

# Kahanahāiki Gulch

Hanging on to the upper rim of Makua valley, Kahanahaiki gulch is a pocket of mesic forest, one of the last remnants of native forest in Makua valley. Mesic forests are one of the most imperiled forest community types in the Hawaiian islands. They are characterized by an annual rainfall of 1,200-3,800mm occurring mainly between October and March. The substrate tends to be well drained and can range from rocky, shallow, organic muck soils to steep, rocky talus slopes, shallow soil over weathered rock in steep gulches, or deep soils over soft weathered rock and gravely alluvium (Wagner, Herbst, Sohmer 1990). Kahanahaiki has most of these soil types in just a 150 acre area. It is also considered a diverse mesic forest containing a rich variety of native plants with no clear dominant species. Kahanahaiki is home to seven endangered plant species including *Schiedea nutallii*, *Schiedea obovatum*, *Cyanea superba*, *Diellea falcata*, *Cyrtandra dentata*, *Flueggea neowawrae*, and *Cenchrus agriminoides*, *Nototrichium humile*, *Lepidium arbuscula* the endangered tree snail *Achatinella mustelina*, and the endangered Oahu Elepaio, a native fly catcher.

Over the past two years, the Army's Environmental Division has been proactive in conserving this rare natural resource. The enclosure around Kahanahaiki gulch was completed in December of 1996, and the feral pigs have been removed. Weeding projects, starting in the most intact areas, are improving the regeneration of the intact forest community. Monitoring and collecting propagules of the endangered plants will hopefully bring them from the brink of extinction. The rare and endangered animals are being monitored and predator control measures such as poisoning rats, is helping their lot.

Please enjoy this unique opportunity to experience this rare forest type but we also ask you to kokua and be aware of your surroundings. Since the removal of the pigs there is a lot of native seedling recruitment which we must be careful not to step on. If you are part of a weeding project make sure you are weeding a weed and not a native! If you are not sure, it is better to leave it or ask an expert. Snails are beautiful but are also federally listed and one must have a permit in order to handle them, please feast your eyes but don't touch! We appreciate your interest and hard work, thank you very much!

‘Iliahi (*Santalum freycinetianum*)

## Species list

### Plants

#### Rare plants

*Alsinidendron obovatum* endemic

CARYOPHILLACEAE (Pink family)

DESCRIPTION: Erect branched subshrubs 3-10 dm tall, glabrous; leaves thick and somewhat fleshy, elliptic, 4-11 cm long 2.5-6 cm wide; flowers 7-12 in somewhat congested cymes; bell-like, white.

*Cyanea superba* endemic

CAMPANULACEAE (Bellflower family)

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Kahanahai'iki

DESCRIPTION: Palm-like trees 4-6m tall; leaves are oblanceolate 50-100 cm long, 10-20 cm wide, densely pubescent on the underside; inflorescences 5-15 flowered; conical, tube curved, corolla whitish or cream with purple veins; berries yellow to orange obovoid 16-22 mm long 10-16mm wide.

*Schiedea nuttallii* endemic

CARYOPHILLACEAE (Pink family)

DESCRIPTION: Erect subshrubs, usually glabrous throughout, leaves opposite, green sometimes purple tinged, narrowly obate or lanceolate; flowers perfect, tiny.

*Diellea falcata* endemic

BLECHNACEAE

DESCRIPTION: Small fern with a thumb like projection on each leaflet, sori spread out on margins with no indusium.

*Cyrtandra dentata* endemic

GESNERIACEAE (Gentian family)

DESCRIPTION: Shrubs 1.5-5 m tall; stems sparingly branched; leaves opposite, borne on upper 3-5 nodes, 9-33 cm long 6-17 cm wide, lower surface velvety, margins coarsely and irregularly serrate or dentate; flowers 3-9 in open cymes arising in the leaf axils, corolla white, tube cylindrical 12-25 cm long; berries white ovoid.

*Flueggea neowawraea* endemic

EUPHORBIACEAE (Spurge family)

DESCRIPTION: Dioecious trees up to 30m tall and 2m in diameter; bark pale brown, rough and scaly, lenticels abundant, whitish; leaves thin, upper surface green, lower surface pale green, ovate-elliptic, margins entire; flowers green with brownish tips; fruits reddish brown to black, globose, milky sap.

