



Red Imported Fire Ant

# Red Imported Fire Ant

*Solenopsis invicta*

## Description:

- ❖ The red imported fire ant is reddish-brownish and about 3-6 millimeters in length (no bigger than a finger nail).
- ❖ Worker ants have the same body proportions, meaning their heads never grows bigger than the abdomen.
- ❖ These ants can average about 250 mounds (colonies) or more per acre. They prefer to build their mounds in sunny open areas, but can build them anywhere.
- ❖ Each mound contains about 80,000-500,000 worker ants.

## How was it introduced?

- ❖ Native to South America, this species has not made its way to Hawai'i yet.
- ❖ However, Hawai'i has three species of "fire ants" (two true fire ants, *Solenopsis geminata* and *Solenopsis papuana*; and the "little fire ant," *Wasmannia auropunctata*).
- ❖ The *Solenopsis invicta* is far more aggressive and dangerous. This ant is mainly transported to new locations by humans (for example, by shipping of goods).
- ❖ It has already been found in California, Australia and New Zealand. The risk of it getting to Hawai'i is very high.

## Why is it a threat?

- ❖ If this species were to come to Hawai'i, it could spread and establish itself very quickly.
- ❖ It can repeatedly sting anything (from human to animal) that disturbs them.
- ❖ Normal human symptoms from the venom of a sting are burning and itching followed by a small blister, which then forms a white bump with puss.

- ❖ A person with a severe reaction may suffer chest pains, nausea, swelling of the face and/or throat, sweating, loss of breath or slurred speech, and even death.
- ❖ In the mainland United States, tens of thousands of people are stung each year, and at least 80 deaths have already occurred.
- ❖ Fire ants can also cause injury or death to livestock, pets, and wildlife, and damage crops, ornamental and wild plants, electrical equipment, and irrigation systems.

## How can we control it?

- ❖ Like many other alien species, once they are established, it is almost impossible to get rid of. It is important to prevent this species from arriving in Hawai'i.
- ❖ Repeated pesticide treatment has proven effective in reducing ant numbers, but is expensive and could contaminate freshwater.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

Reimer, N.J, Okada, C. July 1999. *Alien Pest Alert, Red Imported Fire Ant (*Solenopsis invicta*)*. College of Tropical Agriculture & Human Resources (CTAHR) publications, University of Hawai'i at Mānoa.

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Banana Poka

# Banana poka

*Passiflora mollissima*

## Description

- ❖ Banana poka is a weedy vine, or liana, in the passionflower family. It is thought to be native to the Andean highlands, from Venezuela to Bolivia.
- ❖ It contains a fleshy fruit and has ornamental white flowers.
- ❖ As many tropical lianas do, the banana poka has many adaptations and features that give it an advantage in native Hawaiian forests.
- ❖ Some of these features are: staggered germination, rapid growth rates, early reproductive maturity, continuous growth and reproduction, and high seed output.

## How was it introduced?

- ❖ Banana poka was purposely introduced to the Hawaiian Islands in the early 20th century.
- ❖ It was brought in for agricultural and ornamental reasons. People thought they could cultivate and grow the food, but were mistaken. It is actually the fruit of the similar passion fruit (*Passiflora edulis*) that is edible, not the fruit of the banana poka (*Passiflora mollissima*).
- ❖ Since its introduction, the banana poka has established five major populations in the Hawaiian Islands, three on the island of Hawai'i, one on Kaua'i, and another on Maui.
- ❖ Feral pigs are the main short-term dispersal agents, while birds and humans are the primary long-distance dispersal agents.

## Why is it a threat?

- ❖ Banana poka is an aggressive plant, and is a major threat to Hawaii's forests.

- ❖ Its dense foliage covers the canopy of trees, which in turn blocks out light for other plants and shrubs.
- ❖ The weight of the vine also causes tree branch breakage.
- ❖ When an area in the forest is disturbed, the banana poka grows back much faster than native plants.

## How can we control it?

- ❖ In the early 1970s, the Division of Forestry and Wildlife (DOFAW) used various herbicides that proved effective against the weed. However, the danger they posed to the surrounding native flora and fauna deemed it too risky for further use.
- ❖ Other biological controls were tested by DOFAW, but the end results were inconclusive.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

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Photos courtesy of The Nature Conservancy of Hawai'i

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**Banana Bunchy Top Virus**

# Coconut Heart Rot

*Phytophthora katusae*

## Description

- ❖ The coconut heart rot is a fungus that affects coconut trees. The coconuts become dark and fall off, and then the tree heart rots. Eventually, the leaves are killed, and the tree dies.

## How was it introduced?

- ❖ The coconut heart rot fungus was first found in the 1970s on Kaua'i, and has spread to O'ahu, Maui and Hawai'i. Some scientists believe the fungus spores are spread by strong windblown rains, insects, birds, and mice, or by planting infected trees.

## Why is it a threat?

- ❖ The coconut heart rot fungus is killing many coconut trees. Aside from its beauty, the coconut tree is important to the Hawaiian culture and provides food and building materials. Replacing a dead coconut tree could cost as much as \$3,000 or more.

## How can we control it?

- ❖ Infected coconut trees and nuts should be removed and destroyed immediately. Diseased plants can harbor the fungus for months after it is dead.

