

Hawai'i Volcanoes

VISITOR ALERT: High amounts of dangerous sulphur dioxide gas are present in areas of the park.

The volcanoes here are part of the 3,600-mile-long (5,800 kilometers) Emperor Seamount and Hawaiian Island chain, also known as the Hawaiian archipelago. Along with Lō'ihi, the submarine seamount southeast of the Island of Hawai'i, Kīlauea and Mauna Loa are the youngest and most active of the volcanoes. With an estimated volume of 16,500 to 19,000 cubic miles (68,750 to 79,300 cubic km) from its depressed sea-floor base, Mauna Loa is the most massive volcano

on Earth. It occupies an area of about 2,035 square miles (5,271 square km) above sea level—three times that of Kīlauea.

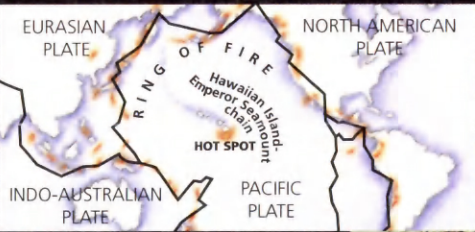
Long before people lived here, hundreds of species of plants and animals found their way to this island via wind, water, and the wings of birds. The survivors adapted to their new environment and, in time, produced species uniquely suited to this volcanic terrain. The evolutionary process was drastically altered by the arrival of humans and

the plants and animals they brought to their adopted lands. Today in the park you can see the results of centuries of volcanism, migration, and evolution along the Hawaiian archipelago.

Hawai'i Volcanoes National Park was created to preserve the natural and cultural settings of Kīlauea and Mauna Loa and to provide a refuge for the native plants and animals, protecting them through understanding, appreciation, and scientific study.

National Park Service staff works hand-in-hand with scientists at the U.S. Geological Survey's Biological Resources Discipline Survey and the U.S. Geological Survey's Hawaiian Volcano Observatory to accomplish these goals and shed light on our environment and on the volcanoes that shape our island. Each eruption is a reminder of the power of natural processes to change the air we breathe, the ground we walk on, and the sea that surrounds this volcanic island we call home.

Volcanoes attest to Earth's dynamic nature. Divided into rigid plates, Earth's outermost layer drifts slowly over the more plastic mantle beneath. Volcanic activity occurs mostly along the edge. The series of volcanoes that includes Washington's Mount St. Helens, Alaska's Katmai, Japan's Mount Fuji, and the Philippines' Mount Pinatubo defines the Pacific Ring of Fire margins. But why volcanoes on Hawai'i, in the middle of the Pacific plate? Plumes

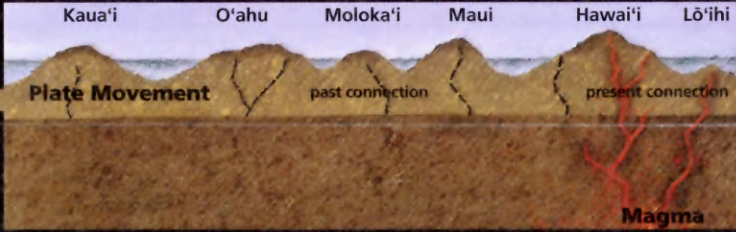


of magma rise from a hot spot deep within Earth's mantle. The gas-charged, fluid rock material pushes up to the surface, erupting on the ocean floor to create a seamount. After several hundred thou-

sand years and countless eruptions, the volcano rises above sea level to build a new island. The volcano continues to grow until the Pacific plate's movement carries the island away from the hot spot. Over the last 70 million years,

the Pacific plate has acted as a conveyor belt, moving the islands northwest off the hot spot at about four inches a year. The active volcanoes, Kīlauea and Mauna Loa, continue the island-building process that formed the

3,600-mile Hawaiian Island-Emperor Seamount chain. But they are not the last. To the southeast, Lō'ihi seamount, an active submarine volcano, is rising from the ocean floor. More volcanoes surely will follow.



