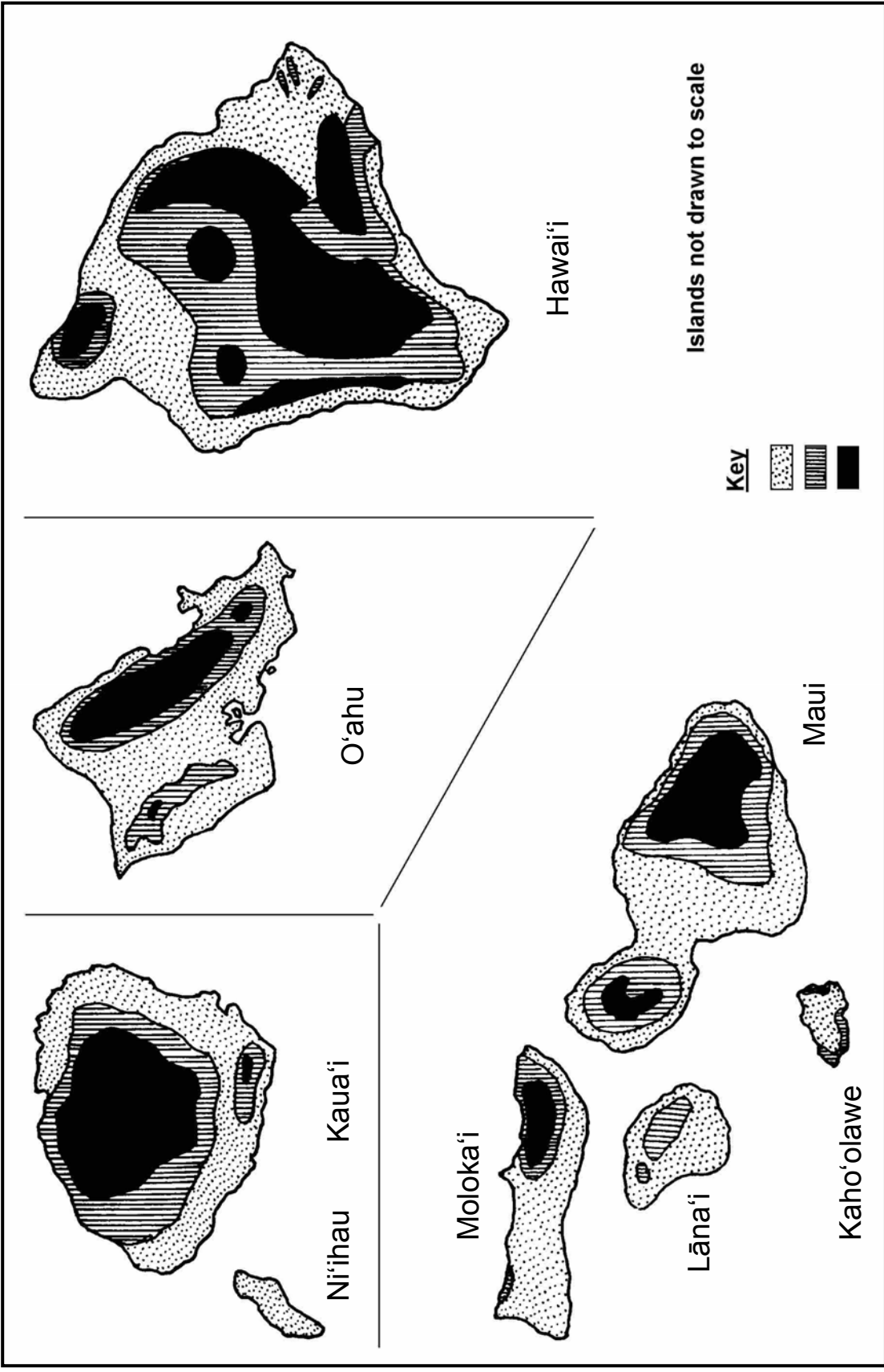


Vegetation Status Map

Design a Preserve



Adapted from Morgan, Joseph R. *Hawaii: A Geography*. Westview Press, 1983.



You represent a group of resource managers working for a nonprofit conservation organization that is looking for native rainforest to preserve. This type of forest has become rare in Hawai'i and populations of many native and unique Hawaiian plants and animals are dropping drastically. Unfortunately, a number of species have already been lost to extinction. Your organization is working to save the healthiest remaining lands where endangered species still exist.

The preserve map represents a small area on the windward side of your island. The south and east sides of the map are coastline. The area shown on the map rises from the coast to an elevation of 600 m (2,000 ft). The map is divided into 25-acre parcels. One thousand acres are native Hawaiian rainforest. The areas on the edge of the rainforest have been disturbed by grazing cattle and introduced plants. The center of the rainforest is mostly undisturbed. The non-native eucalyptus forest includes some grasses and non-native shrubs. Native birds are sometimes seen in this area. A parcel to the east used to be native forest, but was claimed for a cattle ranch and is now grassland with a few old *koa* trees.