## For more information

Department of Agriculture, Plant Quarantine Branch -  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

## References

*Hawai'i Coconut Protectors. Battling Coconut Heart Rot.* November 2001

<<http://www.coconutprotectors.com>>.

# Banana Bunchy Top Virus

## Description

- ❖ The Banana Bunchy Top Virus (BBTV) is a serious threat to the State's banana industry. Some of its effects are: stunting of leaves, which cause a "bunched" appearance; stunted young shoots; narrow, yellow, and brittle leaves; dark green streaks on leaf stalks; and no fruit.

## How was it introduced?

- ❖ In 1989, BBTV was first discovered on a farm in Punalu'u, O'ahu. Currently, most areas of O'ahu are affected, as well as many areas of Hawai'i and Kaua'i.

## Why is it a threat?

- ❖ When the BBTV infects a banana tree, it will not bear fruit. This poses a serious threat to the banana industry.

## How can we control it?

- ❖ For BBTV, there is no cure yet. Researchers are trying to develop resistant banana trees and the Hawai'i Department of Agriculture is attempting physical eradication programs. It is important that people do not transport infected banana plants to other areas.

## For more information

Department of Agriculture, Plant Quarantine Branch --  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

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**Prickly Blackberry**

# Prickly Blackberry

*Rubus argutus*

## Description:

- ❖ The prickly blackberry is a thorn-covered plant that grows like a vine and forms thick masses that are very difficult to penetrate.
- ❖ It has medium, ovate leaves that are divided into 3-5 leaflets with toothlike edges. It has white flowers, and thick stems that have ridges and straighter hooked prickles.
- ❖ The blackberry produces dark berries, which are most abundant in the summer.
- ❖ It grows in many habitats, including native forests, plantation forests, fields, and pastures.

## How was it introduced?

- ❖ Blackberry is native to central and eastern United States.
- ❖ It was intentionally brought to Hawai'i to grow as a potential agricultural plant. However, Hawai'i never developed a significant commercial industry for the blackberry fruit.
- ❖ There are major populations found on the islands of Hawai'i, Maui (Haleakalā), Moloka'i, O'ahu (Wai'anae), and Kaua'i (Kōke'e).

## Why is it a Threat?

- ❖ Blackberry is very aggressive and competes against native plants for limited nutrients.

- ❖ It can recover from fires and other environmental catastrophes much faster than native plant species.
- ❖ Birds are mainly responsible for spreading the seeds of blackberry plants.

## How can we control it?

- ❖ Manual control (cutting) and application of herbicide can be effective, but is a slow and painful process.
- ❖ Several biological control agents were tested, but resulted in little success. Problems with biocontrol are the affect they have on closely related native plants, including the Hawaiian raspberry ('ākala).

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

Bailey, L.H. *Rubus argutus*. Alien Plants of Hawai'i, UH Botany. November 2001 <[http://www.botany.hawaii.edu/faculty/cw\\_smith/rub\\_arg.htm](http://www.botany.hawaii.edu/faculty/cw_smith/rub_arg.htm)>.

Gerrish, Grant. 1992. The Distribution of Rubus species in the State of Hawai'i. Cooperative National Park Resources Studies Unit no. 85, University of Hawai'i at Mānoa.

Photos courtesy of The Nature Conservancy of Hawai'i

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Jackson's Chameleon

# Jackson's Chameleon

*Chamaeleo jacksonii*

## Description

- ❖ The Jackson's chameleon grows to 10-12 inches in length. They can rapidly change color from green, yellow, blue, brown, grey, charcoal, and black.
- ❖ They live in trees and bushes, and feed on insects. Their bulging, rotating eyes move independently, and their tongue can reach up to 1.5 times their body length. This is why they are known as "sharpshooters."
- ❖ The toes of the Jackson's chameleon are opposable, meaning the toes are fused together in-groups of two's and three's. This allows them to walk along the tree branches. Their long tails also help them to grab branches.
- ❖ The male Jackson's chameleons have three horns, appearing like a mini triceratops.

## How was it introduced?

- ❖ In 1972, a Kāne'ohe pet owner received a permit to bring in and sell Jackson's chameleons. When he received them, they were thin and dehydrated. Thinking he could retrieve them later, he released them into his backyard, where they escaped into the wild.
- ❖ Since their introduction, they have increased in numbers and have spread from O'ahu to the islands of Hawai'i, Maui, Kaua'i, and Lāna'i. Some Jackson's chameleons have reached native forests.

## Why is it a threat?

- ❖ Jackson's chameleons are popular pets. While it is legal to own and sell them, they are difficult to keep alive in captivity. This causes many owners to release their Jackson's chameleons into the wild, which is not good for the environment.
- ❖ Although no data has been collected on its effect on native insects, the Jackson's chameleons are believed to prey on them and could consume large quantities.

## How can we control it?

- ❖ Attempts are being made to educate people about the negative impact of letting their pets go into the wild. The Jackson's chameleon is a good example.

## For more information

Hawaii Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

Department of Agriculture, Plant Quarantine Branch -  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

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McKeown, Sean. 1996. *A Field Guide to Reptiles and Amphibians in the Hawaiian Islands*. Diamond Head Publishing, Inc: Los Osos, California.

Reyes, Carl. *Jackson's Chameleon (Chamaeleo jacksonii)*. November 2001  
<<http://www.botany.hawaii.edu/bot350/1996/Reyes/reyes.htm>>.

