

World Heritage Sites

Protected Areas and World Heritage



HAWAII VOLCANOES NATIONAL PARK UNITED STATES OF AMERICA

This site contains two of the most active shield volcanoes in the world, Mauna Loa (4,170m) and Kilauea (1,250m) on the island of Hawai'i. Volcanic eruptions and the lava flows create a constantly changing landscape. Rare birds and endemic species exist as well as forests of giant ferns.

COUNTRY

United States of America

NAME

Hawaii Volcanoes National Park

NATURAL WORLD HERITAGE SITE

1987: Inscribed on the World Heritage List under Natural Criterion viii.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Statement of Significance

Hawaii Volcanoes National Park contains Mauna Loa and Kilauea, two of the world's most active and accessible volcanoes where ongoing geological processes are easily observed. This property serves as an excellent example of island building through volcanic processes. Through the process of shield-building volcanism, the park's landscape is one of relatively constant, dynamic change.

Criterion (viii): This property is a unique example of significant island building through ongoing volcanic processes. It represents the most recent activity in the continuing process of the geologic origin and change of the Hawaiian Archipelago. The park contains significant parts of two of the world's most active and best understood volcanoes, Kilauea and Mauna Loa. The volcano Mauna Loa, measured from the ocean floor, is the greatest volcanic mass on earth.

INTERNATIONAL DESIGNATION

1980: Designated as part of the Hawaiian Islands Biosphere Reserve under the UNESCO Man and Biosphere Programme (99,545 ha).

IUCN MANAGEMENT CATEGORY

II National Park

BIOGEOGRAPHICAL PROVINCE

Hawaiian (5.03.13)

GEOGRAPHICAL LOCATION

Located in the south of Hawai'i island, the easternmost island of the archipelago. The Park covers the summit, southeast and southwest slopes of Mauna Loa and the lower summit, southwest, south, and part of the southeast slopes of Kilauea reaching to the sea. It lies between 19°11' to 19°33'N and 155°01' to 155°39'W; the 'Ola'a Tract, to its northeast is centred on 19°29'N by 155°15'W.

DATES AND HISTORY OF ESTABLISHMENT

1916: Hawaii National Park created on Hawaii and Maui by Act of Congress 39 Stat. 432;

1922: The area more than doubled by Act of Congress, also in 1928 and 1938;

- 1951: The 'Ola'a Forest Tract (>4,000 ha) donated by Hawaii State Executive Order No.1640;
- 1961: The National Park divided between Hawaii Volcanoes National Park on Hawaii and Haleakala National Park on Maui;
- 1980: The two National Parks designated a MAB Biosphere Reserve;
- 1987: The Volcanoes National Park on Hawai'i but not Haleakala National Park designated a World Heritage site;
- 2003: The Hawaii Volcanoes National Park (but not the World Heritage site) extended by the Kahua Ranch on the West Rift zone of Mauna Loa.

LAND TENURE

Federal: the Park was created from federally-owned land donated by the State of Hawai'i. In 1920 Congress authorised the acquisition of privately-owned land and rights of way and in 1930 gave exclusive legal jurisdiction over the Park to the Federal government. Administered by the National Park Service (NPS) of the Department of the Interior.

AREA

92,934 ha.

