

Pu'u o Lokuana Trail Guide



Hawai'i Volcanoes
National Park

Kahuku and its varied landscapes are shaped by powerful forces of nature and ongoing human history.

This trail loops through pastures and lava fields, ending with a splendid view atop Pu'u o Lokuana.

Start/End: Trail begins at the base the cinder cone

Map: See the center pages

Walking distance: 2 miles (3.2 km) round trip

Estimated walking time: 1–1.5 hours round trip

Ascent/Descent: 100 feet (30 m)

Trail rating: Moderate

For your safety and health:

- stay on the trail
- wear sturdy walking shoes and take water
- beware of wasps and carry a first-aid kit
- avoid unstable cracks on lava fields
- watch for hidden rocks in pasture grass
- avoid cliff edges of the cinder pit

Protect Kahuku's native ecosystems:

Before and after this hike, clean your boots and gear to remove seeds and other pesky hitchhikers. Help reduce the spread of invasive plants and animals. No new weeds, please!



Feel the passing showers?

Perhaps it's the Hā'ao rain. This named rain moves across the land in waves, like followers in a chief's procession. In this dry region, life-giving rain is precious.

COVER IMAGE: NPS/DAVE BOYLE

Trailhead

Huli wela ka honua . . .

The land is hot and turns over . . .

Kumulipo, Hawaiian creation chant

Regal, vast and windswept—Kahuku embodies these famous qualities of the Ka'ū District. Seemingly eternal, these landscapes undergo constant change.

Pu'u o Lokuana, the grassy hill ahead, may appear peaceful, but its name refers to an intense downpour of cinder from fountains of lava. With frequent eruptions, Mauna Loa volcano has always dominated life at Kahuku. Here, powerful natural forces—rapid transformations combined with subtle daily variations—continue to shape Kahuku and the lives of its people.

People also shape the land of Kahuku. During traditional times, Hawaiians cleared native plants to make gardens. They harvested forest birds and trees. By 1860, cattle ranching replaced the traditional lifestyle. Forests were logged and became pastures for thousands of animals. In 2003, Kahuku joined Hawai'i Volcanoes National Park, which now protects its native plants and animals, stunning geological features, and rich human history.

Throughout Kahuku, people left clues about their lives in the landscape. Along this trail, you can learn some of their stories.



USGS/J.P. EATON/KILAUEA IKI ERUPTION OF 1959



NPS/JAY ROBINSON

1

Kahuku was one of the first ranches in the Hawaiian Islands.

Ranching is a significant part of the history of Kahuku. Captain George Vancouver brought the first cattle to this island as a gift to King Kamehameha in 1793. Protected by royal edict, wild cattle quickly multiplied to become a dangerous nuisance. They damaged forests and devastated gardens and homes.



To control the growing herds, Mexican vaqueros were recruited to Hawai'i Island in the 1830s. Soon the cowboys became known as paniolo. They developed a distinctive ranching culture, crafting their own style of saddles and

gear. Paniolo music became famous for slack-key guitar tuning and songs celebrating beloved places. Long before the cowboy era in the American West, ranching was an established way of life at Kahuku.

Kahuku Ranch produced beef, hides, and tallow for more than 150 years. Versatile paniolo, skilled with animals, also served as mechanics, planters, and carpenters.

Remote and beautiful, Kahuku was a challenging workplace for ranch hands and a cherished home for their families.



Before ranching, the Hawaiian worldview prevailed for many hundreds of years. In this system, chiefs controlled defined territories supported by the labors of common people. Here, people fished, tended mid-elevation gardens, and collected birds, trees, and other plants in the upland forests. The natural world was imbued with ancestral deities and divine forces.

After Western contact, a market economy changed how people lived and managed the land. In 1848, the concept of private property legally replaced the traditional philosophy of land. Kahuku had become a cattle ranch by 1861, when Kamehameha IV sold it to Charles Harris, its first private owner. Use of Kahuku for private profit during this era significantly altered its natural environment.



In 2003, Kahuku became part of Hawai'i Volcanoes National Park. Now, cattle are gone. Other hoofed animals are being removed, and new fencing helps to keep them out. Park staff and volunteers plant native seedlings to restore forests. A new chapter in land ethics is under way at Kahuku to conserve and learn from its treasures.

