Minimum Requirements Alternative

This alternative proposes minimal changes in the present management and visitor use at Kaloko-Honokōhau. Actions to be carried out under this alternative are limited to those necessary to meet the requirements of the park's authorizing legislation for the protection of cultural and natural resources, providing visitor services and for addressing the health and safety concerns of visitors. Park development for visitor use and interpretation is to be carried out, but at a lower level than under the proposal. Access to the park from the Queen Ka'ahumanu Highway is to be developed in the same manner as in the proposal. Minimal facility development is to be carried out on-site for visitor services. Only a few new services and interpretive programs would be provided. Moderate increases in personnel would be required to implement this alternative. Capital investments for the design and construction of a park infrastructure for visitor use, management, and resource protection will meet minimum requirements.

Park Development and Access. This alternative proposes the construction of a modest visitor center, including parking, as a primary contact point. Its location is to be the same as the proposal, on the disturbed part of the *'a'ā* flow adjacent to the highway. The visitor center proposed under this alternative is to be similar in size, design, and layout to the existing one at nearby Pu'uhonua o Hōnaunau National Historical Park. Structures here are to consist of public rest rooms, an interpretation office facility, outdoor exhibits, and an amphitheater. The interpretive facility is to consist of an open park information/cooperating association sales counter, an office and storage area. Outdoor exhibits are proposed nearby and would consist of a series of wall panels placed along a covered, paved walkway. The covered amphitheater is to be nearby. A covered viewing deck is proposed on top of the *'a'ā* lava flow connected to the visitor center by stairways.

Visitor parking is to be developed adjacent to the visitor center. Under this alternative, the parking lot to be constructed will be the same as in the proposal with a capacity for about 200 to 250 vehicles. There is to be no parking developed at Ala'ula cove.

Under this alternative, visitor orientation is to occur outdoors and would consist primarily of receiving a park brochure and a brief introduction to the park from an interpreter at the information counter. From there, visitors would proceed along self-guided walks lined with a series of exhibit panels. Scheduled interpretive programs would take place in the nearby amphitheater. The amphitheater would be designed and built to the same capacity as in the proposed action.

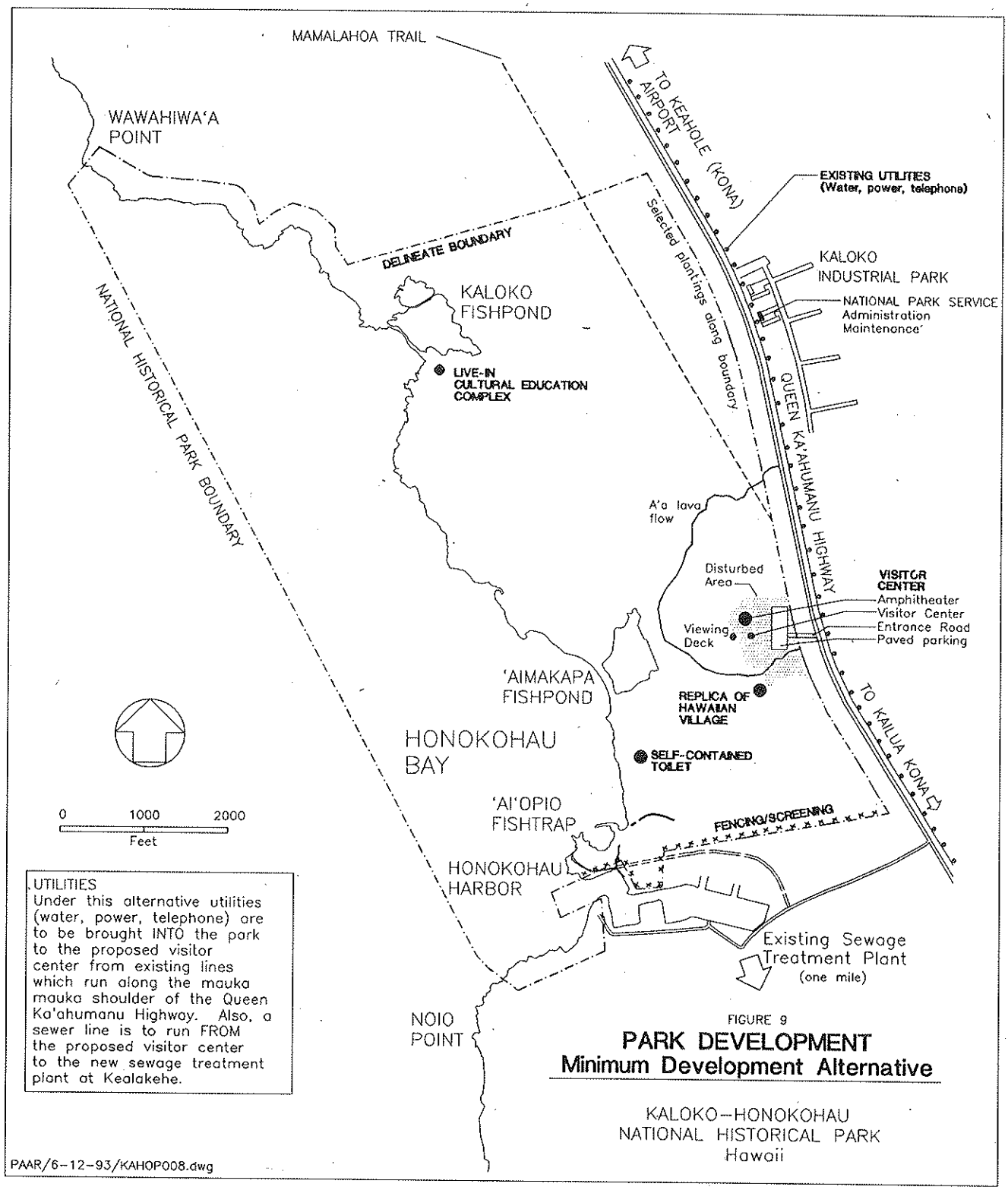


FIGURE 9

PARK DEVELOPMENT
Minimum Development Alternative

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Minimum Requirements Alternative

Access to the park from the Queen Ka'ahumanu Highway is to be the same as described in the proposal. Likewise, utilities will have to be brought into the park for the visitor center as described in the proposal.

Under this alternative the existing park headquarters facility at the Kaloko Industrial Park is to be retained. The park administrative and maintenance operations will continue to take place there. Visitor contact and interpretation is to take place at the modest visitor center to be developed in the park. No park housing is proposed under this alternative.

Like the proposal, this alternative calls for no roads to be constructed within the park. Trail development in the park, including the use of existing unimproved roads and tracks, is also to be the same as in the proposal. Likewise, recreational uses of the beach, shoreline, and offshore waters are to be the same.

The development of a live-in cultural education complex under this alternative is to be for the same purposes described in the proposal. The same site is proposed and access is also to be by foot from the visitor center. However, under this alternative the development associated with the complex is to be carried out as much as possible in the manner of the ancient Hawaiians. There would be only minimal physical development. Participants would be encouraged to try and get by with only the bare necessities and in the traditional Hawaiian manner. The existing chemical toilet located nearby is to be retained. For the construction of the live-in accommodations and any other facilities here, only traditional Hawaiian tools and techniques are to be utilized. Under the supervision of the park superintendent, much of the construction is to be carried out by the participants themselves. The lack of any modern amenities means that all activities taking place at the complex will need to be carefully monitored to make sure that no degradation of park resources such as the nearby fishpond or the park's offshore waters was taking place. Any waste materials generated at the site will have to be removed. This would likely mean that the variety and diversity of activities taking place at the complex would be more limited under this alternative.

