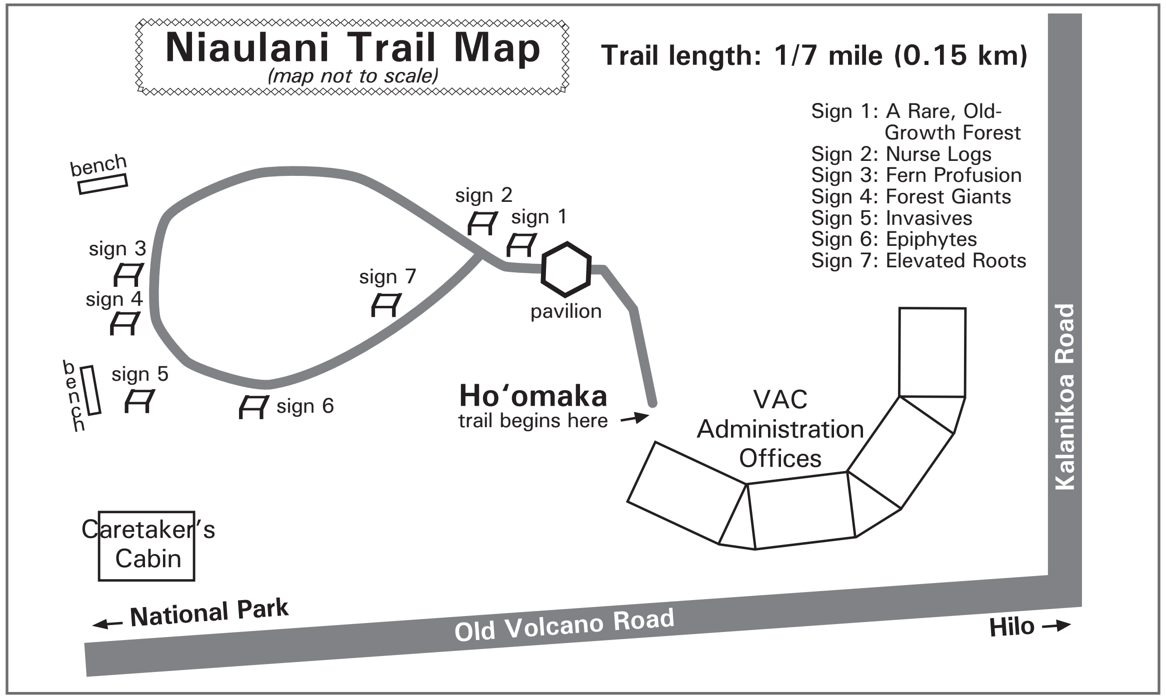
Niaulani is a 7.4 acre parcel leased by the non-profit Volcano Art Center (VAC) in 1997. The property contains a rich mixture of Hawaiian plants in a 4 acre native forest ecosystem. Forest management efforts are underway to control harmful invasive species which inhibit seedling growth of native plants in order to restore the rain forest through natural recovery of native species or by planting. Niaulani provides a rich backdrop for VAC's many arts and environmental education programs.

Visit www.volcanoartcenter.org for more details.



The *Niaulani Plant Guide* was compiled for Volcano Art Center by Tim Tunison and Julia Williams, botanical information; Teresa Leianuenue Reveira, traditional Hawaiian usage and folklore (supplemented by information from the Bishop Museum's Ethnobotany Website); and Ken Charon, plant illustrations.

This publication was made possible with funds from the Hawai'i Hotel Association Visitor Industry Charity Walk and from the Hawai'i Tourism Authority.