2

Roads, trails, and fences have changed the face of Kahuku.

This ranch road leads to a hidden pasture. The surface was molten lava in April 1868. All around you, a young native forest of 'ōhi'a, pukeawe, and 'ōhelo is sprouting naturally on the new rock.



Look for green olivine crystals.

These tiny crystals are commonly found in Mauna Loa lava. The hard crystals remain after the surrounding rock has eroded. Find them in the sand along the road.



NPS/DAVID BOYLE

Kahuku includes amazingly diverse landscapes—rain forests, deserts, alpine shrublands, and more. Its remarkable range of altitude, rainfall, and age produces multiple ecosystems. These interactive combinations of rocks, soil, climate, and living things include microbes and people. Each ecosystem is wondrously complex and ever-changing, offering exciting opportunities to study natural patterns and relationships.

To care for Kahuku and plan for the future, the park uses traditional ecological knowledge and science-based information. An inventory of biological treasures reveals happy surprises and worrisome trends.



© JACK JEFFREY

One example is the Hawai'i 'ākepa, a small orange bird. The only place on earth where these rare creatures live is Hawai'i Island. Park biologists were delighted to find a few 'ākepa surviving in patches of upland Kahuku forest. But mosquitoes also live there, and they transmit lethal bird diseases. Mosquitoes thrive in pig-damaged forests. So, to help the birds survive, the park fences out pigs.

3

“When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

John Muir

This fine stone wall rests on 1868 lava. Originally designed to control cattle, the wall now shelters an emerging native forest.



NPS/RUTH LEVIN

Before ranching, Hawaiian people used a complex network of trails through Kahuku for family visits, for ceremonial purposes, for gathering resources, for trade, and for war.

Once ranching began, a network of walls, fences, and roads were added over time to facilitate cattle ranching and to harvest the riches of the forests.

Every Kahuku pasture was once a native forest. Where rainfall is sufficient, both pasture and forest thrive on older volcanic surfaces. Vast Kahuku has precious little densely vegetated land because of its extensive fields of young lava and extreme climate. Three quarters of Kahuku is rocky wilderness where human traces are faint.



Find the petroglyph nearby.

The history of this unusual image is unknown. As people share Kahuku memories, perhaps its story will come to light. Take photographs, but take care. Walking on petroglyphs damages them.



NPS/RUTH LEVIN

4

“Hawaiians of Ka‘ū did not fear or hate the power and destructive violence of Mauna Loa. They took unto them this huge mountain as their mother . . .”

Mary Kawena Pukui and E. S. Craighill Handy

This lush pasture is fringed by trees and surrounded by flows from the 1868 eruption. It's a kīpuka—an island of land encircled by younger lava. An eruption can form many of these islands, which may become refuges for plants, animals and even people.



HAWAII HISTORICAL SOCIETY

This old photograph shows a family of survivors in a different kīpuka after the 1868 eruption ended. Although surrounded for days by hot lava, these people and their rocky homestead survived. In Hawai‘i, rocks are used as building blocks for homes, trails, and gardens. Currently, park archeologists are analyzing stone structures and other evidence to learn more about the history of Kahuku.

Traditionally, common people lived under the leadership of ali‘i (ruling chiefs). Extended families exchanged forest resources, garden harvests, and seafood within land units called ahupua‘a, which typically extended from the mountains to the sea. They also recognized horizontal land divisions that defined climate zones and degrees of sacredness, increasing with altitude.

Straddling Mauna Loa’s immense southwest flank, Kahuku has always been the largest ahupua‘a in the Hawaiian Islands. Arid, windy, and volcanic, this area was lightly populated. The long coastline offered excellent fishing, but its rugged lava fields had little water and few homes. Most families lived in wetter areas between 500- and 2,500-foot (150- and 760-m) elevation.

Imagine a garden with neat rows of carefully tended kalo (taro) and ‘uala (sweet potatoes) growing in this kīpuka. During traditional times, Ka‘ū had a system of intensively managed agricultural fields where rainfall and soil were suitable. In fields like this one, Hawaiians cleared native vegetation and planted bananas, kalo, and other crops. Described as “dusty-backed in the wind,” these farmers raised food in soil enriched by wind-blown volcanic ash from Kīlauea explosions. Eruptions can enrich, as well as destroy, agricultural fields.