Fencing and screening proposed along the park's southern boundary and the plantings along the *mauka* boundary will be the same as under the proposal. Adding gates and pedestrian access at the harbor entrance to the park will also be provided under this alternative.

Under this alternative, a replica Hawaiian village is to be developed in the same manner as described in the proposed action.

Under this alternative, the rest rooms near the sand beaches at Honokōhau are to remain the composting type, with some provision for expansion. No utility lines are to be brought out to the site.

Minimum Requirements Alternative

The existing permit arrangement with the residents of the dwellings near the 'Ai'ōpio fish trap is to continue exactly as described in the proposal.

As noted, under this alternative a park-wide trail system is to be developed the same as in the proposed action. A park-wide sign plan and wayside exhibit plan similar to that described in the proposal is also to be developed.

The daily visitor capacity for the park will be set at the same level as under the proposal.

Resource Protection and Management. Under this alternative the park would seek to implement the strategies for dealing with cultural and natural resource management issues described in the proposed action. This alternative calls for fewer resource management positions and no marine biologist; therefore, the park's capability for implementing these stratgegies would be reduced.

Visitor Use and Interpretation. Visitor use and interpretation at Kaloko-Honokōhau under this alternative would have the same goals and objectives as the proposed action. The park's interpretive program would be less diverse and more self-guiding due to the more modest visitor center proposal and the lack of an interpretive division.

Completion of Land Acquisition. Same as the proposed action; that is, continue efforts to acquire a sufficient interest in the 18-acre parcel of privately-owned land within the park.

Management of State Lands and Waters. Same as the proposed action.

Adjacent Land Uses. Same as the proposed action, except the lack of a marine biologist position would reduce the park's research and monitoring capability thereby making it more difficult to achieve the goal of establishing water and air quality controls and protecting scenic and aesthetic values on surrounding lands and waters.

Establishing the Kaloko-Honokōhau Na Hoa Pili O Kaloko-Honokōhau (The Friends of Kaloko-Honokōhau). Same as the proposed action.

Management Zoning. This alternative calls for management zoning as described in the proposed action, except the Modern Development Subzone is to be smaller. The Modern Development Subzone would be eliminated at the sites of the maintenance facility, the rest rooms at Honokōhau beach and the small visitor parking area near Ala'ula cove. Under this alternative these areas are to be zoned Historic Preservation. In total, under this alternative about two acres

would be eliminated from the Modern Development Subzone and added to the Historic Preservation Subzone.

Estimated Development Costs. The proposed developments listed below would be constructed in the same phased sequence as the proposed action.

	Gross Construction Costs	Construction Planning Costs	Total Project Costs
Construct Visitor Center	336,000	68,000	404,000
structure (850 sf)			
rest rooms (500 sf)			
information center office (350 sf)			
covered amphitheater, 200 seat (5000 sf)	393,000	77,000	470,000
covered viewing deck (1000 sf)	78,000	15,000	93,000
Construct Main Visitor Parking			
paved parking area (200 cars, 10 oversize)	608,000	116,000	724,000
park entrance road	138,000	27,000	165,000
entrance station (kiosk) and sign	68,000	12,000	80,000
Utilities for Visitor Center			
underground sewer line (2,000 lf)	361,000	69,000	430,000
back flow preventer	17,000	5,000	22,000
sewage lift stations (2)	531,000	102,000	633,000
underground water line (1000 lf)	196,000	40,000	236,000
underground electrical (1000 lf)	128,000	24,000	152,000
Develop Live-in Cultural Education Complex			
construct Hawaiian shelters for working, teaching, meetings, and overnight accommodations	99,000	20,000	119,000
Construct Replica of Hawaiian Village			
Hawaiian type structures (6), including living history/cultural demonstration area	141,000	29,000	170,000
Develop Park-wide Trail System (approximately 8 miles)			
construct new trails and upgrade/rehabilitate existing unimproved roads, trails, and tracks to NPS standards	1,136,000	218,000	1,354,000
construct boardwalk (6' X 4500')	636,000	122,000	758,000
Modification of Queen Ka'ahumanu Highway	668,000	128,000	796,000
southbound deceleration (right turn) lane			
southbound acceleration lane			
northbound acceleration lane			
northbound deceleration (left turn storage) lane			

	Gross Construction Costs	Construction Planning Costs	Total Project Costs
Construct Rest Rooms, Honokōhau Beach (composting toilet)	146,000	32,000	178,000
Construct Boundary Fencing southern line (3250 lf)	96,000	18,000	114,000
Plant Screening Along Park Boundary	98,000	20,000	118,000
Total Estimated Development Costs, Minimum Requirements Alternative	$6,235,000	$1,211,000	$7,446,000

Operation and Maintenance. The required yearly level of staff cost to operate and maintain the park under this alternative would be approximately $795,000.