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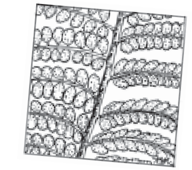
Volcano Art Center
Niaulani Plant Guide

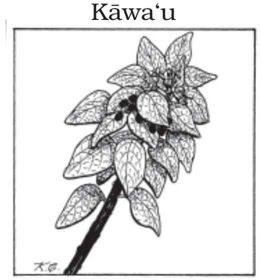


Niaulani has greatly changed since 1997 when alien weeds ruled the forest floor. Himalayan *kāhili* ginger grew wall-to-wall beneath the native tree canopy. Ten-foot-tall, impenetrable thickets of South American tibouchina breached the margins of the forest. The dense, choking stands of ginger and tibouchina eliminated any chance for native plant seedlings to become established. Now that *kāhili* ginger and tibouchina are being controlled, native plants are beginning to recover. The recovery of native flora not only restores the biological diversity of the forest but also preserves plants that are significant to Hawaiian culture.

There are many **endemic** (native and found only in Hawai'i) plant species found at Niaulani. We have also included a few **indigenous** (native but also found beyond Hawai'i in other regions of the world) and **introduced** (not native to Hawai'i) plants in this guide.

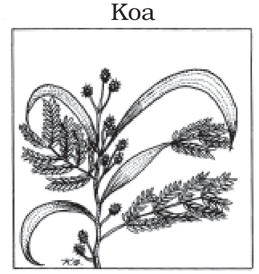
Trees (listed alphabetically)

Kāwa'u



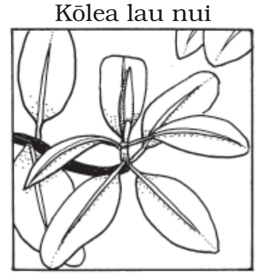
Kāwa'u *(Ilex anomala)* is an indigenous tree that is also called Hawaiian holly. It is in the same genus, *Ilex*, as temperate, continental hollies with their characteristic prickly or toothed leaves. The leaf margins of Hawaiian holly became smooth over evolutionary time in a Hawai'i devoid of large, plant-eating mammals. The young seedlings, usually found on nurse logs or tree trunks, do have toothed leaves, reflecting their evolutionary origin. Look for tiny Hawaiian happy face spiders on the undersides of the leaves. *Kāwa'u* wood was used to make anvils for beating *kapa* (bark cloth).

Koa



Koa *(Acacia koa)* is the tallest and the second most abundant endemic tree in the Hawaiian forest. The largest *koa* trees at Niaulani are possibly the last remaining old growth *koa* in Volcano, spared from logging when the 7.4 acre parcel was protected as a state forest reserve in the early 1900s. The smaller *koa* near the covered pavilion sprouted from roots of nearby older *koa* after non-native trees were removed in 1998, creating a light gap for this sun-loving species. *Koa* means "brave," "bold," and "valiant," as well as "warrior," in Hawaiian. A very hard wood, *koa* was used to make weapons, surfboards, and canoes. It is said that if an *'elepaio* bird was found pecking on the trunk of a potential *koa*, the canoe builder would know it was insect infested and so not a good choice.

Kōlea lau nui



Kōlea lau nui *(Myrsine lessertiana)* is an endemic tree that grows high up into the canopy, tucked under the taller *'ohi'a lehua* and *koa* trees. Its new leaves (*liko*) are often pink. The tree's wood was traditionally used by Hawaiians for house posts, anvils for beating *kapa* (bark cloth), and gunwales on canoes. Red dyes were made from its sap and black dyes from its stems and its charcoal or ashes. In Hawaiian custom, there are often corresponding life forms in the plant, animal, and fish worlds. In this case, there is the *kōlea lau nui* tree and the *kōlea* bird (Pacific golden plover), which migrates to Hawai'i for the winter.