DIETRICH VAREZ

The word for land, ‘āina, is based on ‘ai, meaning “food” or “to feed.” In the past, sustainability was a way of life. Bountiful harvests meant good times while scarcity led to starvation. Stewardship, generosity, working together in harmony and other strong values helped people survive.

5

A terrified family ran for their lives to escape lava flows that raced through this forest in 1868.

In 1865, Captain Robert Brown settled his large family in a stone house at Kahuku Ranch. Captain Brown typified the Yankee spirit of enterprise. He went to sea during the last decades of the whaling industry. Throughout his long life, he pursued a series of business opportunities, marketing the bounty of land and sea as a ship's captain, shop owner, and cattle rancher at Kahuku.

In late March 1868, Brown and his family had their comfortable lives overturned by a series of catastrophic earthquakes. Violent shocks jolted the entire island, but the worst damage was here in Ka'ū, where the earthquakes were nearly continuous.

Most everyone fled the area except the Brown family (pictured here in 1858). Amidst nauseating quakes, they camped outside their shattered Kahuku home until the evening of April 7.



COURTESY OF FRANK SINCLAIR

Suddenly, the earth cracked open and an eruption burst out near their home. The frightened family barely escaped the fast-moving lava flows. By the light of the eruption, they ran barefoot to the safety of a hilltop, where they watched lava flows engulf their home and herds. The oldest daughter, Annie (top row, left in photo), lived near Kahuku. Excerpts from her writings describe these terrible events in pages that follow.



USGS / J.M. POLAND



Check out this lava tree.

During the 1868 eruption, flying blobs of lava hardened around a living tree that stood here. Molten lava drained away, and the remaining hole shows the shape of the incinerated tree trunk.

“Over 3,000 earthquake shocks in 12 days. . . . No words of mine can do it justice.”

excerpts from Annie Brown Spencer's diary of 1868:

March 28, 1868 - *“Today has been a day of terror. Earthquakes during the night and, from daybreak til 2 pm, there were 97. We ran out of the house, with books and dishes falling all about.”*

March 29, 1868 - *“A dreadful night. Heard from Kahuku – the house is in ruins. Poor Mother was terribly nervous, but kept up bravely. A flow was reported on the mountains.”*

April 1, 1868 - *“Last night the shocks were many and hard, consequently our rest was much broken. God only knows how long it will last. We are going to Kahuku tomorrow to get some books.”*

April 2, 1868 - *“We went to Kahuku. All the folks were well and very much pleased to see us. In the poor old house, walls were broken, with cracks a foot wide and furniture was sliding toward the center of the floor. I managed to wrest open the bookcase and get quite a number of books. Mother was afraid the walls would fall in and injure us. After we returned home, there was a most frightful earthquake. . . .absolutely impossible to stand or walk. Punaluu and Honuapo [nearby coastal towns] are desolate. A tidal wave swept all away. Many lives are lost. There have been terrible landslides, with 30 people buried inside of a minute. The earth is in constant tremor. All our houses are much shattered but we thank God that none of us are injured. Oh, it is terrible.”*



COURTESY OF FRANK SINCLAIR

To preserve Hawai'i Volcanoes

National Park for the enjoyment of present and future generations, do not collect or disturb natural, cultural, or historical features.

Please help protect your park . . .
take only photographs and inspiration,
leave only footprints and goodwill.