Before deciding how much area your organization will purchase for a preserve, study the needs of the native plants and animals listed. Also consider the need for road access to your preserve since you will need to drive workers and equipment to the site. Otherwise you will need to use helicopters to transport people and equipment. The state, which owns the eucalyptus forest, and the owners of the cattle ranch will allow you to use the existing roads.

Your budget for this project is \$5,000,000. Out of these funds you must purchase land and pay the salaries of a preserve manager and research biologist **for one year**. You may also need funds to pay for various management needs as they arise.

Budget = \$5,000,000

Costs

Land: \$20,000/acre

Salaries:

preserve manager \$31,000/year
research biologist \$29,000/year

Equipment and Supplies (includes materials and shipping):

fencing (with road access) \$2,000/1,035 ft*
fencing (without road access,
includes helicopter time) \$14,000/1,035 ft*
truck \$10,000
tools \$2,000/year
field equipment (tents,
binoculars, cameras, etc.) \$2,000

Contract Labor: \$15/hour

(Two full time jobs on preserve—
fence building, hunting, weed and fire control)

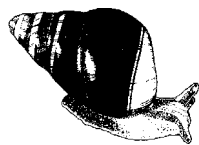
*1,035 ft – edge of one 25-acre parcel

The Task

- 1) Read the habitat needs of the native plants and animals and decide how much land you can purchase with the budget available.
- 2) Outline the boundaries for the preserve on the preserve map.
- 3) Design an ideal nature preserve for the plants and animals described. Draw a picture of the preserve by referring to color photographs in the resource books suggested.
- 4) Explain to the class your reasons for selecting preserve boundaries.

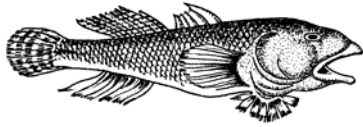
Native Plants and Animals

nuku pu'u—The diet of this endangered native bird consists of wood-boring beetles found in *koa* trees and nectar of lobelia and *'ōhi'a* blossoms. Its nesting habits are unknown.



tree snails (*kāhuli*)—These snails graze on the microscopic film of algae or fungi found on leaves and bark of native trees and shrubs. They give birth to live young, only one at a time, and may spend an entire lifetime on only one plant.

picture-wing flies—There are many species of these flies, including those that feed only on the sap from the bark of *māmane* trees and those that live only on the fronds of *hāpu‘u* (native tree ferns).



goby (*‘o‘opu nōpili*)—The diet of this endemic fish consists of green algae and small shrimp found in freshwater streams. It needs a clean stream that flows to the sea, since it spends its larval stage in the ocean and then returns to a stream.

Hawaiian raspberry (*‘ākala*)—This plant is usually found growing in moist conditions in the forest understory (lower layer of forest). Birds eat its berries and spread its seeds.



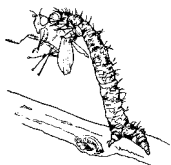
Maui parrotbill—This endangered bird uses its powerful bill to crack open dead branches and eat the insect larvae within. It will also eat fruits of understory plants. Its nesting habits are unknown.

crested honeycreeper (*‘ākohekohe*)—Look into the canopy of the forest to find this native bird. It will fight off other birds competing for *‘ōhi‘a* nectar. When nectar is scarce, look for it feeding in lower levels of the forest on *‘ākala* fruit and on some insects. Its nests have never been described.



lobelia (*‘ōhā wai nui*)—The understory of the forest provides habitat for this native lobelia plant. Birds, like the *nuku pu‘u*, pollinate its long curved flowers.

tree fern (*hāpu‘u*)—Commonly found in the understory of moist forests, this native tree fern is sometimes referred to as the “mother of *‘ōhi‘a*.” Its moist trunk provides a good place for *‘ōhi‘a* seeds to germinate (sprout).