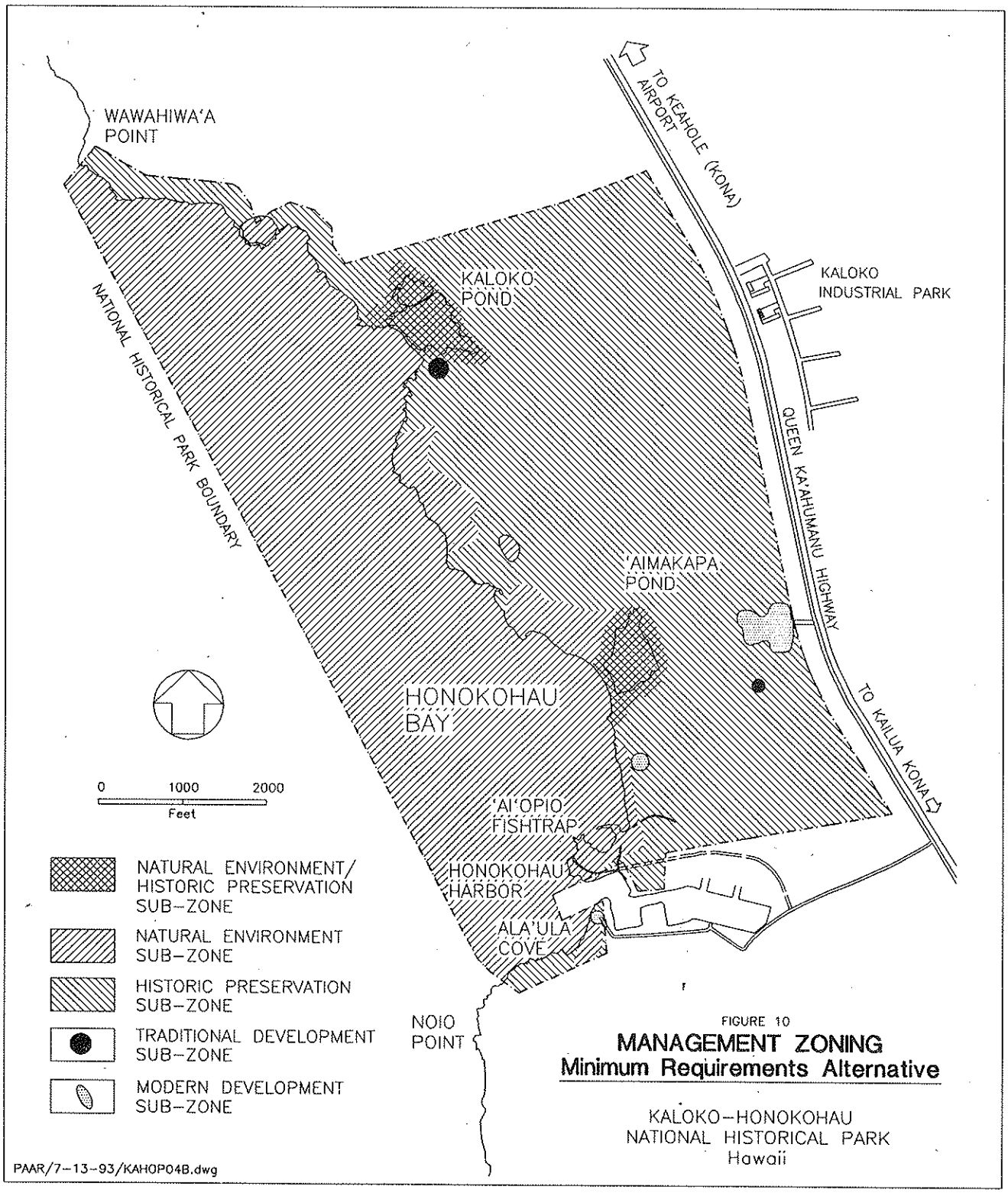
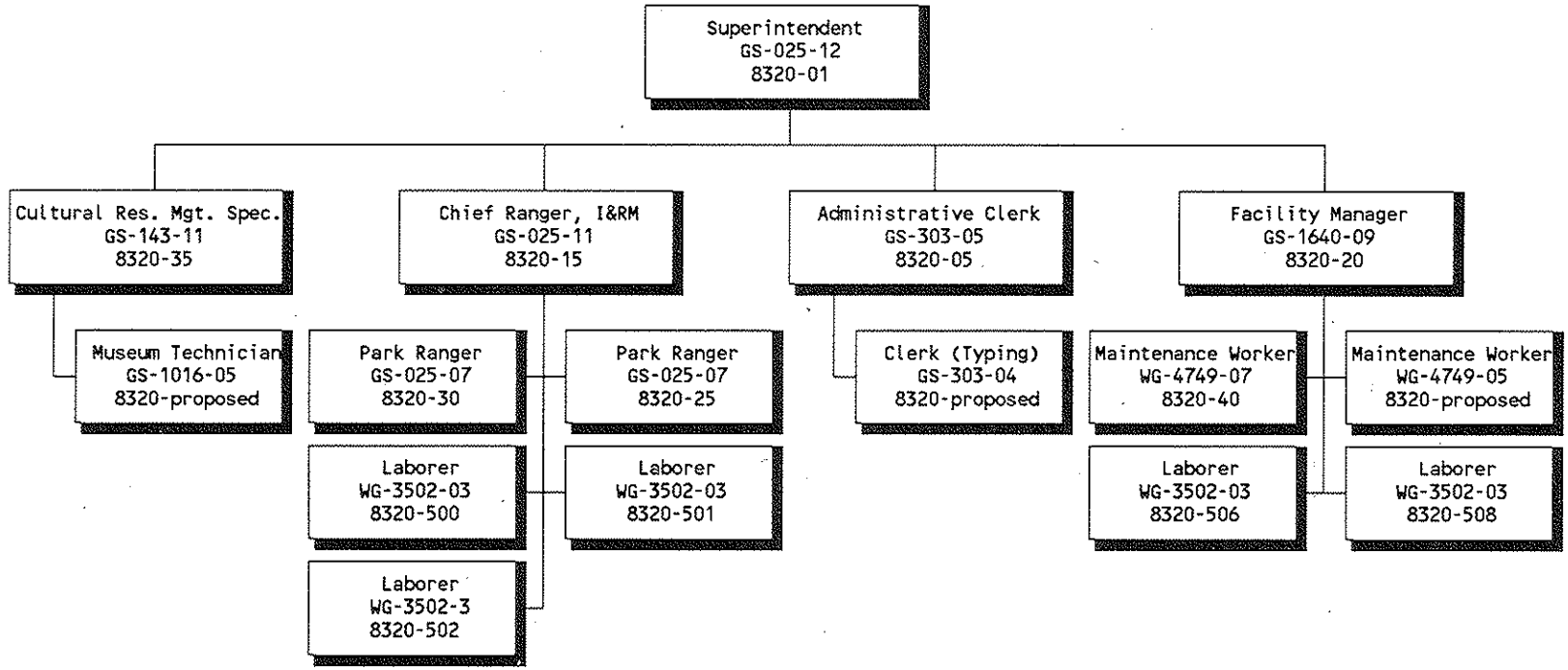


FIGURE 10

MANAGEMENT ZONING
Minimum Requirements Alternative

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Park Staffing. Under the minimum requirements alternative, staffing requirements would consist of the positions shown below.



Minimum Requirements Alternative

Maximum Development Alternative

This alternative calls for maximizing the accessibility of the park to visitors, and emphasizes recreational use of the shoreline. The proposed live-in accommodations connected with the cultural education complex are to be developed with modern amenities and built to accommodate a larger number of participants. Under this alternative, vehicular access to the park's coastal areas is to be developed. Two paved roads are to be built in the park — one from the proposed main visitor parking area to a location *mauka* of Honokōhau beach and the other to the sandy area near Kaloko fishpond. The latter road would have a lateral to the proposed site of the live-in cultural education complex. Under this alternative, the proposed live-in cultural education complex is to be developed at a site *mauka* of Kaloko fishpond instead of in the sandy area. This alternative responds to those individuals at the scoping meetings who wanted more beach recreation areas.

Park Development and Access. Under this alternative the visitor orientation center, including facilities for the park's administrative and maintenance operations is to be developed as described in the proposal. Similarly, under this alternative, the existing park headquarters operation at the Kaloko Industrial Park is to be phased out.

At the proposed live-in cultural education complex, a facility will be built for participants, including individual groups and organizations, to utilize as a place to recreate aspects of the traditional Hawaiian culture and would include a building to hold meetings or for ceremonial gatherings. A major difference under this alternative is that the live-in accommodations proposed here will be constructed as a dormitory facility with modern amenities. These facilities are to be designed and constructed with a Hawaiian motif, but will be modern structures built with present-day conveniences (water, sewer, electricity).

Under this alternative, the dormitory facility is to have a capacity for up to 50 people. The site proposed for the development of facilities connected with the live-in cultural education complex, including parking for 20 vehicles, is located *mauka* of Kaloko fishpond. This general area is known to contain a series of both prehistoric and historic platforms and walls. Developments would be sited to avoid these cultural features.

Utilities (water, power, telephone) will be extended from the *mauka* side of the highway to the live-in cultural education complex. The lines are to run underground. In the park, trenches to contain the sewer line are to be dug along existing roads and trails as much as possible to avoid damaging cultural sites. A single trench can be used