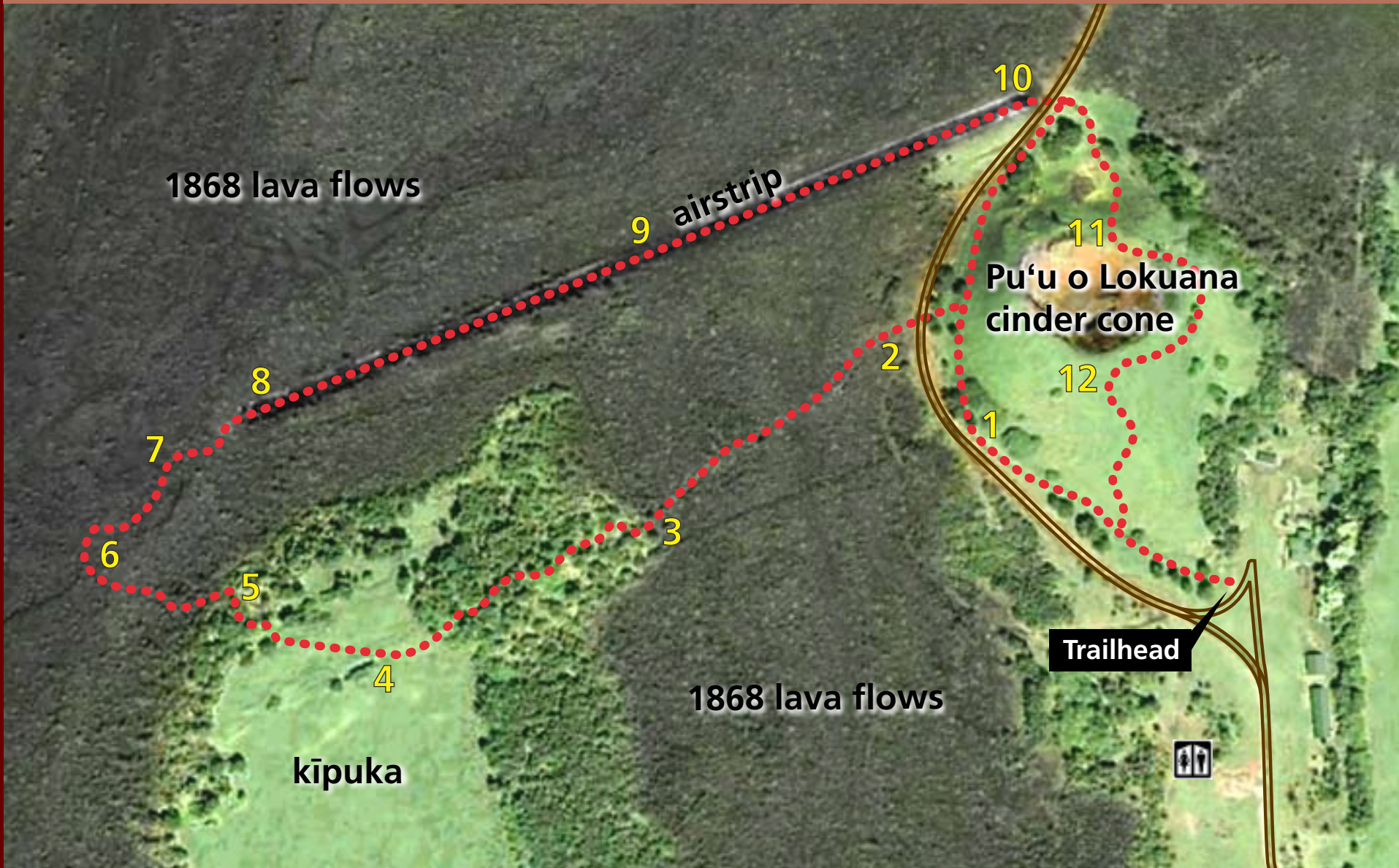
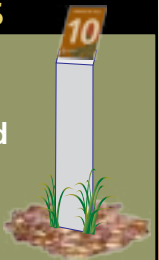
AHU

Ahu (stacked rocks) mark the trail across the lava flows. Please do not disturb them or build new ones.



TRAIL STOPS

Numbered posts or ground markers indicate stops described in this trail guide.



6

These fissures (ground cracks) are the lower section of a 2-mile long series that opened in the catastrophic eruption of 1868.



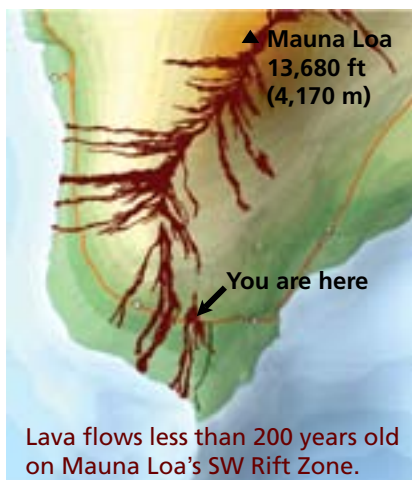
USGS/HAWAIIAN VOLCANO OBSERVATORY

Considered the island's greatest volcanic disaster, the 1868 eruption was preceded by a series of destructive earthquakes as the south part of Mauna Loa slipped seaward.