*Cenchrus agriminoides* endemic

POACEAE (Grass family)

DESCRIPTION: Perennials; culms robust, 30-200 cm tall, swollen at nodes, internodes short; ligule membranous, upper surface scabrous, lower surface glabrous, midrib prominent; inflorescence composed of racemes 5-10 cm long, axis densely puberulent; burrs densely pubescent, outer series of bristles numerous.

### Common natives

‘A‘ali‘i

*Dodonaea viscosa* indigenous

SAPINDACEAE (Soapberry family)

DESCRIPTION: Shrubs or small trees with reddish brown to dark gray bark. Leaves are simple, lanceolate 3-10 cm long, 1-3 cm wide, often wrinkled.

USES: sacred plant of the hula goddess, Laka; tools, weapons (wood); dyes (capsules); fire making; medicinal (soothe itches/rashes); lei making.

‘Akoko

*Chamaesyce multiformis* endemic

EUPHORBIACEAE (Spurge family)

DESCRIPTION: shiny dark green leaves, 3-5 inches long, one inch wide; milky sap; ovoid, three-angled red, green or pink fruiting capsules.

USES: firewood; canoe hull stain

‘Ala‘a, Aulu

*Pouteria sandwicensis* endemic

SAPOTACEAE (Sapodilla family)

DESCRIPTION: Large native tree with smooth oblong leaves, shiny green on the upper surface and bronze on the underside; flowers occur singly or in clusters of two or four in the axils of the leaves; fruits are pear-shaped, purplish black and up to 2 inches long. Tree has sticky milky sap.

USES: sticky sap was used to catch small birds; house construction (hard wood); ‘o‘o (digging sticks); spears.

Alahe‘e

*Canthium odoratum* indigenous

RUBIACEAE (Coffee family)

DESCRIPTION: Large shrub or small tree; oblong dark green shiny leaves 2-3 inches long; flowers grow in clusters at branch tips; they are four or five lobed and about ¼ inch long, white and fragrant; fruit is a black inverted ovoid about 1/3 inch long.

USES: digging sticks; adze blades; black dye (leaves)

Aulu, Lonomea

*Sapindus oahuensis* endemic

SAPINDACEAE (Soapberry family)

DESCRIPTION: Trees 6-15 m tall; bark gray, rough, covered with lenticles, youngest branches yellowish brown tomentose, leaves green with yellow midrib, simple, oblong-ovate, 7.5-27 cm long, 3-14.5 cm wide, glabrous, margins entire, usually somewhat undulate, fruit is 2-3 cm long, exterior is leathery, glossy, seed obovoid black.

USES: house construction; spears; medicinal- laxative (seeds); soap substitute (fruit); lei (seeds)

‘Ie‘Ie

*Freycinetia arborea* indigenous

PANDANACEAE (Screw pine family)

DESCRIPTION: Vine in the same family as hala; stems are ringed and are about an inch in diameter; branches form every few feet ending in tufts of narrow spiny leaves that may be up to 2 ½ feet long and up to 2 inches wide tapering to a point; and inflorescence consisting of two to four cylindrical spikes arises from the center of the leaf cluster, they are about 5 in long, with a diameter of ½ in.

USES: sacred to the Hawaiian forest god, Ku; binding for outrigger canoes, fish trap baskets, sandals (fibers from aerial roots); famine food (fruits)

‘Iliahi

*Santalum freycinetianum* endemic

SANTALACEAE (Sandalwood family)

DESCRIPTION: Shrubs or trees, partially depend on other plants for food, leaves are opposite, feather-veined, up to 4 in long dark glossy green or smaller thick pale green, flowers are perfect, form in panicles at the end of branches or in the axils of leaves, 4-5 lobed red or green or greenish yellow calyx; fruits are drupelike; heartwood is scented.

USES: perfuming kapa (heartwood); heavily harvested in 1800’s for export to the Orient for wood working

Kauila

*Alphitonia ponderosa* endemic

RHAMNACEAE (Buckthorn family)

DESCRIPTION: Alternate, thin, oblong to narrow leaves that are grayish or rusty-woolly on the underside; petioles are up to an inch long. the wood is hard and red-and-black streaked.

USES: hard wood used for weapons.

