

WHC Nomination Documentation

File name: 409.pdf UNESCO Region EUROPE AND NORTH AMERICA

SITE NAME ("TITLE") Hawaii Volcanoes National Park

DATE OF INSCRIPTION ("SUBJECT") 11/12/1987

STATE PARTY ("AUTHOR") UNITED STATES OF AMERICA

CRITERIA ("KEY WORDS") N (ii)

DECISION OF THE WORLD HERITAGE COMMITTEE:

11th session

The Committee wished to encourage the Park authorities to continue their commendable work on geological research and on the control of exotic species.

BRIEF DESCRIPTION:

Two of the most active volcanoes in the world, Mauna Loa (4,170 metres high) and Kilauea, tower over the Pacific Ocean at this site. Volcanic eruptions have created a continually-changing landscape, and the lava flows reveal surprising geological formations. Rare birds and endemic species can be found there, as well as forests of giant ferns.

1.b. State, province or region: Hawaii

1.d Exact location: Long. 155°1' - 155°39' W ; Lat. 19°11' – 19°33' N

Convention Concerning the Protection of the
World Cultural and Natural Heritage

WORLD HERITAGE LIST NOMINATION

HAWAII VOLCANOES NATIONAL PARK

by

The United States of America

1985

WORLD HERITAGE LIST
Nominating Paper
HAWAII VOLCANOES NATIONAL PARK

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WORLD HERITAGE LIST
Nominating Paper
HAWAII VOLCANOES NATIONAL PARK

I. SPECIFIC LOCATION:

- A. **Country:** The United States of America
- B. **State:** Hawaii
- C. **Name of Property:** Hawaii Volcanoes National Park
- D. **Exact Location on Map and Geographical Coordinates:**

Hawaii Volcanoes National Park lies in the southeast portion of the Island of Hawaii, which is the easternmost island in the State of Hawaii. The park (totaling 87,940 hectares, or 217,300 acres) is divided administratively into two segments: the major core area, encompassing the summits and portions of the flanks of two of the world's most active volcanoes, Mauna Loa and Kilauea, containing 84,033 hectares (207,645 acres); and the non-contiguous rain forest area, called the 'Ola'a Forest Tract, containing 3,907 hectares (9,655 acres).

The core segment of the park lies between latitudes N 19 11' and 19 33', and longitudes W 155 1' and 155 39'; the 'Ola'a Tract lies to the northeast of the core segment between latitudes N 19 27' and 19 32', and longitudes W 155 12' and 155 17'.

II. JURIDICAL DATA:

- A. **Owner:** The United States Department of the Interior, Washington, D.C.
- B. **Legal Status:**

An Act of the United States Congress of August 1, 1916 (39 Stat. 432), authorized Hawaii National Park, in two non-contiguous units on two different islands of what was then the Territory of Hawaii --- Kilauea unit on Hawaii and Haleakala unit on Maui. The park was created from federally owned lands and by donation from the Territory of Hawaii.

In 1961, Congress separated these two units into separate national parks (75 Stat. 577), Hawaii Volcanoes National Park on Hawaii and Haleakala National Park on Maui. In the intervening 45 years,

Congressional authorizations of 1922 (45 Stat. 503), 1928 (45 Stat. 424) and 1938 (52 Stat. 781) more than doubled the original acreage set aside for the Kilauea/Mauna Loa unit in 1916.

A Congressional Act of April 19, 1930 (46 Stat. 227), granted exclusive legal jurisdiction for park lands to the Federal Government of the United States.

Part of the June 23, 1938, Congressional Act (52 Stat. 781) gave the Secretary of the Interior discretionary authority to allow homesite leases with the Kalapana extension of the park. It also restricted coastal fishing in the extension to native Hawaiians of Kalapana and persons guided by them. To date, the homesite lease discretionary authority has not been exercised.

The 'Ola'a Forest Tract was obtained by donation of ceded Territorial lands in 1951 and 1953 (Exec. Order #1640 by Territorial Governor Long). Title is vested in the United States Federal Government and the U.S. National Park Service has protective custody, though the land is not technically part of Hawaii Volcanoes National Park. Under terms of the 1938 Extension Act, all lands acquired must be adjacent or contiguous to the existing park boundary. This 'Ola'a Forest Tract is separated by several small parcels of private intervening lands.

An Act of Congress, approved November 20, 1978, formally designated 49,818 hectares (123,100 acres) of the park as Wilderness lands (P.L. 95-625).

C. Responsible Administration:

Administered for the National Park Service, United States Department of the Interior by:

Superintendent
Hawaii Volcanoes National Park
P.O. Box 52
Hawaii National Park, Hawaii 96718

and

Director, Pacific Area
National Park Service
300 Ala Moana Blvd., Suite 6305
Box 50165
Honolulu, Hawaii 96850

II. IDENTIFICATION:

A. Description and Inventory of Natural Heritage:

Hawaii Volcanoes National Park is situated in the southeast portion of the island of Hawaii, which is the largest and easternmost of the 124 islands, islets and atolls comprising both the State of Hawaii and the nearly 1250 kilometer (2000 mile) long island chain, called the Hawaiian Archipelago. These islands, situated in the north-central Pacific Ocean, are the emerged peaks of a tremendous volcanic mountain range rising from the ocean floor. Only the eight main islands, located at the southeastern end of the chain, form the group commonly known as the Hawaiian Islands.

Hawaii Volcanoes National Park contains within its boundaries two of the world's most active volcanoes, Mauna Loa and Kilauea, along with numerous historical, archeological and biological resources.

Kilauea and Mauna Loa, classic shield-type volcanoes, are the dominant features of the park. Surrounded by recent lava flows materials and unique endemic plant communities, these volcanoes are dynamic landforms where new lava flows can drastically change the landscape. Recent eruptions have covered many acres with lava up to about 100 meters (300 feet) deep, created new land where flows enter the ocean, and built up no fewer than three significantly large new landforms within the park where none existed before.

Unique to this particular park is volcanic research, for it is equal in importance to the conservation/public use aspect common to other units of the United States National Park System.

Mauna Loa and Kilauea are the most studied and best understood volcanoes in the world. The favorable opportunities afforded for fundamental and detailed research are not duplicated or even approached in any other part of the world. The program of study is under the direction of U.S. Geological Survey scientists at the Hawaiian Volcano Observatory, a research facility founded on the rim of Kilauea Caldera in 1912 --- four years prior to the establishment of the park. Kilauea is the world's safest and most accessible active volcano for people to see. This dual role makes the park extremely valuable, as a world resource, for both research and sightseeing. Mauna Loa, above the temperature inversion level, has unusually clean air offering exceptional opportunities for air quality studies.

Sherwin Carlquist, in the "Preface" of his classic **Hawaii: A Natural History**, succinctly puts the native Hawaiian ecosystem in global perspective:

"Like a great museum of geology and island plant and animal life, the Hawaiian islands lie isolated in the mid-Pacific. Over millions of years this isolation has permitted unique animal and plant phenomena to develop. Natural crossings of vast stretches of ocean by plants and animals in prehuman time are amazing feats of dispersal. After arrival, these organisms, isolated from mainland areas, have taken curious and unexpected courses of evolution, have presented us with the most exciting and astonishing flora and fauna to be found on an archipelago of oceanic islands. **About 95 per cent of native Hawaiian plants and animals occur nowhere else in the world -- a higher percentage than any comparable area in the world.**" [Boldface emphasis added]

With the arrival of European civilization to the Island of Hawaii two hundred years ago, the fragile native biota of the islands was disturbed. Low and middle elevations have been most significantly altered, even in the National Parks. Since the advent of progressive resources management, especially since 1970, park lands represent the least altered environment in the archipelago. To the uninitiated visitor the park appears to be much the same today as it did when man first saw the magnificent displays of volcanism, the great fern forests and the superb views along the seacoast and up the palis (cliffs).

Geology

Park lands encompass the summit and part of the southeast flank of Mauna Loa volcano and almost a third of Kilauea volcano. These broad, flat volcanic domes rarely explode, normally they send up fountains of molten rock hundreds of meters into the air. Eruptions generally occur in calderas [huge collapsed depressions in the summit] or along the rift zones [zones of intense geologic fracture] on the flanks of the volcanoes. Kilauea is the most active volcano in the world: it achieved fame because of an almost continuously active lake of liquid lava in Halema'uma'u during the 19th century and the early part of the 20th century. From 1952 to 1985 Kilauea has erupted more the 50 times from locations on both the east and southwest rift zones as well as the summit caldera. Most of these eruptions have originated within Hawaii Volcanoes National Park.

Mauna Loa is a massive, flat-domed shield volcano built by layer upon layer of lava and is recognised as the best example of its type in the world. Rising about 9750 meters (32,000 feet) above its base on the ocean floor, Mauna Loa is one of the world's greatest mountains. The upper slopes of the volcano, along its two principal rift zones, contain extensive and recent flows that are stark, picturesque, and forboding. Since man has watched it, Mauna Loa has been intermittently active, with periods of repose or quiet ranging from a few months to more than 20 years. Many of its eruptions are confined to the caldera of Moku'aweoweo; others burst forth from fissures along one of the rift zones on the flanks of the mountain, form spectacular fifteen kilometer long curtains of fire, and feed lava flows that occasionally reach the sea.

Flora

Hawaii flora is remarkable for its extraordinary degree of endemism --- 95% of the native species are found only in these islands. Indeed, this has helped earn International Biosphere Reserve status for Hawaii Volcanoes National Park and has made it an attraction for scholars and scientists. Although park boundaries were drawn primarily to include recent lava flows and the summits of Kilauea and Mauna Loa volcanoes, there is within the park, albeit limited in extent, a rich diversity of species and vegetation types. Major native flora species within the park are:

koa	<i>Acacia koa</i> var. <i>hawaiiensis</i>
'ohi'a-lehua	<i>Metrocideros collina</i> ssp. <i>polymorpha</i>
ilihi [sandalwood]	<i>Santalum paniculatum</i>
'ohelo	<i>Vaccinium reticulatum</i>
hapu'u [tree fern]	<i>Cibotium glaucum</i>
hapu'u 'i'i [tree fern]	<i>Cibotium chamissoi</i>
meu [tree fern]	<i>Cibotium hawaiiense</i>
kupukupu [swordfern]	<i>Nephrolepis exaltata</i>
uiuhe [fern]	<i>Dicranopteris emarginata</i>
wawae'iole	<i>Lycopodium cernuum</i>
'ama'u [fern]	<i>Sadleria cyatheoides</i>
hala	<i>Pandanus odoratissimus</i>
pili grass	<i>Heteropogon contortus</i>
'uki	<i>Machaerina angustifolia</i>
pa'iniu	<i>Astelia menziesiana</i>
mamaki	<i>Pipturus hawaiiensis</i>
mamani	<i>Sophora chrysophylla</i>
u'ulei	<i>Osteomeles anthyllidifolia</i>
'akala	<i>Rubus hawaiiensis</i>
wiliwili	<i>Erythrina sandwicensis</i>
ka'e'e [sea bean]	<i>Mucuna gigantea</i>
hinahina	<i>Geranium cuneatum</i>

kawa'u	<u>Ilex anomala</u>
maneie [soapberry]	<u>Sapindus saponaria</u>
hau	<u>Hibiscus tiliaceus</u>
'akia	<u>Wikstroemia spp</u>
'olapa	<u>Cheirodendron trigynum</u>
pukiawe	<u>Styphelia tameiameia</u>
kolea-lau-nui	<u>Myrsine lessertiana</u>
lama	<u>Diospyros ferrea spp.</u> <u>sandwicensis</u>
pohuehue [beach morning glory]	<u>Ipomoea brasiliensis</u>
ha'i-wale	<u>Cyrtandra platyphylla</u>
kukae-nene	<u>Coprosma ernodeoides</u>
kilauea hedyotis	<u>Hedyotis centranthoides</u>
alahe'e	<u>Canthium odoratum</u>
noni	<u>Morinda citrifolia</u>
kopiko	<u>Psychotria hawaiiensis var.</u> <u>hillebrandii</u>
naupaka-kahakai	<u>Scaevola taccada</u>
huahekili-uka	<u>Scaevola kilaueae</u>
naupaka-kuahiwi	<u>Scaevola chamissoniana</u>
kupaoa	<u>Railliardia ciliolata</u>