On April 2, the most violent quakes triggered lethal landslides and tree-high tsunami waves that swept away villages along the island's southern coast. On the night of April 7, this fissure erupted, spewing out enormous amounts of lava. Escape routes were cut off as lava flowed swiftly to the sea.

Mauna Loa, already the most massive mountain on earth, is still growing. Since 1840 it has erupted more than 30 times. Mauna Loa's active southwest rift zone runs through the center of Kahuku like a giant zipper.

This island is a natural laboratory for the study of active volcanoes. In 1912, geologist Dr. Thomas Jaggar established a permanent observatory on Kilauea to study volcanoes and reduce their risks to society. His dream of a Mauna Loa observatory at Kahuku never came true.



“My God! The lava has cut us off.”
excerpts from Annie Brown Spencer's diary

April 7, 1868 - *“This night, the lava broke out 1/4 mile above Father's house, and the family had to flee just as they were. Father seized Theoph (age 2) and Nina (age 4) and called on all to follow him. At the gate, he helped Mother, whose strength failed her. “Save the children, never mind me,” was her cry. They struck for the hill near the back of the house and right across the track of the flowing lava. Mother carried Theoph wrapped in a blanket.”*



COURTESY OF FRANK SINCLAIR

Annie's family managed a sugar plantation near Kahuku Ranch.

April 8, 1868 - *“About midnight last night there was an alarm of fire, but it was the lava flow. I was so tired I did not get up, but they described the sight as so very grand. We arose early. The whole air was full of smoke and the sun looked like a globe of fire. The steamer came with a large party to see the eruption. We left at 11 a.m. I would not for anything go to Kau again.”*

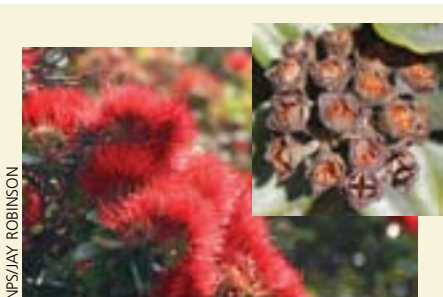
7


Each eruption adds new layers of stone to the massive bulk of Mauna Loa. Soon, life returns.



Spattering fissures and flowing lava streams created the terrain around you. Whether smooth, rough, black or red—all the rocks here are Hawaiian basalt. Shape, texture, and color are determined the moment molten lava chills to stone. Over time, surface weathering adds variety.

The 1868 eruption created multiple lava tubes and channels. Lava tubes form when a crust hardens over a molten lava stream which later drains away to leave a hollow tunnel. Hawaiians have used these natural caves for shelter, water collection, and burials.



 **Look for golden dust-like seeds in brown pods of young 'ōhi'a trees.**

Wind scatters tiny 'ōhi'a seeds onto bare lava, where some survive. Why are most plants rooted in cracks in the rock?

8

Bare and broken, the 1868 flow field was a convenient location for a ranch airstrip.

Built in the 1960s, this airstrip hosted crop dusters, which dropped tons of fertilizers and herbicides onto Kahuku pastures. Strong trade winds, which hikers often feel here, influenced the orientation of the airstrip. On small airfields, pilots prefer to take off and land into the prevailing wind.



Local weather (day-to-day conditions) and climate (weather over long periods) determine what grows and how people use the land. Kahuku's climate includes an exceptional range of temperature and rainfall. Mauna Loa's summit at nearly 14,000 feet (4,267 m) is frosty. At mid-elevations, clouds hug the mountain, leaving its summit and coastlines sunny. Northeast trades wrap around the mountainside and bring more rain to the east side of Kahuku. Torrential storms and devastating droughts add to the challenges of living here. Overall, climate records show that the entire island is growing warmer and drier.



Look west to see houses dotting the lava fields. In the mid-20th century, Kahuku Ranch sold what they considered unproductive "scrubland" to housing developers. Thousands of people now make their homes in this once sparsely populated region.

