National Park Service
U.S. Department of the Interior

Haleakalā National Park
Hawaii

Haleakalā

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The distinctive cinder cones that dot the summit landscape of Haleakalā resulted from relatively recent eruptions. Material from these mildly explosive, fountaining eruptions settled back around the vent forming the cones. Only a few plants, birds, and insects have adapted to the harsh conditions created at the summit and on the upper slopes of the volcano. ʻĀhinahina (silverswords) have shallow root systems that allow them to catch moisture in the porous, loose cinders and long tap roots that anchor the plants in high wind. The dense covering of silvery hairs on the leaves helps conserve moisture and protect the plants from the intense, high-elevation sun.

©JACK JEFFERY

The long, curved bill of the ʻiʻiwi, a rain forest honeycreeper, is ideally adapted to sipping nectar from the tubular flowers of Hawaiian lobelias. As lobelia species have declined due to deforestation and the introduction of grazing and browsing animals, the ʻiʻiwi is often found feeding on the smaller flowers of the ʻōhiʻa *(shown)*. Other species have not been so successful in adapting to the rapid changes brought on by humans. Eighty-five species of Hawaiian birds have become extinct and 32 are on the Federal Endangered Species List, with seven of these possibly already extinct or on the brink. The extinction crisis is real. We can´t take back what has been done, but what we do now is important.

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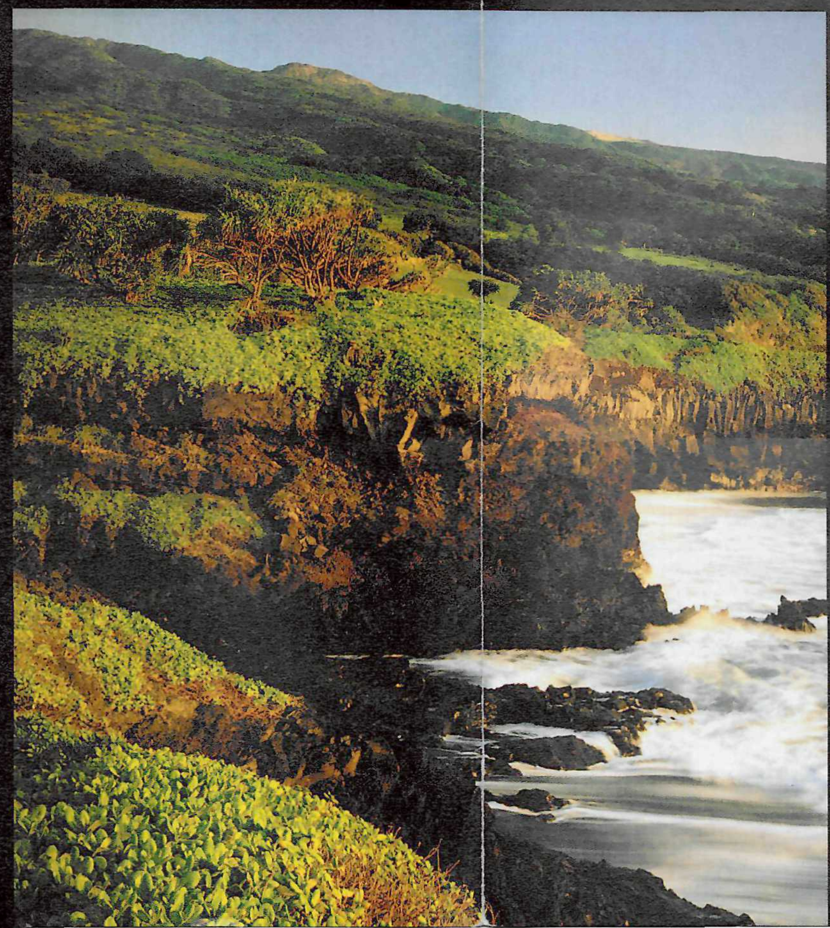
The trail leading from Kīpahulu Visitor Center to 400-foot Waimoku Falls winds for 1.83 miles through a forest of non-native plants like bamboo, mango, and guava. Farther up the valley, above 1,000 feet, the Kīpahulu Valley Biological Reserve protects one of the last intact native rain forest ecosystems left in the Hawaiian Islands. To help preserve this fragile, pristine environment, the reserve is closed to the public. Researchers and managers study this little-known system and attempt to control the encroachment of non-native species.



