating class)
4	Satisfactory control	
3	Moderate control	(- denotes inferior control within rating class)
2	Slight control	
1	No control	

TABLE NO. 2

COST COMPARISON OF HERBICIDES USED AT MANA RIDGE, KAUAI
LANTANA-AALII CONTROL TRIALS, MAY - 1971

Test No.	Herbicide Mixture	Cost of Application Per Acre*
1.	1 lb. Banvel/acre	\$ 7.50
2.	2 lbs. 2,4,5-T/acre	\$ 5.50
3.	4 lbs. 2,4-D/acre	\$ 5.20
4.	2 lbs. Banvel + 4 lbs. 2,4,5-T/acre	\$ 26.00
5.	1 lb. Banvel + 2 lbs. 2,4,5-T/acre	\$ 13.00
6.	1 lb. Banvel + 4 lbs. 2,4-D/acre	\$ 10.70
7.	½ lb. Banvel + 2 lbs. 2,4-D/acre	\$ 5.35
8.	4 lbs. 2,4-D + 1 lb. Toron/acre	\$ 21.90

* Includes cost of helicopter rental, based on \$1.50 per acre sprayed and 4¢ per gallon dropped. (All treatments were applied in mixtures of 10 gallons per acre)

53
6

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 MALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

RICHARD E. MARLAND, PH.D.
DIRECTOR

DIVISION	
TELEPHONE NO.	
DIRECTOR	548-6315
FISH CHIEF	
WATER CHIEF	
...	

January 3, 1978

MEMORANDUM

TO: William Thompson, Director
Department of Land and Natural Resources

FROM: Richard E. Marland, Director
Office of Environmental Quality Control

SUBJECT: Environmental Impact Statement for Kekaha Game
Management Area Noxious Shrub Control Area,
Kekaha, Kauai

As of this date, this Office has received seventeen comments on the above subject. An attached sheet lists the responding agencies and/or organizations.

In our review of the environmental impact statement, we have found several areas in which the document should expand its discussion. We offer the following comments:

Page 3

Although the EIS states that the project will be accomplished with public funds provided by Capital Improvement Project appropriations, Act 218, SLH 1974 and Act 195, SLH 1975, the total amount for the proposed action should also be given.

Page 5

For the use of Tordon, the EIS indicates the Hawaii State label for Tordon 22-K permits aerial application of the herbicide, whereas the E.P.A. label prohibits it. Further explanation should be given in order to clarify why Tordon may be used aurally in Hawaii.

In addition, the statement, "...the negative declaration was published by the Department of Environmental Quality Control..." should read, "the negative declaration was published by the Environmental Quality Commission."

RECEIVED

JAN 11 1978

Page 2

Page 6

The EIS states, "The tree clearing project is a separate job from noxious shrub control project, but they are related to each other in terms of overall hunting area improvements in the area." It should be realized that together the environmental impact increases. In other words, the environmental impacts should be assessed together as cumulative impacts. For example, soil erosion and depletion of soil nutrients may increase with a greater loss of ground cover.

Page 7

The problems of flooding near Kekaha Town are caused by heavily eroded soil and lack of vegetation on steep slopes. As a result, flooding and siltation occur. Possible solutions to the problem have been assessed under the Kekaha Watershed Plan. Although further statements indicate no problems of erosion and flooding, mitigation measures should be described to reflect this.

Page 8

Although the possibility of herbicide in runoff affecting other areas in lower regions has been considered, care should be taken to avoid spraying in the rainy season.

Page 16

The EIS states the review of the EIS is by the Environmental Quality Commission. Actually, the Office of Environmental Quality Control is reviewing the EIS.

Further Discussion

The EIS should also include precautions of storing the herbicide, cleaning the equipment, and waste disposal.

EIS Preparation Notice

In the appendix, the comments made by the U. S. Soil Conservation Service and the U. S. Fish and Wildlife Service did not receive responses. The EIS Regulations require that "Reproduction of the comments and responses made during the consultation process" be included in the EIS process. (section 1:42m.)

For brevity and fairness, this Office did not attempt to summarize other comments. Instead, we recommend that each comment be given careful consideration.

Page 3

Further, we are aware of the fourteen day response period. Since the accepting authority has the discretion to accept responses beyond the fourteen day period, we will accept responses past the fourteen day period.

We trust that these comments will be helpful to you in preparing the revised EIS. We thank you for the opportunity to review the EIS. We look forward to the revised EIS.

Attachments

APPENDIX VI-h

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LHUC, KAUAI 96763

February 7, 1978

Richard E. Marland, Director
Office of Environmental Quality Control
550 Hale Kauhila Street, Room 301
Honolulu, HI. 96813

Dear Dr. Marland:

This letter is in response to your memorandum to William Thompson, Director of the Department of Land and Natural Resources, dated January 3, 1978, with reference to our Draft Environmental Impact Statement for Kekaha Game Management Area Noxious Shrub Control Area, Kekaha, Kauai.

Thank you for your helpful comments on the various areas in which our draft EIS is in need of correction and expansion. We will address your questions and suggested improvements you noted on pages 3, 5, 6, 7, 8 and 16 of the draft as noted in your memorandum in our revised EIS.

Thank you for allowing us additional time to respond beyond the fourteen day response period.

Sincerely yours,

Thomas C. Telfer

Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Wildlife Branch Chief

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LIHUE, KAUAI 96766

February 13, 1978

Ms. Helene Takemoto
Environmental Analyst
Office of Environmental Quality Control
550 Halekauwila St. Room 301
Honolulu, HI. 96813

Dear Ms. Takemoto:

After having talked with you on the telephone today, I have decided to supply you with brief responses to comments made on our EIS for the Kekaha Noxious Shrub Control Project by Dr. Marland's January 3, 1978 letter. We will also address each of these concerns in our revised draft of the EIS.

My responses to each of the comments in Dr. Marland's letter follow:

Page 3 The herbicides for this project were purchased in May of 1975 for a total cost of 10,015 dollars. A permit for their aerial application was obtained from the Department of Agriculture; However, due to the enactment of the Environmental Impact Statement Regulation, and its effective date on June 2, 1975, we complied with the requirements and held off until an E.I.S. review had been completed. The chemicals are currently being stored at the Kekaha Sugar Co. herbicide storage facility in Kekaha, until approval is granted to apply them as planned. Approximately \$5,000 additional cost will be expended to hire a commercial aircraft applicator, and to pay the cost of logistics and Fish and Game supervision on the project. Therefore, the total cost of the project is estimated at \$15,000 (30.00 per acre).