Some common park species brought in by early
Polynesians:

kukui	<u>Aleurites moluccana</u>
ti	<u>Cordyline terminalis</u>
milo	<u>Thespesia populnea</u>

Approximately 40 species have been listed by park managers as being rare enough to warrant special surveillance or treatment to prevent their extinction through unnatural causes. All are candidates for endangered or threatened species. Specifically, these are:

kihi	<u>Adenophorus periens</u>
paukala	<u>Argemone glauca var. inermis</u>
'iwalaui'i	<u>Asplenium fragile var. insulare</u>
ko'oko'olau	<u>Bidens skottsbergii var.</u> <u>conglutinata and var. skottsbergii</u>
'ahakea	<u>Bobea timonioides</u>
'awikiwiki	<u>Canavalia kauensis</u>
'aku	<u>Cyanea tritomantha</u>
kanawao	<u>Cyrtandra giffardii</u>
kanawao	<u>Cyrtandra ramosissima</u>
'a'ali'i	<u>Dodonaea eriocarpa var.</u> <u>skottsbergii</u>
anini	<u>Eurya sandwicensis var.</u> <u>grandiflora</u>
haukuahiwi	<u>Hibiscadelphus giffardianus</u>
(none)	<u>Ischaemum byrone</u>
kamakahala	<u>Labordia hedyosmifolia var.</u> <u>kilaueana and var. magnifolia</u>
ma'oloa	<u>Neraudia ovata</u>
'aiea	<u>Nothocestrum breviflorum</u>

'aiea	<i>Nothocestrum longiflorum</i> var. <i>rufipilosa</i>
poloieie	<i>Ophioglossum concinnum</i>
manena	<i>Pelea hawaiiensis</i> var. <i>hawaiiensis</i>
'alani	<i>Pelea puuluensis</i>
'alani	<i>Pelea zahlbruckneri</i>
'ala'alawainui	<i>Peperomia lilifolia</i> var. <i>obtusata</i>
'ala'alawainui	<i>Peperomia expallescens</i> var. <i>brevipilosa</i>
kapana	<i>Phyllostegia brevidens</i> var. <i>heterodoxa</i>
kapana	<i>Phyllostegia macrophylla</i> var. <i>velutina</i>
'ihi	<i>Portulaca sclerocarpa</i>
hao	<i>Rauvolfia remotiflora</i>
'ohe makai	<i>Reynoldsia hillebrandii</i>
huahekili uka	<i>Scaevola kilauea</i>
'ohai	<i>Sesbania tomentosa</i>
(none)	<i>Silene hawaiiensis</i>
ma'ohi'ohi	<i>Stenogyne rugosa</i> var. <i>subulata</i>
ma'ohi'ohi	<i>Stenogyne scrophularioides</i> var. <i>biflora</i>
'ohe mauka	<i>Tetraplasandra hawaiiensis</i> var. <i>hawaiiensis</i>
'ohe mauka	<i>Tetraplasandra karaiensis</i> var. <i>grandis</i>
koli'i	<i>Trematolobelia wimmeri</i>
a'e	<i>Zanthoxylum hawaiiense</i>
a'e	<i>Zanthoxylum maviense</i>
a'e	<i>Zanthoxylum dipetalum</i> var. <i>geminicarpum</i>

In addition, park managers have identified 34 more plants that are rare in the park, but are not candidate species.

The park presents exceptional opportunities to study plant ecology and evolution. The climatic gradient from east to west is abrupt and as a result, climatic conditions vary considerably. Annual rainfall in the eastern boundary rainforest is about 250 centimeters (100 inches). In the coastal lowlands and summit highlands about 7.5 kilometers (12 miles) distant, it is less than 100 centimeters (40 inches). A natural acid rain forms from chemical reactions between sulphur gases emitted from the volcano and atmospheric gases is largely responsible for the apparent desert-like conditions in the leeward shadow of the Kilauea summit caldera. Natural vegetation zones along this gradient range from very diverse tropical rainforest of 'Ola'a Forest, rich woodlands and shrublands of Naulu Forest, and scattered shrub and grasslands of the Ka'u Desert, to the alpine tundra of the Mauna Loa summit. Vegetation zones are further stratified by age, as a result of periodic lava flows which have isolated

The park's non-native bird species include:

California quail	<i>Callipepla californicus</i>
chukar	<i>Alectoris chukar</i>
ring-necked pheasant	<i>Phasianus colchicus</i>
Japanese blue pheasant	<i>Phasianus colchicus</i> <i>versicolor</i>
spotted dove	<i>Streptopelia chinensis</i>
barred dove	<i>Geopelia striata</i>
Eurasian skylark	<i>Alauda arvensis</i>
Chinese thrush	<i>Garrulax canorus</i>
red-billed leiothrix	<i>Leiothrix lutea</i>
mynah, common	<i>Acridotheres tristis</i>
nutmeg mannikin	<i>Lonchura punctulata</i>
house sparrow	<i>Passer domesticus</i>
cardinal	<i>Cardinalis cardinalis</i>
Japanese white-eye	<i>Zosterops japonicus</i>
house finch	<i>Carpodacus mexicanus</i>
Kalij pheasant	<i>Lophura leucomelana</i>
wild turkey	<i>Meleagris gallopavo</i>

No fish are found within the park, but there are limited opportunities to view and study the colorful fish populations along the park's 48-kilometer (30-mile) coastline.

The park's native land mammal list is limited to only the Hawaiian or hoary bat (*Lasiurus cinereus*)

Feral animals have done great damage to the native plant and animal communities to an extent that cannot be accurately assessed or controlled without a continuing and extensive research program. Feral goats (*Capra hircus*) had, until the early 1970's, built up high populations in the open, drier coastal and high mountain sections of the park despite long-term reductions efforts. Goat populations, previously estimated at 15,000 - 20,000, have been controlled through vigorous reduction programs. Today there are thought to be no wild goats within fenced areas of the park. Park managers are monitoring ingress and movement through release of radio-transmitted animals. Recovery of the native plants is underway, although depletion of species has been extensive and non-natives have become well established. It is likely that only partial restoration of pristine conditions is attainable, even in areas which are intensively managed.

Pigs (*Sus scrofa*) brought to the Hawaiian Islands by early Polynesian colonizers are believed to have been small and quite domesticated. Impact from these animals is said to have been confined to the proximity of settlements. Europeans introduced much larger, more adaptable animals which have invaded forest, woodland,

and shrubland, causing massive deterioration of understory vegetation and soils. Research and management efforts to control feral pigs, including fencing, baiting, trapping, snaring, and hunting, have achieved a substantial degree of success on about 4000 hectares (or about 10,000 acres).

B. Maps:

Attached are the following maps:

1. LOCATION MAP, HAWAII VOLCANOES NATIONAL PARK, in reference to the State of Hawaii and the Pacific Basin.
2. TOPOGRAPHIC MAP OF HAWAI'I: THE BIG ISLAND, University of Hawaii Press: this contains the best existing map of Hawaii Volcanoes National Park.
3. Map of the Designated Wilderness Area of Hawaii Volcanoes National Park.

Please Note: A single sheet U.S. Geological Survey Topographic Map [scale 1:100,000] is currently under preparation, but will not be available until early in 1987.

C. Photographic Documentation:

1. Set of eight black-and-white 8 X 10 glossy photographs:
 - A. Looking across the Ka'u Desert floor at the profile of Mauna Loa Volcano, Hawaii Volcanoes National Park, Hawaii, U.S.A.
 - B. Prime archeological resources of Hawaii Volcanoes National Park, Hawaii, U.S.A.; Ruins of canoe sheds and boundary walls at Kamoamo Village.
 - C. Petroglyphs at Pu'u Loa Petroglyph Field, Hawaii Volcanoes National, Hawaii, U.S.A.
 - D. The collapsed crater wall lying on the floor of Halema'uma'u Crater, within Kilauea Summit Caldera, Hawaii Volcanoes National Park, Hawaii, U.S.A.
 - E. Eruption of Halema'uma'u Crater, within Kilauea Summit Caldera, Hawaii Volcanoes National Park, Hawaii, U.S.A.

- F. Eruption of snow-capped Mauna Loa Volcano, looking across the Kilauea Summit Caldera, Hawaii Volcanoes National Park, Hawaii, U.S.A.
- G. 'Ohi'a and hapu'u tree fern forest, near Thurston Lava Tube, Hawaii Volcanoes National Park, Hawaii, U.S.A.
- H. Looking down across Poli o Keawe Pali (Cliff) toward the Puna-Ka'u coastline, Hawaii Volcanoes National Park, Hawaii, U.S.A.

2. Set of ten 35 mm. slide transparencies, representative views of Hawaii Volcanoes National Park. [slides identified on the mounts]

- A. September, 1982, Kilauea Summit Caldera Eruption.
- B. Mauna Loa Eruption, 1949 or 1950.
- C. Pu'u 'O'o Cone, fuming --- venting gases, November, 1983.
- D. Kilauea Iki Crater, from Kilauea Iki Overlook.
- E. 'Ohi'a - Hapu'u Tree Fern Forest, near Thurston Lava Tube
- F. Waha'uia Heiau Ruins.
- G. Cliffs of the Kalapana Sea Coast, from overlook near Kalapana District residential area.
- H. Mauna Ulu Shield, looking from Hawaiian Volcano Observatory across Kilauea Summit Caldera.
- I. Mauna Loa Volcano, looking from Puhimau viewing platform.
- J. Lava Flows from Mauna Ulu along Chain of Craters Road, between Mau Loa o Mauna Ulu and Muliwai a Pele turnouts.

D. History:

Ancestral Hawaiians from Polynesian islands to the south arrived on the island of Hawaii during two major migrations --- the first from about A.D. 500 to 750, and the second from about A.D. 1000 to 1250. Land within the national park, especially the coastal region, is rich in remains left by these ancient Hawaiians --- heiau [temple] ruins, house platforms,

stone walls of canoe sheds, pens and corrals, graves, shelter caves, petroglyphs, paved trails, and agricultural areas. Many are within accessible from the Chain of Craters Road which transverses the park from Kilauea summit caldera to the Kalapana coastal area. Others are scattered along that section of coast as well as inland, and are accessible only by trail and to a lesser extent, inland. The people who lived here were mainly fishermen and farmers, and in the uplands some were bird hunters. Habitation required special adaptation to severe environmental conditions and reveals the versatility and ingenuity of the Hawaiians.

At least two major archeological sites deserve special emphasis here as they relate to key aspects of early Hawaiian culture --- Waha'ula Heiau ruins and the Puu Loa petroglyph field.

Waha'ula Heiau (Red Mouth Temple) is reported to have been established and constructed in 1275. Nearby Ka'ili'ili village probably supported the temple. These are the most important archeological sites in the park. The heiau is one of the most significant in the Hawaiian Islands, as it is important in the story of Kahuna Nui (High Priest) Pa'ao and the introduction of the heiau luakini and the ritual worship of the major gods that characterized Hawaiian ceremonial worship --- including the introduction of the practice of human sacrifice. It is in remarkably fine condition and has an impressive appearance.

Puu Loa petroglyph field, about 0.2 hectare (0.5 acre) in extent, is the largest concentration of "rock carvings" in the park, and one of the three largest in the Hawaiian Islands. Many of the petroglyphs are ancient, and have been almost completely obliterated by successive drawings and erosion. The forms are mainly dots with rings, human figures, sails and circles with attached lines.

The European/Asian era of the park's history began with the arrival of Captain James Cook, British Royal Navy, in 1778-1779. His ship, The Resolution, navigated offshore from what is now Hawaii Volcanoes National Park, trading with the Hawaiians of the Puna and Ka'u districts, exchanging nails, beads, and cloth for pigs, fruit and salt.