Photo courtesy of Vince Mahoney

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*Kappaphycus* spp.

# Brown Licorice or Red Algae

*Kappaphycus* spp. (*K. striatum* & *K. alvarezii*)

## Description

- ❖ These two species of alien algae are thicker, taller, bushier, and bumpier than native seaweed.
- ❖ It is almost impossible to physically distinguish these two species apart in the field because they have extremely variable morphological plasticity.
- ❖ They also have high growth and reproduction rates.

## How was it introduced?

- ❖ In the mid-1970s, a researcher brought *K. alvarezii* to Kāne'ohe from the Philippines. He wanted to farm the seaweed for its natural gel called carrageen.
- ❖ It can be used as a smoothening agent in such products as ice cream, toothpastes, jellies, medicines, and paint.
- ❖ Eventually, the task proved too labor and cost intensive, causing the farm to shut down. The seaweed escaped the farm and made its way to Kāne'ohe Bay sometime between 1970-1976.

## Why is it a threat?

- ❖ These seaweeds grow quickly and can spread to new areas.
- ❖ They do not appear to have any predators.
- ❖ They appear to be growing atop our coral in thick abundances.

- ❖ Hawaii's corals grow very slowly, only about 1 cm each year. It is also home to other plants, fish, and microorganisms. If this alien seaweed were to smother and kill the coral, it would destroy the whole ecosystem.
- ❖ Paddlers and fishermen get tangled in the seaweed.

## How can we control it?

- ❖ Studies on controlling the *Kappaphycus* spp. are being conducted.

## For more information

Alien & Invasive Algae in Hawai'i  
2000 Hawai'i Coral Reef Initiative Research Program  
<http://www.botany.hawaii.edu/GradStud/smith/websites/Alien-Bishop.htm>

## References

Tighe, Lori. Strong alien seaweed may be killing Kāne'ohe Bay coral. 27 July, 1998.  
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Photo courtesy of Jennifer Smith,  
Botany Department, University of Hawai'i at Mānoa

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Coqui Tree Frog

# Coqui Tree Frog

*Eleutherodactylus coqui*

## Description

- ❖ The coqui tree frog adult is approximately 2 inches in length.
- ❖ They are brown or grey-brown in color, and have variable patterns on their bodies. Some have a light stripe down their back; others have V or W shaped designs. Others are just one color.
- ❖ These frogs live in moist parts of large-leafed plants and can live in elevations from 0-3900 ft.
- ❖ At night, the males are identifiable through their unique mating song that sounds like a high-pitched "coKEE." That's why it is called "coqui."

## How was it introduced?

- ❖ Native to Puerto Rico, the tree frog first appeared in Hawai'i in 1996. It is believed to have spread through plants in nurseries. Most populations were probably spread through transport from infected nurseries to residential or resort areas.
- ❖ There are populations on Maui and O'ahu, but the island of Hawai'i is affected the most.

## Why is it a threat?

- ❖ The tree frog is a serious threat to Hawai'i's native ecosystem because they can invade native forests up to almost 4000 feet high and could feed on native insects, some of which are already rare.
- ❖ Scientists believe that their populations can grow very rapidly.
- ❖ The biggest concern for most Hawai'i residents is the noise they make at 90-100 decibels. Many residents complain of not being able to sleep at night.

## How can we control it?

- ❖ Government agencies and private businesses are working together to find ways to control the spread of this frog. Scientists are testing the effect of caffeine on the frogs. A spray form of caffeine might be the best control against these frogs.

## For More Information:

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

Kraus, F., Cambell, E.W., Allison, A., Pratt, T. "Eleutherodactylus Frog Introductions to Hawai'i" *Herpetological Review*. (1999), vol.30.

Photo courtesy of The Nature Conservancy of Hawai'i

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**Kāhili Ginger**

# Kāhili Ginger

*Hedychium gardnerianum*

## Description

- ❖ Kāhili ginger can grow up to 6-7 ft. in height, forming dense clusters.
- ❖ The leaves are long and oval in shape and have a waxy surface.
- ❖ The flowers are cream to yellow in color and have long red stamens that produce a perfumed smell.
- ❖ Each flower stalk can produce up to 100 seeds.
- ❖ Kāhili ginger thrives in cool, moist tropical climates, and rarely grows at low elevations.

## How was it introduced?

- ❖ Kāhili ginger is native to the Himalayas.
- ❖ It was probably brought to Hawai'i as an ornamental plant.
- ❖ The plant has since spread to Kaua'i, O'ahu, Maui, Lāna'i, and Hawai'i.

## Why is it a threat?

- ❖ Growing in dense colonies, the kāhili ginger smothers out native plants and prevents native seeds from establishing. The kāhili is one of the few invasive alien plants that can germinate and thrive under dense canopies.
- ❖ Having so many seeds, the kāhili ginger spreads rapidly. The main seed dispersal agents are birds and humans.