Page 5 The State label for Tordon is a more permissive one which is approved by the E.P.A.. A State label is granted to states which can justify the need for more liberal conditions. In this case, Tordon 22-K is registered for aerial application in Hawaii upon the approval of the Department of Agriculture. The use of the State label is only permitted for use at the discretion of the Dept. of Agriculture. That agency has the authority to permit the use of the State label.

Page 5 Our revised draft of the E.I.S. will list the proper agency title as you noted in your comments.

Page 6 Even though the tree clearing project will take place within the greater Kekaha Game Management Area (20,000 acres), the areas involved are not the same that will be treated by herbicides. Therefore, there should be no cumulative, or compounded impacts of the two projects. The tree clearing project is a maintenance job, whereby already existing pasture is being invaded by scrub silk oak trees. The impact of that job has been assessed separately, and found to be negligible, since we are only maintaining what is being lost to tree invasion. The herbicide treatment is "reclamation" of areas already overgrown with pure stands of noxious shrubbery. Perhaps there are secondary impacts, (beneficial ones) resulting from the improved hunting conditions of both projects together. This is why the tree clearing project was even mentioned in the EIS draft: To reveal the "complementary" aspects of the project.

Page 7 The areas to be treated with herbicides are not prone to further erosion hazard by the removal of shrub cover. Reference was made in the E.I.S. of the Kekaha Watershed Plan only for informational purposes. The Kekaha Watershed Plan boundaries include land to the south of our proposed herbicide project, and include areas of steep gradient, and where erosion has been very severe. The U.S. Soil Conservation Service, and State Division of Forestry who both have reviewed our E.I.S. and project plans, have stated no objection to our proposed shrub removal project. Those agencies were directly involved in the Kekaha Watershed Plan.

Page 8 We will clarify our discussion on avoiding the application of herbicides during the rainy season when run-off is likely to be a hazard. Our intention is to apply the herbicides immediately after the period of heavy winter rainfall, when the plant pests are most susceptible to the herbicides, and when there is least danger of there being run-off problems.

Page 16 A correction in the title of the "reviewing agency" will be made in the revised E.I.S..

Further Discussion

We stated in our draft E.I.S. that "all label restrictions will be adhered to". Copies of the labels were included in the appendix. We will improve this section of the revised draft, by explaining the specific precautions that will be followed: Specifically, all equipment and containers will be rinsed non-crop areas, containers will be buried in a non-sensitive non-crop area. The herbicides will be stored in an approved area, where contamination with food, feedstuff, fertilizer, seeds, insecticides, fungicides or other pesticides would be avoided. The State label as well as the E.P.A. labels specify the precautions for storage and handling. These will be adhered to.

EIS Preparation Notice

Letters of comment to the U.S. Soil Conservation Service and the U.S. Fish & Wildlife Service have been drafted, and copies will appear in the revised E.I.S.

Ms. Helene Takemoto
2/13/78

As I stated before, these subjects you commented upon will be clarified in our revised EIS.

I am also including copies of our responses to others who have commented, so that you may review these concerns also.

I hope that this letter answers your questions regarding our draft E.I.S..

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. Walker
Chief, Wildlife Branch

APPENDIX VI-j

154 Aliilani Place
Kihei, Hawaii 96753
January 1, 1978

The Honorable George Ariyoshi
State Capitol Building
Honolulu, Hawaii

Dear Governor Ariyoshi:

I have read with great concern in The Garden Island of 12/19/77 that the Kauai Division of Fish and Game plans to herbicide 500 acres of the Kekaha area with Tordon 22K and 2.4-D. The article also states that before the project can begin, you and the Environmental Control Commission must approve the impact statement.

I cannot urge you strongly enough to veto this project on the basis of the dangerous effects of the two herbicides. The following information on them can be found in Clinical Toxicology of Commercial Products, Gosselin, Hodge, et al, 1976, and Dangerous Properties of Industrial Materials, Sax, 1968.

Tordon contains, among other ingredients, Boron compounds and Picoline. Boron compounds may involve both irreversible and reversible toxicological changes. Picoline is related to pyridine, which causes central nervous system damage.

The 2.4-D was one of the herbicides used in Viet Nam and which has since been found to have caused birth defects there. It causes, in addition, central nervous system depression, nausea, and brain, liver and kidney damage. It has a toxicity rating of 4. It has also been found to increase pathogen pests on corn when used on weeds in the vicinity.

Once these harmful chemicals have been sprayed on the area, they are certain to be carried downhill in runoff and will enter the streams, ground water reserves and edible plants, eventually. In addition, there is the danger of the contact that hunters, hikers and workers will make with the chemicals, and they may cause birth defects in the wildlife of the area.

This is a very high risk to take for the dubious benefit of improving access for a small segment of the population. My

APPENDIX VI-j

154 Aliilani Place
Kihei, Hawaii 96753
January 1, 1978

The Honorable George Ariyoshi
State Capitol Building
Honolulu, Hawaii

Dear Governor Ariyoshi:

I have read with great concern in The Garden Island of 12/19/77 that the Kauai Division of Fish and Game plans to herbicide 500 acres of the Kekaha area with Tordon 22K and 2.4-D. The article also states that before the project can begin, you and the Environmental Control Commission must approve the impact statement.

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Once these harmful chemicals have been sprayed on the area, they are certain to be carried downhill in runoff and will enter the streams, ground water reserves and edible plants, eventually. In addition, there is the danger of the contact that hunters, hikers and workers will make with the chemicals, and they may cause birth defects in the wildlife of the area.

This is a very high risk to take for the dubious benefit of improving access for a small segment of the population. My

The Honorable George Ariyoshi
January 1, 1978
page 2

suggestion, instead, is to expend a portion of the money intended for this project and raise more game birds in captivity for release in the Kekaha area.