9

“Saying no child of his should rest in such a grave, the old Captain, with the help of a couple of laborers, set to work.”

Charles Wetherby Gelett



COURTESY OF FRANK SINCLAIR

The Brown family homestead lies somewhere under this desolate tract of lava. In a sad chapter of their story, young Amanda Brown died of typhus in 1866 and was buried near the homestead. Her gravesite, along with the rest of the ranch, was covered by lava flows in 1868.

After the eruption, Captain Brown brooded about his departed daughter Amanda—alone in this wild place. He returned to Kahuku

to find her grave. Despite the daunting terrain, it is said that he located her grave and moved her remains to sanctified ground in a nearby churchyard.



PHOTO SOURCE: <http://www.captainbrown.net/index.shtml>

10

“Ranching is the business of turning grass into dollar bills.”

Kahuku Ranch Manager Freddie Rice

Ranching at Kahuku was never simple. Water shortages and rough terrain were tough on stock and staff. Uncontrollable



NPS/JAY ROBINSON

fluctuations in world markets and politics affected beef prices. The remote location, lack of convenient ports and natural events such as eruptions, fires and storms presented challenges.

Damon Estate, the last private owner of Kahuku, purchased the ranch in 1958. Ranch managers improved the breeding, raising and marketing of cattle and built a system of paddocks served by miles of roads and water pipes. Through the 1980s, the ranch expanded pastures by bulldozing all but the tallest canopy trees, replacing native plants with non-native grasses.

Buffalo, pines, and peacocks are among a long list of non-native species added to Kahuku over the years to increase profitability. In 1968, the ranch released mouflon (wild Mediterranean sheep) for trophy hunting. Eleven original animals became thousands. Along with other unwanted browsers, they still munch on these fields and forests.



NPS/JAY ROBINSON

Since the 1860s, ranching at Kahuku included selling trees, land and other resources, as well as cattle. All this took a heavy toll on native ecosystems. Remaining bits of native forest are precious sources of plants, seeds, and inspiration.

11

Pu'u o Lokuana has been mined twice—first with explosives and then by bulldozers.

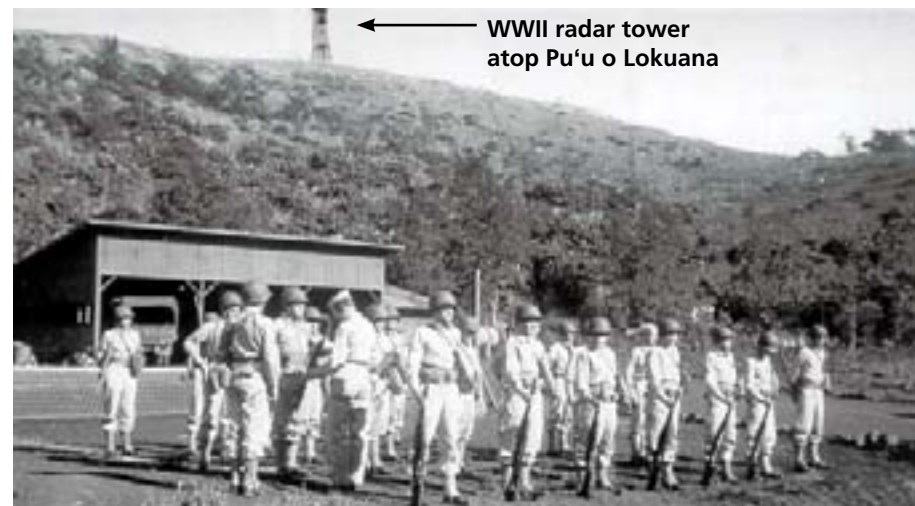
This cinder quarry reveals the crimson heart of Pu'u o Lokuana. The intense red color of the cinders is due to naturally occurring iron oxidation.

This area has a long military history. Hilltops like this one were landmarks and were used as lookouts. Loyal armies followed war chiefs into battle to protect or defend their territories. Ka'u warriors were famously fierce and rarely defeated. On their home terrain, their knowledge of the land allowed them to disappear into concealing mists and hidden caves.