## How can we control it?

- ❖ Manual control includes: pulling small seedlings out by hand; removing the flower heads; and digging up the plants and roots. Removing the flower heads will not kill the plant, but will slow its spread.
- ❖ The chemical control of spraying herbicides has had some success, but is a slow process.
- ❖ Using a bacterium (already found in Hawai'i) to rot the ginger's rhizomes is being researched. This potential biocontrol has had good success at targeting only the kāhili ginger, and not non-target species.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

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Mafher, John. 'Wild Ginger' *Plant Pest Control*. January 2002.  
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Photos courtesy of Kōke'e Resource Conservation Program

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# Pig, Goat, Deer

*Sus scrofa, Capra hircus, Axis axis*

## Description

- ❖ Pigs, goats, and deer are called ungulates (animals with hooved feet). They are normally domestic animals but when they escape to the wild, they are called “feral.”
- ❖ Feral ungulates destroy native plants, accelerate soil erosion, and spread alien weeds and insects.

## How was it introduced?

- ❖ Polynesians brought the small, domesticated pig to the Hawaiian Islands in the 4th century A.D. and Europeans brought a larger type of pig in the early 1900s. These pigs are believed to have cross-bred in Hawaiian forests.
- ❖ Goats were introduced to the 8 major Hawaiian Islands before the 1800s. In 1981, they were eradicated from Ni’ihau and Lāna’i, and in 1990, from Kaho’olawe.
- ❖ Deer were imported from India to Moloka’i as a gift to King Kamehameha from the government of Hong Kong. The largest deer populations are on the islands of Lāna’i, Moloka’i, and Maui.

## Why is it a threat?

- ❖ The negative effects of feral ungulates is severe in Hawai’i because Hawaiian plant species evolved in an environment without the pressure of grazing and browsing animals, and lost any defenses to protect themselves against ungulates.
- ❖ Feral pigs have the greatest impacts on Hawaii’s rainforest and other ecosystems. They create mosquito breeding grounds (which negatively affect our native bird populations) when burrowing for roots in the ground. In these dug-up areas, soil washes down in streams and aggressive alien plants take over. Pigs also spread seeds of alien plants.

- ❖ Goats have reduced native plant populations, aided in alien plant invasions, and have increased soil erosion by their grazing. Goats are able to reach very remote areas, which are the last habitat for some rare native species.
- ❖ Deer eat native plants and rub their antlers on tree trunks, injuring the trees. Deer, as well as pigs and goats, are also a threat to farm crops.

## How can we control it?

- ❖ Currently, the most effective method of control for these feral ungulates is a combination of fencing (around sensitive habitat), and methods of capturing the animals, especially hunting.

## For more information

Hawai’i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

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Photos courtesy of The Nature Conservancy of Hawai’i

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Gorse



# Gorse

*Ulex europaeus*

## Description

- ❖ Gorse is a spiny shrub that can grow up to 3 ft.in height.
- ❖ It forms a thick and dense thicket that is hard to penetrate.
- ❖ It has grey-green spine-like leaves that drop off when the plant matures, leaving just sharp spines.
- ❖ The flowers are bright yellow-orange.
- ❖ Gorse grows best in cool environments above 3,000 ft.

## How was it introduced?

- ❖ Gorse is native to northern Europe.
- ❖ It was brought to Hawai'i in the early 1900s as sheep food.

Changes in ranching practices and the absence of effective control methods have led to the spread of gorse on Hawai'i and Maui.

- ❖ Today, it covers thousands of acres on the islands of Hawai'i, Maui, and Moloka'i.

## Why is it a threat?

- ❖ Gorse grows five times faster in Hawai'i than in Europe.
- ❖ Gorse can crowd out native plants by growing thickly and taking over acres of land.
- ❖ When its pods dry, they split open and release seeds in the air.
- ❖ The seeds can lie dormant in the ground for 30 years.

## How can we control it?

- ❖ The problem is so serious in most areas that mechanical and chemical control is ineffective.
- ❖ Fire control has been attempted, but the fire is not usually hot enough to kill the seeds in the soil.
- ❖ Biological control has been unsuccessful to date; however new biological studies are being conducted.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

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Photos courtesy of U.S. Fish and Wildlife Service

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**Fountain Grass**

# Fountain Grass

*Pennisetum setaceum*

## Description

- ❖ Fountain grass grows in clumps and can reach up to 2-3 ft. in height.
- ❖ The pink or purple flowers are bristly and small, grouped in upright stalks.
- ❖ Fountain grass has established itself on most of the major Hawaiian Islands, growing primarily in pasturelands.

## How was it introduced?

- ❖ Native to Africa, fountain grass was introduced to the Hawaiian Islands in the beginning of the 20th century.
- ❖ Vehicles, humans, wind, water, and possibly birds disperse the seeds.

## Why is it a threat?

- ❖ Fountain grass is considered very disruptive to native Hawaiian ecosystems. It crowds out native plants.
- ❖ It is a fire-stimulated grass, which means it not only increases the frequency and intensity of wildfires, but also recovers faster than most other plants.

- ❖ Fountain grass is very different from other alien grasses in that it can grow wild on bare lava flows.
- ❖ It also destroys pasturelands and is not palatable to cattle.

## How can we control it?

- ❖ Fountain grass control began in the 1960s. The main method of control is to pull the plant out.
- ❖ Herbicides are used in areas where there are a lot of fountain grass plants.
- ❖ Other methods are being studied.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

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Photo courtesy of The Nature Conservancy of Hawai'i

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Strawberry Guava

# Strawberry Guava or Waiawī

*Psidium cattleianum*

## Description

- ❖ Strawberry guava varies from a large shrub to a medium tree, reaching up to 15 ft. tall.
- ❖ It has a smooth, peeling bark, and glossy dark green leaves with a leathery texture.
- ❖ The flowers are small and have white petals.
- ❖ The fleshy fruit is round and can be red or yellow. The fruits are edible by humans and other animals.