Kaulu

*Pteralyxia macrocarpa* endemic

APOCYNACEAE (Dogbane family)

DESCRIPTION: Trees 8-15 m tall, leaves dark green and shiny on upper surface, lower surface paler and dull often brittle, very broadly elliptic 9.2-18 cm long 4.5-7.7 cm wide; margins revolute or flat, looks like plumeria; corolla tube 7-9 mm long; endocarp with the central and lateral wings or ridges prominent.

Koa

*Acacia koa* endemic

FABACEAE (Pea family)

DESCRIPTION: Bark is light gray, and smooth when the tree is young, but deeply furrowed longitudinally in mature trees. First leaves are light green, finely divided, consisting of five to seven pairs of pinnae, each pinna with twelve to twenty-four pairs of leaflets; these are replaced by dark green, smooth, stiff, crescent-shaped phyllodes; flowers appear as axillary clusters of small cream-colored balls. fops flattened brown seeds.

USES: war canoes, paddles, surfboards (hard wood)

Kolea

*Myrsine lessertiana* endemic

MYRSINACEAE (Myrsine family)

DESCRIPTION: Trees or occasionally shrubs 2-8 m tall, branches purplish brown to reddish brown, leaves glabrous dark green to occasionally yellowish green, young ones reddish to dark reddish purple, clustered at the tips of the branches, oblong elliptic 5-12 cm long, 1.3-5 cm wide, midrib prominent, flowers perfect, 5-15 or more in bracteate fascicles arising on woody knobs, petals green tinged purple, dupes purplish black, globose to ovoid.

Ko’oko’olau

*Bidens sp.* endemic

ASTERACEAE (Sunflower family)

DESCRIPTION: perennial herbs or shrubs with opposite leaves, simple and ovate or compound with 3-7 leaflets, short or long stemmed; flower heads may be clustered or single on long stems at branch tips; flowers are ‘daisy like’, vary in color from white to yellow; fruits are black or dark brown.

USES: medicinal- tea for general sickness, stimulate appetite (stems, leaves, flowers)

Kopiko

*Psychotria mariniana* endemic

RUBIACEAE (Coffee family)

DESCRIPTION: Trees up to 20m tall, branches yellowish to dark brown, leaves narrowly oblanceolate 5-13 cm long, 1.5-6 cm wide, domatia (a portion of a plant modified to form a chamber for insects, mites, fungi, or blue-green algae) usually very conspicuous at the base of the veins along the midrib; flowers are small usually glabrous sometimes pubescent in the corolla tube throat.

USES: anvils for beating kapa (hard whitish wood); fuel

Lama

*Diospyros spp.* endemic

EBENACEAE (Ebony family)

DESCRIPTION: Bark is black; leaves are oval or oblong with pointed tips 4-5 inches long; reddish when young but leathery and dark green when mature; male and female flowers are born on separate trees; they are small and occur in the axils of the leaves; fruits are small, ovoid, ¾ inches long and bright red when ripe.

USES: medicine and placed in hula alters, fence sacred areas; name suggests enlightenment.

Maile

*Alyxia oliviformis* endemic

APOCYNACEAE (Dogbane family)

DESCRIPTION: Shrubby vine, leaves are oval, pointed, and shiny with short stems; grow in pairs, threes or fours and are 1-3 inches long. flowers grow in the axils of leaves in groups of 3-4, 1/10 inch long, yellow with four or five short lobes; fruit is an ovoid drupe ½ inch or longer, black; bark of the stems and leaves are highly scented when bruised.

USES: lei- dedicated to the hula goddess Laka, one of the five sacred plants in her alter

Mamaki, Mamake

*Pipturus albidus* endemic

URTICACEAE (Nettle family)

DESCRIPTION: Shrubs or small to medium-sized trees. Leaves are variously toothed about 4 inches long, white beneath, veins on the lower surface are green reddish or purplish; bark is smooth and light brown and is matted with gray, woolly hairs on young branches; fruit are dry brown achenes embedded in a white tasteless receptacle

USES: kapa (bark); medicinal- laxative (fruits); rope and cordage (fibers); herbal tea

Manono

*Hedyotis terminalis* endemic

RUBIACEAE (Coffee family)

DESCRIPTION: Shrubs, lianas, or small trees up to 5 m tall, leaves variable 2-18 cm long, 0.9-8 cm wide, glabrous, stipules 2.5-16 mm long, adnate to petioles only at base; flowers in terminal paniculate inflorescences 3-25 cm long.