Trouble in Paradise

The Hawaiian Archipelago, once celebrated as islands of evolution, are now islands of extinction. The arrival of people changed the conditions that fostered the original diversity of life. Forests vanished as people cleared the land to plant crops and build communities. Polynesians and other settlers introduced invasive plants and animals, and some thrived and multiplied in their new home. The impact has been catastrophic. Pigs destroy the understorey of tree fern and 'ōhi'a forests. Their muddy wallows make breeding grounds for mosquitoes that transmit avian malaria and pox to native birds.

Mongoose, cats, and rats eat native birds and their eggs. Invasive plants like the faya and kahili ginger displace vast areas of Hawaiian forests. The onslaught of introduced plants and animals caused the extinction of countless native species and still threatens unique life forms on Hawai'i.



Endemic: Unique to Hawai'i, found no place else on Earth.
Indigenous: Naturally occurring in Hawai'i but also found elsewhere.
Invasive: Introduced by humans.
• Endangered

Life Comes to a New Land

A few million years ago, a spore released into the wind from a fern in southeast Asia was carried by an air current high into the jet stream, where it drifted eastward. Eventually it settled on a barren lava field in the middle of the Pacific Ocean. This is just one way that life came to the Hawaiian Islands.

Insects, seeds, and spiders also rode air currents to the islands. Migrating or storm-driven birds carried seeds in their digestive tracts or stuck to their feathers. Ocean currents carried salt-resistant seeds and insects, plants, and snails on floating debris. Amphibians, reptiles, freshwater fish, and most mammals were not able to cross the vast ocean expanse—only the monk seal and

hoary bat succeeded. Few of the millions of organisms embarking on this chance voyage made it here. Of those, only a few survived.

Over a span of about 32 million years, plants and animals colonized the Hawaiian Island chain at a rate of one insect every 68,000 years, one plant every 98,000 years, and one bird every

one million years. The species changed gradually, evolving new forms better adapted to island life. Without the predators and competitors of their former homelands, they didn't need elaborate defense mechanisms to survive. Qualities that once protected them proved unnecessary and were eventually lost. Contradictory terms now describe these new life forms: nettleless

nettles, mintless mints, stinkless stink bugs, and flightless birds. About 90 percent of Hawai'i's native flora is endemic, found nowhere else on Earth. The islands' 110 endemic land birds evolved from as few as 30 original ancestors; about 1,100 kinds of flowering plants evolved from 270 to 280 immigrants; over 1,000 mollusks evolved from at least 22 immigrants; and

about 10,000 endemic insects and spiders developed from 350 to 400 separate original colonizers. The diversity of life that came to flourish on these isolated, once barren islands bears witness to the force of evolution and the tenacity of life.

Ho'oulu Lāhui—People of the Islands

I ke ao kahiko, ua ka'i nā po'e Hawai'i ma ka wa'a kaulua a pae ma kēia 'āina. Mamuli o ka 'ike ana i ke ahi o Pele—he 'āina, he 'āina i mua o kākou. Ua hele mai lākou me nā mea pono āpau no ka noho ana a noho lākou me ka 'ike 'ole. He 'āina he mea nui loa ia lākou pēlā me ke kai. Kēia mau mana'o lanakila lākou. Ua hele mai lākou me ke akua. O kō lākou akua oia no o Kāne, Kū, Lono, Kanaloa, Pele a me nā 'aumākua a me nā akua 'ē a'e. Aia o Pele mā nā 'āina āpau. Kekahi o lākou ke mālama nei nō. Mahalo lākou i kō lākou akua no nā mea āpau.

He po'e na'auao lākou. Mai ka 'āina nā mea 'ai āpau. Mai ke kai ka pa'akai a me ka i'a a mai ka lani ka wai. Mālama lākou i ka 'āina a me ke kai e like me ka mālama ana o ke kino o ke kanaka. O ke aloha o ka 'āina, he mea pau'ole—kō kākou 'āina aloha.

– Translation by Native Hawaiian Elder



Polynesians from distant lands came to the shores of Hawai'i over a thousand years ago. Sailing on large, double-hulled canoes they navigated by using the position of the stars, the sun, and the moon, by the movement of waves, and by the flight of birds. These ancestors of Native Hawaiians, guided by the elemental forces of nature, arrived with only bare necessities. By

drawing upon the resources of the land and sea, they sustained themselves and thrived.