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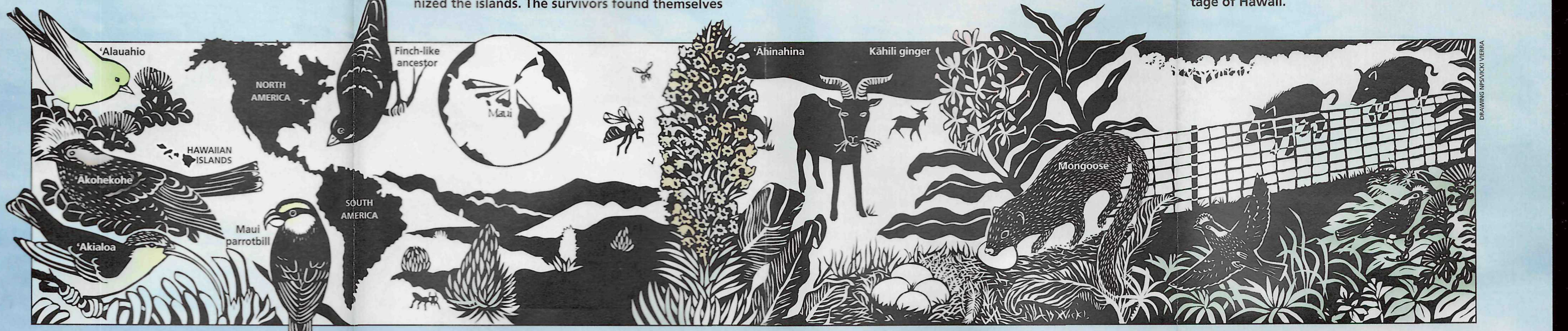
Countless times over hundreds of thousands of years, hot lava met the ocean amidst clouds of steam. Each time the island grew a little larger. Today sharks, octopi, green sea turtles, humpback whales (winter only), and fish inhabit the coastal waters of Kīpahulu. Many of the native stream dwellers in the Hawaiian Islands were originally ocean species that over time adapted to live in fresh water. The ʻoʻopu (gobies), bottom fish with frog-like faces, spend their adult lives in streams. After adults spawn, the eggs are washed out to sea. As hatchlings the young ʻoʻopu migrate back up to the freshwater pools where they began their lives. Suction cups (actually fused fins) on their bellies aid the ʻoʻopu in their upstream journey.

The most isolated major island group on Earth, the Hawaiian archipelago is 2,400 miles from the nearest continent. The chain reaches from the Big Island of Hawaiʻi (at about the same latitude as Mexico City) to Kure Atoll 1,500 miles to the northwest, and it is still growing. For at least 81 million years, new islands have been forming as the Pacific Plate moves northwestward over a stationary plume of magma rising from a "hot spot" within the Earth´s mantle. The fluid rock makes its way up through the ocean floor, and countless eruptions over hundreds of thousands of years eventually create a volcanic island. But the plate´s unceasing movement slowly separates the volcano from its source, terminating its growth even as a new volcano rises from the ocean floor over the hot spot. The volcano that formed East Maui, part of which lies within the boundaries of the national park, last erupted about two centuries ago.

Across vast expanses of ocean, life eventually came to Maui and the other islands in the form of seeds, spores, insects, spiders, birds, and small plants. They drifted on the wind, floated on ocean currents, or hitched a ride on migrating or storm-driven birds. Many groups of organisms (amphibians, reptiles, social insects, and all land mammals except earlier ancestors of the monk seal and of bats) were unable to make the long journey, while some arrived but did not survive in their new home. It is estimated that an average of only one species every 35,000 years successfully colonized the islands. The survivors found themselves in a land of vast opportunity. The Hawaiian Islands are a mosaic of habitats, from rain forest to alpine, often in close proximity. In the surrounding ocean, rainfall averages 25–30 inches annually. Yet Maui and the other islands, trapping moist trade winds, receive rainfall ranging from over 400 inches annually on the windward side of the mountains to less than 10 inches on the leeward side. Average temperatures range from 75°F at sea level to 40°F at the summit of the highest volcanoes. Isolated by the sea, these mountains have created an extremely diverse environment in a small area.