## How Introduced?

- ❖ Native to Brazil, it was intentionally introduced to Hawai'i in the early 19th century, probably for its edible fruit.
- ❖ It has now naturalized in low to middle elevations on all of the main Hawaiian Islands, except for Ni'ihau and Kaho'olawe.
- ❖ Feral pigs and birds are most responsible for spreading this weed.

## Why is it a Threat?

- ❖ Strawberry guava grows closely together, blocking out sunlight and shading out native plants in the understory.
- ❖ Strawberry guava also has an edge over natives because it grows quickly, it fruits heavily, its seeds grow easily, and it can grow in a variety of areas.

## How can we control it?

- ❖ Controlling feral pigs is one of the first steps in controlling strawberry guava populations because it restricts the spread of seeds.
- ❖ A direct method is cutting a ring around the base of the tree or cutting down the tree to a stump and applying an herbicide to the cut area.
- ❖ Biological control agents are being studied.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

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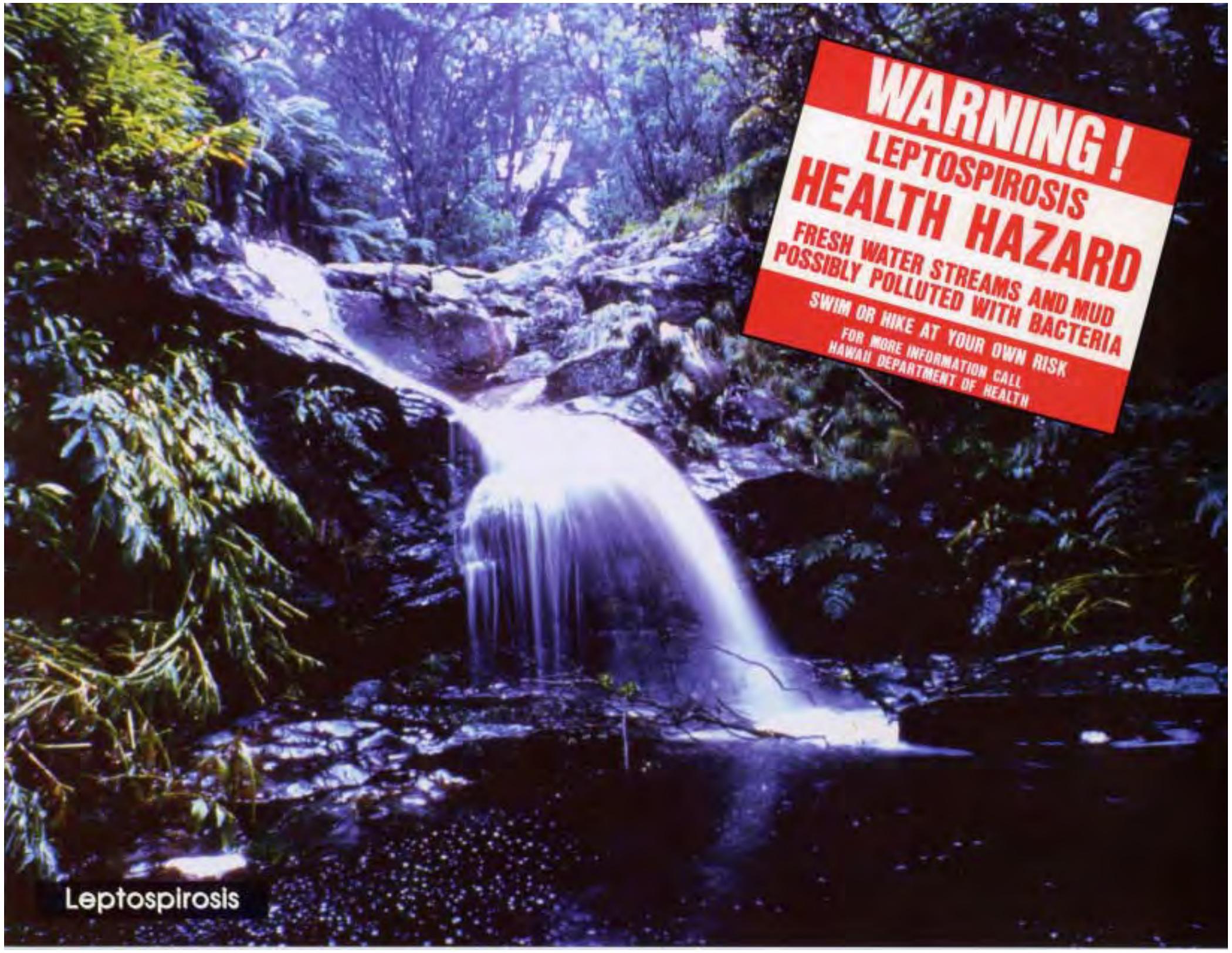
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**WARNING!**  
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HAWAII DEPARTMENT OF HEALTH