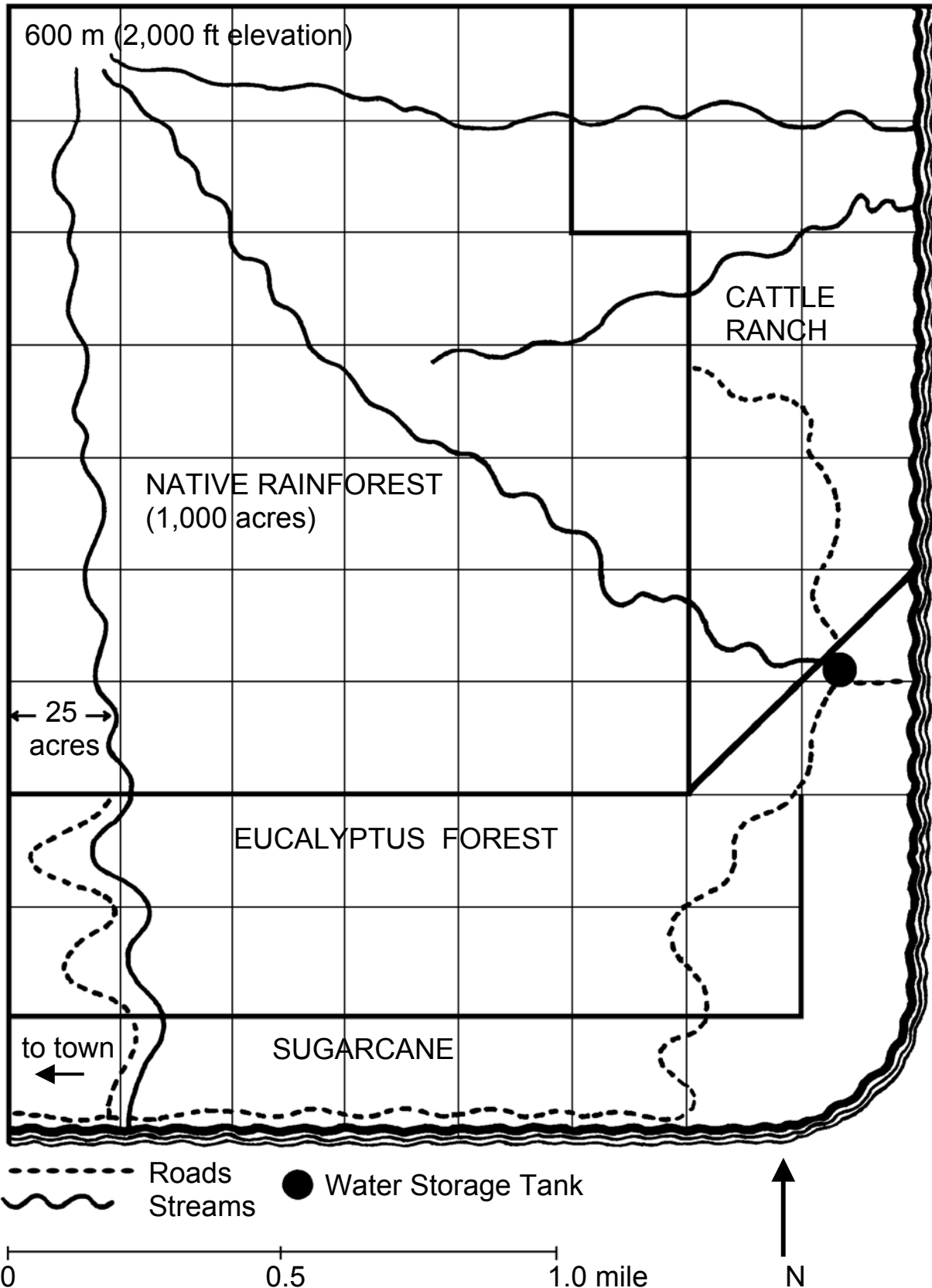


carnivorous caterpillar—This unusual moth larva catches and eats living flies and other small insects. It lives on the edges of leaves and twigs in the understory of forests.

mamaki—The understory of moist forests provides habitat for this large native shrub. Birds eat its small white fruits and spread its seeds.



Kamehameha butterfly (*pulelehua*)—Its larvae feed on the leaves of native *mamaki* in the forest understory. Birds eat the butterfly larvae.

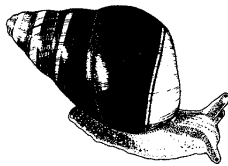




1. You have just discovered pigs roaming through your preserve. They are knocking over *hāpu'u* and eating the starch inside. This leaves a place for rainwater to collect and mosquitos to breed. The mosquityos are spreading diseases to the native birds. How will you control the wild pigs?



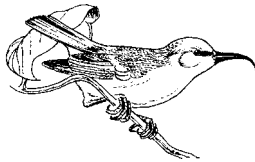
4. Cattle have broken through the fence at the edge of the forest. They are trampling the roots of *koa* trees and eating their seedlings as well as many of the native shrubs. The weight of the cattle compacts the soil and new seedlings are not sprouting. The fence is on your land. How will you solve the problem?



2. You find a few tree snail shells on the ground. On the shells you see the teeth marks of rats that have invaded your preserve. Rats are also known to eat the eggs of forest birds. How will you control the rats?



5. You have been cutting down and piling up introduced trees and shrubs in the preserve. These plants dried out and caught fire due to the actions of a careless hiker. The fire is spreading in your preserve as the wind blows from the northeast. How will you control the fire?



3. Bird populations are declining on your preserve. You discover that wasps (introduced on imported Christmas trees) are eating the caterpillars that some birds relied on for food. You are conducting research to find out how to control the wasp by using disease or predators. Your research budget has been cut by \$30,000. How will you solve the problem?



6. Hikers with seeds clinging to the mud of their boots visit the preserve. When the seeds sprout you discover a plant known as Koster's Curse, or *Clidemia*, growing in the preserve. Birds, mongooses and pigs have spread the seeds and the pest is growing over understory plants and crowding them out. How will you control this new aggressive plant?