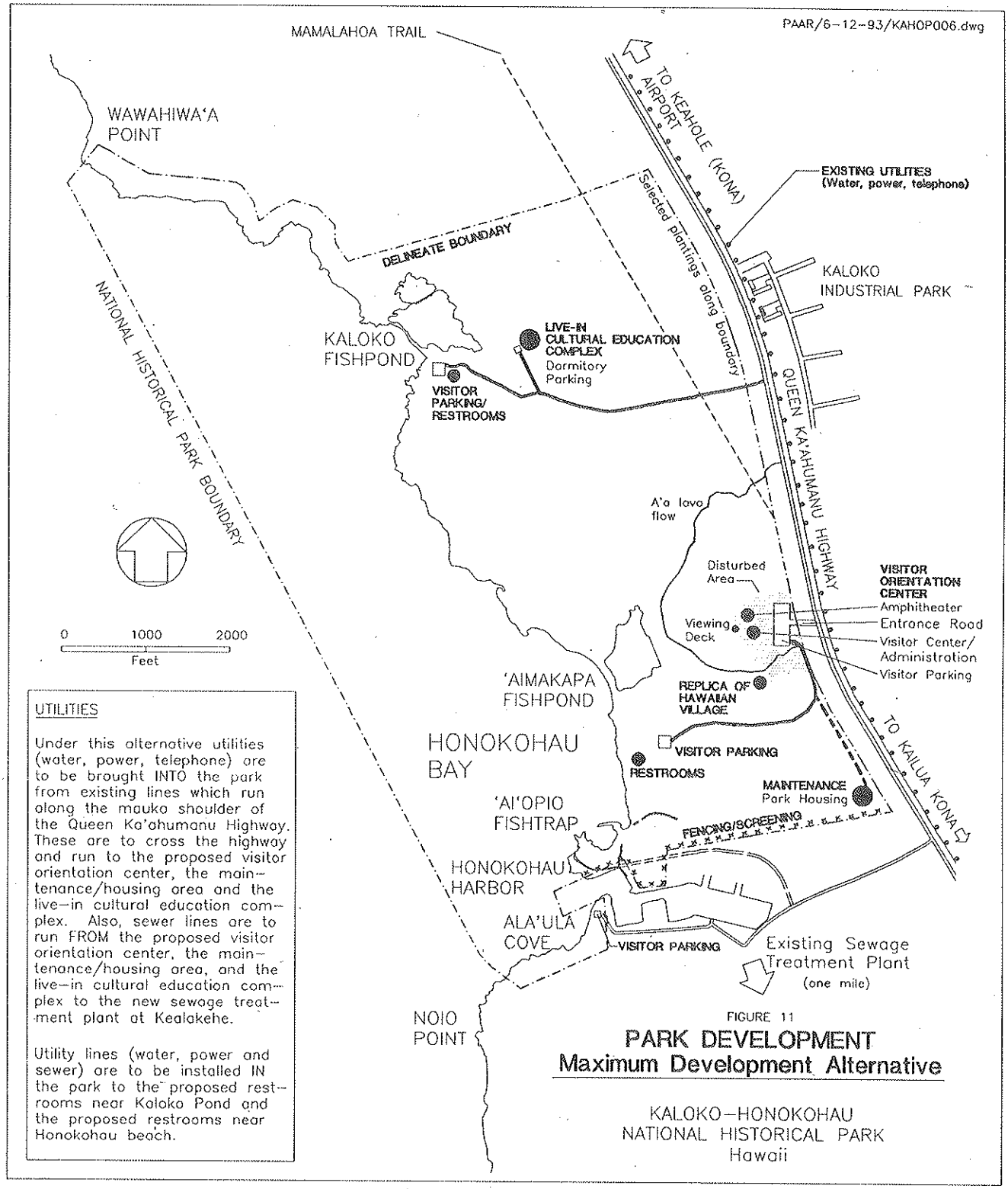


FIGURE 11

PARK DEVELOPMENT
Maximum Development Alternative

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

to run water and sewer lines, but will need to be wide and deep enough to permit the water main to be located on an undisturbed earth shelf located on one side of the sewer line and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. A sewage lift station would be needed at the midway point. The Hawaiian Electric Light Company requires a separate trench for the electrical line.

The National Park Service and the participants are to have the responsibility for operating and maintaining the complex, in consultation with the park's advisory commission. This entire development will extend over about two acres.

The site proposed for the live-in cultural education complex under the proposal, the disturbed sandy area near Kaloko fishpond, is, under this alternative, to be paved for visitor parking to accommodate 50 vehicles. A public rest room is to be constructed nearby. Water, sewer, and electrical lines will need to be extended to the rest room. They would branch off from the lines going on to the proposed site of the live-in cultural education complex and would also be underground.

Under this alternative the existing unimproved road to Kaloko fishpond is to be kept open and is to be paved. The road is to provide vehicular access to the proposed live-in cultural education complex (the existing jeep track branching off the service road would be improved and extended up to the site of the proposed live-in cultural education complex) and to the visitor parking area. The road is to remain at its existing width. A formal intersection to connect with the Queen Kaʻahumanu Highway will be needed. Although this would not be the main park entrance road, a controlled T-intersection would be needed here. Acceleration and deceleration lanes would need to be provided on the highway to permit safe egress and ingress. An easement would be needed to cross the State-owned right-of-way.

The proposed trail going around the *mauka* side of Kaloko fishpond would be screened off from the nearby site of the proposed live-in cultural education complex under this alternative. Also sections of the proposed trail system in the vicinity would be eliminated. Instead of being used as trails, under this alternative, these sections would be improved (paved) and utilized for vehicular access to the proposed live-in cultural education complex and the proposed visitor parking area.

Under this alternative, vehicular access is to be provided to a short distance *mauka* of Honokōhau beach via paved road from the visitor orientation center. This is to be a new road rather than the improvement of an existing dirt road. It is to terminate at a proposed visitor parking area just *mauka* of the rest room proposed near Honokōhau beach. The parking area is to be large enough to accommodate 100 vehicles. The parking area and the *makai* end of

the road are located in an area known to contain cultural resources of high significance. Proposed developments would have to be sited to avoid these sites or features.

Resource Protection and Management. Under this alternative the park would seek to implement the strategies for dealing with cultural and natural resource management issues described in the proposed action. This alternative calls for several additional resource management positions in addition to the marine biologist position. The park's capability for implementing cultural and natural resource management strategies would therefore be increased.

Visitor Use and Interpretation. Visitor use and interpretation at Kaloko-Honokōhau under this alternative would have the same goals and objectives as the proposed action. The park's interpretive program though would be more diverse and more oriented toward personal services due primarily to the proposed doubling in the number of interpretive staff as compared with the proposed action.

There would be an increase in the numbers of visitors to Kaloko-Honokōhau under this alternative. In addition, there would probably be a different type of visitor — more car oriented, likely to stay longer, and recreation oriented. There would be more of an inclination to drive to the beach parking area, walk the short distance to the beach, with gear, and stake out a spot with the idea of staying most of the day.

Completion of Land Acquisition. Same as the proposed action — that is, continue efforts to acquire a sufficient interest in the 18-acre parcel of privately-owned land within the park.

Management of State Lands and Waters. Same as the proposed action.

Adjacent Land Uses. Same as the proposed action.

Establishing the Kaloko-Honokōhau Na Hoa Pili O Kaloko-Honokōhau (The Friends of Kaloko-Honokōhau). Same as the proposed action.

Management Zoning. Management zoning under this alternative is to be the same as in the proposed action, except at the live-in cultural education complex will be included in the Modern Development Subzone and expanded slightly to accommodate the additional buildings and parking called for under this alternative. Also included in the Modern Development Subzone will be the two *makai* parking areas and the paved roads leading to them. These would add about four acres to this subzone. The four acres would be deleted from the Historic Preservation Subzone.