The colonizers gradually adapted to the environment of the islands and to life without the predators and competitors of their homelands. Eventually most evolved into entirely new (and often defenseless) species found nowhere else in the world. The roughly 10,000 native species of flora and fauna of the Hawaiian Islands are thought to have evolved from about 2,000 colonizing ancestral species. The isolation that has made the plants and animals of the Hawaiian Islands unique also makes them vulnerable to rapid changes brought on by humans. Hawaiian species often cope poorly with habitat alterations, foreign diseases, predation, and competition from introduced species. (Today about 20 alien species are introduced to the islands every year.) Active intervention by conservation managers is essential to the survival of the natural heritage of Hawaii.



DRAWING NPS/VICKI VIERRA

By adapting to a variety of food sources and habitats through the process of **adaptive radiation**, a single finch-like ancestor from the Americas gave rise to an estimated 52 species of Hawaiian honeycreepers. The slightly curved bill of the ʻākohekohe is ideal for feeding on the nectar of native flowers. Strategies for feeding on insects resulted in other bill shapes: the ʻakialoa (probably extinct) foraged among leaves and branches; the ʻalauahio feeds on insect larvae and nectar of ʻōhiʻa and lobelia flowers; and the Maui parrotbill crushes twigs to find prey.

Endemic species evolved in the Hawaiian Islands from ancestral colonizers and are unique to a specific area. Haleakalā ʻāhinahina is a silversword endemic to the upper slopes of Haleakalā. This ʻāhinahina grows as a compact rosette of narrow silvery leaves for up to 50 years before finally flowering. After flowering once in its lifetime, the plant dies. The endemic insects that pollinate the Haleakalā ʻāhinahina are essential to the long-term survival of these fragile plants and are dependent on them for nourishment.

Foreign species of plants and animals introduced purposely or accidentally by humans are known as aliens. **Alien species** have reduced populations of native Hawaiian species and in some cases threaten their survival. Aggressive alien plants, like kāhili ginger, can spread into remote forests, displacing native vegetation. Goats eliminate vegetation, resulting in severe erosion. Mongooses, originally brought to the Hawaiian Islands to control rats in sugar cane fields, prey on the eggs and young of ground-nesting birds.

The State of Hawaii includes only two-tenths of a percent of the total U.S. land area, yet one-third of the plants and birds listed or considered for listing on the Federal Endangered Species List are Hawaiian. The impact of human activities on native species and ecosystems cannot be completely undone, but **active management** is limiting and even reversing some of the damage. Today´s natural area managers build fences, control alien species, restore native vegetation, and work to increase our knowledge of Hawaiian ecosystems.

Diversity on Haleakalā

Found at the highest elevations, the **alpine/aeolian** zone appears barren. Rainfall sinks rapidly into the porous, rocky ground, whose bare surface becomes summer every day, winter every night. Few plant species can establish seedlings in this harsh environment, and plant cover is sparse; only a few hardy shrubs, grasses, and the ʻāhinahina (silversword) survive. Unique communities of insects and spiders thrive by feeding on wind-imported insects, other organic matter, and moisture from lower elevations.

The **subalpine shrubland** covers extensive areas below the alpine/aeolian zone and above the forest line. Over a dozen species of shrubs and grasses inhabit this zone, many found nowhere else on Earth. Shrubs are sparse in the shallow soils at higher elevations, but form dense thickets where soils are deeper. The shrubs provide food for many bird species, including the nēnē (Hawaiian goose).