Native Hawaiians recognized and revered a pantheon of gods, goddesses, and guardian ancestors with traditions that have evolved and are still practiced today. Woven into all aspects of life were ritual and reciprocal protocols that asked permission and gave thanks. These were

necessary for the perpetuation of resources upon which life depended. Accumulated knowledge and wisdom enabled Native Hawaiians to adapt to life on these volcanically active lands. They tended crops in shallow rock pits, dried salt along the shoreline to preserve fish, and captured birds to eat. Water was collected in gourds, drop by drop from the ceilings of lava tubes or from springs. Deities rewarded careful

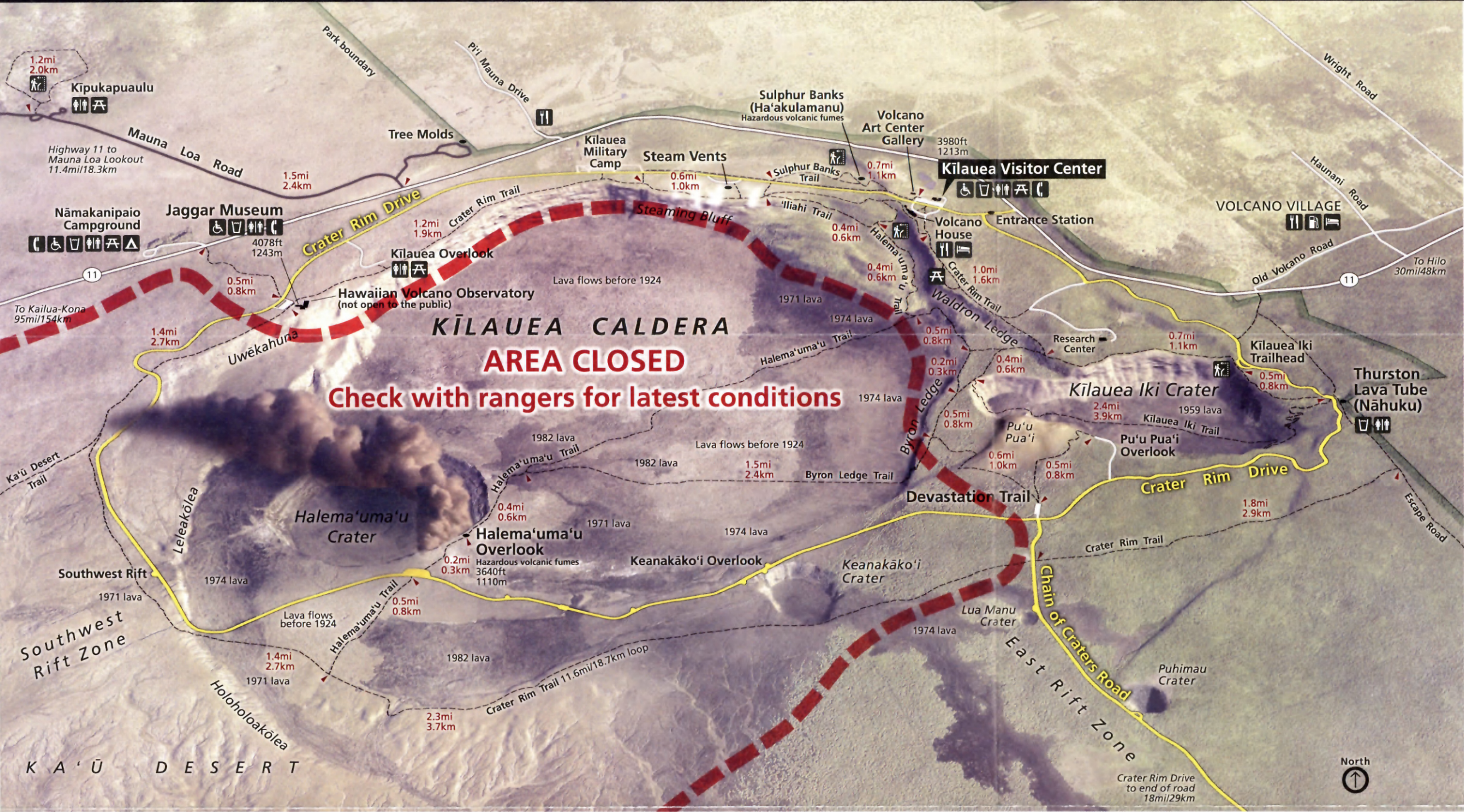
stewardship, and their wrath was felt if they were displeased. Today, in these seemingly inhospitable lands, a myriad of resources feed, clothe, and house the people of Hawai'i.