Therefore, in the interests of the health and safety of the people of Kauai and the Kekaha environment, I urge you to ban this project. Further, I encourage you to stop similar projects in other parts of the State.

Very truly yours,

Mele Stokesberry-Skillings

Mele Stokesberry-Skillings

Enc.

cc: Hawaii Environmental ^{Quality} ~~Control~~ Commission
The Garden Island
Mr. Edward Johnson
Deputy Administrator for Pesticides
Environmental Protection Agency
Washington, D. C.

Herbicide of Kekaha area planned to improve hunting

Five hundred acres of state hunting land on the west-side may be herbicided next spring to combat overgrowths of lantana and aalii which are affecting the propagation of game birds and mammals in the area.

The project, proposed by the Division of Fish and Game, would clear the broad-leaved plants from selected portions of the 20,000-acre Kekaha Game Management Area, which begins some three miles past Kekaha Town.

After the spraying, division personnel hope that the areas, infested with dense shrubs, will be converted to grasslands which would be suitable for grazing and provide a better habitat for bird species such as quail, pheasants, partridges, doves and seed-eating passerines.

Mammals, such as feral pigs and blacktail deer, should also benefit from the clearing of the shrubs, since it would allow the establishment of other, palatable food plants.

"Herbicide control of noxious shrubs would benefit recreational hunting by increasing the carrying capacity of game birds and mammals in the area," a draft environmental impact statement on the project

years ago, so we began experimentation then," Telfer said.

During the herbiciding, the areas to be sprayed will be marked with flags. Chemicals will be mixed at a central spot within the game management area, and from there a helicopter will fly to the target areas being careful not to cross crop lands, bodies of water or other areas which would be sensitive to herbicides.

Mixed with the herbicides will be a thickening agent to control any drifting of the spray and, as an added precaution, no herbiciding will be conducted if the wind is greater than eight miles per hour or is headed toward sensitive crop areas to the west.

The impact statement says Silk Oak and klu, the other prominent tree and shrub species in the area, were "relatively resistant" to the spray mixture. Some annual weeds are sensitive to the chemicals, it continues, but rapidly grow back following defoliation.

"No probable effects on fish or aquatic organisms, native ecosystems, agriculture, archeological sites or public health are evident, due to the remoteness of the project area," the impact statement reads.

Telfer said the lantana and aalii would die within weeks, but it would take a year before the woody material decomposed. Meanwhile, grasses and herbs would spread, reducing any erosion problems.

says. "The project would improve hunter access into the field, and permit better utilization of the game resources. Hunting dogs would be more effective after the removal of dense stands of noxious shrubs."

If approved, the project, being funded by the state at an estimated cost of \$2000, would begin between January and March, when young, growing plants are most susceptible to the effects of the herbicide.

Areas ranging from five to 75 acres, totalling 500 acres, will be sprayed.

"We're just trying to maintain some clearings, that's about all we're trying to do," said Tom Telfer, Kauai head of the fish and game division. "Some of the spots are just turning into low quality bird habitats."

The spraying would take less than two weeks, and no further treatments would be made within a 10-year period. Approximately 200 acres are infested with lantana, and 300 with aalii.

The herbicides which will be used - called 2,4-D and Tordon 22K - have both been approved by the Environmental Protection Agency and the state, and were chosen after tests were conducted starting in 1969 with the assistance of the UH Agricultural Experiment Station in Wailua.

"Actually, we recognized the problem a number of

The only unavoidable adverse effect of the project, the impact statement says, would be the temporary displacement of cattle and wildlife from the 500 acres to be treated, due to the odor of the chemicals.

The game management area is state Hawaiian Homes land, leased to Kekaha Sugar Co. for range cattle pasturage. Both Hawaiian Homes and the plantation agreed with the herbiciding.

The impact statement said the invasion of lantana and aalii occurred because of severe alterations to the native vegetation, caused by fires, the importing of domestic livestock and their subsequent overpopulation on range lands.

Since the game management area was opened for public hunting in 1956, the impact statement said "its potential for game bird hunting has not been reached due to a serious problem with noxious shrubs."

There are seven mammal species in the game area, all exotic, and 16 bird species. The only indigenous bird is the Hawaiian Short-eared owl.

Before the project can begin, the impact statement must be approved by the Governor and the Environmental Control Commission. The Department of Agriculture would then issue a serial permit to allow the spraying.

ESTABLISHED 1904, VOL. 74, NO. 151

LIHUE, KAUAI, HAWAII

MONDAY, DECEMBER 19, 1977

PER COPY 20¢

LIHUE OBSERVER

APPENDIX VI-k

DIVISION OF BIRD PROTECTION	
DIRECTOR	
FIELD CHIEF	
WILD CHIEF	
EXECUTIVE	
PLN	
W. S. CHIEF	
E. S. CHIEF	
OFF. SERV.	
SECRETARY	
FED. AID	

January 23, 1978

Ms. Dale Stokesberry-Skillings
 154 Alilani Place
 Kihai, Hawaii 96753

Dear Ms. Stokesberry-Skillings:

Thank you for your letter of January 1, 1978, expressing concern over the proposal to apply certain herbicides to rangeland at Kekaha, Kauai, to improve habitat for game birds.

It is unfortunate that you did not have the advantage of reading the draft environmental impact statement which was prepared for this project, as I believe it fully addresses your concerns. The chemicals to be used are fully approved by the State Department of Agriculture, and have been used widely in Hawaii over the past years with no ill effects on humans, wildlife, or non-target plants. Tordon is considered the safest chemical known for use on weeds and noxious plants, and 2-4-D is bio-degradable and safe when used correctly under controlled conditions. Let me assure you that if the project is approved, the application will be made under the most stringent controls which will preclude any adverse effects on humans, wild animals, or food crops. I believe that the undesirable effects described in your letter are true of a chemical known as 2-4-5-T, which is prohibited for such use, rather than the 2-4-D. Experts on the subject, including authorities at the University of Hawaii, have indicated that they have no objections to the application under the terms stipulated in the E.I.S. The site of the project at Kekaha is extremely dry, and there are no running streams or sensitive agricultural crops in the vicinity. The

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Ms. Mole Stokesberry-Skillings

Page 2

January 23, 1978

alternative you suggest of releasing additional game birds in the area would not be practical from a financial or biological standpoint, as the area can only support the number of birds presently existing in view of the available food, water, and cover.