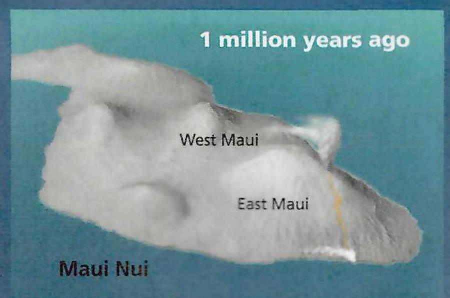
Rain forest occupies the windward slopes of Haleakalā. Annual rainfall ranges from 120 inches to 400 inches or more. The forest canopy is dominated by ʻōhiʻa trees in the upper elevations, grading into a mixed ʻōhiʻa and koa canopy at lower levels. Diverse vegetation—smaller trees, ferns, shrubs, and herbs—grows in the understory. One of the most intact rain forest ecosystems in Hawaii, the Kīpahulu Valley is home to numerous rare birds, insects, and spiders.

The **dry forest** zone is found on the leeward slopes of Haleakalā, in areas with 20 to 60 inches of annual rainfall. Dry forests may once have been more extensive than rain forests, but browsing animals, grass invasions, and fire have drastically reduced them. Small patches of dry forest are preserved in Kaupō Gap.

Cutting across several life zones, **stream** ecosystems hosting fish, shrimp, and limpets meet the **lowland/coastal** zone. These low elevation ecosystems have been more heavily modified by humans than any other life zone. Native shrubs and herbaceous plants remain only in pockets along the coast.

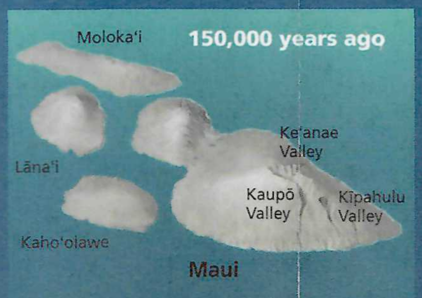
The Shaping of Maui

East and West Maui began life millions of years ago as two of a group of five shield volcanoes. These volcanoes rose from the ocean floor with countless eruptions of lava, eventually emerging from the sea to form volcanic islands. A million years ago the growing islands had coalesced into a huge single island with multiple volcanic peaks. The first diagram shows that island, Maui Nui, with a still-active caldera on East Maui and lava flowing from a vent.



MAP AND DIAGRAMS NPS

Eruptions continued until about 400,000 years ago, building a mountain (Haleakalā) on East Maui that rose higher than today´s 10,023-foot summit. At the same time the forces of erosion and subsidence were reducing the height of the volcanic peaks and flooding the lowlands between them. By 150,000 years ago *(second diagram)* the peaks had separated, forming the islands of Maui, Kahoʻolawe, Lānaʻi, and Molokaʻi.



As water and wind cut large valleys into the sides of East Maui, upstream erosion created the dramatic features composing today´s park. The amphitheater-like heads of Keʻanae, Kaupō, and Kīpahulu valleys slowly cut their way toward the summit. The first two eventually merged, forming a huge basin at the top. Later, new lava flows partially filled the basin. Numerous volcanic vents, called cinder cones, mark the younger eruption sites.

Exploring Haleakalā

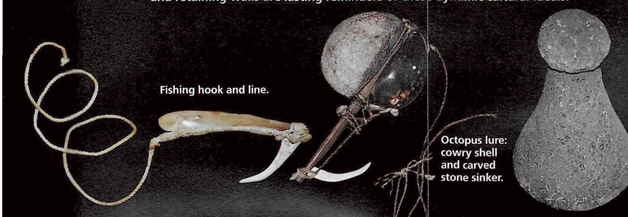
COURTESY OF BISHOP MUSEUM

Hawaiians adapted to some Western influences on dress and on architectural elements such as the Western door *(see left)*. At the same time they maintained their basic cultural identity and continued to live in extended families. This social unit remained intact for pursuing agricultural and cooperative fishing ventures and gathering materials. The hālau (long house) was the community gathering place. Buildings were usually thatched with pili grass, although other materials, including lauhala (pandanus leaves), were used. Being greeted with aloha and invited into a home to eat (*Aloha, e ʻai kākou*) is still a primary requisite of good manners in the Hawaiian Islands.

The coastal Kīpahulu area once supported a large population of Hawaiians. Current estimates place several hundred thousand people in the Hawaiian Islands at the time of Captain Cook´s arrival in 1778.