The historic events that occurred within the park area after Captain Cook first viewed the Puna/Ka'u coast are of value chiefly in the association with events that occurred elsewhere, and in the descriptions of the volcano and the coastal Hawaiian habitation as recorded in the accounts of early travelers. An explosive eruption of Kilauea was a historic factor in the

eventual rise of Kamehameha as ruler of all Hawaii. In 1790, while enroute through the Ka'u Desert to battle the forces of Kamehameha, a portion of Keoua's army was destroyed by ash fallout from the volcano. Fossil footprints of some of the Hawaiian warriors remain today in ash deposits in the Ka'u Desert.

Capt. George Vancouver's naturalist, Archibald Menzies, was the first westerner to penetrate inland to what is now the park. He ascended Mauna Loa in the winter of 1794: a climb not duplicated until Lt. Charles Wilkes, U.S. Navy, and his aides made the climb in 1841.

In 1823, a band of Christian missionaries visited Kilauea caldera and wrote such vivid and widely read descriptions that Kilauea became well known to the entire world for its prime scientific values as well as a desired visitor destination. By the 1840's, before Yosemite Valley became known to Europeans, Kilauea volcano had become a regular stop for venturesome visitors to Hawaii. They stayed in native-style huts until 1856, when the first Volcano House was established on the caldera rim. Successive Volcano House structures, built in 1877, 1893 and 1941 have continued to serve volcano-watching visitors ever since. Only the 1877 and 1941 structures survive. The former now is adaptively used as a gallery for the Volcano Art Center, whose stated purpose is to enhance the understanding and awareness of the visitor to the park resources and values through media of the fine arts and the lively arts. The 1941 structure still serves as the park's solitary hotel.

The records of Menzies [1794], the Rev. William Ellis [1823], the officers of the HMS Blonde [1824], and Wilkes [1841] started a long list of amateur and professional observations of Hawaii's volcanoes which laid foundations for more systematic study. These systems of volcanic study were formalized with the founding of the Hawaiian Volcano Observatory on the rim of Kilauea caldera by Dr. Thomas A. Jaggar in 1912.

Hawaiians believed the Kilauea summit to be sacred, and made offerings to the Goddess of Volcanoes --- Pele. It was at Halema'uma'u, the principle vent of Kilauea, that the image of Pele was weakened in 1824 by High Chiefess Kapiolani, a convert to Christianity. Kapiolani ate 'ohelo berries without the traditional offering to Pele, and suffered no ill affects. Her action did much to weaken belief in the old gods and paved the way for a wider acceptance of Christianity.

Christian missionaries based in Hilo built churches and schools in the mid-1800's along what is now the

park's sea coast. Cattle, goats, pulu [a tree-fern product] harvesting, and visitor service enterprises changed the Hawaiian way of life as well as the structures of the villages. The now abandoned villages represent Western influences grafted onto the traditional Hawaiian culture. Only visitor services activity, scientific investigation, and national park management activity have survived on Kilauea's rim.

The earliest suggestions for setting the Kilauea area aside as a National Park came in 1903 in the form of written comments by Volcano House guests in hotel registers. Following his 1906 topographical survey of the Kilauea summit area, Civil Engineer Albert Loebenstein compared it favorably with Yellowstone as a scenic area and proposed that both Kilauea and Mauna Loa summits be included in a new national park. Between 1907 and 1911, Honolulu newspaper publisher Lorrin A. Thurston exerted concentrated efforts toward the publicising of the volcanic area as a future national park. He escorted visiting parties of Federal Officials and Congressional delegations to Kilauea summit and its boiling lava lake, and used the front page of his Pacific Commercial Advertiser to publish endorsements of the national park proposal by Theodore Roosevelt, John Muir and Henry Cabot Lodge. After unsuccessful attempts in 1911 and 1915, Territorial Delegate Kalaniana'oli introduced a bill in the U.S. Congress to create Hawaii National Park. The bill received the timely support of Hawaiian Volcano Observatory founder Dr. Thomas Jaggar, who had been sent to Washington by territorial citizens [members of the newly created Hawaiian Volcano Research Association] to lobby for a federal government take over of the Observatory as a permanent scientific institution. Jaggar's expert testimony on Hawaiian history as well as geology and vulcanology played a major role in the successful passage of the act creating Hawaii National Park on August 1, 1916. At Jaggar's urging, the summit caldera of Haleakala volcano on the island of Maui was also included in the bill.

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IV. STATE OF PRESERVATION/CONSERVATION:

A. Diagnosis:

As previously shown in this paper, the integrity of the park's geologic and vulcanologic resources remain uncompromised. The dynamic geologic processes and the landforms altered and created by them, the primary purpose for which the park was originally set aside, will remain relatively undisturbed. The prime site for

the on-going geological study and research by the scientist at the Hawaiian Volcano Observatory should continue into the indefinite future. The international significance of the role of the Observatory can only increase because of its salient contributions of both information and direct personal services of professional staff leading to greater worldwide understanding of volcanism and earthquake phenomena, processes, and monitoring techniques.

However, the effects of non-native biotic and biologic introductions by both early Polynesian settlers and later European/Asian cultures have left serious, and at times severe impacts on the fragile native Hawaiian ecosystems. Native plant and animal communities are easily disturbed by competition from introduced species. This vulnerability may come about because so many of the native Hawaiian plants established themselves and evolved in this isolated in the absence of typical continental competition or because of the disturbance of native ecosystems. Species evolved by adaptive radiation. For example, native mints lost both their pungent smell and distinctive minty taste. A native nettle the mamaki, lost its stinging property. Native raspberries have lost their thorns. These species became very susceptible to non-native plant feral animal introductions.

Non-native plants pose immediate and serious threats to native Hawaiian ecosystems. Approximately 50 of the 400+ non-native species in the park are especially aggressive and persistent, displacing native species, dominating native plant communities, and disrupting native ecosystem processes. The magnitude of the problem exceeds the capability of current resources to solve completely. Consequently, management efforts are aimed at approaches that prioritize control areas and target species. Greatest efforts are to be given to controlling disruptive non-native species in ecosystems and assemblages that are relatively intact and biologically significant, and have the highest probability of approaching self-perpetuation. Studies have shown that many native plants can naturally outcompete introduced plants if selected threats are controlled.

Hawaii's mammalian fauna is characterized a paucity of native families and genera because of the isolation of the islands. The colonization of Hawaii by Europeans, beginning in the late 18th century, opened an era during which numerous animal species were introduced. Some of these now occupy vast areas and a broad range of habitats, causing considerable destruction of native ecosystems. Park management efforts have focused attention on the most visible and pervasive introductions, namely the goats, pigs, cattle, sheep and mon-gooses. Programs to control feral cats, rats, dogs,

and mice, as well as non-native birds, wasps, mosquitos and many other known and unknown species await identification, study, prioritization and adequate resources.

B. Agent Responsible for Preservation/Conservation:

The Park Superintendent and the Pacific Area Director, whose addresses are provided in Part IIC. of this nominating paper have direct responsibility for preservation and Conservation of this property. The Management Ecologist, who heads park's Natural Resources Management Division, and the Chief Park Interpreter, who coordinates the park's Cultural Resources Management activities, have key delegated responsibilities for such preservation and conservation efforts. the Research Scientist, assigned to Hawaii Volcanoes by the Regional Chief Scientist, the Pacific Archeologist on the Pacific Area Director's staff, and the Cooperative Park Studies Unit, located in the Department of Botany at the University of Hawaii in Honolulu provide additional research capabilities and professional assistance.

C. History of Preservation/Conservation:

Early park efforts at vegetation conservation and management seemed to center on developing both native plant and tree nurseries and native seed sources, from which rare threatened and endangered species could be reintroduced to bolster deteriorated native Hawaiian ecosystems. For many years the park also was used as a type of natural arboratum refuge for rare, threatened native Hawaii species from other parts of the Island of Hawaii and even from other Hawaiian Islands.

Recent approaches to native plant management a Hawaii Volcanoes National Park which have emphasized scattered plantings of rare woody species and widespread plantings of a number of common native species are being replaced by a more broadbased approach. The new management program focuses on reducing non-native plant and animal threats, permitting native ecosystem processes to occur, and encouraging native species to replace themselves unaided. The objectives of native plant management in the park are to redress anthropogenic causes of population loss and to support populations at levels sufficient to maintain the genetic diversity they need to continue to survive, adapt and evolve. Management does not intend to disrupt the natural processes of extinction and colonization by artificially maintaining rare species in an arboratum setting. Management's intent is that rare species may be unburdened of human-caused sources

of decline and allowed to survive or perish according to the dictates of natural processes.

Early attempts at feral goat (*Capra hircus*) control using direct reduction by hunting were not able to harvest enough goats to make an overall reduction in population. Feral goat populations within the park have been significantly reduced during the last decade through boundary and internal fencing, driving, hunting, and tracking. Within fenced areas numbers have been reduced from approximately 15,000 to less than 10 animals, and quite possibly reduced to zero. Organized control efforts began in the early 1970's with construction of boundary and interior fences dividing the populations into workable units. Massive drives and capture followed as the next phase. By 1978, the remaining goat populations were too small and too scattered for drives to be successful; searching by helicopters and shooting by hunters on foot became the next step. By 1981, the few remaining groups of goats were so wary and elusive that helicopter searches became prohibitively expensive and impractical. The final stage of feral goat control has used radio-transmitted captured goats who, when released, seek out the remaining elusive wild goats and lead hunters to them. The program has been successful. Present emphasis in the goat control program is long term fence maintenance and population monitoring.

Feral pig (*Sus scrofa*) populations have been controlled in three major areas of the park: the Kilauea Iki unit; the Kipuka Ki unit; and the 'Ola'a Tract unit --- totaling about 2,800 hectares in size. Experimental area of 500 ha., the Puhimau unit, is expected to be liberated by the end of 1985. Feral pigs occupy rainforest, mesic forest, seasonal montane forest, shrubland, and perhaps even open grassland habitats -- about 22,500 hectares [about 25% of the park]. Populations are most dense in the rainforests, which comprise about 11,000 ha, primarily in 'Ola'a and East Rift forest areas. Here their population densities are believed to be about 30-50 pigs per square kilometer. Total park population of pigs may be 4,000 animals.

Current Natural Resource Management program plans place highest priority on maintaining goat control and then feral pig control with its supportive research programs. Pigs are relentlessly destroying understory plants in the forests and shrublands, enhancing the spread of introduced plant species, and through their rooting and wallowing habits are creating pockets of standing water which are favorable breeding places for mosquitoes and other water borne vectors of disease. Avian malaria among native forest birds is one result of this condition. The dispersal of seeds of banana

poka, firetree, ginger and guava can be directly attributed to pigs, and the spread of most other non-native species are enhanced by the disturbance of surface litter, cover vegetation, and opening of the tree fern sub-canopy.

Research activities intend to provide managers with the most efficient methods for controlling feral pigs and to propose models for long term monitoring of control effects. To date, control methods thus far examined have been live trapping with bait, live and kill snaring, and expert hunting with trained dogs. Research shows that pig behavior varies with different habitat types and population densities. Thus far the expert hunting with trained dogs has proven most effective in terms of cost and efficiency. However, the labor-intensity, risk, and physical limitations of this method compel further investigation.

Five endangered forest birds (i'o, 'akepa, 'akiapola'au, Hawaii creeper, and o'u) occur or have occurred in the park. The primary habitat for the 'akepa, 'akiapola'au and Hawaii creeper is on adjacent private or State lands, which are undergoing deforestation because of logging, cattle grazing, and sustained yield management of feral goats and pigs. National park lands, therefore, are becoming a very important refuge and essential habitat for remnants of forest bird populations. The primary habitat for the o'u is the 'Ola'a Forest, an area in the National Park which is designated as Critical Habitat by the U.S. Fish and Wildlife Service. This very rare bird was last recorded in 'Ola'a Tract in January, 1984. Noting the deterioration of native forest bird habitat island-wide, the U.S. Fish and Wildlife Service has proposed a translocation study of the 'akiapola'au into the koa-ohia forest of the Mauna Loa strip section of the park. Forests in this area have recovered dramatically since the removal of feral goats (*Capra hircus*) and cattle (*Bos taurus*), and may once again support viable populations of forest birds which are currently listed as Endangered.