Leptospirosis

# Leptospirosis

*Leptospira*

## Description

- ❖ Leptospirosis is a bacterial disease caused by *Leptospira interrogans*, affecting mainly wild and domestic animals, such as rats, pigs, and other mammals. These animals then contaminate soil and water through their urine.
- ❖ Humans can get infected if contaminated soil or water comes in contact with open wounds, the mouth, or eye. Some scientists even believe that the disease can penetrate skin that has been immersed in contaminated water for a prolonged time.
- ❖ Symptoms usually occur 7 to 14 days after being infected. The occurring symptoms are fever, headache, chills, sweating, muscle pain, red eyes (conjunctivitis), and vomiting. The occasional yellowing (jaundice) of the skin and the whites of the eyes and a rash may also occur. There are medicines to treat this infection, but if left untreated, one can develop liver, kidney, blood and nervous tissue damage.
- ❖ Leptospirosis is just one example of tropical diseases affecting people that can be spread by alien species.

## How was it introduced?

- ❖ Leptospirosis is endemic to warm, tropical areas.

## Why is it a threat?

- ❖ Hawai'i not only has a suitable environment for leptospirosis, but has many available vectors to help it spread. Many of our domestic and feral animals, such as pigs, mongoose, rats, and mice get infected with leptospirosis and spread it throughout Hawaii's forests, streams and taro fields.
- ❖ There are more reported cases of leptospirosis in Hawai'i than anywhere in the nation.

## How can we control it?

- ❖ The carriers of leptospirosis are controlled through trapping and poisoning. Without these carriers, the infection of humans is less likely to occur.
- ❖ To prevent yourself from getting infected, avoid fresh water streams or ponds, especially if you have an open wound or cut. Also, do not drink the water from fresh water streams and ponds without boiling or chemically treating it first.

## For more information

State of Hawai'i Department of Health - <http://www.state.hi.us/health/>

## References

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Photo courtesy of Hawai'i Department of Health

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Miconia

# Miconia

*Miconia calvescens*

## Description

- ❖ Miconia is an attractive tree that can grow up to 50 ft. in height.
- ❖ It has long, dark green leaves that can grow 2 ft. long, with purple undersides and 3 obvious leaf veins.
- ❖ The fruits are small and dark purple. Each fruit can contain 50-200 seeds. A typical Miconia tree can produce 3 million seeds every 2 to 3 years. The seeds can last in the soil up to 4 years.
- ❖ Miconia can thrive in areas of shade or sunlight, and tends to grow in wet areas.
- ❖ The primary method of dispersal are people, birds, and feral animals.

## How was it introduced?

- ❖ Miconia is native to Tropical America.
- ❖ It was introduced to Hawai'i in the 1960s as an ornamental plant due to its attractive dark green and purple leaves.
- ❖ Several nurseries sold the plant prior to its listing as a noxious weed in 1992.

## Why is it a threat?

- ❖ With their rapid growth, tall height, and big leaves, Miconia block the majority of the sunlight from native forest undergrowth.
- ❖ Miconia seedlings grow quickly in shady areas.
- ❖ Miconia is called the "Green Cancer" in Tahiti. It was introduced to Tahiti in 1937. Now, more than half of Tahiti's forests are invaded with dense stands of Miconia.

- ❖ Scientists believe 25% of the indigenous species in Tahiti are threatened with extinction.
- ❖ This situation is what we are trying to avoid here in Hawai'i.

## How can we control it?

- ❖ The physical removal of Miconia is the most practiced in the state. This involves searching for the plant and uprooting it.
- ❖ Chemical control has been practiced in some areas with success.
- ❖ Biological controls are still being studied.
- ❖ Perhaps the best way to control Miconia is through education. People disperse Miconia seeds by carrying seeds in the mud of their boots and walking to a clean area, or by unknowingly planting Miconia trees in their yards.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

Loope, Lloyd L. 1998. *Regional Trends of Biological Resources - Hawai'i and the Pacific Islands*. Pages 747-774 in Mac, M.J., P.A. Opler, C.E. Puckett Haeker, and P.D. Doran, editors. Status and trends of the Nation's biological resources. 2 vols. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

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Mosquito

# Mosquito

*Culex quinquefasciatus*, *Aedes albopictus*, *Aedes aegypti*

## Description

- ❖ In Hawai'i, there are at least three kinds of mosquitoes - one night and two day.
- ❖ The night mosquito, *Culex quinquefasciatus*, is common in the mountains and seashore. It breeds mostly in the stagnant water of tin cans, barrels, tubs, and puddles. It also prefers polluted water, such as those in cesspools and catch basins.
- ❖ The day mosquitoes are the *Aedes albopictus* and *Aedes aegypti*. They only breed in clear water contained in such things as water tanks, rain-barrels, water pans, tree holes, rock-holes, and waterbearing plants.
- ❖ Aside from being active during the day, these mosquitoes are also distinguished from the night mosquito by their black and white markings.

## How was it introduced?

- ❖ In 1826, the night mosquito was introduced to the Hawaiian Islands by the "Wellington" ship from Mexico. The mosquitoes were breeding in the ship's stored drinking water, which was dumped in a Hawaiian stream. The mosquitoes soon became established in the islands. The day mosquitoes arrived later.