Kahuku has been both a battleground and a refuge. In the 1780s, two great ali'i, Ka'u chief Keoua and his cousin Kamehameha, waged war for dominance of Hawai'i Island. After years of bloody battles, Keoua's army was defeated—not by other warriors, but by Pele. Explosions from Kilauea volcano in 1790 killed a third of his army in the Ka'u Desert. Many interpreted this disaster as a sign that Pele favored Keoua's rival. Kamehameha prevailed, and Kahuku became part of his family's wealth. Some local families never conceded to the new rule. They left their homes and hid in the uplands of Kahuku for years.



DIETRICH VAREZ



During World War II, radar was just emerging as a tool to detect planes and ships. Pu'u o Lokuana was chosen as the site for the secret Kahuku radar station. Marines, who jokingly called themselves “scope dopes,” scanned radar screens in a dark room carved inside this cinder cone. The entire facility was mined with explosives in case of enemy invasion.



The giant concrete blocks nearby once supported the WWII radar tower. After cinder mining began, the blocks were moved to their current location. Nearly 100 feet (30 m) of Pu'u o Lokuana has been removed. Its red cinders now lie under gardens, homes, and roads throughout Ka'u.

12

“[Land is] a fountain of energy flowing through a circuit of soils, plants and animals.”

Aldo Leopold

The riches of Kahuku are in the upland forest, wao akua (realm of the gods). A century-and-a-half ago, this hill was shaded by a canopy of great trees. An unbroken forest blanketed the mountainside from this elevation to about 6,000 feet (1,830 m).

In the dense forest, Hawaiians harvested towering logs with prayers, offerings, and great effort. Kahuku was known for its giant koa trees, which experts carved into canoe hulls. Huge 'ōhi'a logs were transformed into images of war gods. The forest also provided medicinal plants and birds for food and feathers. The brilliant cloaks that symbolized the glory of high-born individuals were crafted from countless multitudes of tiny feathers.

During the 1800s, forest plants became commodities in a market economy. Common folk were ordered to cut and haul 'iliahi (sandalwood) and pulu (tree fern fibers) from the chilly

mountains. People suffered, and forests were depleted. Koa was marketed from Kahuku until 2003, when the National Park Service became the caretaker of this bountiful land.



THE NATURE CONSERVANCY/GRADY TIMMONS



ARTHUR WIERZCHOS

Conclusion

Join the heroes of hope and restore Kahuku.

The fields, forests, and lava flows of Kahuku reveal beautiful patterns, complex relationships, and, sometimes, overnight transformations. Extremes of volcanic terrain and climate offer a remarkable range of settings for plants, animals, and people.

This magnificent place has been changed by its human history. In turn, Kahuku has influenced generations of people who inhabited, worked, and traveled this vast and varied land. Their stories inform and inspire us as we plan for the future.



FRIENDS OF HAWAII VOLCANOES NATIONAL PARK/CHARLIE WALSH

Now guided by conservation goals, people continue to shape Kahuku. Teams of researchers, planters, fence-builders, and educators work to protect and share the history and natural wonders of Kahuku. Join us to create new stories and help build a legacy for the future. It takes all of us to mālama ka 'āina (care for the land).

For More Information

- *Descendants of Captain Robert Brown: 1809 – 1894*, <http://www.captainbrown.net/index.shtml>
- *Hawaiian Cowboy: A Photographic Journal*, by Michael McClure and Dr. Billy Bergin
- *Hawaiian Volcanoes*, by Clarence Edward Dutton
- *History of Kahuku Ranch*, by Marge and Dennis Elwell
- *Kamehameha and his Warrior Kekūhaupi‘o*, by Stephen L. Desha
- *Life in Hawaii, An Autobiographical Sketch of Mission Life and Labors (1835-1881)*, by Titus Coan
- *The Polynesian Family System in Ka‘ū, Hawai‘i*, by E.S. Craighill Handy and Mary Kawena Pukui
- *Polynesian Researches: Hawaii*, by William Ellis
- *Sarah Joiner Lyman of Hawaii: Her Own Story*, by Sarah Joiner Lyman
- *Volcano Ranch: The Environmental History of Kahuku Ranch*, by Christy Avery

To learn more about Hawai‘i Volcanoes National Park, visit: www.nps.gov/havo

To read more about Mauna Loa and historic eruptions, visit the USGS Hawaiian Volcano Observatory at: hvo.wr.usgs.gov.

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