Nene research and management are directed toward the long-term restoration of this once nearly extinct bird to its former range in and around the park. Previous research served to summarize prior studies about the bird and to suggest that problems of wild population survival include cat and mongoose predation, disturbance by humans, habitat degradation, and restricted movements. Further research is needed which identifies nutritional needs, specific habitat requirements, and possible genetic deficiencies. No NPS funds exist for this research. Management activities include rearing and releasing birds from

backcountry pens and monitoring of the wild population. This program is undertaken in co-operation with the Hawaii Department of Land and Natural Resources, and it depends on their generous donation of goslings for release in the Park.

D. Means for Preservation/Conservation:

Hawaii Volcanoes National Park is legally established as a conservation unit per an act of Congress, August 1, 1916. The technical means for preservation and conservation have been discussed elsewhere in Part IV. Hawaii Volcanoes National Park is one unit in a system of over 300 areas administered by the U.S. National Park Service, U.S. Department of the Interior. The park receives an annual budget of approximately one and one-half million (U.S.) dollars, which is considered adequate to fulfil the basic mandate for which the area was established. Hawaii Volcanoes National Park was also designated an International Biosphere Reserve property on November 20, 1980.

E. Management Plans:

1. FINAL MASTER PLAN, HAWAII VOLCANOES NATIONAL PARK with ES; approved November 7, 1975.
2. NATURAL RESOURCES MANAGEMENT PLAN, HAWAII VOLCANOES NATIONAL PARK, AND FINAL ENVIRONMENTAL STATEMENT (FES 74-28); approved in 1974, and revised and updated in 1978, 1980, and annually since 1982; the most recent update was prepared, March, 1985.
3. CULTURAL RESOURCES MANAGEMENT PLAN, HAWAII VOLCANOES NATIONAL PARK, approved July, 1985.
4. WILDERNESS RECOMMENDATION, HAWAII VOLCANOES NATIONAL PARK; prepared June, 1974; filed June, 1975; designated November 20, 1978.
5. STATEMENT FOR MANAGEMENT, HAWAII VOLCANOES NATIONAL PARK; approved May, 1985, but still awaits final drafting of maps.
6. LAND ACQUISITION PLAN, HAWAII VOLCANOES NATIONAL PARK; approved March, 1980; will be replaced by "Land Protection Plan" currently under preparation.
7. INTERPRETIVE PROSPECTUS, HAWAII VOLCANOES NATIONAL PARK; August, 1985; approved by Regional Director, July 18, 1985.
8. HAWAII FOREST BIRD RECOVERY PLAN, U.S. Fish and Wildlife Service; 1983.

Also, the Hawaii Volcanoes National Park Backcountry Management Plan is currently being researched and prepared.

V. JUSTIFICATION FOR INCLUSION ON THE WORLD HERITAGE LIST:

Hawaii Volcanoes National Park is considered to be of outstanding universal value and is nominated to the World Heritage list under all Natural Criteria for both selection and integrity, except criterion "v" of "Integrity". The primary values of Hawaii Volcanoes National Park are based on dynamic, on-going geologic processes of vulcanism, of endemic and native biota and human interrelationships with the land, rather than on values related to migratory species.

CRITERIA FOR SELECTION:

I. Outstanding Examples Representing the Major Stages of the Earth's Evolutionary History:

This site is a unique example of significant island building through on-going volcanic processes. It represents the most recent activity in the continuing process of the geologic origin and change of a nearly 1250 kilometer (2000 mile) long Hawaiian Archipelago. The property also contains excellent examples of the biotic successional stages following on the heels of continuing volcanic activity. These biotic stages not only include luxuriant vegetational development of native, subtropical rain forest and mesic forest biota, but also unique assemblages of species in subalpine and alpine ecosystems, and special ecosystems such as those on recent lava flows and in lava tubes or caves.

II. Outstanding Examples Representing Significant On-Going Geological Processes, Biological Evolution and Man's Interaction With His Natural Environment:

This property is indeed an extraordinary example of fluid lava vulcanism, as well as significant, on-going island chain building through those volcanic processes. Through the process of shield-building vulcanism, the park's landscape is one of relatively constant, dynamic change. The park contains significant parts of two of the world's most active volcanoes, Kilauea and Mauna Loa. The seamount Mauna Loa, measured from the ocean floor, is the greatest volcanic mass on earth [41,680 cubic kilometers, or 10,000 cubic miles]. At about 9750 meters (32,000 feet) total height [of which, 4169 meters (13,677 feet) is above ocean level], the volcano is more than 610 meters (2000 feet) taller than Mount Everest. We believe that the pioneering role of the park scene in volcanic research and monitoring facilities, begun

in 1912 by Dr. Thomas A. Jaggar, is of global significance. Such continuing efforts, now operated by the U.S. Geological Survey's Hawaiian Volcano Observatory, not only makes these two volcanoes, Mauna Loa and Kilauea, the best understood volcanoes on earth, but also is of international significance because of its contributions of information and direct staff services support to the world-wide understanding of volcanism and earthquake phenomena, processes and monitoring.

These lands protected, preserved and managed within Hawaii Volcanoes National Park personify biological evolution to its most dramatic extent. After development of these volcanic islands, only those life forms capable of blowing in, floating in, flying in, or hitch-hiking on something so capable could even hope to gain a "toehold" on these isolated islands. The mesic and wet forests of Hawaii Volcanoes National Park contain biotic assemblages that are unique products of adaptive radiation and natural selection. From only a few ancestral species, great varieties of new species have developed. From a single but unknown ancestral honeycreeper species evolved 28 new species over thousands of years of geologic time; each with distinctive bill and behavior, from the o'u with its parrotlike bill to crush seeds to the petite 'i'iwi with its slender curved bill to tap nutrient-rich nectar of similarly curved native blossoms. Over 90% of the native species in these islands are endemic. Along with Haleakala National Park, once a sister unit of Hawaii National Park for 45 years to this Hawaii Volcanoes property with many equivalent biotic resources, the park preserves and manages one of the only remaining large complexes of assemblages of significant remaining biotic systems in the Hawaiian Islands.

The park's land with its unique features provided focal points of Hawaiian cultural interactions of human activity with their natural environment. The summit caldera of Kilauea volcano has special spiritual significance to many Hawaiians. Waha'ula Heiau ruins along the Kalapana coast preserves one of the most significant temple sites in all of the Hawaiian Islands. Here under the strong guidance of kahuna nui (high priest) Pa'ao, the practice of human sacrifice began, spread and finally ended, and here too the rigid system of Hawaiian social classes began and reached fruition. The park also contains one of the largest historic districts on the United States' National Register of Historic Places. The 88,654 hectare (129,065 acre) Puna-Ka'u Historic District features culturally significant petroglyph fields, prehistoric village sites, canoe landings, historic coastal landing sites: all of which importantly illustrate humanity's integral interaction with natural environments.

III. Contains Superlative Natural Phenomena, Formations or Features of Areas of Exceptional Natural Beauty:

This 932 square-kilometer (360 square-mile) park contains extensive natural phenomena associated with its primary theme -----

active vulcanism. These features include wide-ranging variety from dramatic volcanic seas cliff headlands with their sea arches, crashing surf, and segments of newly created land (11-15 years old) formed by lava flows entering the ocean, to the stark boldness of the summit areas of Mauna Loa with its recently formed lava shields (18 months old) and its huge summit caldera called Moku'aweoweo [4.8 km by 8 km, or 3 by 5 miles in size]. In between, the park offers features and formations widely ranging in size and form, from volcanic bombs, tree molds, lava trees, small spatter cones and ramparts, through lava tubes of a variety of sizes, to virtual rivers of hardened lava flows [both a'a and pahoehoe], a long chain of pit craters of various sizes, several major shields [such as Mauna Ulu and Puu Koa'e] and the two summit calderas. These volcanic features combined with surviving segments of native and endemic Hawaiian biota provide exceptional areas of natural beauty. Of particular note among them would be: the climax forest areas of mature koa in the Kipuka Ki area of the mid-elevations of Mauna Loa; the wet, subtropical ohia/fern forest north and east of Kilauea's summit caldera rim; and the sparsely vegetated but impressive Ka'u Desert sprawling out along Kilauea volcano's Great Crack of its Southwest Rift Zone.

IV. Contains the Most Important and Significant Natural Habitats Where Threatened Species of Animals or Plants of Outstanding Universal Value, from the Standpoint of Science or Conservation, Still Survive:

The park contains significant assemblages of native, subtropical rain forest and mesic forest biota, excellent examples of biotic succession stages following dynamic volcanic activity, significant areas of intact or nearly intact subalpine and alpine ecosystems, unique biota in lava tubes or caves, as well as a small area of some of the most pristine dry forest remaining in Hawaii. Since much of each of these important ecosystems is composed of endemic Hawaiian species, scientists believe these survivors to be of at least important universal value, and most likely of outstanding international value. The park contains several endangered species, such as the Hawaiian goose or Nene (*Nesochen sandvicensis*), as well as numerous candidate threatened or endangered invertebrate species and 41 candidate threatened or endangered plant species [as listed in recent United States Federal Register issues and also in Part IIIA of this nominating paper.

CRITERIA FOR BIOTIC INTEGRITY:

I. Site Should Contain All or Most of the Key Interrelated and Independent Elements in Their Natural Relationships:

As noted in selection criteria "iv" above, the park does contain: significant biotic assemblages of native subtropical rainforests, and mesic forests; biotic successional stages following on-going volcanic activity; small but intact areas of the most pristine surviving dry forests in Hawaii; subalpine and alpine systems and unique microbiotic systems in lava tubes. For the most part, a majority of the key interrelated and interdependent elements of these systems still remain intact within their natural relationships.

The assemblages of biota are of international interest because they preserve the best examples of several evolutionary processes still available as well as contain numerous unique life forms that cannot be duplicated elsewhere.

II. Site Should Have Sufficient Size and Contain the Necessary Elements to Demonstrate the Key Aspects of the Process and to be Self-perpetuating;

and

III. Site Should Contain Those Ecosystem Components Required for the Continuity of the Species or the Objects to be Conserved:

Although introduced plants, invertebrates and vertebrates are becoming nearly ubiquitous, unique Hawaiian biota are still present in assemblages that are intact or nearly intact over considerable acreages -- enough to approach self-perpetuation. The Polynesian cultures with their attendant biotic introductions as well as European/Asian cultures with their past and present impacts have vastly modified much of Hawaii, especially the lowlands. However because of these impacts throughout Hawaii, the remaining native biota in the park becomes all the more valuable to the international community and will only become more so in the future. In Hawaii Volcanoes National Park forests, unique forms illustrating examples of evolutionary processes already receive protection and benefit from active resources management programs designed to reduce deterioration resulting from effects of introduced organisms. This occurs nowhere else in Hawaii, with the exception of Haleakala National Park and in a few smaller areas managed by The Nature Conservancy. Haleakala National Park, as previously pointed out in this nominating paper, was a non-contiguous sister unit to Hawaii Volcanoes for 45 years within Hawaii National Park and contains many equivalent biotic resources.

It is unlikely that what remains of the small dry forest tract in the park's lowlands will be self-perpetuating (WH integrity criterion iii) or sufficiently large (WH integrity criterion ii), although as far as we know, many of the interrelated and interdependent elements (WH integrity criterion i) are present. Protection and management of this vegetation remnant could perpetuate the extant species assemblage or a major portion thereof for a considerable number of years in the future.

At upper elevations in the park [perhaps above 915 meters (or 3000 feet) for most vegetation types], native elements predominate in many large areas of wet and mesic forest, despite the presence of some introduced plants and animals. Park personnel are beginning to concentrate protection and management efforts on the most intact and ecologically important of these areas. It is quite possible that in addition to containing key interrelated and interdependent elements (WH integrity criterion i), some tracts are large enough to demonstrate key natural processes indefinitely and thus be largely self-perpetuating (WH criterion ii).