Some Native Hawaiian families trace their lineage to Pelehonuamea, a woman deified because of her power over volcanic eruptions and lava flows. Today Pele resides in Halema'uma'u.

Respect for her presence is essential in a land where evidence of her work abounds, and where landscapes can be transformed overnight. Through the centuries, in times of plenty and of scarcity, Native Hawaiians remain steadfast in their love of these cherished islands, their 'āina aloha.



Exploring Hawai'i Volcanoes



Volcanic gases billow from Halema'uma'u Crater.

What To See and Do

On Kilauea:
Crater Rim Drive This 11-mile drive circles the Kilauea summit caldera and craters and leads through rain forest and desert, with stops and walks on the way. Note: Portions of this road are closed due to high sulphur dioxide levels (see **Visitor Alert** below). **Highlights:** Steam Vents, Jaggar Museum, Devastation Trail, Kilauea Iki Crater, and Thurston Lava Tube (Nāhuku).

Chain of Craters Road This 36-mile round-trip drive intersects Crater Rim Drive, descends 3,700 feet to the coast, ending at a lava flow in the road. **Highlights:** Lua Manu and Pauahi craters, Mauna Ulu lava shield, Kealakomo overlook, Pu'u Loa Petroglyphs, Hōlei Sea Arch.

On Mauna Loa: For a backcountry trip, hike the 19.6-mile trail (three or four days) to the Mauna Loa summit (13,677 ft). **Warning:** you must be in good physical condition and properly equipped for winter mountaineering.



The two types of Hawaiian lava, pāhoehoe and 'a'ā, are chemically alike but differ in appearance. Pāhoehoe (above left) has a smooth and rosy surface. 'A'ā is jagged and clinkery (above right).



Molten lava hurled into the air can form droplets (Pele's tears) or glassy filaments (Pele's hair).

An Island Rises from the Sea



Magma (molten rock) from Earth's mantle layer rises to a reservoir about one-half to three miles beneath the summit of Kilauea. As pressure builds in this reservoir, earthquakes and inflation of the volcano herald a possible eruption at the summit or along a rift zone.

Planning Your Visit

Kilauea Visitor Center Start here for information, exhibits, and a bookstore. Ask about the park's roads, trails, activities, and safety precautions. The visitor center is open daily; check the park website for details about holiday hours.

Climate Expect changeable weather. At 4,000 feet elevation the Kilauea summit can be rainy and chilly any time of year. The coastal area is usually warm and dry. Be prepared. Bring a rain jacket, long pants, and closed-toe shoes.

Eruption Updates Visit the U.S. Geological Survey website: volcanoes.usgs.gov/hvo/activity/kilaueastatus.php

Regulations

- **Collecting** rocks, lava, sand, cultural artifacts, plants, or animals is prohibited.
- **Archeological sites and artifacts** are protected by federal law. Be respectful and do not climb on, build, or alter any rock structure. Do not make rubbings or molds of petroglyphs.
- **Fishing** along the coast from the eastern park boundary to the cliff midway between Keauhou and Halapē is restricted to native Hawaiian residents of Kalapana.

- **Backcountry camping** brochure and required permit are available at Kilauea Visitor Center. Group limit is 12 people. Use "Leave No Trace: pack it in—pack it out."
- **Day hike permits** are required for hiking the Nāulu Trail or the Nāpau Trail beyond Mauna Ulu. Get permits at Kilauea Visitor Center.
- **Fires** are allowed only in fireplaces and grates at Nāmakanipaio Campground and Kipukapuau-lu and Kilauea Overlook picnic areas. Vehicle exhaust systems can start fires in grassy areas; park only where designated. Do not smoke on trails. Lighting or possession of fireworks is prohibited.
- **Pets** must be leashed and attended. Pets are not allowed on trails or Hilina Pali Road or in the Kulanaokuaikei Campground or the backcountry.
- **Nēnē** (Hawaiian Goose), a critically endangered species, needs your protection. Watch for nēnē along roads. Slow down in nēnē habitat areas marked by signs. Do not feed nēnē! Feeding causes them to beg for food by roadsides and to approach vehicles.
- **Bicycles** are restricted to paved roads and a few designated trails. Ask for a brochure with a bike trail map at Kilauea Visitor Center.
- **Firearms** and more regulations are available on the park website.