## Why is it a threat?

- ❖ Mosquitoes are a threat to Hawaii's native bird population. Mosquitoes carry avian malaria and pox from infected alien birds to Hawaii's native forest birds. Native birds are not able to overcome these diseases.

- ❖ Aside from being a blood-sucking annoyance, mosquitoes are also a threat to people. They can spread such diseases as malaria, yellow fever, dengue fever, encephalitis and West Nile virus.
- ❖ Currently, dengue fever seems to be the most serious threat. Dengue is a viral disease transmitted to humans by the bite of an infected mosquito. The symptoms of dengue fever are similar to that of the flu - high fever, severe headaches, extreme body, and joint pain. Other effects are vomiting, eye pain, and rash. There is no cure. If you have contracted the disease, it is important not to take aspirin, ibuprofen, or high levels of vitamin E to avoid bleeding complications.

## How can we control it?

- ❖ Chemical controls include repellent and space sprays with the active ingredients DEET and pyrethroids. Other sprays and controls are available, but the best method is to eliminate their breeding ground. This entails eliminating any water containment as those mentioned in the **Description** section.

## For more information

Department of Agriculture, Plant Quarantine Branch -  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

## References

Anti-Mosquito League. 1931. *The Mosquito, Its Life-history and Control in Hawai'i*. Honolulu, Hawai'i: Anti-Mosquito League.

Photo courtesy of William Mull

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Piranha

# Piranha

*Serrasalmus* spp.

## Description

- ❖ Piranhas of the *Serrasalmus* spp. can be voracious predators with their razor sharp teeth.
- ❖ They are fast swimmers.
- ❖ While their normal prey is smaller fish, they have been known to attack humans when starving.

## How was it introduced?

- ❖ Piranhas are native to South America. In 1992, 39 piranhas were confiscated in Hawai'i. It is believed that all of them were sold from a pet dealer on the U.S. mainland and shipped to Hawai'i through uninspected First Class mail.
- ❖ In 1993, a piranha was caught in the Wahiawā reservoir on O'ahu. This piranha was identified as *Serrasalmus natteri*, otherwise known as the red-bellied piranha.

## Why is it a threat?

- ❖ There are only five native freshwater fishes in Hawaii's streams. Piranhas are much more aggressive than our native aquatic species. There would be dire consequences if these alien predators were to become established in Hawaii's unique and fragile freshwater ecosystem.
- ❖ Many alien freshwater animals such as the tilapia, swordfish, prawn, and crayfish have already invaded Hawaii's streams. They compete with and eat native freshwater animals.

## How can we control it?

- ❖ Hawaii's Department of Agriculture Plant Quarantine Branch is in charge of inspecting all incoming cargo and mail to ensure that no unwanted pests enter Hawai'i. More staff and funding are needed to make this a more effective means of control.

## For more information

Department of Agriculture, Plant Quarantine Branch-  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

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Photo courtesy of Mike Yamamoto, Division of Aquatic Resources,  
Department of Land and Natural Resources

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Rat

# Black Rat, Norway Rat, Polynesian Rat

*Rattus rattus, Rattus norvegicus, Rattus exulans*

## Description

- ❖ The black rat is a medium to large rat, 5 to 7 inches in length. Its body color varies from grey to black, and the underside is grey, to grey-white, or white. It has a sharply pointed nose, large eyes, and large, thin ears. It has the broadest distribution of the three species within the Hawaiian Islands and occupies the widest range of habitats, from urban buildings to remote forests.
- ❖ The Norway rat is the largest of the three rats in Hawai'i, weighing about 10 to 18 ounces, and measuring 8 to 10 inches in length. Its stout tail is shorter than its whole body. The body is reddish brown to grey or black, and the underside is whitish. It has a wide head, blunt nose, and small ears and eyes. Its primary habitat is in artificial habitats, such as urban areas and agricultural fields.
- ❖ The Polynesian rat is the smallest of the three rat species, weighing only 2 to 3 ounces. The tail is as long, or slightly longer, than its 4 to 5 inch body length. The body color is cinnamon-brown to grey with light buff or grey undersides. It has a roundly pointed nose, short ears, and medium-sized eyes. It is common in most non-urban areas.

## How was it introduced?

- ❖ The black rat is thought to have arrived on O'ahu between 1870 and 1880, and then spread to the other islands.
- ❖ The Norway rat probably arrived in the late 1700s aboard the European sailing ships. It was considered to be established in 1835.
- ❖ The Polynesian rat, originally from Southeast Asia, arrived in Hawai'i with the first Polynesians as early as 400 AD.

## Why is it a threat?

- ❖ All three species cause severe economic damage to agriculture and property.
- ❖ They are carriers of a number of diseases that are communicable to people and pets.
- ❖ The black and Polynesian rats are among the greatest threats to the survival of many native Hawaiian species because of their high densities in native ecosystems and omnivorous diet.

## How can we control it?

- ❖ Although trapping and poisoning with bait stations can be effective at controlling rats over small areas and in urban locations, broad scale application of pelleted rodenticides by air is the most cost effective method for controlling rats in agriculture and native ecosystems. This method is not yet approved for use.

## For more information

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

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Sugihara, R.T. 1997. Relative abundance and diets of black and Polynesian rats in two Hawaiian rain forests. *Pacific Science* 51: 189-198.