Trees (continued)

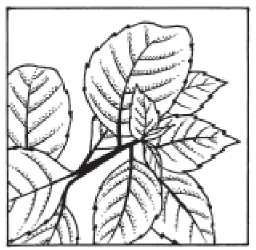
ʻŌhiʻa lehua

ʻŌhiʻa lehua *(Metrosideros polymorpha)* is the dominant tree at Niaulani. In the 1700s, Kīlauea erupted explosively, raining down ash and dense, tiny rocks that—along with fire—destroyed the existing forest. Look closely at the upper canopy foliage; it is grey-green in color because of the dense mat of minute hairs that clothe the *ʻōhiʻa* leaves. This is the pioneer form of the tree that colonizes new lava flows and ash deposits in the Kīlauea area. The endemic *ʻōhiʻa*'s hard wood was the only wood used for building *heiau* (temples) and for carving images of the gods (*kiʻi*). *ʻŌhiʻa* blossoms (most commonly red, but also pink, yellow, and white) are considered sacred to the Volcano goddess Pele and provide nectar for native birds, including the scarlet *ʻapapane* which flits and sings above. Hawaiian custom tells us that if you pick a *lehua* flower, it will surely rain.

ʻŌlapa

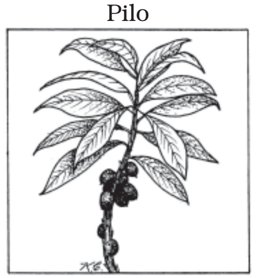
ʻŌlapa *(Cheirodendron trigynum)* is the third most abundant native tree at Niaulani. It typically gets started as an epiphyte (attached to other plants or trees) on the trunk of an *ʻōhiʻa* tree, where there is plenty of sunlight and little competition from other plants. From its perch above the forest floor, the endemic tree gently drapes its aerial roots around the *ʻōhiʻa* trunk without hurting its host. The roots eventually reach the ground and penetrate the soil, where nutrients and moisture are plentiful. Hawaiians used *ʻōlapa* fruit, leaves, and bark to create bluish-black dyes, and its roots for medicine. If you listen closely, you may hear the warbling call of the *ʻōmaʻo* (Hawaiian thrush), a gray forest bird that loves to eat the tree's tiny blue-black berries. Because the leaves flutter or dance in the breeze, *ʻōlapa* is a term also used to refer to hula dancers.

Olomea



Olomea *(Perrottetia sandwicensis)* is a small, rain forest tree. Unlike all the other native trees and shrubs in Niaulani, *olomea* is deciduous, meaning it loses all of its leaves for a few weeks in the winter. This endemic tree has ovate, red-veined leaves, tiny green flowers, and red fruits borne in panicles (pyramidical clusters). *Olomea* wood is very hard and was traditionally rubbed against softer woods to start fires.

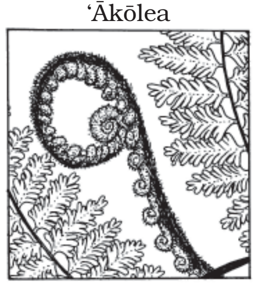
Pilo



Pilo *(Coprosma ochracea)* is a small, endemic tree belonging to the coffee family. In November and December the tree transforms into a colorful display when the female flowers develop little orange fruits which resemble coffee berries. *Pilo* berries were used medicinally as a laxative, and are another favorite food of the *ʻōmaʻo* bird (Hawaiian thrush).

Ferns (listed alphabetically)

ʻĀkōlea



ʻĀkōlea *(Athyrium microphyllum)* is an intricately divided forest floor fern that can be distinguished from all other ferns in Hawaiʻi by the soft, white spines on the top (or back) of its fronds. This endemic fern is rare in Volcano except in forests like Niaulani, protected from logging, pigs, and invasive plants. It is spreading now that these pests have been removed or controlled. *ʻĀkōlea* was used medicinally by Hawaiians for loss of appetite and childbirth, as well as for *lei* (garland) making. The base of the fern's stalks were cooked and eaten.