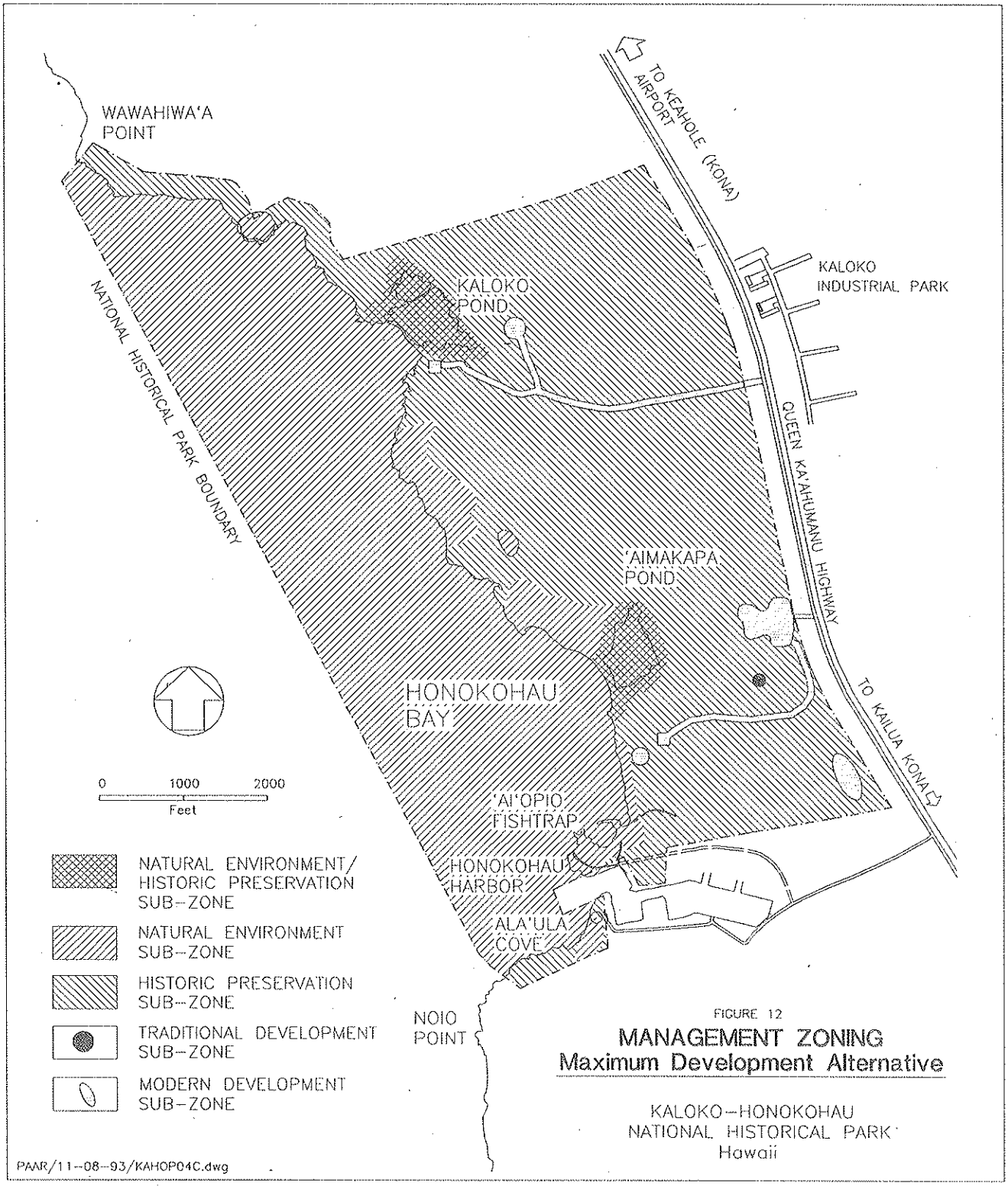


FIGURE 12

MANAGEMENT ZONING
Maximum Development Alternative

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Estimated Development Costs. The proposed developments listed below would be constructed in the same phased sequence as the proposed action.

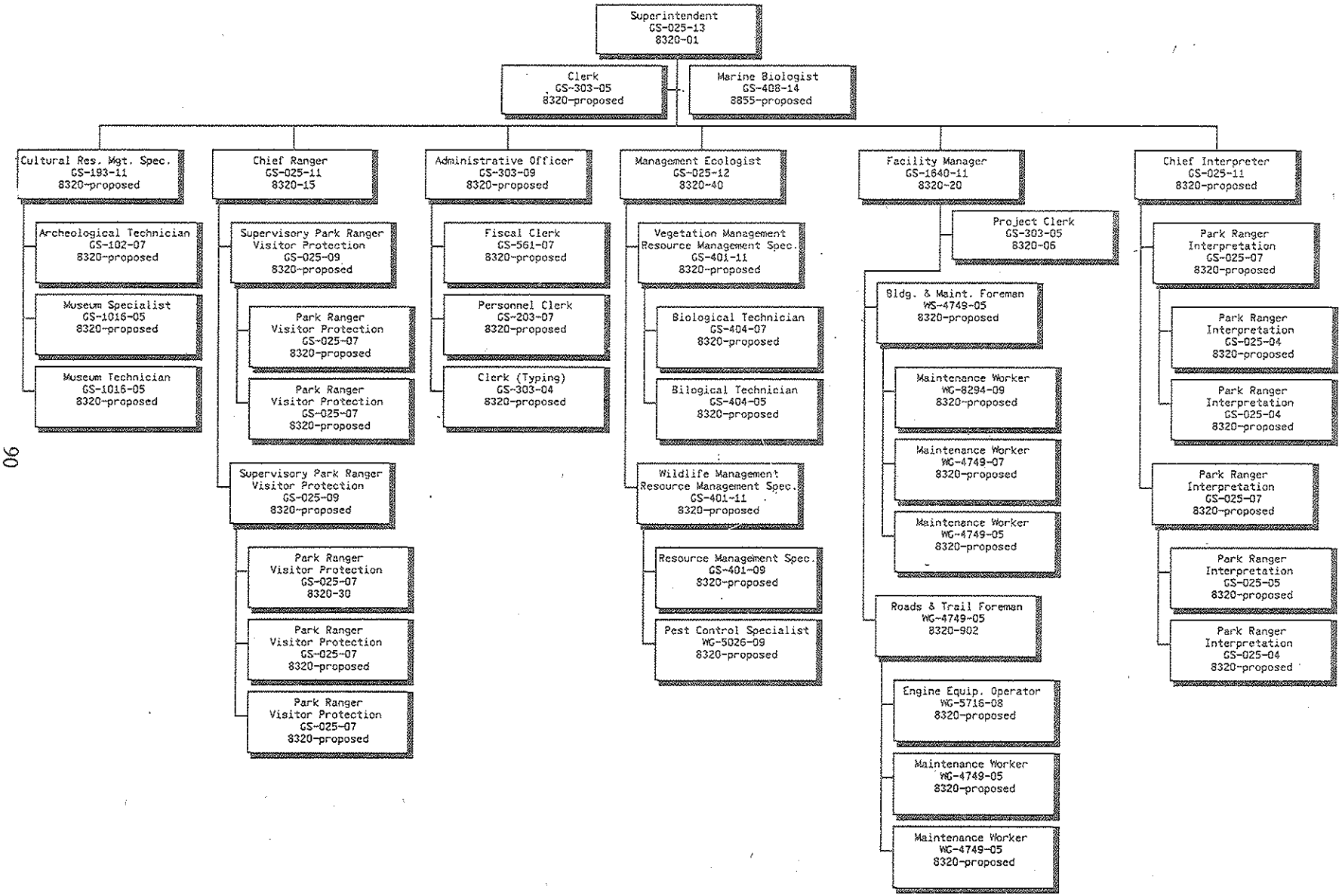
	Gross Construction Costs	Construction Planning Costs	Total Project Costs
Construct Park Headquarters (Visitor Services/ Administrative Offices)			
structure (8200 sf)	$3,383,000	$645,000	$4,028,000
museum (1800 sf)			
visitor rest rooms (800 sf)			
lobby/information/sales area (1000 sf)			
park staff offices/work space (900 sf)			
archeologist/marine biologist lab (600 sf)			
cooperating association office/storage (200 sf)			
library (400 sf)			
storage (100 sf)			
prefabricated environmentally controlled curatorial storage/workroom/office (1400 sf)	77,000	15,000	92,000
superintendent's office (150 sf)			
administrative offices (300 sf)			
rest room (100 sf)			
conference room (250 sf)			
storage (100 sf)			
records space (100 sf)			
covered amphitheater, 200-seat (5,000 sf)	393,000	77,000	470,000
covered viewing deck (1000 sf)	78,000	15,000	93,000
air condition (8200 sf) orientation center/ administrative structure	65,000	11,000	76,000
Museum Exhibits	885,000	168,000	1,053,000
Construct Main Visitor Parking			
park entrance road	138,000	27,000	165,000
paved parking area (200 cars, 10 oversize)	608,000	116,000	724,000
entrance station (kiosk) and sign	68,000	12,000	80,000
Utilities for Visitor Orientation Center/ Maintenance Facility			
underground sewer line (2,000 lf)	361,000	69,000	430,000
back flow preventer	17,000	5,000	22,000
sewage lift stations (2)	531,000	102,000	633,000
underground water line (2000 lf)	389,000	75,000	464,000
underground electrical (2000 lf)	256,000	53,000	309,000