Special ecosystems in the park that meet all the World Heritage criteria are those on recent lava flows in several areas and those in lava tubes or caves. Here where introduced influences are usually minimal, successional processes are especially unique and worthy of preservation. Thus manipulation strategies in management of these protected areas would be minimal. As with aspects of wet and mesic forests, some of the best examples and most studied biota of their kind in the world exist in Hawaii Volcanoes National Park. The presence of the two active volcanoes -- Mauna Loa and Kilauea -- in the park, assures the continuation of dynamic geological processes leading to new areas for primary and secondary succession of biota in these unique ecosystems. As in mesic and wet forests, new species are still being discovered and there is much to learn which will be of international interest to the scientist, the manager and visitor alike.

The subalpine and alpine ecosystems of Mauna Loa in the park are also of some biological interest. They contain unique species assemblages and are little affected in many areas by introduced organisms. All World Heritage criteria are met here too, except in lower subalpine vegetation where it is necessary to remove feral goats (*Capra hircus*) to permit recovery of native plants. Exclosure studies have shown that once goats are removed, introduced plants can be outcompeted by native species. Active goat management to assure no reentry of the animals in the subalpine vegetation of the park is a continuing maintenance activity.

IV. Area Containing Threatened and/or Endangered Species Should be of Sufficient Size and Contain Necessary Habitat Requirements of the Survival of the Species:

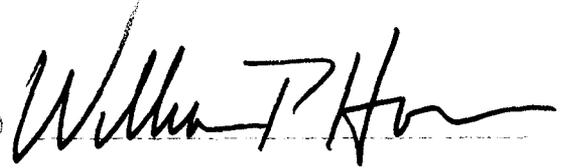
We do not really have enough information on genetic, ecologic, evolutionary, energy flow and nutrient cycling processes to make this statement for many taxa or for systems threatened and/or endangered species. However, we do know that many areas of wet and mesic forest within Hawaii Volcanoes National Park are primary candidate sites for reintroduction of missing ecosystem components [at least those which we are fortunate enough to know about], and important aspect of World Heritage criteria iii and

iv. Such federally endangered species as the following are examples:

Hawaiian goose or Nene	--	<u>Nesochen sandvicensis</u>
'alala	--	<u>Corvus hawaiiensis</u>
'akiapola'au	--	<u>Hemignathus munroi</u>
Hawaii creeper	--	<u>Oreomystis mana</u>
o'u	--	<u>Psittirostra psittaces</u>

These species are at risk in less protected areas outside the park.

Signed (on behalf of State Party)



Full Name William P. Horn

Title Assistant Secretary of the Interior

Date

12/23/85

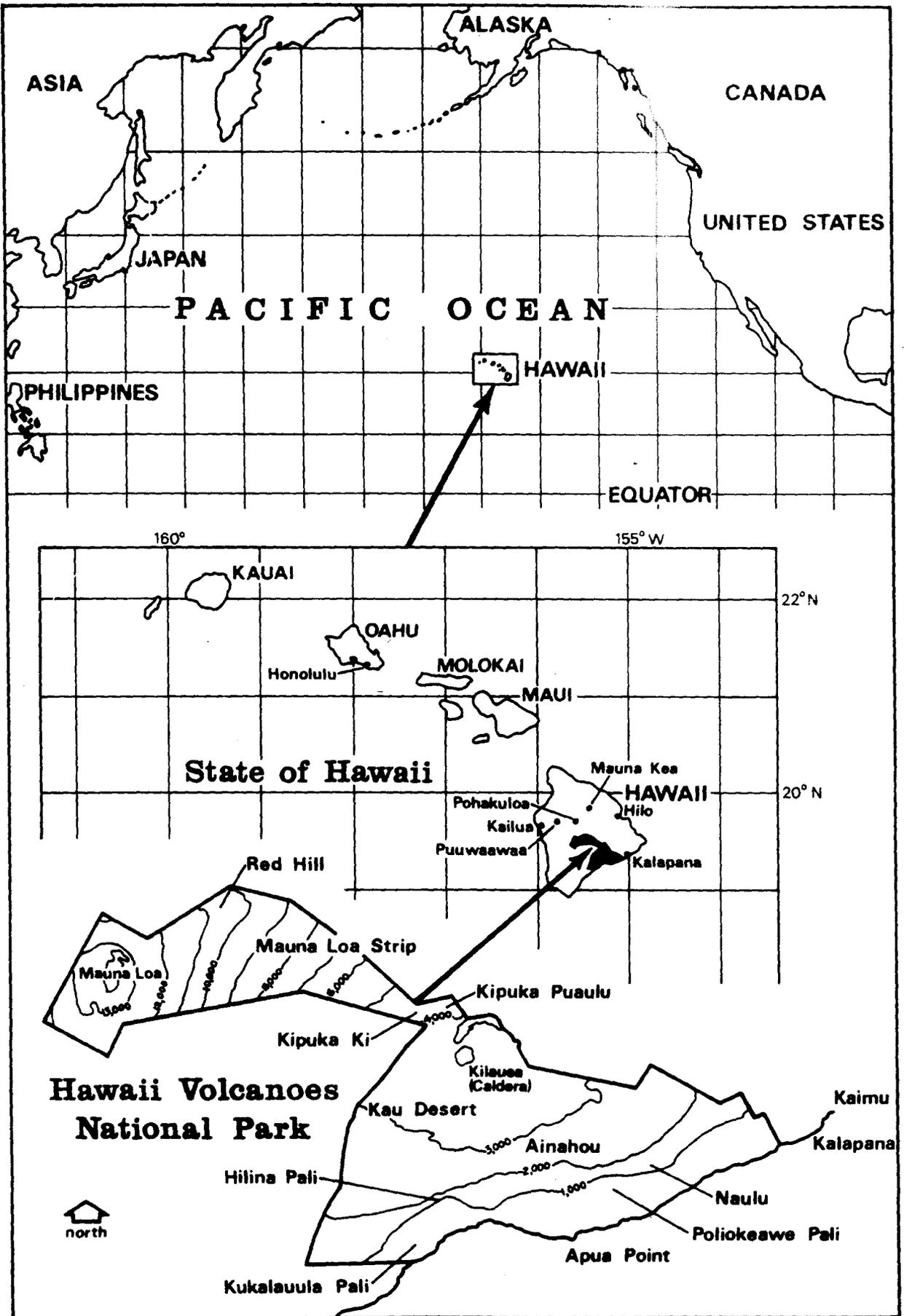


Fig. 7. The location of Hawaii Volcanoes National Park in reference to the State of Hawaii and the Pacific Basin. The Kilauea caldera, approximately circular, is about 3 miles in diameter.

WORLD HERITAGE NOMINATION -- IUCN SUMMARY

409: HAWAII VOLCANOES NATIONAL PARK (USA)

Summary prepared by IUCN (April 1987) based on the original nomination submitted by USA. This original and all documents presented in support of this nomination will be available for consultation at the meetings of the Bureau and the Committee.

1. LOCATION:

Lies in the south-east part of the island of Hawaii, the eastern-most island of the State of Hawaii, and includes the summit and south-east slope of Mauna Loa and the summit and south-western, southern and south-eastern slopes of the Kilauea volcano. The core of the park lies at 19°11'-19°33'N, 155°01'-155°39'W.

2. JURIDICAL DATA:

The national park was created in 1916 by Act of the U.S. Congress. The area of the park was more than doubled as a result of Congressional authorizations in 1922, in 1928 and in 1938. The 'Ola'a Forest Tract was donated in 1951 and 1953. The 'Ola'a Forest Tract, being separated from the core by parcels of private land is, according to Executive Order 1640, not technically part of the national park. The park was accepted as part of the Hawaii Islands Biosphere Reserve in 1980. The national park now covers 87,940ha.

3. IDENTIFICATION:

The park extends from the southern coast, with its volcanic sea cliff headlands to the summit calderas of Kilauea (the most active volcano in the world, with more than 50 recorded eruptions in the last 33 years up to 1985) and Mauna Loa volcanoes. The latter is a massive, flat-domed shield volcano built by lava flow layers and is considered to be the best example of its type in the world extending from 5,581m below sea level to 4,169m above. The climatic gradient is abrupt from east to west resulting in the climate varying with altitude from tropical humid to alpine desert with average temperatures ranging from 22°C at sea level to 7°C at 3,400m and cooler still on the summit of Mauna Loa.

Twenty-three distinct vegetation types have been described for the park, ranging from the very diverse tropical rainforest of 'Ola'a to the scrub and grassland of Ka'u and the alpine tundra of Mauna Loa, grouped into five major ecosystems namely, subalpine, montane seasonal, montane rainforest, submontane seasonal and coastal lowlands. The 'Ola'a Forest tract, over 4,000 ha in size, is probably the largest remaining tract of virgin ohia and fern forest in the Hawaiian Islands. The park also contains remnants of a variety of upland native plant communities, characteristic of pre-18th century colonization habitats. Some of the endemic plant species are confined to a single valley or mountain slope, with native flora numbering 41 species, with a further 40 listed as rare and warranting special attention.

A number of vulnerable, endangered, and rare endemic bird species are present including nene goose, Hawaiian hawk, Hawaiian crow, and three members of the honeycreeper family. Endemic birds recorded from the park include the common 'apane', the scarce 'amakihi', the endangered Hawaiian creeper, the short-eared owl and the Hawaiian thrush.

The park is rich in archeological remains particularly along the coast with native villages, temples, graves, paved trails, canoe landings, petroglyphs, shelter caves, agricultural areas and two major archeological sites.

4. STATE OF PRESERVATION/CONSERVATION:

Management is carried out in accordance with a master plan and a natural resources management plan. The park is divided into three land-use zones: primary use zone for concentrated visitor use, wilderness threshold zone, and back country zone, the largest and least-used zone. Hunting of wild pigs (and goats) by local residents is permitted and control methods including fencing, baiting, trapping, snaring and hunting have resulted in reduced foraging impacts in a 4,000 ha area of the park. Mongooses, cats, dogs, and several species of alien birds and insects continue to disrupt native ecosystems. Heavy browsing by goats still denudes the landscape of shrubs and prevents regeneration of many native plant species.

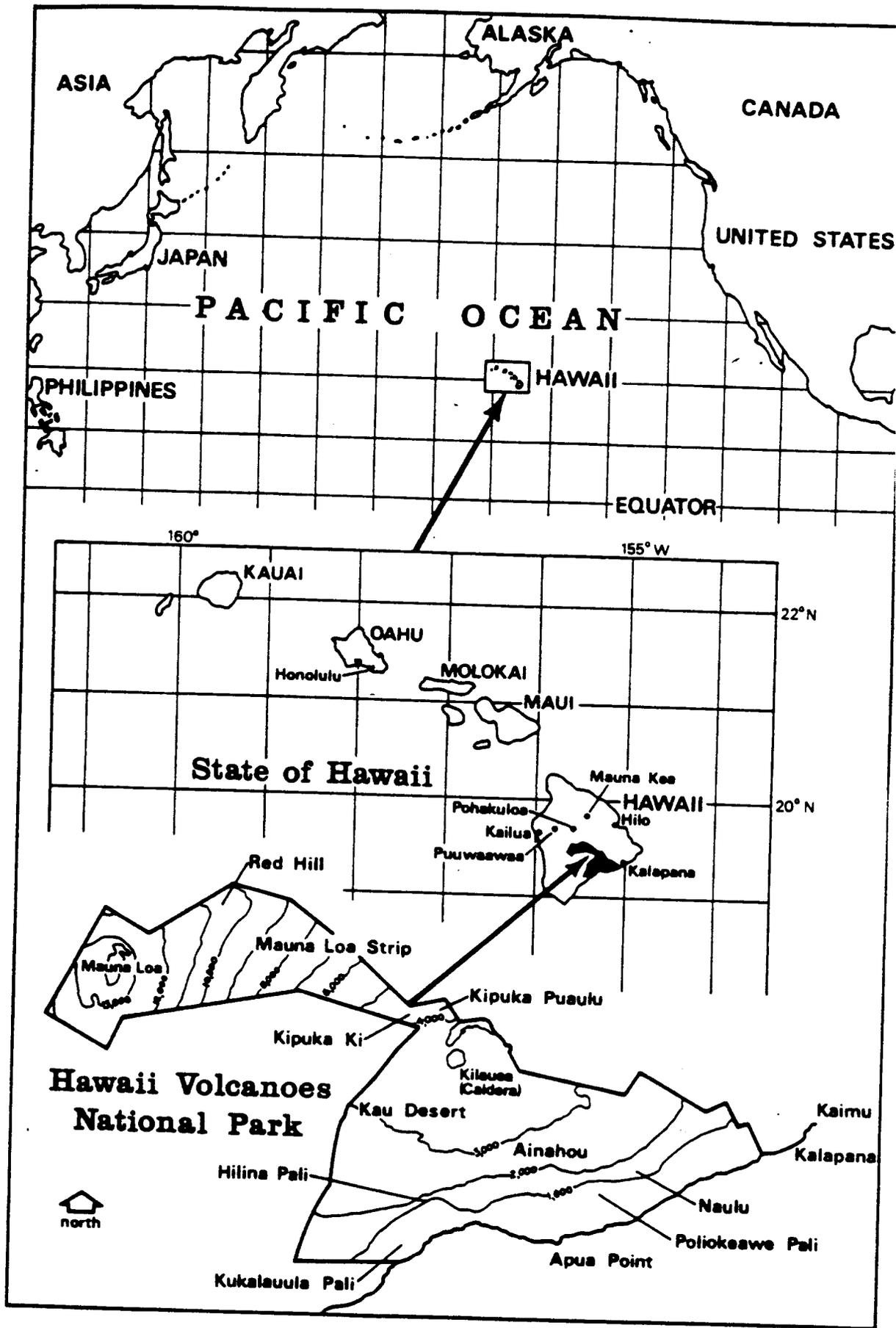
There is a volcanic geological research programme, directed by US Geological Survey scientists based at the Hawaiian volcano Observatory which was founded in 1912 on the rim of the Kilauea Caldera. Mauna Loa and Kilauea are the most studied and best understood volcanoes in the world. Staff positions include Management Ecologist, Park Interpreter, Research Scientist and Archeologist.