Herbs & Vines (listed alphabetically)

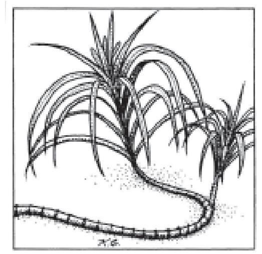
ʻAlaʻala wai nui

ʻAlaʻala wai nui *(Peperomia cookiana & hypoleuca)* represents an uncommon endemic plant life-form in Hawaiian forests. The great majority of native flowering plants are trees or shrubs; *ʻalaʻala wai nui* is an herbaceous plant without woody tissue. The other native herb in Niaulani's rain forest is *paʻiniu*. *ʻAlaʻala wai nui*'s natural home is the forest floor, growing from the soil or covering nurse logs. It also grows well as an epiphyte (attached to other plants or trees). Like other forest floor species, this herb is now spreading thanks to the removal of feral pigs and *kāhili* ginger. The two common species at Niaulani typically have red markings on the undersides. *Peperomia cookiana* has noticeably hairy stems and leaves, whereas *Peperomia hypoleuca* has few hairs. *ʻAlaʻala wai nui* was used medicinally and to make a greyish-green dye.

Paʻiniu

Paʻiniu *(Astelia menziesiana)* is an endemic lily sometimes mistaken for the *ʻieʻie* vine (see below), since both species are rosette-shaped and have very long, narrow leaves. However, *paʻiniu* is an herbaceous plant and the undersides of its leaves are silvery, while *ʻieʻie* is a woody vine and the undersides of its leaves are green. *Paʻiniu*, like many Hawaiian plants, can grow as an epiphyte (attached to other plants or trees) or from the soil. It has little, yellow or green flowers that grow from a center stalk. In the days when feral pigs roamed a forest floor choked with *kāhili* ginger, *paʻiniu* luckily was able to grow up above, in the safe refuge of tree trunks. Now, *paʻiniu* is beginning to spread on the ground. Hawaiians used the shiny outer layer of its leaves for *lei* (garlands) to show they had visited Kīlauea Volcano, where this species is most commonly found.

ʻIeʻie



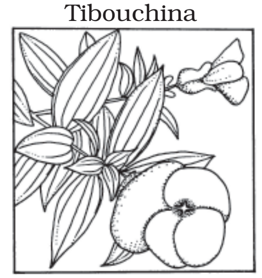
ʻIeʻie *(Freycinetia arborea)* is an indigenous vine that sprawls along the ground and climbs trees or tree ferns using its aerial roots. After years of *kāhili* ginger dominance, this vine was scarce; now, patches of *ʻieʻie* are expanding. The vine produces vivid, conical orange flowers borne on cylindrical spikes, and is pollinated by Hawaiʻi's only native land mammal, the endangered *ʻōpeʻapeʻa* (Hawaiian hoary bat). *ʻIeʻie* was used on the altar of Laka, the goddess of *hula*, and is identified with Kū, the Hawaiian god of war. *ʻIeʻie* roots were used to weave baskets, fish traps, helmets, capes, and sandals.

Invasive Plants (listed alphabetically)

Kāhili ginger

Kāhili ginger *(Hedychium gardnerianum)* was introduced to Hawaiʻi from Asia and named for its resemblance to feathered standards (*kāhili*) of the Hawaiian chiefs. Although it is a beautiful plant with sweet smelling flowers, this ginger is one of the worst rain forest weeds in Hawaiʻi, because it spreads rapidly and prevents the establishment of all native plants.

Tibouchina



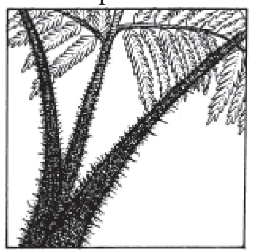
Tibouchina *(Tibouchina urvilleana)* was introduced from Brazil in 1910 as an ornamental garden plant. Despite its abundance of showy purple flowers, tibouchina (often called glory bush or princess flower) is a harmful weed in the Volcano rain forest. Even though it rarely produces seeds, it forms single species stands by expanding aggressively from spreading shoots and roots.