	Gross Construction Costs	Construction Planning Costs	Total Project Costs
Construct Maintenance Facility (4,000 sf)	450,000	113,000	563,000
structure			
work area (2000 sf)			
office space			
shop			
tool room			
rest room/locker room			
garage area (2000 sf)			
air condition work area (2000 sf)	17,000	5,000	22,000
gravel parking area (10 vehicles)	17,000	5,000	22,000
perimeter fencing (450 lf, chain link), with sliding gate)	23,000	6,000	29,000
gravel road (1500 lf)	197,000	38,000	235,000
park housing	236,000	45,000	281,000
Develop Live-in Cultural Education Complex			
construct dormitory (4000 sf)	708,000	135,000	843,000
men's dorm (800 sf)			
women's dorm (800 sf)			
living/dining area (700 sf)			
kitchen (500 sf)			
women's bath (400 sf)			
men's bath (400 sf)			
lanai (400 sf)			
construct meeting room building (2000 sf)	354,000	69,000	423,000
shelters for working, teaching/learning, meetings, etc.	119,000	23,000	142,000
rest room (400 sf)	197,000	38,000	235,000
underground sewer lines (6000 lf)	1,083,000	207,000	1,290,000
back flow preventer	6,000	2,000	8,000
sewage lift station (2)	531,000	102,000	633,000
electrical, underground cable (3000 ft)	428,000	86,000	514,000
water, underground line (3000 lf)	384,000	81,000	465,000
parking (20 cars)	68,000	12,000	80,000
Construct Replica of Hawaiian Village			
Hawaiian type structures (6), including living history/cultural demonstration area	141,000	29,000	170,000
Develop Park-wide Trail System (approximately 7-1/2 miles)			
construct new trails and upgrade/rehabilitate existing unimproved roads, trails, and tracks to NPS standards	1,065,000	203,000	1,268,000
construct boardwalk (6' X 4500')	636,000	122,000	758,000

	Gross Construction Costs	Construction Planning Costs	Total Project Costs
Modification of Queen Ka'ahumanu Highway (main entrance)	668,000	128,000	196,000
southbound deceleration (right turn) lane			
southbound acceleration lane			
northbound acceleration lane			
northbound deceleration (left turn storage) lane			
Park Road to Kaloko Fishpond (4500 lf)	1,170,000	224,000	1,394,000
branch to live-in cultural education complex (625 lf)	164,000	35,000	199,000
parking (50 cars)	147,000	33,000	180,000
Construct Rest Room, Kaloko Fishpond	197,000	38,000	235,000
underground water and sewer lines (500 lf)	147,000	33,000	180,000
underground electrical (500 lf)	72,000	14,000	86,000
back flow preventer	6,000	2,000	8,000
Modification of Queen Ka'ahumanu Highway (Kaloko entrance)	668,000	128,000	796,000
southbound deceleration (right turn) lane			
southbound acceleration lane			
northbound acceleration lane			
northbound deceleration (left turn storage) lane			
Park Road to Honokōhau Beach (2375 lf)	617,000	119,000	736,000
parking (100 cars)	275,000	53,000	328,000
Construct Rest Room, Honokohau Beach	197,000	38,000	235,000
underground water and sewer lines (2000 lf)	588,000	114,000	702,000
sewage lift station	77,000	15,000	92,000
underground electrical (2000 lf)	285,000	57,000	342,000
back flow preventer	6,000	2,000	8,000
Construct Visitor Parking and Trail Access, Ala'ula Cove			
parking area (10 cars)	17,000	5,000	22,000
Construct Boundary Fencing			
southern line (3250 lf)	96,000	18,000	114,000
Landscaping Visitor Orientation Center and Visitor Parking	275,000	53,000	328,000
Plant Screening Along Park Boundary	98,000	20,000	118,000
Total Estimated Development Costs, Maximum Development Alternative	$20,040,000	$3,909,000	$23,949,000

Operation and Maintenance. Under this alternative, the required level of staff cost to operate and maintain the park would be approximately $2,100,000/year.

Park Staffing. In order to implement the actions called for in the maximum development alternative, the below listed positions will be needed.



Maximum Development Alternative

AFFECTED ENVIRONMENT

Fortunately, Kaloko-Honokōhau has come into the national park system with a great deal of its important resource values intact. To be sure, small portions of the park bear visible signs of disturbance. *Mauka* of 'Aimakapā fishpond is a fairly large (approximately 15 acres) area of the *'a'ā* flow that was bulldozed several years ago during highway construction. In the 1970's, a small papaya orchard was planted here. Nothing remains of that orchard today. South of Kaloko fishpond another area has been bulldozed and dredge spoil deposited (about 10 acres). Moreover, the scenic, open space, natural, and cultural values of the 18-acre privately-owned coastal strip are threatened by development. Nonetheless, the park remains a rich repository of prehistoric and historic archeological sites and 'Aimakapā fishpond, one of Hawaii's finest freshwater habitat. Too, park lands are intimately linked with the history of the Hawaiian culture and kingdom.

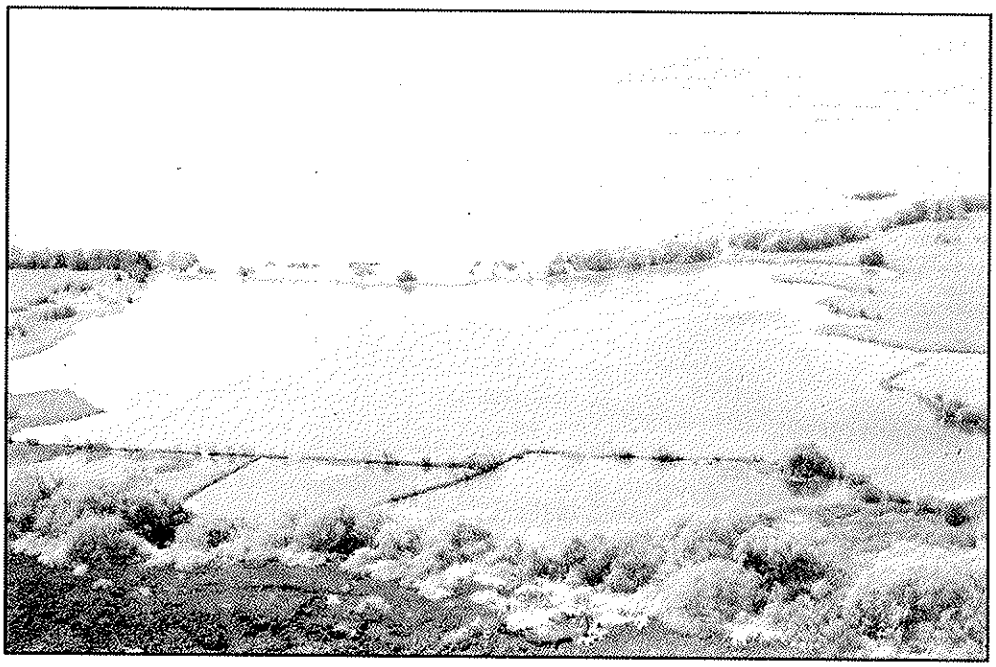
Cultural Resources

Within the boundaries of Kaloko-Honokōhau National Historical Park there is abundant evidence of the ancient Hawaiian culture that once thrived here. Archeological sites in the park represent a wide range of the different aspects of that culture, including its agriculture, aquaculture, religion, recreation, housing, and burial practices. The national historic landmark status given to the Honokōhau Settlement attests to the level of significance of these sites. These numerous and

significant sites represent not only the Hawaiian culture, but the change that took place in that culture over time.