Maua, a'e

*Xylosma hawaiiense* endemic

FLACOURTIACEAE (Flacourtia family)

DESCRIPTION: Dioecious trees up to 3-9 m tall, bark dark gray, branches stiff; leaves thick, ovate to broadly elliptic 7-14 long, 3-8 cm wide, glabrous, margins crenate; flowers 5-10 in 1 to several short cymes, nectary disk 4 lobed; berries deeply reddish purple, broadly ovoid.

Naupaka kuahiwi

*Scaevola gaudichaudiana* endemic

GOODENIACEAE (Goodenia family)

DESCRIPTION: shrubs or small trees; smooth to hairy young branches with thin, smooth to densely hairy oval or narrow light green leaves; flowers are smaller than beach *naupaka* and are either white, yellow or lavender, the corolla has five winged lobes and a tube split halfway or more down one side, five short stamens form a ring around the style; fruits are black, drupaceous and contains two stones.

USES: subject of a modern Hawaiian legend involving two separated lovers

'Ohe

*Reynoldsia sandwicensis* endemic

ARALIACEAE (Ginseng family)

DESCRIPTION: Trees up to 20 m tall with a straight trunk and spreading crown, branch ends thick, nearly fleshy, leaves deciduous in dry season, 20-35 cm long, leaflets medium or yellowish green on upper surface, lower surface lighter shiny, broadly ovate, 7-10 cm long, margins crenate to serrate; inflorescence 5-30 cm long, buds greenish turning orangish purple.

'Ohelo

*Vaccinium* spp. Endemic

ERICACEAE (Heath family)

DESCRIPTION: Shrubs with leathery oblong to nearly circular leaves, about an inch long, margins are finely serrated, bluish green or grayish green; flowers develop singly in leaf axils and are usually red; fruits are round about 1/3 inch in diameter, are either red, orange or yellow.

USES: fruits are highly prized for their flavor.

'Ohe mauka

*Tetraplasandra oahuensis* endemic

ARALIACEAE (Ginseng family)

DESCRIPTION: Trees 3-10 m tall, leaves 15-35 cm long leaflets 7-15 broadly elliptic, 5-13cm long 2.5-8 cm wide, glabrous; flowers in erect 2-3 times compound umbellate inflorescences; calyx a low, undulate rim the lobes poorly defined, petals 5-7, pinkish or yellowish green, fruit blackish purple at maturity, globose.

'Ohi'a lehua

*Metrosideros polymorpha* endemic

MYRTACEAE (Myrtle family)

DESCRIPTION: Extremely variable ranging from small shrubs to tall trees, leaves vary from round to narrow, with tips that are blunt or pointed and with surfaces that are smooth or woolly, young leaves usually are reddish or pink, old leaves dark green; flowers range in color from dark red to light pink or yellow, the color comes from the numerous stamens which are from half an inch to an inch in length; the bark is rough and scaly and the wood is hard and dark red; the fruit is a capsule filled with many tiny seeds.

USES: poi boards, bowls, idols, kapa beaters; tea (leaves); black dye (bark); lei-lehua blossoms sacred to Pele

Olopua, Pua

*Nestegis sandwicensis* endemic

OLEACEAE (Olive family)

DESCRIPTION: Tree reaching heights of 60 feet, leaves are leathery, narrow, 3-6 in long and light green on the underside; flowers are perfect, pale yellow and clustered at the leaf axils; fruit is an ovoid dark blue drupe about ½ inch long.  
USES: adze handles (fine textured very heavy hard wood); fish hooks, spears, rasps; fuel wood- burns hot even when green

Pala'a

*Sphenomeris chinensis* indigenus  
LINDSAEACEAE (Lace fern)

DESCRIPTION: light brown, smooth, shiny stems, one-half foot to a foot long; fronds are smooth ovate pointed that are as long as the stem or longer; subdivided three times; the smallest divisions are wedge-shaped; sori are located close to the edge with a covering only at the top.

Palapalai

*Microlepia strigosa* endemic  
DENNSTAEDTIACEAE (Hay-scented fern)

DESCRIPTION: similar to the Pala'a in having three subdivisions of its fronds, but it has larger softer appearing fronds commonly one to three feet long and is hairy; the rhizomes are covered with pale yellowish hairs; sori are found at the tip of the veinlets of the last segments of the fronds.