These people were skilled at fishing, farming, collecting, and craftwork. Management of their resources was based on mālama ʻāina (caring for the land), an ideal still alive among Hawaiians today. Successful farming, fishing, and gathering depended also on the concepts of lōkahi (working together) and laulima (many hands). Loʻi kalo (taro patches), fishing shrines, heiau (temples), canoe ramps, and retaining walls are lasting reminders of these dynamic cultural ideals.

Hawaiians showed great skill in creating ingenious and beautiful practical items from stone, bone, wood, and shell. A broad range of tools and utensils, like poi pounders, fish hooks, octopus lures, and adzes, were fashioned using only stone implements. The poi pounder was one of the most frequently used. Poi was prepared fresh daily by pounding cooked corms (underground stems) of the kalo (taro) plant and thinning them with water to the desired consistency.



Fishing hook and line.

Octopus lure: cowry shell and carved stone sinker.

Poi pounder for crushing kalo (taro) corms (underground stems) to produce poi.

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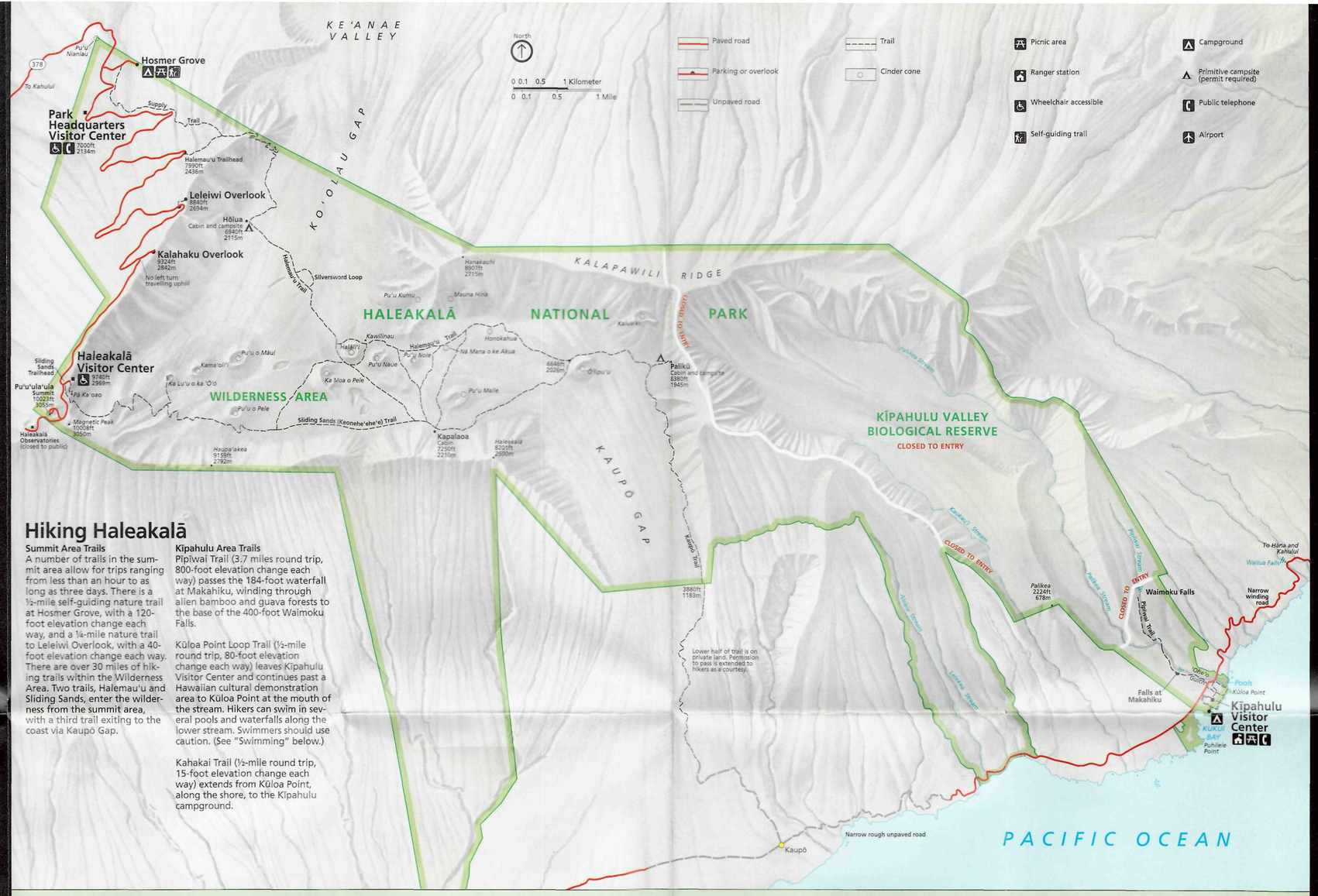
Agricultural practices in the Islands were carefully managed according to the rhythms of nature. Mahiʻai (farmers) specialized in growing crops such as kalo *(see left)* or ʻuala (sweet potato). The Hawaiian calendar recommended planting based on the changes of a year-round growing season. As with much of Hawaiian life, respect for the spiritual realm was shown during every phase of planting and harvesting. Fundamental patterns of Hawaiian culture were based on the planting and growth cycle of this plant. The concept of ʻohana (the family) is derived from ʻohā, the sprout used to propagate kalo. The ʻohana worked together to build extensive irrigated terraces for the growing of over 300 varieties of kalo.