The most impressive of the sites are the Kaloko and ʻAimakapā fishponds and the ʻAiʻōpio fish trap and the several *heiau* located between Wāwāhiwaʻa Point in the Kohanaiki *ahupuaʻa* and Alaʻula cove area in the *ahupuaʻa* of Kealakehe. Probably the two most prominent of these *heiau* were Makaʻōpio near Alaʻula cove and Puʻuoina south of the ʻAiʻōpio fish trap.

ʻAimakapā, the largest of the fishponds, is approximately 15 acres in size. ʻAimakapā is a *loko puʻuone* pond; that is, a large natural pond formed behind a barrier beach. The fishpond is still intact, although some parts of its shoreline have become overgrown with vegetation. *Awa* (milk fish, chanos) as well as native and migratory birds are found in and around the fishpond. The variety of sites around the fishpond include a *holua*, *heiau*, and a very large platform.



ʻAimakapā fishpond is one of Kaloko-Honokōhau's most important resources, containing both natural and cultural values. It provides essential habitat for federally endangered water birds and its dikes and walls attest to the engineering skills of the Hawaiians.

The *holua* is one of seven which have survived in Kona. It is the only *holua* besides the one in Keauhou wide enough to allow two contestants to compete at the same time. The takeoff and runway as far as the brow of the lava flow are well preserved.

A large stone located on a high point behind ʻAimakapā is another interesting site. This stone is called *Kanaka Leo Nui*, which means "man with a loud voice". Local tradition says that in ancient times a

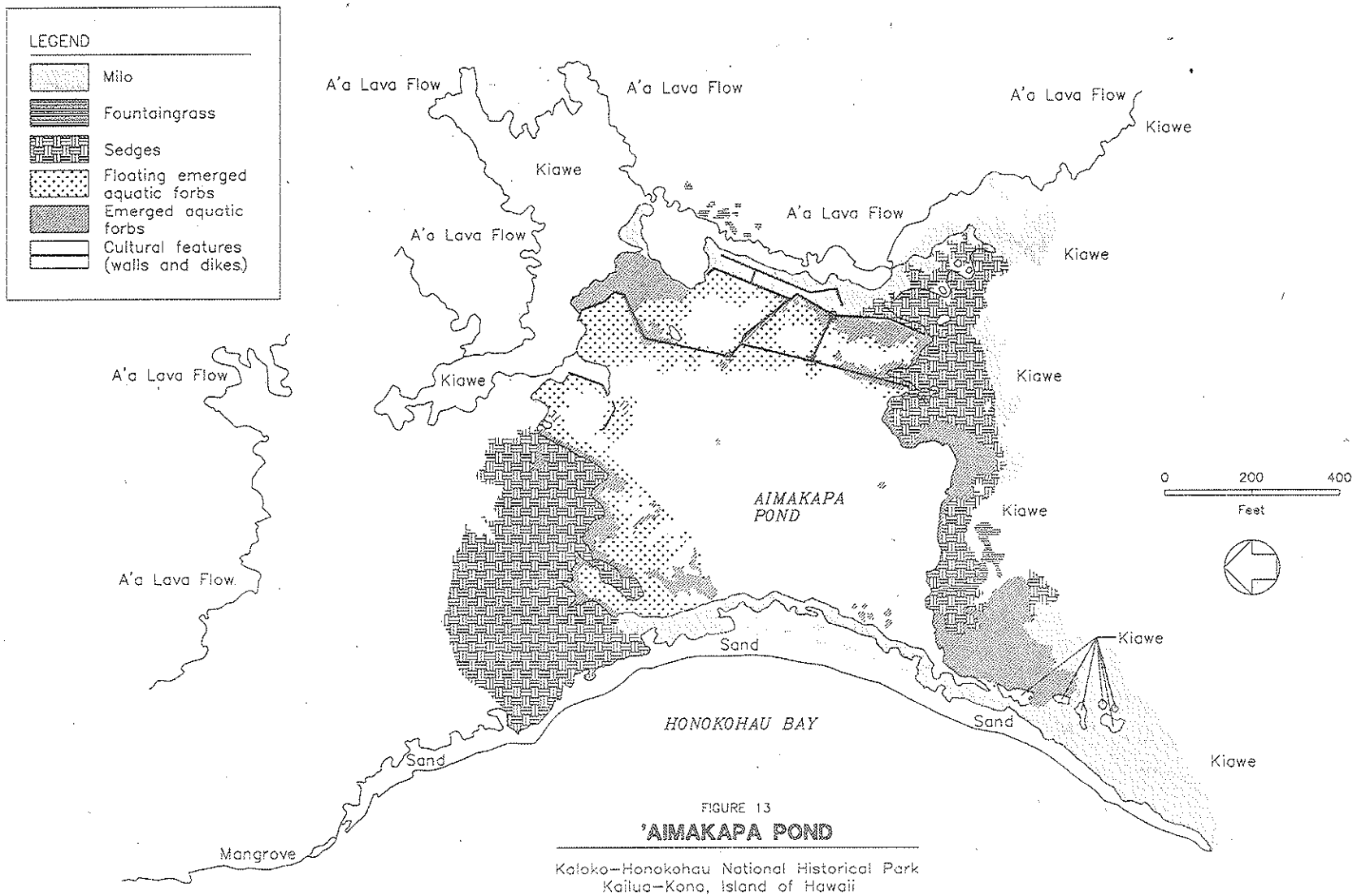


FIGURE 13

'AIMAKAPA POND

Kaloko–Honokohau National Historical Park
Kailua–Kona, Island of Hawaii

Aerial photo base 6–16–88.