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Photos courtesy of Jack Jeffrey

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Apple Snail

# Apple Snail

*Pomacea canaliculata*

## Description

- ❖ The apple snail is a freshwater snail that grows to be 2 inches round with a thin gold or brown shell.
- ❖ The snail travels fast in fresh water streams and is known as a “live eating machine,” because it can eat all day and night and grow constantly.
- ❖ It feeds on taro, azolla, duck weed, water hyacinth, ung choy, lotus, watercress, rice seedlings and other aquatic plants.

## How was it introduced?

- ❖ The apple snail is native to South America. It was intentionally introduced to Hawai'i around 1989 as a potential commercial food product.

## Why is it a threat?

- ❖ While some people eat the snail, it has become a serious threat to Hawaii's taro patches. An entire young taro plant can be eaten in one night by these snails.
- ❖ Apple snails have spread to all of the Hawaiian Islands except Moloka'i and Lāna'i.

## How can we control it?

- ❖ The best defense from the apple snail is to prevent it from entering a new area.
- ❖ If snails have already been introduced into an area, then the mechanical (manual) method of handpicking and destroying egg clusters has been effective. However, it is labor intensive and should be done as a community effort to get best results.
- ❖ Ducks eat the apple snails, making them effective biological controls. However, the ducks can host parasites, which irritate human skin.

## For more information

Department of Agriculture, Plant Quarantine Branch -  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

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Crowie, Robert H. 1994. *Freshwater Snail Surveys in Relation to Eradication of Apple Snails with Copper Sulphate on Kaua'i*. Bishop Museum Technical Report No.5. Honolulu, Hawai'i.

Photo courtesy of Hawai'i Department of Agriculture, Plant Quarantine Branch

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**Brown Tree Snake**

# Brown Tree Snake

*Boiga irregularis*

## Description

- ❖ This snake was named for its greenish-brown color.
- ❖ The adult brown tree snake can grow up to 8 to 10 ft. in length, and weight about 5 pounds.
- ❖ It lives in trees but has been known to live in homes, buildings, and wherever it can find food and shelter.
- ❖ It is active at night and eats almost anything, from lizards, garbage, and hamburgers. However, its favorite food is birds.
- ❖ While lacking fangs, the brown tree snake has teeth that secrete weak venom.

## How was it introduced?

- ❖ It is native to the Solomon Islands, New Guinea, northern and eastern Australia, and eastern Indonesia.
- ❖ As of now, the brown tree snake has not invaded Hawai'i, but hitchhikers in cargo shipment and in the wheel compartments of airplanes have been intercepted.

## Why is it a threat?

- ❖ After World War II, the brown tree snake was accidentally introduced to Guam. In the next 3 decades, the snake spread and wiped out 9 of the island's 12 forest birds, half of its lizard population, and maybe even some of its bats.
- ❖ Hawai'i has no native snake species. If this snake, or any snake for that matter, were to become established in Hawai'i, it would devastate our already fragile native bird populations.

## How can we control it?

- ❖ The U.S. Department of Agriculture performs night inspections and sets up traps in Guam airports and shipping ports to prevent the departure of any snake.
- ❖ Hawaii's Department of Agriculture tries to catch any snakes with trained dogs before they escape into the environment.

## For more information

Department of Agriculture, Plant Quarantine Branch -  
[http://www.hawaiiag.org/hdoa/pi\\_pq.htm](http://www.hawaiiag.org/hdoa/pi_pq.htm)

Hawai'i Ecosystems at Risk Project (HEAR) - [www.hear.org](http://www.hear.org)

## References

State of Hawai'i Department of Land & Natural Resources. *Alien Species, Brown Tree Snake*. <<http://www.hawaii.gov/dlnr/Snake.html>>.

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Photo courtesy of Gerry Ellis, ENP Images

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Taape

# Taape, Blueline Snapper

*Lutjanus kasmira*

## Description

- ❖ The taape is a bright yellow fish with four light blue lines and narrow brown borders extending the length of its body.
- ❖ It can grow to about 12 inches long.
- ❖ It is a carnivore, and eats crustaceans and smaller fish.
- ❖ They generally live in deeper waters of reef in large schools.

## How was it introduced?

- ❖ In 1958, the taape was imported from the Marquesas Islands into Hawaiian waters for game and commercial fishing. Due to its low prices, taape is becoming a common item in fish markets.
- ❖ Since its introduction, the taape has become established throughout the entire archipelago up to Laysan Island, 800 miles northwest of Kaua'i. It has adapted quickly and successfully over a large range of depths.

## Why is it a threat?

- ❖ There are concerns that it competes with native fish for food and space. Many Hawai'i fishermen dislike the taape, saying it is taking over favorable bottom fishing grounds.
- ❖ However, a recent study indicates that the taape generally does not share the same depth and feeding habitat with most native species and may not be a major threat, at least to adult native fish species. The study did not address the impact of taape with young stages of native fish or with native species in shallow-water coastal habitat.
- ❖ The taape is just one example of a non-native aquatic species that can disrupt native aquatic wildlife and fisheries.

## How can we control it?

- ❖ Not many control methods have been attempted. Perhaps the best solution is to prevent the introduction of non-native fish species to Hawaii.

## For more information

Hawai'i Department of Land and Natural Resources -  
<http://www.state.hi.us/dlnr/Welcome.html>

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Photo courtesy of the Waikiki Aquarium

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