For Your Safety

- **Hiking** STAY ON MARKED TRAILS. Avoid cliffs, earthquakes, and steam vents; these features are unstable and can be slippery. Hiking over cracks and holes, loose rock, and thin lava crust can greatly increase your risk of getting hurt. Wear sturdy closed-toe shoes. Lava fields are shadeless and hot. Wear sunscreen, a hat, and sunglasses. Carry at least two quarts of water per person.
- **Along the coast** expect strong winds, steep sea cliffs, high waves, and unpredictable surf.
- **Volcanic eruptions** can be extremely hazardous. Areas around erupting vents are closed to travel. Even from a distance fumes and fallout (Pele's hair, cinder, and ash) can irritate lungs and eyes. Heed ranger instructions and obey all signs.

Services

- **Hotel and Cabins** Volcano House, on Kilauea Caldera rim, is closed for renovations; ask park staff for details.
- **Campgrounds** The park has two drive-in campgrounds. Nāmakanipaio (off Hwy 11) has water. Fires are allowed in fireplaces and grates only. Kulanaokuaikei (off Hilina Pali Road) has no water; campfires are prohibited. Use fueled camping stoves only. The facilities in both campgrounds are wheelchair-accessible. Camping is first-come, first-served; no fees or reservations.



Stays are limited to seven consecutive days per month, not to exceed 30 days per year.

- **Volcano Village**, one mile from the park, has stores, restaurants, gasoline, and lodging.

Access for Persons with Disabilities

Wheelchairs for use in the park are available at Kilauea Visitor Center, Jaggar Museum, and the ranger station at the end of Chain of Craters Road. Kilauea Visitor Center, Jaggar Museum, Volcano House, Volcano Art Center Gallery, and hula platform are wheelchair-accessible. Park campgrounds have wheelchair-accessible campsites and restrooms. Pullouts in the park afford panoramic views of the landscape. Visit Kilauea Visitor Center for information on wheelchair-accessible trails. Service animals are welcome.

Visitor Alert!

High amounts of dangerous sulphur dioxide gas are present in areas of the park. These gases are a danger to everyone, particularly people with heart or respiratory problems and infants, young children, and pregnant women. Volcanic gas looks like smog. Keep windows closed when it is visible. If air irritates, smells bad, or you have difficulty breathing—leave the area. Portions or all of the park may be closed for times of high sulphur dioxide levels. Kilauea Visitor Center offers updates on air quality in a clean-air environment during operating hours.

More Information

Hawai'i Volcanoes National Park
P.O. Box 52, Hawai'i National Park
HI 96718-0052
808-985-6000
www.nps.gov/havo