I hope the information provided has clarified your concerns regarding this matter. Please be assured that this project will not be approved until and unless all possible adverse effects are considered and mitigated. Your understanding in this matter is appreciated.

With warm personal regards, I remain,

Yours very truly,


George R. Ariyoshi

cc: Hon. W. Y. Thompson
Hon. John Farias, Jr.

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1671
LILUOKE, KAUAI 96746

February 7, 1978

Ms. Mele Stokesberry-Skillings
154 Aliilani Place
Kihei, Hawaii 96753

Dear Ms. Stokesberry-Skillings:

This is in response to your letter addressed to Governor Ariyoshi dated January 1, 1978, regarding Fish and Game Division plans to herbicide five hundred acres of Kekaha Game Management Area brushland on Kauai.

Perhaps if you had been able to review our draft impact statement on the proposed project, your concerns about the toxic effects of the herbicides planned for use would have been allayed.

The toxic effects of both 2,4-D and Tordon (picrolam) have been thoroughly studied by experts in the field. Both chemicals are registered for application to rangeland in Hawaii, and pose no health hazards when used in accordance with the approved label restrictions.

The herbicide you referred to as having been used in Viet Nam and having caused birth defects is probably 2,4,5-T rather than 2,4-D. 2,4-D herbicide does have a toxicity rating of 4, which is termed in layman's terms "slightly toxic". As is true with any chemical, toxicity presents a problem to humans or wildlife only when there is exposure of the chemical to humans or wildlife in toxic amounts. Our proposed project specifies methods and rates whereby toxic amounts are nearly impossible for humans or animals to become exposed to. The herbicides will be diluted, and sprayed on unpalatable vegetation far from human habitations, and in dry areas not subject to heavy run-off. Experts, including authorities of the Department of Agriculture, Department of Health, and U.S. Fish and Wildlife Service have reviewed our draft impact statement and indicated no objections to our proposed herbicide treatments in Kekaha Game Management Area.

Your suggestion that game birds be raised in captivity and released to improve hunting is not a practical solution to our problem. Game management studies have shown that habitat quality is one of the most important factors in game carrying capacity. To raise additional birds and release them on habitat unable to support them results in high mortalities, and may even add undue stress on the existing wild game populations. Besides producing more birds, our proposed project has the effect of maintaining suitable hunting area, where hunters can actually hunt the

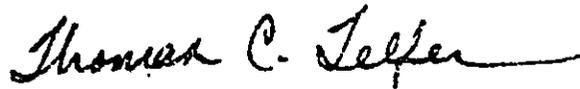
Ms. Stokesberry-Skillings
2/7/78

- 2 -

birds. Noxious shrubs on Kauai are not in static condition, but are ever-increasing and crowding out open areas suitable for hunting.

I hope that this letter answers your concerns regarding the Kekaha herbicide project. Please be assured that every caution will be taken to prevent hazzard to human or animal health as a result of this project.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch



University of Hawaii at Manoa

Harold L. Lyon Arboretum
3860 Manoa Road • Honolulu, Hawaii 96822

16 December 1977

Department of Land and Natural Resources
Division of Fish and Game
1151 Punchbowl St.
Honolulu, Hawaii 96813

Gentlemen,

I have reviewed the Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project. Please accept the following comments:

1. Dodonaea eriocarpa is here described as being "noxious" and a "widespread and common native range plant". Hosaka and Thistle (1954, Noxious Plants of the Hawaiian Ranges) include it in their list of noxious plants but erred in the distribution of the species. Their distribution range is that of D. viscosa var. arborescens and not that of D. eriocarpa. According to St. John (1973, List of Flowering Plants in Hawaii) there are 19 varieties and 11 forms of D. eriocarpa endemic to Hawaii. Of these, 20 taxa are restricted to single islands. Two are endemic to Kauai and three are found on other islands as well as on Kauai. Hence, the binomial D. eriocarpa is totally inadequate and until positive identification can be made, the statement that it is "a widespread and common native range plant" is false.
2. What are the "beneficial forbs" that will replace the killed shrubs as predicted in the report? Have these been identified as being present in the project area?
3. 2,4-D is known to have residual properties which may be cumulative. Did the 1969, 1971 and 1974 experiments also include soil analysis at various time intervals to determine the residual properties of the herbicide at various concentrations?
4. Repeated reference is made to the altered condition of the vegetation due to past fires, overgrazing and noxious shrub invasion. One cannot help but infer that the area is a useless wasteland of exotic vegetation suitable only for pasture and hunting. But the fact remains that the very practice of hunting and grazing is preventing the native vegetation from reclaiming the land. Furthermore, when one endemic species establishes

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a foothold, it is considered "noxious" and must be eradicated. This re-invasion should be a welcome sight! Instead of destroying these shrubs, the entire 300 acres should be set aside, protected and studied for successional trends.

5. The species list in Appendix III appears to be inadequate. There is no system to the enumeration of the species. They should be grouped in families (common names would suffice) so the layman is able to tell which and how many of the species listed are grasses, which are legumes, and so forth. Furthermore, the status (ie: native, indigenous, exotic) of each species should be indicated. The relative abundance is given but there is no mention of methodology. It seems to me that in 500 acres there should be more than 36 species of higher plants. Perhaps the survey was conducted during an exceptionally dry month which may explain the absence of many short-lived perennials and annuals. If this is the case, it should be indicated in the report. Thus, the vegetational analysis section of this EIS is totally deficient. The following misspellings can be found in Appendix III:

Plucheia = Pluchea
Cassia leschenalutiana = C. leschenaultiana
Sonchus oloraceus = S. oleraccus
Veronia = Vernonia

Thank you for allowing me to share my ideas.

Aloha,

Kenneth M. Nagata
Research Associate

APPENDIX VI-n

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1071
LIIHUE, KAUAI 96766

February 7, 1978

Kenneth M. Nagata
Research Associate
University of Hawaii at Manoa
Harold L. Lyon Arboretum
3860 Manoa Road
Honolulu, HI 96822

Dear Dr. Nagata:

This letter is in response to your comments on the Draft E.I.S. for the Kekaha Game Management Area Noxious Shrub Control Project, Kekaha, Kauai, dated December 16, 1977.