Papala

*Charpentiera sp.* endemic  
AMARANTHACEAE (Amaranth family)

DESCRIPTION: forest trees with alternate lanceolate, elliptic ovate or obovate leaves that are leathery often with a thickened margin; young leaves are slightly to densely hairy; flowers are borne in slender smooth or minutely hairy compound panicles 4 to 24 inches long in the leaf axils; the wood is light and flammable.

USES: fireworks (the soft wood rubbed with kukui oil thrown off cliffs into the wind)

Papala kepau

*Pisonia sp. (sandwicensis, brunoniana, umbellifera)* indigenus  
NYCTAGINACEAE (Four-o'clock family)

DESCRIPTION: Trees or large shrubs up to 30 m tall with soft, brittle wood, leaves elliptic at least 20 cm long and 10 cm wide, opposite or pseudowhorled; flowers perfect or unisexual, fruit is long, prominently 5 ribbed, ribs very sticky.

USES: catching birds (sticky gum exuded by fruit was rubbed on branches native birds would land upon)

Pukiawe

*Styphelia tameiameia* indigenus  
EPACRIDACEAE (Epacris family)

DESCRIPTION: shrub growing 3-9 feet high; numerous fine brittle stems and branches covered with numerous small leaves about ½ inch long and 2/10 inch wide alternate, stiff, leathery, very short stemmed and oblong with the tip blunt or pointed and the base blunt or wedge-shaped; upper surface is smooth while the undersurface appears whitish; flowers are small and inconspicuous in the leaf axils and are five parted tubular; the fruit is a globular pink, red or white dry drupe about ¼ inch in diameter.

USES: smoke cleansing- Hawaiian culture (dispensation for ali'i chiefs); red and brown dyes (bark); cremation of outlaws (wood); lei (leaves and berries)

'Uki 'uki

*Dianella sandwicensis* indigenus  
LILIACEAE (Lily family)

DESCRIPTION: long narrow smooth leathery leaves with close, longitudinally parallel veins 1-3 feet long by ½ to 1 inch wide forming a two-rowed cluster along a short erect stem; flowers are small and bluish arising from a branching flower stem; fruits are blue berries.

USES: dye (berries); house thatching (leaves)

'Ulei

*Osteomeles anthyllidifolia* indigenus  
ROSACEAE (Rose family)

DESCRIPTION: sprawling shrub to small trees; leaves are compound consisting of 11-25 oblong leaflets ½ inch long arranged in pairs with an extra leaflet at the tip; young leaves are silvery gradually becoming smooth; flowers are white and rose-like loosely clustered at the tips of branches, ½ inch in diameter with 5 petals, 5 sepals, and many stamens; fruits are 1/3 inch diameter, white, round and sweet tasting with five stones.

Uluhe

*Dicranopteris linearis* endemic  
GLEICHENIACEAE (False staghorn fern)

DESCRIPTION: fern with fronds that fork repeatedly an indefinite number of times, bearing a pair of pinnae 6-9 inches by 2-4 inches at each fork as well as at the tip; these are cut into narrow lobes about ½ inch wide; sori are irregularly spread on the underside of the pinnae.

### Invertebrates

#### Snails

The entire genus of *Achatenilla* tree snails, which is only found on Oahu, is listed as endangered. *Mustilina* is the only species found in the Wai'anae mountain range where as the Koolaus' host a wide variety of species, some of which are restricted to specific ridges. The population of *mustilina* in Kahanahai'iki was first discovered by Joby Rorher and Kapua Kawelo in 1996, and has been informally

monitored since. Recently, we put in two snail plots to more intensively monitor their population, reproductive rate and impacts of predators.

#### **Arthropods**

A survey conducted by the U. S. Fish and Wildlife Service is currently in progress. This is a base line survey meant to assess what the status of the arthropod fauna is, as there has been no such survey to date. It is possible that there are some candidate *Drosophilla* sp present along with other rare insects.

#### **Vertebrates**

##### **Birds**

The native flycatcher, *Chasiempis sandwichensis gayi* otherwise known as the Elepaio is a species of concern on Oahu. It is heavily impacted by avian pox and avian malaria. We have done some surveys using playbacks of Elepaio songs and have found three individuals, two males and one female in the gulch.

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