ALTITUDE

From sea-level to 4,169m

PHYSICAL FEATURES

Hawaii is the largest of the Hawai'ian Islands, rising to the two peaks of Mauna Kea (4,205m) and Mauna Loa (4,169m), with, on its southeast flank, Kilauea (1,250m) and the crater of Halemaumau. Geologically, the islands are young, formed by the underlying plate moving slowly westward over a hot spot in the Earth's crust, forming a succession of volcanic islands, the oldest island being furthest west and the easternmost island, Hawai'i, experiencing the most activity. The Park extends from the summit calderas of Mauna Loa and Kilauea to the southern coast which is periodically reached by lava flows. Hawai'i's double peak is a massive, flat-domed shield volcano built up by lava from 6,096m below sea-level, making it at 10,265m the highest freestanding mountain in the world. This, though relatively gentle, is the world's most continuously active volcano, and is considered the world's best example of effusive vulcanism. Halemaumau fire pit on Kilauea was an active lava lake until the 1930s. Mauna Loa last erupted in 1984 but Kilauea remains active along the East Rift, a ridge over an underground magma chamber, which extends far out under the sea. This rift has been the site of intermittent eruption since 1983 when a 300m-high cinder cone appeared and extensive lava flows from the Pu'u 'O'o vent started to break out, most recently from mid-2007, accompanied by a swarm of earthquakes and tremors (NPS, 2007); 240 ha of land have been intruded into the sea. Other volcanic features of the Park include calderas, pit craters, cinder cones, spatter ramparts, fumaroles, solfataras, lava tubes, tree moulds, pahoehoe and 'a`a lava flows, volcanic sea cliffs and black sand beaches. The separate 'Ola'a Forest Tract on the northeast flank of Kilauea is a mid-level rainforest.

CLIMATE

The oceanic weather is unpredictable and dominated by northeast trade winds. Altitudinal climatic change is reinforced by an abrupt climatic gradient from east to west: windward mid-slopes receive a mean annual rainfall of 3,810mm, while leeward slopes receive only a tenth of that amount. Higher levels can be cloudy. Summer storms and showery conditions are common, and violent hurricanes can occur between June and November. The eruptions of Kilauea even cause acid rainfall. Such extremes of annual average precipitation produce dramatic climatic and biotic changes. Annual average temperatures range from 22°C at sea level to 7°C at 3,400m, and the summits can carry snow in winter.

VEGETATION

The Park's high diversity of plant communities runs a continuous gradient from sea to mountain summit and from dry to seasonably or persistently wet, which is accentuated by the volcanic activity. About 70% of the Park is bare lava rock with very scattered vegetation, about 15% is scrub, 10% forest and 5% grassland. But the diversity results in a mosaic of successional and climax stages in seven major zones: coastal lowlands, rain forest, grassland, mid-elevation woodland, upland forest and woodland, desert scrub and sub-alpine to alpine scrub: Doty & Mueller-Dombois in (1966)

described 23 distinct types of vegetation. The Park's 23 species of nationally threatened plants are 6% of a flora which includes 15 endangered trees. The rate of endemism in flowering plants is extremely high - 90% - because of the islands' geographic isolation, though, typically for island flora, is impoverished compared with continental sites. Its greatest diversity is found in mesic and rain forests. Ferns form a noticeable proportion of the native flora, in highly developed tree fern-dominated rain forests inland. The Ola'a Forest tract of over 4,000 ha is one of the largest tracts of virgin ohia *Metrosideros polymorpha* and fern forest remaining on the island. Much of the flora is threatened by wildfire, by introduced ungulates which have invaded all plant communities and by plants which they stimulate and disperse. The flora contains nearly twice as many exotic as native species, especially below 600m. However, communities above 1,500m remain essentially native. One beleaguered native species being propagated in the Park is the Mauna Loa or kau silversword *Argyroxiphium kauense* (CR), a spectacular succulent. A checklist of vascular plants was compiled by Higashino, *et al.* in 1988.

FAUNA

The islands' isolation and their vulnerability to invaders has left a relatively impoverished fauna though one still rich in endemic species. Most island native species descend from animals that could fly in like birds, bats and insects; were light enough to be carried by birds, such as snails, some insects and spiders; or were blown or washed ashore; and survived by adaptive radiation. Except for one bat, the Hawaiian hoary bat *Lasiurus cinereus semotus*, there are no native mammals. Introduced wild boar *Sus scrofa*, small Indian mongoose *Herpestes javanicus*, mouflon *Ovis musimon*, goat *Capra hircus*, feral dogs, cats, birds, and a very large number of invertebrates including Argentine ant *Iridomyrmex humilis* have colonised parts of the Park. The hawksbill turtle *Eretmochelys imbricata* (CR), the Hawaiian monk seal *Monachus schauinslandi* (CR) and humpback whale *Megaptera novaeangliae* are sometimes seen offshore (NPS, 2007).