I will respond to each of your comments by paragraph number on your letter.

1. We will have the species and varieties of Dodonaea in question verified by a competent botanist prior to our revision of the E.I.S., and address this concern accordingly in that draft.
2. "Beneficial forbs" that have been found to persist and invade the sites treated with herbicides in Kekaha G.M.A. include: Japanese tea, Cassia leschenaultiana; indigo, Indigofera suffruticosa; haole koa, Leucaena glauca (lower elevations); narrow-leaf plantain, Plantago lanceolata and waltheria, Waltheria americana and others. Primarily, the seed bearing grasses which are released after the shrubs defoliate such as yellow foxtail, Setaria glauca and Paspalum spp. will be the most beneficial to the game residing in the area.
3. The herbicide 2,4-D is not a persistent chemical. It's half-life is 1/4th to 1/2 month, and residual phytotoxicity lasts up to one month. (Reference: Ecological Effects of Herbicides: Mullison, W. R.. 1972, Down to Earth Magazine Vol. 28: No. 2, pp 21-24, published by Dow Chemical Co., Midland, Michigan).

No soil analysis was carried out in our previous herbicide trials. We are not staffed or equipped to run a study on the residual effects of the herbicides in the soils. However such studies done elsewhere have been reviewed and were considered while assessing the environmental impact of the project. Our original herbicide trials were conducted in cooperation with professionals in the field, namely: Dr. Donald L. Plucknett, then Director of the Wailua Branch Station of the Univer-

Kenneth M. Nagata
2/7/73

- 2 -

sity of Hawaii Agriculture Experiment Station, and a Doctoral Candidate in Agronomy, Douglas Nichols. Actually, the residual effects of the herbicides proposed for use is beneficial in controlling the very persistent noxious shrub, lantana. Lantana does re-sprout occasionally after the initial treatment, and the residual herbicide in the soil effects the total kill of the plant. There are many factors that come into play in the breakdown of herbicides, including: weather conditions, chemical makeup of the soil, bacterial makeup in the soil, and exposure to sunlight. Phytotoxicity of Tordon (picrolam) is generally gone eleven months after application.

4. The land area involved in our project is so badly altered that it is barely suitable even for pasture or hunting. This is why we propose to improve it for those purposes. The land in question is zoned for agriculture, not conservation, therefore pasture improvement and game management are justifiable uses for the area.

Even if grazing animals and game were to be removed from the area, we could not expect a "re-invasion" of native plants. Animal exclosures within the area have revealed to us that palatable exotic plants such as silk oak, Grevillea robusta, and molasses grass, Melinis minutiflora form dense stands in the absence of cattle and deer, and may be a more serious threat to native plants than are the herbivores. Ungrazed stands of grasses, such as molasses grass pose the additional threat of fires, which could easily get out of hand and burn adjacent native forests.

Your suggestion that the 300 acres of aalii be set aside for study is not realistic within an area so highly altered, and used for agricultural purposes. No proposals have been made to my knowledge by the Natural Areas Reserve Commission for such a preserve in Kekaha Game Management Area. There are many other areas within Forest Reserve land that support good stands of aalii, that would be more worthy of preservation.

5. The list of plants in Appendix III is arranged in groups of trees, shrubs, forbs and grasses. Each group is separated by a blank space. Perhaps these groups could be identified by headings, but I presume the only persons really interested in the botanical makeup of the area, have a working knowledge of the plants listed, at least by their common names.

The survey of vegetation shown in Appendix III was compiled by myself. I have been directly involved with the management of wildlife in Kekaha G. M. A. during the past ten years, and am intimately involved with the plant and animal communities existing there. Thirty-six species is a low number for such a large area, and by no means can that list be purported as an exhaustive list. However, these plants include all of the species which I have encountered while making field reconnaissance surveys in the areas to be treated. The area is a very dry, harsh environment, not suited to a wide variety of plants. Ms. Carolyn Corn, D.L.N.R. Forestry Botanist, accompanied me on a field trip to the area on July 22, 1977, stated that there is no danger to potential rare and endangered plants, so long as the herbicides are sprayed in the areas intended. She said, "if there are any rare and endangered plants they would be found in and

Kenneth M. Nugata
2/7/78

- 3 -

around the rock outcrops and along the steeper slopes of the valleys". She found no endangered plants within the project site, or its immediate vicinity.

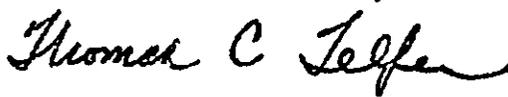
Please keep in mind that the area proposed for herbicide treatment represents only two and one-half percent of the entire Kekaha Game Management Area, which largely consists of similar vegetation throughout.

The cost of an exhaustive botanical search for potential rare plants within this highly altered and abused area cannot be justified. The Field Supervisor of the U.S. Fish and Wildlife Service, Division of Ecological Services stated in his comments on the EIS draft that "In consultation with our Endangered Species staff, it is highly unlikely that any endangered species of plants or animals would be affected by the project. The report's appended species checklist of plants and animals is an accurate listing for the area involved". I am confident that we can trust their expertise on the matter.

Thank you for your corrections on our misspellings of plant names in Appendix III. Corrections will be made in the revised draft.

I hope these replies to your comments adequately answer your questions about the project.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch

Division of Ecological Services
 300 Ala Moana Blvd., Rm. 5302
 P. O. Box 50167
 Honolulu, Hawaii 96850

Reference: ES

December 13, 1977

DIVISION OF ECOLOGICAL SERVICES	
DIRECTOR	<input checked="" type="checkbox"/>
FISH CHIEF	<input checked="" type="checkbox"/>
WILD CHIEF	<input checked="" type="checkbox"/> Draft reply
ENF. CHIEF	<input type="checkbox"/> Reply Direct
FISH BR.	<input type="checkbox"/> Comments
WILD BR.	<input type="checkbox"/> Information
ENF BR.	<input type="checkbox"/> Comp. Act. & File
OFF SERV.	<input type="checkbox"/> Return Tee
SECRET.	<input type="checkbox"/> Remarks:
FEC. NO.	