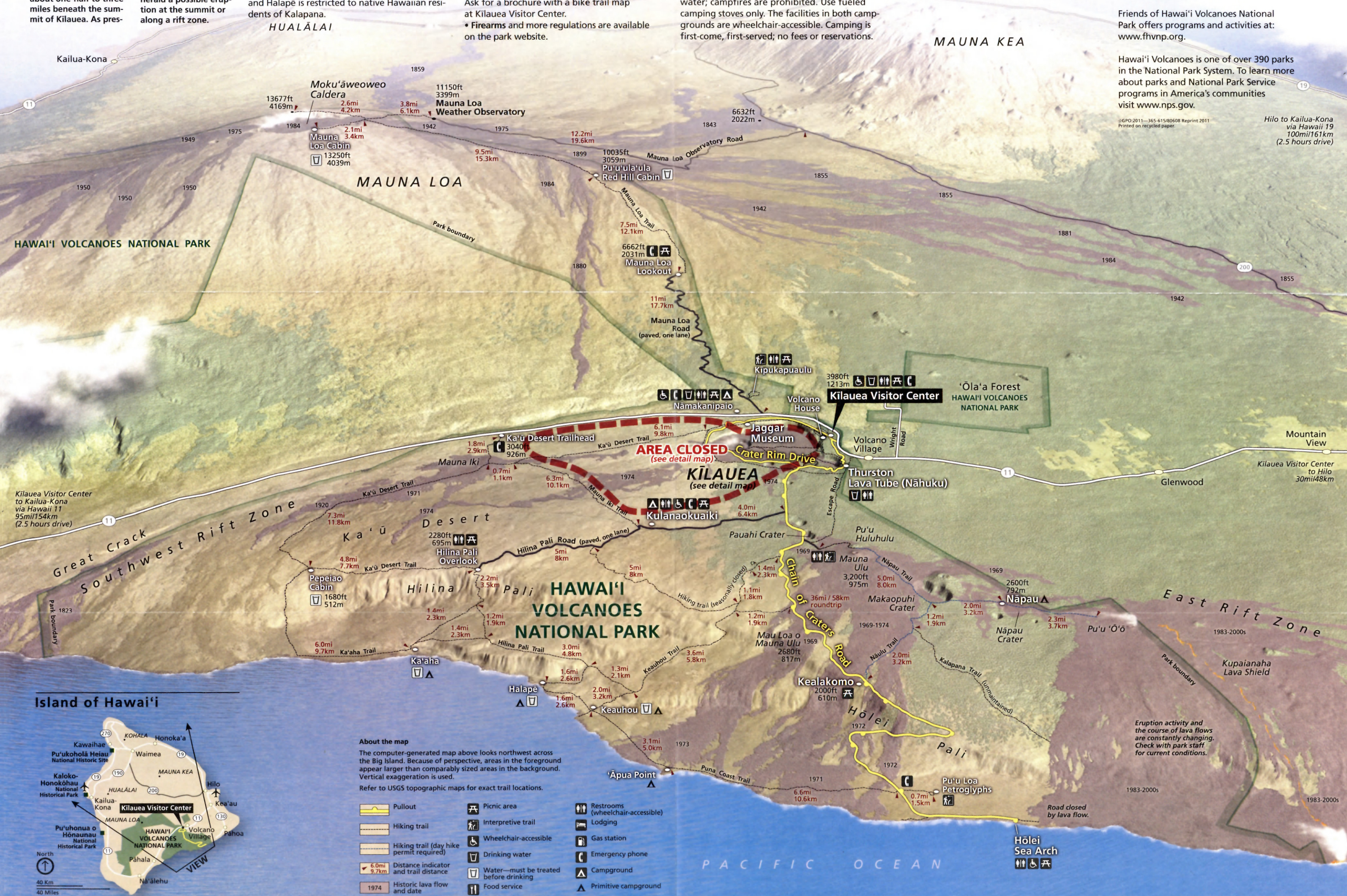
Hawai'i Natural History Association offers educational publications at: www.hawaiinaturalhistory.org.

Friends of Hawai'i Volcanoes National Park offers programs and activities at: www.fhnpv.org.

Hawai'i Volcanoes is one of over 390 parks in the National Park System. To learn more about parks and National Park Service programs in America's communities visit www.nps.gov.

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Printed on recycled paper.

Hilo to Kailua-Kona
via Hawaii 19
100mi/161km
(2.5 hours drive)



Island of Hawai'i



About the map

The computer-generated map above looks northwest across the Big Island. Because of perspective, areas in the foreground appear larger than comparably sized areas in the background. Vertical exaggeration is used. Refer to USGS topographic maps for exact trail locations.

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|---|---------------------------------------|-----------------------------------|
| Pullout | Picnic area | Restrooms (wheelchair-accessible) |
| Hiking trail | Interpretive trail | Lodging |
| Hiking trail (day hike permit required) | Wheelchair-accessible | Gas station |
| Distance indicator and trail distance | Drinking water | Emergency phone |
| Historic lava flow and date | Water—must be treated before drinking | Campground |
| | Food service | Primitive campground |