Three large endangered birds endemic to Hawai'i are found in the Park: the nene or Hawaiian goose *Branta sandvicensis* (VU) which is terrestrial and non-migratory, Hawaiian petrel *Pterodroma sandwichensis* (VU) and the 'io or Hawaiian hawk *Buteo solitarius*. In their isolation, the small land birds have evolved a spectacular assemblage. Of the 23 surviving endemic Hawaiian songbirds six Hawaiian honeycreepers, three being globally threatened, occur in the Park: Hawaiian creeper *Oreomystis mana* (EN), 'akepa *Loxops coccineus* (EN), 'akiapolaau *Hemignathus munroi* (EN), 'amakihi *H. virens*, 'apapane *Himatione sanguinea*, and i'iwi *Vestiaria coccinea* (VU). Other notable birds are the endemic 'elepaio or monarch flycatcher *Chasiempis sandwichensis* (VU), Hawaiian thrush *Phaeornis obscurus*, pueo or Hawaiian short-eared owl *Asio flammeus sandwichensis* and band-rumped storm-petrel *Oceanodroma castro*. The Hawaiian crow *Corvus hawaiiensis* which became extinct in 2002 is being reintroduced from captive specimens. Much less is known about invertebrate forms but these include unusual endemics such as the giant Hawaiian dragonfly *Anax strenuous*, the largest dragonfly in the United States, a moth caterpillar *Hyposmocoma molluscivora* discovered in 2003 which eats snails and the volcanoes cave cricket *Thaumotogryllus cavicola* (VU) which lives on the ceilings of lava tubes.

CONSERVATION VALUE

Hawaii Volcanoes National Park site is an excellent example of continuous volcanic island building and of successional communities in forests following volcanic activity. It is of considerable fascination and beauty and contains the habitats of several threatened and endemic species. It lies within a Conservation International-designated Conservation Hotspot, a WWF Marine Global 200 Eco-region, a BirdLife-designated Endemic Bird Area and overlaps a UNESCO Biosphere Reserve.

CULTURAL HERITAGE

The Park perpetuates the island's native culture by protecting the many archaeological remains, particularly along the coast where there are native villages, *heiaus* (temples) like Waha'ula, graves, paved trails, canoe landings, cave shelters and house sites, some dating back 700 years, and at Pu'u Loa, a large concentration of petroglyphs. The islands were discovered to the west by the explorer James Cook in 1778-79. Christian influences started around 1823, with churches, schools and the introduction of cattle, goats, and *pulu* (tree-fern fibre) harvesting (NPS, pers. comm., 1995).

LOCAL HUMAN POPULATION

The surroundings area is barely populated except near the sea where occasional roads and subdivisions have been overrun since 1983 by lava flows from the East Rift.

VISITORS AND VISITOR FACILITIES

Mauna Loa was first climbed by visitors in 1794 and as a result of descriptions written in 1823, Kilauea had become a tourist attraction by 1840. The first Volcano House was constructed in 1866 and successive structures were built in 1877, 1893 and 1941 for volcano watching visitors. In 2004 there were 2,564,761 recreational and non-recreational visitors (NPS, 2007). The 1877 building is now the Volcano Art Centre; the 1941 building is the Park's only hotel. Other facilities include two campgrounds, 96 km of paved roads, one the Kilauea Crater Rim drive, and 190 km of marked trails. Hiking and fishing are two other major activities. Several settlements with accommodation are quite near and the island has two airports.