Governor, State of Hawaii
 Office of Environmental Quality Control
 550 Halekauwila Street, Room 301
 Honolulu, Hawaii 96813

Re: Draft FIS
 Kekaha Game
 Management Area
 Noxious Shrub
 Control Project
 Kekaha, Hawaii

Dear Sir:

We have reviewed the draft environmental impact statement dated 15 November 1977 concerning application of the herbicide TORDON 22-K and 2,4-D for controlling noxious shrubs in the Kekaha Game Management Area.

Generally we feel that the draft FIS is adequate as far as fish and wildlife resources are concerned. However, we do have several comments and/or questions which should be considered in the final draft:

Appendix II-e

This paragraph states that "TORDON 22-K weed killer is highly potent, persistent and water soluble". As the herbicide will be applied when the shrubs have young, active growth, one can assume it will be during the rainy season. Will the herbicide be washed into the irrigation ditch at the base of the slopes? Will it contaminate the water table?

This appendix also states "Do not apply (TORDON 22-K) by aerial equipment", whereas Appendix II-b presents directions

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DEC 14 1977

Division of Fish & Game

(according to application regulations to the State of Hawaii) for aerial application. Do the State regulations of Appendix II-e for TORBON 22-K application supercede those of the manufacturers' label of Appendix II-e?

Appendix II-e

This appendix refers to the movement of picloram through the digestive and urinary tracts of animals grazing in areas where this persistent, potent chemical has been applied. Will cattle and wildlife carry it throughout the game management area? Although, because of the odor (pg. 10), cattle/wildlife may temporarily avoid the treated areas, they may resume grazing before the picloram has completely dissipated.

In consultation with our Endangered Species staff, it is highly unlikely that any endangered species of plants or animals would be affected by the project. The report's appended species checklist of plants and animals is an accurate listing for the area involved.

We appreciate the opportunity to comment.

Sincerely yours,

Maurice H. Taylor
Field Supervisor

cc: HA
HDF&G

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1871
LIHUE, KAUAI 96766

February 7, 1978

Maurice H. Taylor
Field Supervisor
Division of Ecological Services
U. S. Fish & Wildlife Service
P. O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Taylor:

This letter is in response to your comments on the Draft E.I.S. for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai, dated December 13, 1977.

I will respond to each paragraph of your letter by the headings you have provided:

(Appendix II-e)

The herbicides Tordon 22-K and 2,4-D are most effective when applied to plants with adequate foliar surface to absorb the chemicals. Therefore, we propose to apply the herbicides immediately after the annual rainy season, when foliage is at it's peak of production. We will address and clarify the timing of the herbicide application with regard to runoff hazard in the revised draft of the EIS.

The State of Hawaii label for Tordon (Appendix II-b and II-c) is a more permissive label authorized by the E.P.A. Hawaii has requested and been authorized this more permissive label for rangeland application of Tordon by aircraft. The manufacturer's label is attached to the containers sold nation-wide. Some other States have considerable broad leaf agricultural crops that rule out aerial application. The use of the Hawaii State Tordon label is available only upon application to the Department of Agriculture, so that approval must be granted before it is used.

(Appendix II-e)

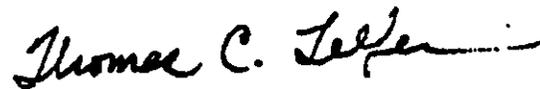
Cattle and wildlife could possibly spread Tordon to other areas of the Game Management Area within their urine: However, the degree of this would be very small, since we are spraying only dense stands of non-palatable vegetation. We in essence are "re-claiming" pasture, not maintaining pasture. Even so, the volume of Tordon transport via the urine of animals would be very small, and only into areas of similar vegetation, where residue would not cause damage to valuable vegetation.

Maurice H. Taylor
2/7/78

- 2 -

Thank you for your comments on our E.I.S. draft. We will consider your thoughts in our revised document. I hope that these responses adequately answer your questions.

Sincerely yours,



Thomas C. Telfer
Wildlife Biologist, Kauai

cc: Ronald L. Walker
Chief, Wildlife Branch

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
P. O. BOX 1071
LIHUE, KAUAI 96766

February 7, 1978

James W. Morrow, Director
Environmental Health
American Lung Association of Hawaii
245 North Kukui Street
Honolulu, Hawaii 96817

Dear Mr. Morrow:

This letter is in response to your comment on the Draft E.I.S. for the Kekaha Game Management Area Noxious Shrub Control Project, Kauai, dated December 12, 1977.

You questioned whether or not there would be long term contamination of the soil with Tordon residues.

Tordon is one of the more persistent herbicides on the market. It's phytotoxicity has been found to last between 6 and 12 months in the soil. This property is beneficial for the control of lantana, which is a particularly persistent pest. We have found through our previous trials that some re-sprouting of lantana after the herbicide application occurs, but is eventually controlled by the residual tordon in the soil. The hazards to livestock and wildlife resulting from residual herbicide in the soil has been studied by experts in the field, and Tordon is very unlikely capable of causing a chronic response. Tordon has "very little tendency for retention by animals, and their residence time in the body is very short." (Reference: Behavior and Impact of Some Herbicides in the Forest, Norris, Logan A., 1975, Herbicides in Forestry, Proceedings of John S. Wright Forestry Conference, Purdue Univ., West Lafayette, Indiana, pp 159-176). Tordon is registered by the E.P.A. for range use in Hawaii, and is considered one of the safest herbicides on the market, if used in accordance with the label restrictions.

Thank you for your comments on our E.I.S. Draft. We will address your question regarding persistency of Tordon more clearly in the revised document.

Sincerely yours,

Thomas C. Telfer
Wildlife Biologist, Kauai

cc: R. L. Walker
Chief, Wildlife Branch

**UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE**

P. O. Box 50004, Honolulu, HI 96850

January 4, 1978

Mr. Michio Takata
Director, Division of Fish and Game
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Takata:

**Subject: Draft EIS for Kekaha Game Management Area Noxious Shrub
Control Project, Kekaha Game Management Area, Kauai**

We have reviewed the above environmental impact statement and have
no comments to offer.

Thank you for the opportunity to review this document.