COURTESY OF BISHOP MUSEUM

Approximately 1,500 years ago, Polynesian colonists sailed large double-hulled canoes on migrational voyages from the South Pacific. They navigated over 2,500 miles of open ocean using nature´s signs—stars, birds, winds, tides, and currents. To sustain themselves the Polynesians brought to the Hawaiian Islands food and medicinal plants, introducing kalo, ʻuala (sweet potato), *uhi (yams)*, ʻ*ulu (breadfruit)*, and kō (sugar cane), as well as dogs, pigs, and chickens. Koa trees, found only on the Hawaiian Islands, provided logs for hulls of double- and single-hulled canoes. Single outrigger canoes *(see left)* were mainly used by Iawaiʻa (fishermen) to catch deepwater fish such as aku (bonito).

Adze used to shape canoes.

ARTIFACTS COURTESY OF HĀNA CULTURAL CENTER



Hiking Haleakalā

Summit Area Trails
A number of trails in the summit area allow for trips ranging from less than an hour to as long as three days. There is a ½-mile self-guiding nature trail at Hosmer Grove, with a 120-foot elevation change each way, and a ¼-mile nature trail to Leleiwi Overlook, with a 40-foot elevation change each way. There are over 30 miles of hiking trails within the Wilderness Area. Two trails, Halemauʻu and Sliding Sands, enter the wilderness from the summit area, with a third trail exiting to the coast via Kaupō Gap.

Kīpahulu Area Trails
Pīpīwai Trail (3.7 miles round trip, 800-foot elevation change each way) passes the 184-foot waterfall at Makahiku, winding through alien bamboo and guava forests to the base of the 400-foot Waimoku Falls.

Kūloa Point Loop Trail (½-mile round trip, 80-foot elevation change each way) leaves Kīpahulu Visitor Center and continues past a Hawaiian cultural demonstration area to Kūloa Point at the mouth of the stream. Hikers can swim in several pools and waterfalls along the lower stream. Swimmers should use caution. (See "Swimming" below.)

Kahakai Trail (½-mile round trip, 15-foot elevation change each way) extends from Kūloa Point, along the shore, to the Kīpahulu campground.

Visiting the Park

Visitors to the park can explore the summit area or the Kīpahulu area on the coast. Park headquarters and the 10,023-foot summit can be reached from Kahului via Hawaii 37 to 377 to 378. Driving time to the summit from the resort areas of Kīhei and Kāʻanapali is about two hours. Kīpahulu is reached via Hawaii 36 to 360 to 31. Driving time from resort areas to Kīpahulu is three to four hours.

Weather Weather and viewing conditions at the summit are unpredictable and can change rapidly. Be prepared for cold (30–50°F), wet, windy weather (10–40 mph) and intense sun. Sunrise is often clear, but the summit is a popular spot, so expect crowds. Kīpahulu is subtropical with light rain showers occurring any time of the year. Call 808-877-5111 for the forecast.