SCIENTIFIC RESEARCH AND FACILITIES

The islands have been and continue to be important in the history of evolutionary biology and for the study of effusive vulcanism ever since the first observations in 1823. The Park is home to a multi-agency Research Centre, which includes facilities for the US Forest Service, the National Biological Service (NBS) and university researchers. The Park also maintains 12 weather stations. There is a museum with 380,000 specimens, a herbarium and library. The US Forest Service conducts research on insect biological agents to control exotic forest pest weed species. And the collaborating Bishop Museum publishes definitive biological manuals of all known Hawaiian organisms. The three research groups of the NBS are the majority of the researchers in the Pacific Islands Service Centre. These scientists focus on three areas: diseases and the other limiting factors on native birds, monitoring and an inventory of Park flora and fauna (National Park Service, pers. comm., 1995). The US Geological Survey's Hawaiian Volcano Observatory, founded on Kilauea in 1912, runs a volcanic geological research program, monitoring Mauna Loa and Kilauea which are the most studied and best understood volcanoes in the world; and the research has contributed to understanding of island-building through volcanic processes. The present eruption on the east rift of Kilauea is monitored constantly, web information is published daily and a newsletter weekly. The observatory has trained most of the world's volcanic scientists and has developed research techniques that are now standard procedure.

MANAGEMENT

The National Park is managed by the National Park Service of the Department of the Interior following in the General Development Plan of 1976 and a Natural Resources Management Plan which is updated annually. This divides the area into three zones: Primary Use zone for intensive visitor use, interpretive programmes such as the Crater Rim Summit loop drive, the Chain of Craters Road corridor, and the Waha'ula Visitor Centre areas; Wilderness Threshold zone, a self-guiding nature area used almost exclusively by local island residents and off-island visitors who rent vehicles; and Backcountry zone, the largest and least used area. A detailed Wildland Fire Management Plan has been drawn up to deal with a threat which has recently been destructive, though burned areas are systematically replanted. A Commercial Services Plan and an Air Tour Management Plan provide for and regulate appropriate concession services. Commercial development, resource exploitation, hunting, gathering, off-road driving and fire-setting are prohibited unless licensed. In the past feral goats laid waste to Park lands from the dry coastal lowlands to the alpine zone, destroying shrubs and preventing regeneration of many native plants. In the early 1970s populations of between 15,000 and 20,000 built up, but the islanders have been encouraged to hunt and trap both pigs and goats which have now been reduced to low numbers except for parts of Mauna Loa above 2,800m. Park staff are aggressively restoring habitat, guarding nest sites, monitoring threats and population impacts, removing alien wildlife, planting endangered and rare plants such as the Ka'u silversword and planning to restore the populations of the nene, Hawaiian petrel and hawksbill turtle (NPS, 2007).

MANAGEMENT CONSTRAINTS

Feral pigs, goats, and mouflon sheep, mongoose, feral cats and rats, ants, wasps, mosquitos; and invasion by at least 25 exotic plants all threaten native species of which scores, especially birds, have been eliminated in the past. The invasives are now too widespread for easy control and Hawai'i has become leading state both for extinctions and numbers of nationally endangered species. The control of feral pigs and non-native plants are now the highest conservation management priorities. The severest disturbance has occurred in semi-arid lowland and mid-level areas, the least impacted have been the uplands. Low numbers of pigs ranged over approximately 8,000 ha (8.5%) of the Park, mostly the mesic and wet areas, damaging the native vegetation, disturbing soil and dispersing alien plant seeds. Pockets of standing water created by their wallowing provide breeding places for mosquitoes which cause serious avian malaria and bird pox. Another alien, the mongoose has caused widespread extinction of endemic snakes. Argentine ant is a pest especially around settlements and is

spreading. Large alien weeds such as the nitrogen-fixing faya tree *Myrica faya* and velvet tree *Miconia calvescens* both successfully colonise lava flows and open ground, shading out other species. However, the numbers of both pigs and mosquitoes are beginning to come under control.

STAFF

In 2007 there are 130 full time employees (NPS, 2007). These include specialists in mountain ecology, park interpretation, research and archaeology. Seasonal staff are employed from the Young Adult Conservation Corps.

BUDGET

The annual operating budget for 2007 is \$5,558,000. Entry fees are charged and there is periodic additional funding for research projects (NPS, 2007).

LOCAL ADDRESS

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REFERENCES

The principal source for the above information was the original nomination for World Heritage status.

Carlquist, S. (1980). *Hawaii: A Natural History*. Lawai, Kauai, Hawaii: Pacific Tropical Botanical Garden, Honolulu. 463 pp.

Cox, G. (1999). *Alien Species in North America and Hawaii: Impacts on Natural Ecosystems*. Island Press, Washington. 388 pp.