Sincerely,


Jack P. Kanalz
State Conservationist

cc: Office of Environmental Quality Control

DIRECTOR OF	
DIRECTOR	<input checked="" type="checkbox"/>
ASSISTANT	<input checked="" type="checkbox"/>
STATE	<input type="checkbox"/>
WILD LIFE	<input type="checkbox"/>
FOREST	<input type="checkbox"/>
WATER	<input type="checkbox"/>
PLANT	<input type="checkbox"/>
ANIMAL	<input type="checkbox"/>
SOIL	<input type="checkbox"/>
OTHER	<input type="checkbox"/>

RECEIVED
JAN 5 1978
OFFICE OF ENVIRONMENTAL QUALITY CONTROL



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 15TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96853

DIVISION OF FIS	
DIRECTOR	<input checked="" type="checkbox"/>
FISH. CHIEF	<input checked="" type="checkbox"/>
ENR. CHIEF	<input checked="" type="checkbox"/>
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WATER	<input type="checkbox"/>
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3 JAN 1978



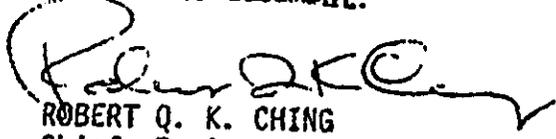
REPLY TO
ATTN OF: DEEV (Mr. Nakashima, 449-1831)

SUBJECT: Draft Environmental Impact Statement (EIS) for Kekaha Game Management Area Noxious Shrub Control Project, Kauai

TO: Governor, State of Hawaii (Office of Environmental Quality Control)
550 Halekauwila Street
Room 301
Honolulu, Hawaii 96813

1. This office has reviewed the subject draft EIS and has no comment to render relative to the proposed project.

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.


ROBERT Q. K. CHING
Chief, Engineering, Construction
and Environmental Planning Div
Directorate of Civil Engineering

Cy to: Dept of Land and Natural Resources
Division of Fish and Games
1151 Punchbowl Street
Honolulu, Hawaii 96813

RECEIVED

JAN 5 1978

Division of Fish and Games

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002A:FWD:amn
Ser 2538

28 DEC 1977

VISION OF FILE	
ACTOR	<input checked="" type="checkbox"/>
CHIEF	<input type="checkbox"/>
D. CHIEF	<input checked="" type="checkbox"/>
F. CHIEF	<input type="checkbox"/>
H. BR.	<input type="checkbox"/>
I.D. BR.	<input type="checkbox"/>
J. BR.	<input type="checkbox"/>
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Environmental Quality Commission
State of Hawaii, Office of the Governor
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Draft Environmental Impact Statement
Kekaha Game Management Area
Noxious Shrub Control Project

The draft Environmental Impact Statement for the Kekaha Game Management Area Noxious Shrub Control Project has been reviewed and the Navy has no comments. As requested by your letter of 29 November 1977, the subject EIS is returned. Thank you for the opportunity to review the EIS.

Sincerely,

R. P. NYSTEDT
CAPTAIN, USN
DISTRICT CIVIL ENGINEER
BY DIRECTION OF THE COMMANDANT

Encl:

Copy to: (w/o encl)
State Dept of Land and Natural Resources, Div of Fish and Game ✓

DEC 30 1977

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. Box 3378
HONOLULU, HAWAII 96801

December 22, 1977

GEORGE A. L. YUEN

DIVISION OF FISH & GAME	
DIRECTOR	<input checked="" type="checkbox"/> Andrew W. Mertz, M.D., M.P.H. Deputy Director of Health
FISH. CHIEF	<input type="checkbox"/> Stephen R. Thompson, M.A. Deputy Director of Health
WILD. CHIEF	<input checked="" type="checkbox"/> Draft Deputy Director of Health
ENF. CHIEF	<input type="checkbox"/> James S. Kumagai, Ph.D., P.E. Deputy Director of Health
FISH. BR.	Comments
WILD. BR.	Information, please refer to:
ENF. BR.	Comp. AER 6 FIEP 18 - 88
OFF. SERV.	Return To:
ADV.	Remarks:

MEMORANDUM

To: Division of Fish and Game
Department of Land & Natural Resources

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Kekaha Game
Management Area Noxious Shrub Control Project, Kekaha, Kauai

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we have no objections to this project.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.


JAMES S. KUMAGAI, Ph.D.

cc: Environmental Quality Commission
Office of Environmental Quality Control

RECEIVED

JAN 3 1978

Division of Fish & Game

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65

UNIVERSITY OF HAWAII

Water Resources Research Center

Office of the Director

December 21, 1977

Office of Environmental Quality Control
550 Halekiauila Street, Room 301
Honolulu, Hawaii 96813

Dear Sir:

**Subject: Kekaha Game Management Area Noxious
Shrub Control Project**

We have reviewed the above subject EIS, and have no critical comments. Thank you for the opportunity to participate in this EIS review.

Sincerely,

Reginald H. F. Young
Reginald H. F. Young
Asst. Director, WRRC

RHFY:jmn

Enclosure

cc: DLNR ✓

DIVISION OF FISH & GAME	
DIRECTOR	<input checked="" type="checkbox"/> Return
FISH CHIEF	<input type="checkbox"/> Comments
WLD. CHIEF	<input checked="" type="checkbox"/> Draft Reply
ENF. CHIEF	<input type="checkbox"/> Reply Direct
FISH. SR.	<input type="checkbox"/> Comments
WLD. SR.	<input type="checkbox"/> Information
	<input type="checkbox"/> Comp. Act. & File

DEC 30 1977

Mr. Tolson	
Mr. Casper	
Mr. Callahan	
Mr. Conrad	
Mr. Felt	
Mr. Gale	
Mr. Rosen	
Mr. Sullivan	
Mr. Tavel	
Mr. Trotter	
Tele. Room	
Miss Holmes	
Miss Gandy	

STP 8.4620

December 19, 1977

Office of Environmental
Quality Control
550 Halekaiwila St., Room 301
Honolulu, Hawaii 96813

Gentlemen:

Subject: Kekaha Game Management Area Noxious
Shrub Control Project - EIS

Thank you very much for giving us the opportunity to review and
comment on the above-captioned EIS. We have no comments to offer which
could improve the document.