Driving Vehicles must remain on roads or in parking areas. Road hazards in and en route to the park include steep turns, rocks, fog, rain, slippery pavement, cattle, bicyclists, large buses, and heavy traffic. When driving down from the summit of Haleakalā, use lower gears to prevent brake failure. Slower vehicles must use pullouts. If you have mechanical problems, move your vehicle out of traffic lanes to wait for help.

Regulations and Safety Report accidents, violations, unusual incidents, or sightings of alien species to a ranger. Bicycles are restricted to paved roads and parking areas. Prohibited: hunting, firearms, in-line skates, and skateboards.

High altitude may complicate health conditions and cause breathing difficulties. Pregnant women, young children, and those with respiratory or heart conditions should consult their doctor regarding travel to high elevations. Turn back and seek medical aid if you have problems. The summit is about 30°F colder than beaches. The weather conditions change rapidly. Hypothermia is a possibility any time of year.

Activities and Facilities Begin your visit by stopping at one of the visitor centers: Park Headquarters Visitor Center (7,000 feet), Haleakalā Visitor Center (9,740 feet) in the summit area, or the Kīpahulu Visitor Center. An entrance fee is charged to enter the summit area. No food or gas is available in the park. No water is available at Kīpahulu. Public phones are at park headquarters and the Kīpahulu parking lot.

Ranger Programs Talks and hikes are offered regularly. Groups may arrange special programs subject to staffing; call at least one month in advance. Contact the park for details.

Hiking Trails are rugged and strenuous. Hiking off designated trails and cutting switchbacks are prohibited; they cause erosion and unsightly scars that mar the scenery for years to come. Off-trail hikers can unknowingly crush the roots of native plants, like silversword, and trample unique insect species living among the rock and cinder.

Wilderness Area water supplies are not potable; water should be treated before drinking. Use portable toilets where provided. If toilets are not available, bury your waste and carry out paper; waste attracts alien ants that kill native species. Open fires are not permitted in the Wilderness Area. Sunscreen and plenty of water are essential.

Pets Pets must be physically restrained at all times and are not allowed on trails. Nēnē and other ground-nesting birds are vulnerable to harassment and predation.

Camping Wilderness Area camping is allowed only at Hōlua and Palikū. Required permits are free—first-come, first-served—at park headquarters on the day of the trip. Use cooking stoves only. No fire!

Drive-in campgrounds are available at Hosmer Grove and Kīpahulu—first-come, first-served. No permit is required, and no fee is charged. Grills, picnic tables, and restrooms are provided at both campgrounds. Hosmer Grove has water. NO water is available at Kīpahulu. Fires are allowed only in the grills.

At all campgrounds, stays are limited to three nights per month and group size is limited to 12 people.

Wilderness Area Cabins Three primitive cabins, accessible only by hiking or horseback, are in the Wilderness Area. Cabins are by reservation only. Call 808-572-4400 three months before your requested day for reservations or to fill vacancies. Cabins are rented to one group of up to 12 people per night. Stays are limited to three nights per month.

Swimming Kīpahulu streams are very dangerous at high water—the water can rise four feet in 10 minutes. People have died by ignoring warnings. Swimming is also not recommended when streams are stagnant and not flowing. Ocean swimming is not recommended due to high surf and currents.

Plants and Animals Remove seeds from boots, rain gear, and tents before entering the park. One of the greatest threats to native species is the introduction of alien plants, seeds, and animals. Although some species like the nēnē (Hawaiian goose) act tame, they are wild. Do not feed nēnē or other wildlife. Feeding causes the animals to beg and endangers them as they approach moving vehicles.

Cultural Resources All cultural resources are protected by law. It is illegal to alter, remove, damage, or destroy these resources. If you find an artifact, leave it in place and report the discovery to park staff. Do not create imitation artifacts by gathering or stacking rocks in ahu (piles).

More Information

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www.nps.gov/hale

Haleakalā National Park is one of over 390 parks in the National Park System. To learn more about national parks and National Park Service programs in America´s communities, visit www.nps.gov.

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