Cuddihy, L. & Stone, C. (1990). *Alteration of Native Hawaiian Vegetation: Effects of Humans, Their Activities and Introduction*. Univ. of Hawaii Cooperative National Park Resources Studies Unit. 138 pp.

Degner, O. (1973). *Plants of Hawaii National Park*. Braun-Brumfield Inc, Ann Arbor, Michigan.

Doty, M. & Mueller-Dombois, D. (1966). *Atlas of Bioecological Studies at Hawaii Volcanoes National Park*. Hawaii Botanical Science Paper No. 2. University of Hawaii, Honolulu. 507 pp.

Hazlett, R. (1993). *Geological Field Guide to Kilauea Volcano*. Hawai'i Natural History Assoc'n, 123 pp.

Higashino, P., Cuddihy, L., Anderson, S. & Stone, C. (1988). *Checklist of Vascular Plants of Hawaii Volcanoes National Park*. Cooperative National Park Resource Studies Unit Technical Report 64, University of Hawaii at Manoa.

Holcomb, R. (1987). Eruptive history and long-term behavior of Kilauea Volcano. In Decker, R., Wright, T. & Stauffer, P. (eds). *Volcanism in Hawaii*. U.S.G.S. Professional Paper 1350: pp 261-350.

Jacoby, J. (1989). *Vegetation Maps of the Upland Plant Communities of the Islands of Hawaii, Maui, Molokai and Lanai*. Cooperative National Park Resources Studies Unit, University of Hawaii.

MacDonald, G., Abbott, A. & Peterson, F. (1983). *Volcanoes in the Seas: The Geology of Hawaii*. University of Hawaii Press, Hawaii. 400 pp.

National Park Service (NPS) (2007). website Hawai'i Volcanoes National Park.

----- (1976). *Hawaii Volcanoes National Park Master Plan*. US Department of the Interior, National Park Service.

----- (1973). *Hawaii Volcanoes National Park, Hawaii, Natural Resources Management Plan and Program*. Revised & updated annually since 1982.

Smart, C. (1965). *The Archaeological Resources of Hawaii Volcanoes National Park*. Department of Anthropology, Bishop Museum. 112 pp.

Smathers, G. & Mueller-Dombois, D. (1973). *Invasion and Recovery of Vegetation After a Volcanic Eruption in Hawaii*. National Park Service Scientific Monograph Series No. 3. US National Park Service, Washington DC.

Stone, C. & Pratt, L. (1994). *Hawaii's Plants and Animals: Biological Sketches of Hawaii Volcanoes National Park*. Hawaii Natural History Association, National Park Service, and University of Hawaii Cooperative National Park Resources Study Unit. Honolulu. 399 pp.

Stone, C, Clifford, W., Smith, C & Tunison, J. (eds) (1992). *Alien Plant Invasions in Native Ecosystems of Hawaii. Management and Research*. Cooperative National Park Resources Studies Unit, University of Hawaii. Papers from an NPS / University of Hawaii Cooperative National Resources Unit symposium, Sixth Conference in Natural Sciences, Hawaii Volcanoes National Park, 1986.

Stone, D. & Keith, J. (1987). Control of feral ungulates and small mammals in Hawaii's national parks: research and management. In Richards, C. & Ku, J. (eds), Control of Mammal Pests. Suppl. 1 *Trop. Pest. Manag.* 32: 277-287. Torgon & Francis Ltd., London.

Stone, C. & Scott, J. (eds) (1985). *Hawaii's Terrestrial Ecosystems: Preservation and Management*. University of Hawaii Cooperative National Park Resources Studies Unit, Honolulu.

Wagner, W., Herbst, D. & Sohmer, S. (1999). *Manual of the Flowering Plants of Hawai'i* (rev. ed.) Bishop Museum Spec. Pub. 97. Univ. Hawaii & Bishop Museum Press, Honolulu: 2 vols. 1919 pp.

DATE

1980. Updated 8-1986, 2-1987, 7-1987, 11-1987, 2-1991, 7-1995, 11-2007, May 2011.