5. JUSTIFICATION FOR INCLUSION ON THE WORLD HERITAGE LIST:

The Hawaii Volcanoes National Park nomination, as presented by the Government of USA provides the following justification for designation as a World Heritage property:

a) Natural property

- (i) Earth's Evolutionary History. The site is a unique example of island building through on-going volcanic processes. It also contains excellent examples of biotic successional stages following volcanic activity.
- (iii) Exceptional Natural Beauty. The park's landscape contains dramatic volcanic sea cliffs, a huge summit caldera plus a range of volcanic features such as lava tubes, pit craters, and caves.
- (iv) Habitat of Rare and Endangered Species. The park has a small area of some of the most pristine dry forest remaining in the Hawaiian Islands. There are several endangered birds and rare plant species.



The location of Hawaii Volcanoes National Park in reference to the State of Hawaii

409 HAWAII VOLCANOES NATIONAL PARK (USA)

1. DOCUMENTATION

- (i) IUCN Data Sheet
- (ii) Consultations: B. Cahn, G. Stankey, A. Holt, R. Dasmann, L. Hamilton, O. Hamann
- (iii) Additional Literature Consulted: C.P. Stone and J.M. Scott, 1985, Hawaii's Terrestrial Ecosystems: Preservation and Management
- (iv) Site visit: 1984

2. COMPARISON WITH OTHER SITES

There are 6 protected areas in the Hawaiian Islands over 10,000 ha. in size. The Hawaii Volcanoes National Park is by far the largest and has the most volcanic features. The Kilauea crater in the Park is one of the most studied volcanic sites in the world having a Geological Station since 1912. Kilauea is also the most active large volcano in the world erupting more than 50 times in the last 34 years. Mauna Loa is in fact the greatest volcanic mass on earth rising from the ocean floor with a relief 600m. higher than Mt. Everest. Additionally, Mauna Loa is recognised as one of the best examples of a shield volcano in the world.

Most of the Park's volcanic features (sea cliffs, calderas, lava tubes, etc.) are also found on other volcanic islands such as the Canaries or Iceland. The biological succession processes are similar to other sites as well except for the many endemic Hawaiian species that are found in the Park.

In summary, the Hawaii Volcanoes National Park is the most exceptional protected area in the Hawaiian Islands both in terms of its volcanic display and its species assemblage. Scenically, it is less spectacular than a number of other volcanoes and it is primarily distinguished by its size and level of activity.

3. INTEGRITY

Like all natural areas in Hawaii the Park has been subject to considerable biological alteration since man's arrival so that it displays numerous evidence of human disturbance. Direct removal or alteration of native forest for growing sugar, pineapple plantations, ranching and logging, has altered the native biota of the forest habitats, particularly at low and middle elevations. Ranching activities and the introduction of species such as the pig Sus scrofa (4,000 at a density of 30-50 pigs per square kilometre), goat Capra hircus (previously 15,000-20,000 now 10 individuals within marked areas) and mongoose Herpestes auropunctatus have had serious biological consequences, including destruction of native ecosystems and widespread extinction of endemic species. Pockets of standing water, created by the wallowing of the feral pigs, provide breeding places for mosquitos, resulting in serious avian malaria. The spread of non-native plant species is also attributed to dispersion by the feral pigs. Mongooses, cats, dogs and several species of alien birds and insects continue to disrupt native ecosystems. Heavy browsing by goats still denudes the landscape of shrubs and prevents regeneration of many native plant species.

All of these problems are being addressed in the context of the national resources management plan. The control programs undertaken on the basis of solid scientific research have been a model for removal of alien animals and plants (including illegal narcotics) on oceanic islands. Threats from geothermal development on adjacent lands and the intrusiveness of helicopter overflight have also been reduced through political action. A land exchange has now been authorized that will add 2,300 ha. to the Park.

4. ADDITIONAL COMMENTS

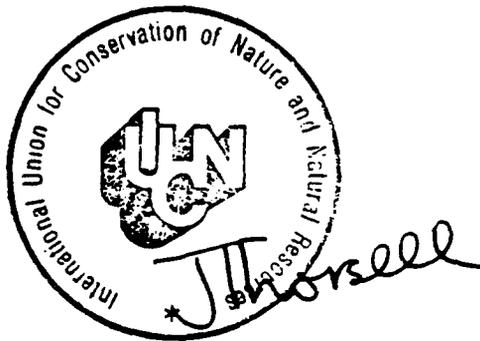
The cultural milieu in which the 'goddess of the volcano' plays an important spiritual part in the legends of the local people, is a strong component in management of the Park.

5. EVALUATION

What is most outstanding about the Hawaii Volcanoes National Park is the significance of the on-going geological processes that are so easily observed there. As one of the world's most active volcanoes it serves as an excellent example of island building through volcanic processes. It has been an exceptionally productive area for science and has developed research procedures that are now standard world-wide. It, therefore, clearly meets Criteria (ii) of the Convention. The Park's values on the basis of Criteria (i) and (iii) are less evident and its biological values, though significant, are secondary to its overall theme of active vulcanism.

6. RECOMMENDATION

The Hawaii Volcanoes National Park should be added to the World Heritage List. The Park authorities should be encouraged to continue their commendable work in geological research and control of exotic species.



UNITED STATES OF AMERICA-Hawaii Volcanoes National Park

UNITED STATES OF AMERICA - Hawaii

NAME Hawaii Volcanoes National Park

IUCN MANAGEMENT CATEGORY II (National Park)
IX (Biosphere Reserve)
X (World Heritage Site)

BIOGEOGRAPHICAL PROVINCE 5.03.13 (Hawaiian)

GEOGRAPHICAL LOCATION Lies in the south-east part of the island of Hawaii (Big Island), the easternmost island of the State of Hawaii, and includes the summit and south-east slope of Mauna Loa and the summit and south-western, southern, and south-eastern slopes of the Kilauea Volcano. The core of the park lies at 19°11'-19°33'N, 155°01'-155°39'W; the 'Ola'a Tract, to the north-east is centered on 19°29'N, 155°15'W.

DATE AND HISTORY OF ESTABLISHMENT Hawaii National Park, created on 1 August 1916 by Act of the US Congress (39 Stat. 432), consisted of two units each on different islands, one on Hawaii Island and the other on Maui Island. The area of the park was more than doubled as a result of Congressional authorisation in 1922 (45 Stat. 503), in 1928 (45 Stat. 424) and in 1938 (52 Stat. 781). The 'Ola'a Forest Tract was donated in 1951 and 1953 (Executive Order #1640). The park was split into Hawaii Volcanoes National Park (on Hawaii Island) and Haleakala National Park (on Maui Island) in 1961 (75 Stat. 577). Hawaii Volcanoes National Park is protected under 16 U.S.C. 1 (National Park Service Organic Act) and under the terms establishing the park as set out in 16 U.S.C. 395b, and under several sections of 16 U.S.C. 391-396a. Hawaii Volcanoes and Haleakala national parks were accepted as MAB Biosphere Reserves in 1980, and combined to form one cluster, Hawaiian Islands Biosphere Reserve, in April 1983. Hawaii Volcanoes National Park is under consideration for inscription on the World Heritage list.

AREA 92,964ha (June 1987). The biosphere reserve designation covers 92,934 ha.

LAND TENURE The park was created from federally-owned land donated by the State of Hawaii, while the Congressional Act of 1930 (46 Stat. 227) gave exclusive legal jurisdiction to the Federal government. The Act of 1920 (41 Stat. 452) authorised the acquisition of privately-owned land and rights of way. The owner is the United States Department of the Interior, Washington, DC and protective custody remains with the National Park Service (NPS). The 'Ola'a Forest Tract, being separated from the core by parcels of private land, is, according to Executive Order #1640, not technically part of the national park. A land exchange, authorised by Congress and now in progress, will add 2,300 ha to the national park. This covers the private land tract. The 'Ola'a Forest Tract is now apparently out of private ownership.

ALTITUDE From sea level to 4,170m

PHYSICAL FEATURES The park extends from the southern coast to the summit calderas of Kilauea and Mauna Loa volcanoes. Mauna Loa is a massive, flat-domed shield volcano built by lava flow layers and is considered to be the best example of its type in the world. It extends from 6,096m below sea level to 4,103m above. These are among the world's most active volcanoes and exhibit constantly changing features especially from the two principal rift zones featuring extensive recent flows. Since 1969 new flows have spread to 78 sq. km of the park and added more than 81ha of new land to the island.

This activity continues. An unusual feature in the park is an area which has sunk 3.4m into the sea as a result of an earthquake several years ago. The Halemaumau fire pit was a continuously active lava lake into the early 1900s and others existed along the East Rift. Eruptive activity, which began in January 1983 in the East Rift Zone, continues at frequent intervals and has produced extensive new lava flows and a 300m high cinder cone.

CLIMATE The weather is dominated by north-east trade winds. Windward mid-slopes receive a mean annual rainfall of 3810mm, and leeward areas receive only 10% of that amount. Such extremes of annual average precipitation produces dramatic climatic and life-zone gradients. Annual average temperatures range from 22°C at sea level to 7°C at 3,400 m. The summit of Mauna Loa is cooler still.

VEGETATION The park contains a high diversity of plant communities with striking life-form and physiognomic differences. Doty and Mueller-Dombois (1966) have identified 23 distinct vegetation types in 5 major ecological zones, varying from rain forest to desert scrub and coastal strand to alpine. The spectrum of environments occurring in the tropics, from persistently to seasonably wet, to dry are found in Hawaii, and account for the vegetative diversity. The range of environments results from temperature and moisture gradients associated with elevation and exposure differences. Volcanism enhances vegetative diversity, resulting in a mosaic of successional and climax stages in all park environments.

Endemism rates in flowering plants are extraordinarily high (95%) because of geographic isolation. Characteristic of islands, the flora is impoverished relative to continental areas, with greatest diversity in rain forest and lowest diversity in desert or alpine scrub. Similar to other islands, ferns constitute a significant portion of the native flora, with tree fern-dominated rain forest reaching its highest development in Hawaii in and adjacent to the park. With imperfect isolation mechanisms and active speciation, species lines within many genera are difficult to draw, presenting challenges for evolutionary biologists and systematists in Hawaii.