Ferns (continued)

ʻAmaʻu

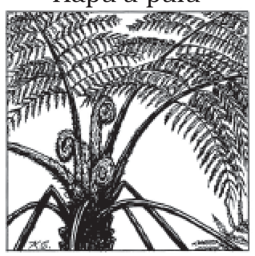
ʻAmaʻu *(Sadleria pallida)* is an endemic tree fern that rarely grows to the height of the *hāpuʻu*. There are just a few individuals at Niaulani because of the dense shade cast by taller tree ferns. *ʻAmaʻu* was considered one of the *kinolau* (physical forms) of the demigod Kamapuaʻa, because of the red and dark brown bristles (*pulu*) on the fronds. Legend tells us that Kamapuaʻa, whose animal form is the pig, had his bristles burned red in an encounter with the volcano goddess Pele. Pele's home, Halemaʻumaʻu Crater, is said to have gotten its name from the *ʻamaʻu* ferns that grow on the surrounding lava flows. Pulp from its stems was used as glue in the making of *kapa* (bark cloth); leafstalks were beaten and used as sizing (with bark) in *kapa* making; and trunk fibers were processed to make red dye for *kapa* decoration. The young leaves were cooked and eaten, and in times of famine the starchy inner part of the trunk was also consumed. The fern's fronds were used as thatching for *hale* (buildings) and as mulch.

Hāpuʻu ʻiʻi



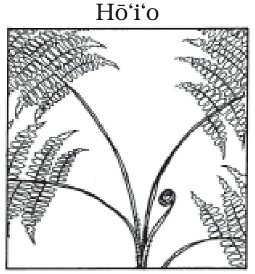
Hāpuʻu ʻiʻi *(Cibotium menziesii)* is an endemic tree fern found in moist forests and rain forests. It is similar to the *hāpuʻu pulu* (see below) except for the bristles at the base of its fronds. The hairs of the *hapuʻu iʻi* are stiff, coarse, and reddish-brown or black, while the hairs of the *hapuʻu pulu* are soft, silky, and yellowish-brown.

Hāpuʻu pulu



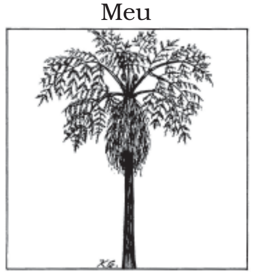
Hāpuʻu pulu *(Cibotium glaucum)* is the most common large tree fern at Niaulani. It forms a closed canopy beneath the native trees, helping suppress invasive weeds but also slowing down the recovery of native plants. When a *hāpuʻu* falls to the forest floor, a gap of sunlight and a nurse log are created, both of which help hasten the reestablishment of native plants. Because many plants sprout on the moist bark of this endemic tree fern, it is said to be the body form of Haumea, the goddess of motherhood. Mats of soft golden hairs (*pulu*) at the base of the fronds and on fiddleheads (the young unfolding fronds) identify the *hāpuʻu pulu*. Hawaiians used *pulu* to embalm their dead, filling the body cavity to absorb fluids in preparation for burial. The pith and fiddleheads were eaten in times of famine, and feral pigs love the fern's starchy core. Now that our forest is partly fenced, pigs must look elsewhere to dine on this delicacy.

Hōʻiʻo



Hōʻiʻo *(Diplazium sandwichianum)* survived decades of *kāhili* ginger dominance on the forest floor and is now spreading since the invasive weed has been removed. This large endemic fern is abundant on the forest floor of undisturbed or recovering rain forests in the Volcano area. The new shoots unfurl into tender fiddleheads, which are edible only for a few weeks of the plant's life cycle. (Since the tips of all young fern fronds resemble the scroll of a violin, they are often referred to as 'fiddleheads.') The delicate *hōʻiʻo* fiddleheads were traditionally eaten with *ʻopae* (shrimp) and *poi* (mashed taro).