Sincerely,



E. ALVEY WRIGHT
Director

AKL:jk

cc: LT-P ✓
DLNR

RECEIVED

DEC 23 1977

Dept. of Fish & Game

V

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 621
HONOLULU, HAWAII 96808

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

December 13, 1977

FILE NO. _____

DIVISION OF FISH & GAME	
DIRECTOR	<input checked="" type="checkbox"/> Return
FISH. CHIEF	<input type="checkbox"/> See File
WILD. CHIEF	<input checked="" type="checkbox"/> Draft Prep
ENF. CHIEF	<input type="checkbox"/> Reply Direc.
FISH. ST.	
WILD. ST.	
ENF. ST.	
OFF. SERV.	
SECRETARY	
FED. A/C	

Environmental Quality Commission
550 Halekauwila Street
Room 301
Honolulu, Hawaii

Dear Sirs:

Subject: Kekaha Game Management Area Noxious Shrub Control Project, Kauai Island

This office has no further comments on the above undertaking.

Sincerely yours,

Jane L. Silverman
Historic Preservation Officer
State of Hawaii

RECEIVED
DEC 14 1977

Division of Fish & Game

cc: Div. of Fish and Game

GEORGE R. ARIYOSHI
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 118, HONOLULU, HAWAII 96810

HIDEO MURAKAMI
COMPTROLLER
MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

LETTER NO. (P) 2297.7

DEC 12 1977

Dr. Richard Marland
Director
Office of Environmental
Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Dr. Marland:

Subject: Draft EIS for Kekaha Game Management Area
Noxious Shrub Control Project, Kauai

The subject project will not have any adverse environmental impact on any existing or planned facilities serviced by our department.

Thank you for this opportunity to comment.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Hideo Murakami".

HIDEO MURAKAMI
State Comptroller

Handwritten notes and arrows

APPENDIX VI-11

5060
5059
LS

EDUARDO E. MALAPIT
Mayor



HENRY MORITA
County Engineer
Telephone 245-3318

CLAY KAGAWA
Dep. County Engineer
Telephone 245-3802

COUNTY OF KAUAI
DEPARTMENT OF PUBLIC WORKS
4398 RICE STREET
LIHUE, KAUAI, HAWAII 96766

December 9, 1977

DIRECTOR	<input checked="" type="checkbox"/>
FISH CHIEF	<input checked="" type="checkbox"/>
WATER	<input checked="" type="checkbox"/>
PLANNING	<input checked="" type="checkbox"/>
ENGINEERING	<input checked="" type="checkbox"/>
CONSTRUCTION	<input type="checkbox"/>
MAINTENANCE	<input type="checkbox"/>
PROPERTY	<input type="checkbox"/>
RECORDS	<input type="checkbox"/>
TRAINING	<input type="checkbox"/>
GENERAL	<input type="checkbox"/>

Honorable W. Y. Thompson, Chairman
DEPARTMENT OF LAND & NATURAL RESOURCES
State of Hawaii
P. O. Box 621
Honolulu, HI 96809

Dear Mr. Thompson:

RE: ENVIRONMENTAL IMPACT STATEMENT (EIS) KEKAHA GAME
MANAGEMENT AREA NOXIOUS SHRUB CONTROL PROJECT

Our main concern on potential erosion problems that may arise with the elimination of vegetative cover has been addressed to our satisfaction.

We have no other comments to offer at this time. Thank you for the opportunity to review the EIS for subject project.

Very truly yours,

Henry Morita
HENRY MORITA
County Engineer

KM:hs

RECEIVED
DEC 16 1977

... fish & game

EDUARDO E. MALAPIT
MAYOR



BRIAN K. NISHIMOTO
PLANNING DIRECTOR

COUNTY OF KAUAI
PLANNING DEPARTMENT
4285 RICE STREET
LIHUE, KAUAI, HAWAII 96766

December 7, 1977

DIRECTOR	
FISH CHIEF	
WILD CHIEF	
ENR. CHIEF	
FISH CR.	
WILD CR.	
ENR. CR.	
FILE	

Governor, State of Hawaii
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement (EIS)
Kekaha Game Management Area Noxious Shrub
Control Project
Kekaha Game Management Area, Kauai

We have reviewed the subject EIS and have no comments
on the proposed project.

BRIAN NISHIMOTO
Planning Director

cc: Dept. of Land & Natural Resources
Division of Fish and Game

RECEIVED
DEC 8 1977
Dept. of Land & Game

GEORGE R. ARIMOSHI
Chairman



APPENDIX VI-16

ALBERT D.V. JOY
Chairman

TELEPHONE NO.
548-6915

STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

November 29, 1977

DIVISION OF	
DEPT. OF	
FISH & GAME	<input checked="" type="checkbox"/>
WILDLIFE	<input checked="" type="checkbox"/>
ENV. CONTROL	
FISH BUREAU	
WILDLIFE DIV.	
ENV. CONTROL	
SECRETARY	
OFF. OF	
REMARKS:	

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) prepared pursuant to Chapter 343, Hawaii Revised Statutes and its Rules and Regulations:

Kekaha Game Management Area Noxious Shrub
Title - Control Project
Location - Kekaha Game Management Area, Kauai
Classification - Agency Action

We would appreciate your comments or acknowledgement of no comments. Please submit one copy each to:

- 1) Accepting Authority: Governor, State of Hawaii (Ofc. of Envi- Quality Cont:
Address: 550 Halekauwila Street
Room 301
Honolulu, HI 96813
- 2) Proposing Party: Dept. of Land and Natural Resources
Address: Division of Fish and Game
1151 Punchbowl Street
Honolulu, HI 96813

Your comments must be received or postmarked by: January 7, 1978

If you have no future use for this document, please return the EIS to the Commission. (Comments or acknowledgement of no comments should be directed to both the accepting authority and proposing party.)

Thank you for your participation and cooperation in the EIS process!

20 December 1977

No comments.

RECEIVED

DEC 23 1977

Div of Fish & Game

Patricia A. Greene

PATRICIA A. GREENE
Colonel, ANC
Chief, Health and Environment Activity
Directorate of Health Services, USASCH.