Introduced plants, stimulated and dispersed by introduced ungulates, have invaded all plant communities. The park's flora contains nearly twice as many non-native flowering plants as native ones. Although some plant communities, especially those below 600m have been significantly impacted

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by introduced plants, others, particularly those above 1,500m, are essentially native. A significant portion of the park's flora is threatened by ungulates, introduced plants and wildfire. There are 41 candidate endangered species, with an additional 40 species considered to be rare, comprising 30% of the flowering plant flora of the park. Although several introduced plant species threaten to seriously disrupt native plant communities, control programs are underway throughout the park for 41 localised species and in selected areas for five widespread species.

A checklist of vascular plants has been compiled (Higashino, et al., 1988).

FAUNA Animal life is characterised by paucity of forms and by scarcity of native species. Except for a single species of bat Hawaiian hoary bat Lasiurus cinereus semotus (I), native mammalian forms are absent. Little is known to date about invertebrate forms. Avian forms present interesting and significant examples of adaptive radiation and of extinction. Most endemic avian species are rare or endangered. Species which are formally listed in the US as threatened include Hawaiian goose (nene) Branta sandwichensis (V), a terrestrial non-migratory goose; Hawaiian hawk, (io) Buteo solitarius (R); four honeycreepers; the akepa Loxops coccinea (R); the akiapola'au Hemignathus munroi (V); the o'u Psittirostra psittacea (E); and Hawaiian creeper Oreomystis mana; Hawaiian dark-rumped petrel Pterodroma phaeopygia sandwichensis (R); and short-eared owl (pueo) Asio flammeus sandwichensis. Other endemic species include Hawaiian thrush (omao) Phaeornis obscurus; and four honeycreepers, the apapane Himatione sanguinea, elepaio Chasiempis sandwichensis, amakihi Hemignathus virens and iiwi Vestiaria coccinea. Introduced pigs, cats, mongooses, dogs, birds, and innumerable invertebrates have colonized parts of the park environment.

CULTURAL HERITAGE The park is rich in remains (88,654ha are included in Puna-Ka'u Historic District) and particularly so along the coast with native villages, heiaus (temples), graves, paved trails, canoe landings, petroglyphs, shelter caves, agricultural areas and two major archeological sites: Waha'ula Heiau ruins (constructed in 1275) and the Pu'u Loa Petroglyph Field, at 0.2 ha being the largest concentration of "rock carvings" in the park and representing early Hawaiian culture. Following the arrival of Captain James Cook in 1778-79, Christian influences started in or around 1823, with churches and schools built and the introduction of cattle, goat, and pulu (tree-fern product) harvesting and the encouragement of visitors. Extensive ruins of stone structures dating back to the time of Pa'ao (a high priest) in 1275 are present.

LOCAL HUMAN POPULATION No information

VISITORS AND VISITOR FACILITIES Mauna Loa was first climbed in 1794 and as a result of descriptions written in 1823, Kilauea Volcano had by 1840 become a tourist attraction. The first Volcano House was constructed in 1866 and successive structures were built in 1877, 1893, and 1941 to serve volcano watching visitors. The 1877 construction is now used as the Volcano Art Center, the 1941 construction is the park's only hotel. Present day facilities include the Volcano House and two campgrounds.

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Hiking and fishing are two of the major activities.

SCIENTIFIC RESEARCH AND FACILITIES The park was previously used as a natural arboretum and a centre for developing both native plant and tree nurseries and native seed sources, but the present policy is for a reduction in threats from non-native elements and unaided natural processes, and in fact there has been intensive study of native recolonisation and successions following eruptions.

There are programmes for the monitoring of feral goat, feral pig, and native Hawaiian goose movement through the use of radio transmission collars and radio telemetry. The US Fish and Wildlife Service is studying limiting factors for endangered birds. Birds are reared and released from pens outside the park, a program undertaken in cooperation with the Hawaii Department of Land and Natural Resources. In addition, there are several vegetation plots with transects and three quality monitoring stations. The University of Hawaii, together with park staff, are studying non-native plants and animals, methods of their control and the restoration of native species. The next three five-year research programmes will concentrate on the integration of herbicidal and other control methods, long-term monitoring of effects on native plant species (and alien communities) and new herbicidal testing.

The US Fish and Wildlife Service, the US Forest Service, and the NPS are studying endangered birds, and there is a proposal to translocate the akiapola'au into the koaohia forest of the Mauna Loa section of the park. The University of Hawaii, together with park staff, are studying exotic plants and animals and methods of their reduction and the restoration of native species and many of the International Biological Program island ecosystem studies were based here.

The US Geological Survey's Hawaiian Volcano Observatory, founded in 1912 on the rim of the Kilauea Caldera, and the Hawaii Field Research Center, which includes the University of Hawaii, the National Park Service, the US Fish and Wildlife Service, and the US Forest Service programs, are situated in the park. There is a volcanic geological research program and Mauna Loa and Kilauea are the most studied and best understood volcanoes in the world. The observatory has trained most of the volcanic scientists in the world and developed research techniques that are now standard procedure. Research conducted here has contributed to understanding of island building through volcanic processes.

The park maintains six weather stations which measure air temperature, rainfall, wind speed, wind direction, and relative humidity, and six other stations monitoring rainfall.

CONSERVATION VALUE The park is managed to preserve its outstanding scenic, geological, and biological values and to ensure its availability for public use and enjoyment.

CONSERVATION MANAGEMENT The construction of goat and pig fencing, control of feral pigs in newly fenced units and the maintenance of these structures

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are the top three priorities. Feral pig control is conducted in 140ha to 1,900ha fenced units in 1989, 8,000ha of closed canopy rain forest and montane woodlands had been cleared of pigs. The other important management goal is controlling non-native species and active management to reduce the negative effects of invasions by feral ungulates and alien plants, especially in relatively intact ecosystems. Taking of wild pigs and goats by local residents is permitted and control methods including fencing, baiting, trapping, snaring and hunting have resulted in improved conditions in 4,000ha of the park. There are mammal control efforts in the petrel colonies in the park. Widespread alien species control is, however, restricted by current or expected staffing and funding levels. A modest plant control research programme has produced safe, cost-effective herbicidal control methods for five alien species in near-native ecosystems.

For administrative purposes the park is divided into two segments; the summits and parts of the flanks of volcanoes Mauna Loa and Kilauea covering 84,033ha; and the 'Ola'a Forest Tract, containing 3,907ha, the latter separated from the major sector by several small parcels of private land, although a land exchange has been authorised by Congress and is in progress. The tract is managed for conservation and its protection status is enhanced under the auspices of the Department of Natural Resources. Act of Congress formally designated 57% as Wilderness lands (P.L. 95-625). The park is divided into three land use zones: primary use zone for concentrated 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, comprising 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 zone. Commercial development, resources exploitation, hunting, gathering, off-road moterized vehicles, burning, etc. are prohibited. There is a special emphasis on the delineation, study and management of Special Ecological Areas. These are areas largely intact, representing important ecosystems, containing rare and/or diverse components, which are manageable and are of educational potential.

Threats from geothermal development on adjacent lands and the intrusiveness of helicopter overflights have been reduced through political pressure.

MANAGEMENT CONSTRAINTS Introduced plants and animals have affected all sections of the park. Most severe disturbance has been in the semi-arid lowland and mid-elevation areas; least impact has been in the uplands. Introduced pigs and goats stimulated massive disruptions and removal of natural vegetation. Direct removal or alteration of native forest for sugar and pineapple plantations, ranching and logging have altered the native biota of the forest habitats, particularly at low and middle elevations of the Hawaiian Islands. These have been most impacted and the prospects for restoration are least encouraging. However, other areas are recovering and studies show that exotics can be controlled and biological integrity restored. Ranching activities and the introduction of species such as the pig Sus scrofa (4,000 at a density of 30-50 pigs per sq. km) and goat Capra hircus have been largely eliminated from the park's lowlands.

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by fencing park boundaries, construction of barrier fences and by organising hunts. Heavy browsing by goats denuding the landscape of shrubs and preventing regeneration of many native plant species was particularly serious in the early 1970s when high population had built up in the drier coastal and high mountain sections despite long-term reduction efforts. Goats then numbered between 15,000 and 20,000 but are now limited to only 10 individuals within marked areas and a total of 100 animals residing in the park. Exotic mongoose Herpestes auropunctatus has had a serious biological impact, including destruction of native ecosystems and widespread extinction of endemic species. Argentine ant Iridomyrmex humilis is a pest (especially around human settlements) and is spreading in native ecosystems. Black rat Rattus rattus and Norway rat R. norvegicus are also found in the park.

Pox and malaria disease reservoirs in domestic birds is an added threat. Pockets of standing water, created by the wallowing of feral pigs, provide breeding places for mosquitos, resulting in serious avian malaria.

All major ecological zones have alien plant problems. Approximately 600 non-native plant species occur in the park and at least 40 of these are known to invade native ecosystems. The spread of non-native plant species is also attributed to dispersion by feral pigs, and to cohort die-back in which large areas of dead trees are subject to invasion by alien species, a situation particular to 'ohi'a. Those species currently being controlled in special ecological areas include Psidium cattleianum, Hedychium gardnerianum, Linociera ligustrina, and Tropaeolum majus. Other ubiquitous aliens include Pennisetum setaceum and Myrica faya.

STAFF In 1987 there were 10 permanent staff on resource management/research and about 20 permanent less than full time, 39 seasonal and 50 members from the Young Adult Conservation Corps (YACC). Individual positions include Management Ecologist, Chief Park Interpreter, Research Scientist, and Pacific Area Archaeologist.

BUDGET The park received an annual base budget of US\$ 2.5 million in 1991. Additional biological research programme was about US\$ 500,000 (1990) and cultural research programme was US\$ 110,000 (1990).

LOCAL ADDRESSES

Superintendent, Hawaii Volcanoes National Park, P O Box 52, Hawaii National Park, Hawaii 96718

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DATE 1980, revised August 1986, February 1987, June and November 1987, February 1991

DOCUMENT 0005U

409. PARC NATIONAL DES VOLCANS DE HAWAÏ (ETATS-UNIS)

Résumé préparé par l'UICN (avril 1987) d'après la désignation d'origine soumise par les Etats-Unis. L'original et tous les documents présentés à l'appui de cette désignation seront disponibles pour consultation aux réunions du bureau et du comité.

1. SITUATION:

Situé au sud-est de l'île d'Hawaï, qui est l'île la plus orientale de l'Etat d'Hawaï, le parc comprend le sommet et le versant sud-est du Mauna Loa, et le sommet et les versants sud-ouest, sud et sud-est du volcan Kilauea. Le centre du parc se situe à 19°11'-19°33'N, 155°01'-155°39'O.

2. DONNEES JURIDIQUES:

Le parc national a été créé en 1916 par une loi du Congrès américain. Sa superficie a plus que doublé par suite d'autorisations du Congrès datant de 1922, 1928 et 1938. La forêt de 'Ola'a fut acquise par des dons faits en 1951 et 1953. Séparée du coeur du parc par des zones privées, elle ne fait techniquement pas partie du parc national, comme le stipule l'ordre exécutif (Executive Order) 1640. Le parc a été accepté en 1980 comme réserve de la biosphère. Il couvre actuellement 87 940 ha.

3. IDENTIFICATION:

Le parc s'étend des falaises de la côte sud aux caldérans du Kilauea (volcan le plus actif du monde avec plus de 50 éruptions de 1952 à 1985), et au Mauna Loa. Ce dernier est un immense dôme de lave aplati construit sur des couches de lave successives, c'est le meilleur exemple au monde de ce type de volcan - il s'enracine à 5581 m sous le niveau de la mer et s'élève à 4169 m au-dessus. Avec un gradient climatique abrupt d'est en ouest, le climat varie en altitude du climat tropical humide au désert alpin, avec des températures moyennes de 22° au niveau de la mer à 7° à 3400 m, et plus fraîches encore au sommet de Mauna Loa.