Meu



Meu *(Cibotium chamissoi)* is an uncommon tree fern that grows tall and slim. This endemic fern is distinguished by a cylindrical trunk which lacks large indentations where old fronds were attached. It resembles a palm tree more than the *hapuʻu* fern and wears a "skirt" of dead fronds beneath its new growth.

Shrubs (listed alphabetically)

Kanawao

Kanawao *(Broussaisia arguta)* is a tall shrub in the forest understory. Like many native Hawaiian shrubs, it has fragile stems and it spreads by roots buried just below the surface of the ground. These features make it vulnerable to cattle browsing and feral pig rooting. *Kanawao* will continue to spread and probably become the most abundant shrub at Niaulani as species recovery progresses. This endemic member of the hydrangea family is also called Hawaiian hydrangea, and the little flowers and berries appear in wide, convex clusters. Its berries were used medicinally to help women conceive. Hawaiians say that *kanawao* is "the fruit that gives birth to chiefs."

Māmaki

Māmaki *(Pipturus albidus)* is an endemic Hawaiian "nettle-less" nettle. Because it evolved on the most isolated island chain on earth, a land that developed free of large herbivorous mammals, *māmaki* lost its defenses against browsing (in this case, nettles). The only examples of *māmaki* growing alongside the Niaulani nature trail are found at the covered pavilion. They grew from seed when a forest gap was created by removal of non-native tropical ash trees in 1998. As a light-loving gap invader, *māmaki* grows rapidly but is short-lived. The shrub has broad, white-backed leaves and white mulberry-like fruit. The leaves usually have red veins only when young (compared to the *olomea* tree, which always has red-veined leaves). The inner bark fibers were used by Hawaiians for making *kapa* (bark cloth), and the long, strong fibers were used for making cordage and rope. *Māmaki* fruit was used medicinally, and the leaves are still widely brewed as a healing tea.

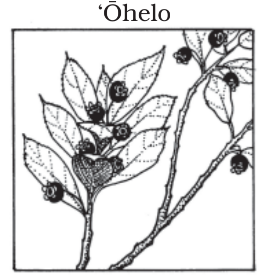
Manono

Manono *(Kadua affinis)* is one of the most variable species in the Hawaiian flora. Some *manono* plants at Niaulani are vine-like with small, leathery leaves. Other *manono* plants are shrubs or small trees with large, thinner leaves. A member of the coffee family, this endemic plant has small greenish flowers and purple berries that grow in clusters. Its wood was used in canoe-building.

ʻOhā wai

ʻOhā wai *(Clermontia parviflora)* is an endemic shrub of the lobelia family with large, whitish to purple flowers. You can see it growing on the trunks of *ʻōhiʻa* trees and tree ferns or from the soil. The *ʻohā wai*'s fruit and sap were used medicinally, and the fruit eaten raw.

ʻŌhelo



ʻŌhelo *(Vaccinium calycinum)* is a rain forest cousin of the more widely known *ʻōhelo* that grows in the open in and around Kīlauea Caldera. The rain forest *ʻōhelo*, also called *ʻōhelo kau lāʻau* or tree *ʻōhelo*, is typically found as an epiphyte (attached to other plants or trees), usually on an *ʻōhiʻa* tree. It will eventually drop down from the safety of its tree host to start spreading on the forest floor. *ʻŌhelo* can also grow from the soil in restored, weed-free rain forests where pigs do not disturb the understory. This endemic relative of the cranberry produces tart red berries, a favorite of the *ʻōmaʻo* (Hawaiian thrush) and *nēnē* (Hawaiian goose). *ʻŌhelo* berries were eaten and used medicinally, but legend tells us that they should not be picked on the way to Kīlauea Caldera for fear of losing one's way in resulting mist and rain. Upon reaching the summit, the first *ʻōhelo* berry picked should be tossed into the volcano as an offering to Pele.