Vingt-trois types de végétation distincts ont été décrits dans le parc, de la forêt tropicale humide très diverse de 'Ola'a, à la broussaille et aux prairies de Ka'u, ou la toundra alpine de Mauna Loa. L'on y distingue ainsi cinq grands écosystèmes, à savoir subalpin, saisonnier montagnard, forêt humide de montagne, saisonnier submontagnard, et plaine côtière. La forêt d'Ola'a, de plus de 4000 ha, est la plus grande forêt vierge d'ohias et de fougères des îles Hawaï. Il y a également dans le parc plusieurs communautés indigènes de plantes d'altitude caractéristiques des habitats d'avant la colonisation de l'île au 18e siècle. Certaines plantes endémiques n'existent que dans une seule vallée ou sur un seul versant. On dénombre 41 espèces indigènes, tandis que 40 autres sont considérées comme rares ou nécessitant une attention particulière.

On rencontre dans le parc plusieurs espèces aviennes rares, menacées ou vulnérables, dont l'oie néné, le faucon d'Hawaï, le corbeau d'Hawaï, et trois espèces de la famille des oiseaux-sucriers. Parmi les oiseaux endémiques du parc, il y a l'"apane" commun, et le rare "amakihi", oiseau-sucrier d'Hawaï, le hibou à oreilles courtes et la grive d'Hawaï.

Le parc est riche en ruines archéologiques, notamment le long de la côte où se trouvent des villages indigènes, des temples, des tombes, des sentiers pavés, des débarcadères pour canoes, des pétroglyphes, des grottes, des zones agricoles et deux grands sites archéologiques.

4. ETAT DE PRESERVATION/CONSERVATION:

La gestion s'appuie sur un plan de gestion général et un plan de gestion des ressources naturelles. Le parc est divisé en trois zones selon l'utilisation: Une zone axée sur le tourisme, une zone tampon sauvage, et une zone d'arrière-pays, la plus vaste et la moins utilisée. La chasse aux cochons sauvages et aux chèvres est autorisée pour les résidents, la chasse, la mise en place de barrières, la pose d'appâts, de pièges et de collets ont permis de réduire la destruction du couvert végétal sur 4000 ha du parc. Mangoustes, chats, chiens, et plusieurs espèces d'oiseaux et d'insectes continuent de perturber les écosystèmes indigènes. Les chèvres continuent de dénuder le paysage de broussaille et empêchent la régénération de nombreuses plantes indigènes.

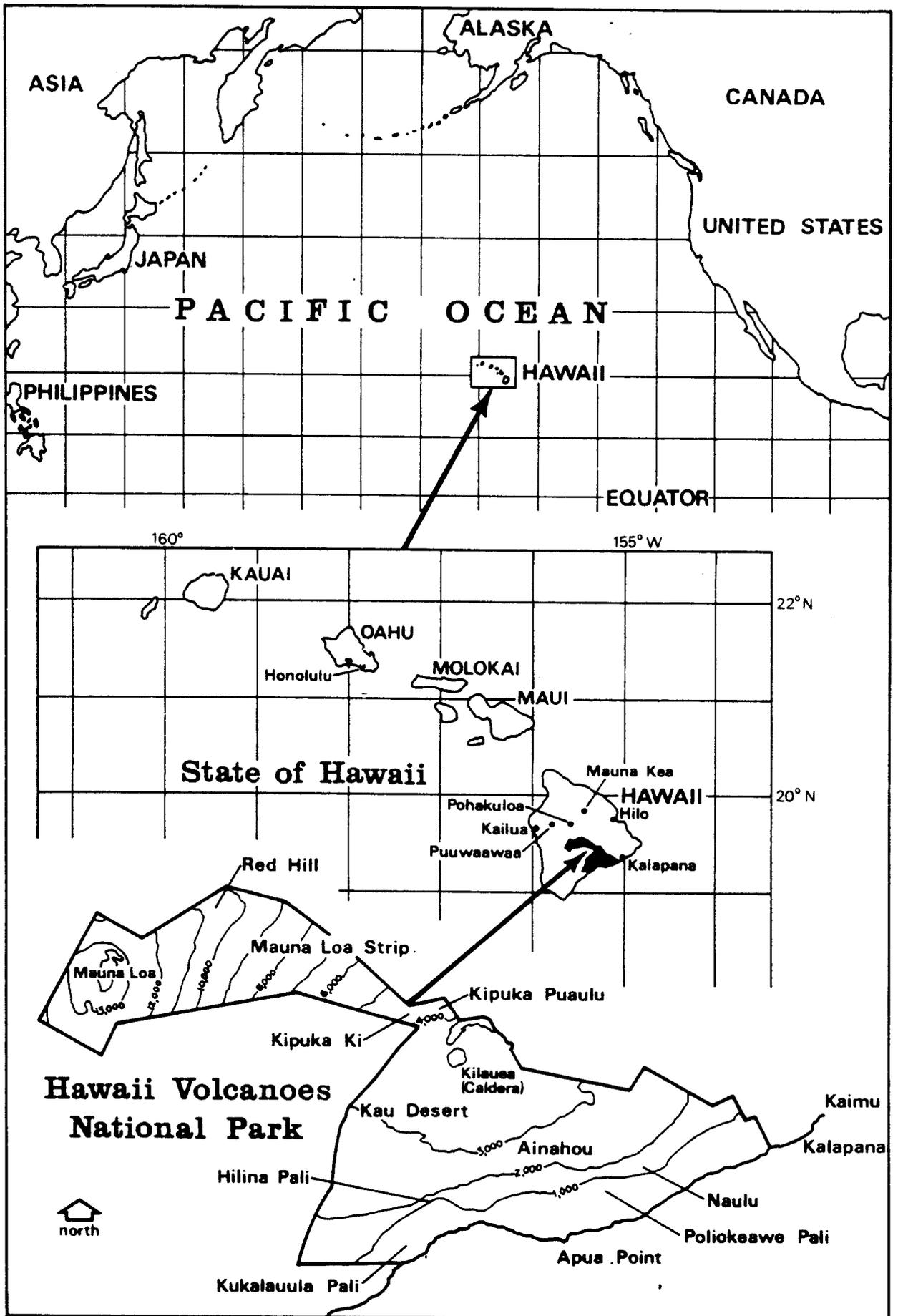
Des scientifiques effectuent un programme de recherche en géologie volcanique dans le cadre de l'Etude géologique américaine (US Geological Survey), à l'observatoire des volcans d'Hawaï fondé en 1912 au bord de la caldera du Kilauea. Les volcans de Mauna Loa et Kilauea sont les mieux étudiés et les mieux connus du monde. Un écologiste gestionnaire, un guide-interprète, un chercheur et un archéologue font partie du personnel du parc.

5. RAISONS JUSTIFIANT LA DESIGNATION POUR LA LISTE DU PATRIMOINE MONDIAL:

Pour justifier la désignation du Parc national des volcans de Hawaï (Etats-Unis) en tant que bien du patrimoine mondial, le Gouvernement américain a donné les raisons suivantes:

a) Bien naturel

- (i) Evolution géologique de la Terre. Ce site est un exemple unique de formation de l'île par un processus volcanique en cours. Il contient d'excellents exemples de stades biotiques successifs suivant l'activité volcanique.
- (iii) Nature d'une beauté exceptionnelle. Le parc offre un paysage grandiose de falaises volcaniques, d'énormes calderas et divers traits volcaniques tels que des orgues, des cratères et des grottes.
- (iv) Habitat d'espèces rares ou menacées. Il y a dans le parc une petite région de forêt sèche primaire parmi les dernières des îles Hawaï. Il y a plusieurs oiseaux menacés et plantes rares.



The location of Hawaii Volcanoes National Park in reference to the State of Hawaii

409 PARC NATIONAL DES VOLCANS D'HAWAÏ (ETATS-UNIS)

1. DOCUMENTATION:

- (i) Fiches de données de l'UICN
- (ii) Consultations: B. Cahn, G. Stankey, A. Holt, R. Dasmann, L. Hamilton, O. Hamann
- (iii) Littérature consultée: C.P. Stone and J.M. Scott, 1985, Hawaii's Terrestrial Ecosystem: Preservation and Management
- (iv) Visite du site: 1984.

2. COMPARAISON AVEC D'AUTRES AIRES:

Il y a six aires protégées de plus de 10 000 ha aux îles Hawaï. Le Parc national des Volcans d'Hawaï est de loin le plus vaste et le plus volcanique. Le cratère du Kilauea, dans le parc, est l'un des sites volcaniques parmi les plus étudiés du monde, une station géologique s'y trouve depuis 1912. Le Kilauea est le plus grand volcan actif du monde, avec plus de 50 éruptions en 34 ans. Le Mauna Loa est en fait la plus énorme masse volcanique qui soit: sa hauteur totale, en partant du fond de l'océan, dépasse de 600 m celle de l'Everest. Le Mauna Loa est un des meilleurs exemples de volcan bouclier.

La plupart des traits volcaniques du parc (falaises, calderas, orgues, etc.) se retrouvent dans d'autres îles volcaniques telles que les Canaries ou l'Islande. Les phénomènes de successions biologiques sont les mêmes qu'ailleurs, mais le parc compte de nombreuses espèces endémiques d'Hawaï.

En résumé, le Parc national des Volcans d'Hawaï est l'aire protégée la plus exceptionnelle d'Hawaï, tant par son volcanisme que par sa faune. Son paysage est moins spectaculaire que celui qu'offrent d'autres volcans, dont il se distingue surtout par la taille et l'activité.

3. INTEGRITE:

Comme toutes les régions naturelles d'Hawaï, le parc a subi une altération biologique considérable depuis l'arrivée de l'homme et il porte de nombreuses marques de perturbations. A basse et moyenne altitudes notamment, la flore originales des biotopes forestiers a été modifiée par le défrichement ou par des plantations de canne à sucre et d'ananas, par l'abattage et l'élevage en ranchs. L'élevage et l'introduction d'espèces telles que le porc Sus scrofa (400 têtes, avec une densité de 30 à 50 bêtes au km²), la chèvre Capra hircus (autrefois 15 000 à 20 000, maintenant 10 animaux dans des zones marquées) et la mangouste Herpestes auropunctatus, ont des conséquences biologiques graves, notamment la destruction des écosystèmes originaux et l'extinction des espèces endémiques. Des flaques d'eau croupissante, qui servent de bauges aux cochons sauvages, permettent le développement des moustiques vecteurs de la malaria avienne. Les porcs sont également à l'origine de la dispersion d'espèces végétales non natives. Les mangoustes, les chats, les chiens et plusieurs espèces d'oiseaux et d'insectes étrangers continuent de perturber les écosystèmes indigènes. Les chèvres, par leur broutage, continuent de dépouiller la région de sa végétation de buissons, et empêchent la régénération de bon nombre d'espèces végétales indigènes.

Le plan national de gestion des ressources tente de résoudre tous ces problèmes. Les programmes de lutte contre les animaux et les plantes non indiennes (y compris les plantes narcotiques illégales) dans les îles

océaniques, entrepris sur la base de solides études scientifiques, sont un modèle du genre. L'action politique a permis de réduire les menaces que faisaient courir le développement thermique sur les terres voisines du parc, et les vols par hélicoptère. Un échange de terres a été autorisé, qui ajoutera 2300 ha au parc.

4. COMMENTAIRES ADDITIONNELS:

Le milieu naturel dans lequel la "déesse du volcan" joue un rôle spirituel important dans les légendes locales, est un important élément de la gestion du parc.

5. EVALUATION:

Ce qu'il y a de plus remarquable dans le Parc national du Volcan d'Hawaï, est l'importance des phénomènes géologiques qui s'y déroulent, et que l'on peut si facilement observer. Comme le volcanisme y est extrêmement actif, c'est un excellent exemple d'île édiflée par le volcanisme. C'est une région exceptionnelle pour la science; l'on y a mis au point des méthodes de recherche qui sont maintenant classiques. L'aire satisfait donc au Critère (ii) de la convention. L'intérêt du parc selon les Critères (i) et (ii) est moins évident; sa valeur biologique, quoiqu'importante, passe après le volcanisme actif.

6. RECOMMANDATIONS:

Le Parc national des Volcans d'Hawaï devrait être inscrit sur la Liste du patrimoine mondial. Il convient de féliciter les autorités du parc pour leur travail de recherche géologique et de lutte contre les espèces exotiques, et de les encourager à le poursuivre.