Revised 3–23–92
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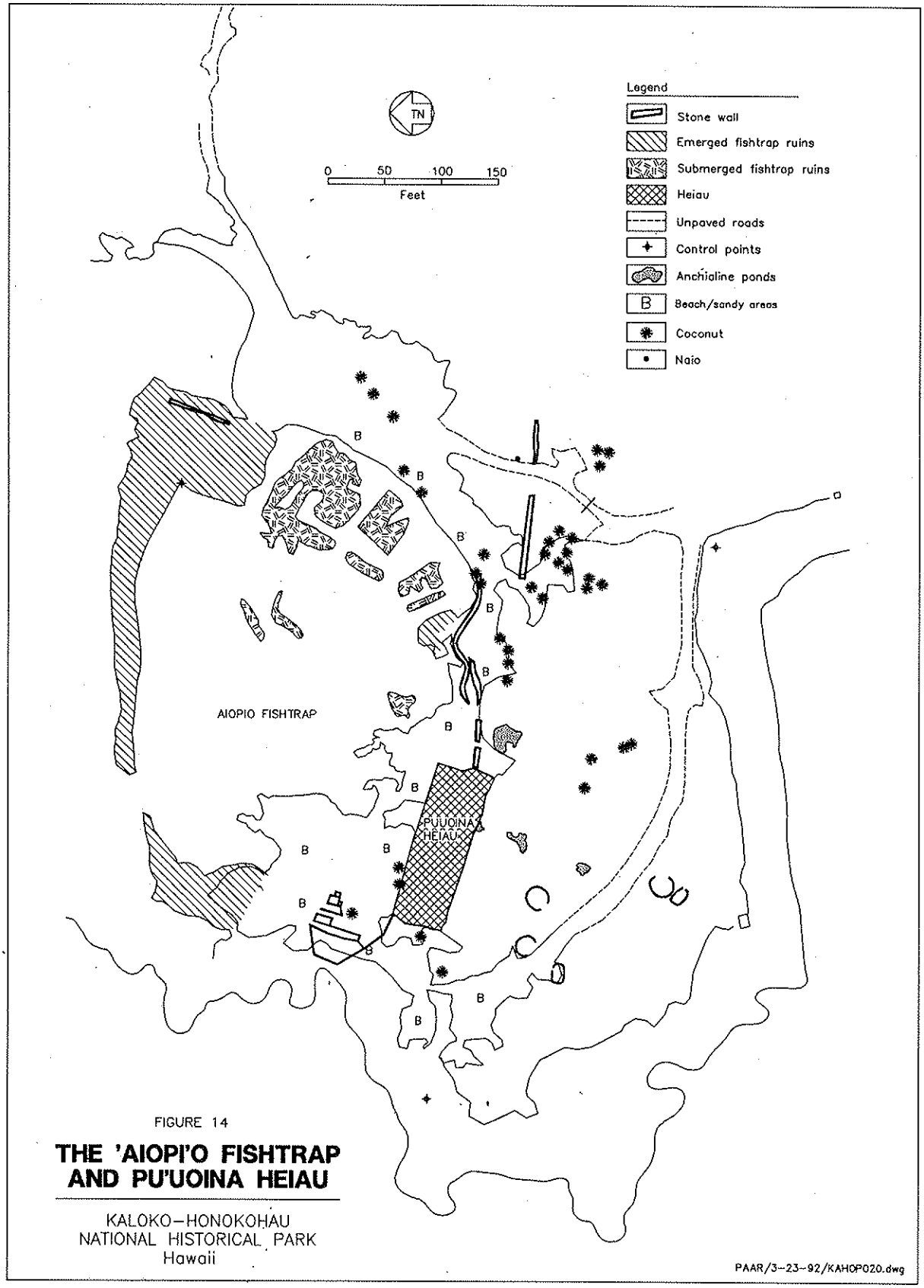


FIGURE 14

THE 'AIOPI'O FISHTRAP AND PU'UOINA HEIAU

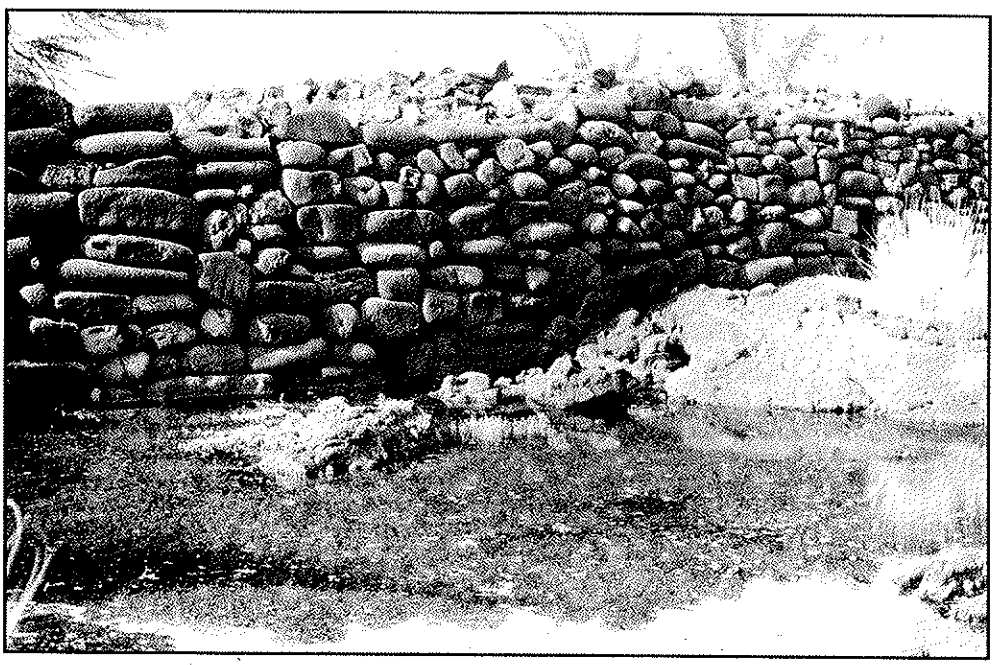
KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

chief by that name stood on the stone and directed fishing fleets off the coast.

The number and type of sites located around 'Aimakapā indicate that this area was used by the *ali'i* for both recreational and ceremonial purposes.

The 'Ai'ōpio fish trap is 1.7 acres in size and is of the *loko kuapā* type, a pond whose backbone consisted of a stone or coral wall. 'Ai'ōpio is referred to as a fish trap because it has no *mākāhā* (sluice gate) and there are four rectangular walled enclosures which were probably used as holding pens for netted fish.

At the south side of the 'Ai'ōpio fish trap is the Pu'uoina *heiau*, probably the finest example of a platform type in Kona. The dimensions of the *heiau* measure 50 feet by 145 feet and its height varies from three to eight feet. The simple beauty and durability of the *heiau* are indications of the resourcefulness of the ancient Hawaiians who constructed it.



Pu'uoina *heiau*, one of the largest and best known stone structures in the park, has been stabilized and partially restored. Additional restoration work is planned on the stone platform pending the results of ongoing research.

To the west of Pu'uoina *heiau* at Ala'ula cove is a fisherman's *heiau* known as Maka'ōpio. The striking feature of this *heiau* is two great upright stone slabs which measure about one foot by four feet by seven feet high. The stones may have served as *Kū'ula* (fish gods), but local Hawaiians also believe they were used to measure the heights of warriors who passed through the area.

North of 'Aimakapā fishpond is the Kaloko fishpond, also of the *loko kuapā* type. Kaloko is a natural embayment separated from the sea by a man-made sea wall. It is approximately 11 acres in size, with secondary walls within the pond forming three separated areas where fingerlings were raised or where different species of fish were kept.

Kaloko is an excellent example of the engineering skill of the ancient Hawaiians. It has the largest and thickest man-made sea wall and is the most impressive example of a *loko kuapā* type pond on the island of Hawai'i.

The park also contains numerous Hawaiian burial sites. The burial sites are often overlooked in terms of their overall significance. Their importance to Hawaiians in the area and throughout the State cannot be discounted. These burial sites were especially sacred grounds with *mana.* In Hawaiian religious beliefs deceased ancestors returned in the form of *'aumakua* (family god) to guide and protect family members still living.

In addition, according to Kamakua (1964), a cave near Kaloko fishpond is the burial place of several members of the Kamehameha family. The possibility of Kamehameha the Great being buried at Kaloko has tremendous significance for people of Hawaiian ancestry. Many local people fear that through careless or thoughtless development the possible burial site of the founder of the Hawaiian kingdom might be disturbed or destroyed.

The park contains numerous other sites of significance. These sites include the *mauka-makai* trails, *kahua hale* (house platforms), *ko'a* (fishing shrine), *ahu* (stone mounds), a concentration of more than 50 stone enclosures (believed to be agriculture planters), lava tube shelters, canoe landings and shelters, salt pans, petroglyphs, and *papamū* (the flat rock surface or board on which the Hawaiiian game *konane* was played).

An intensive archeological survey of most of the Kaloko *ahupua'a* area of the park has been completed. The Kohanaiki portion of the park has also been intensively surveyed. Several reconnaissance level archeological surveys have been conducted in the past over portions of the Honokōhau *ahupua'a* area. The State-owned Kealakehe lands in the park have also undergone reconnaissance level archeological surveys.

The National Park Service is scheduled to undertake additional archeological surveys on Honokōhau lands to relocate previously recorded sites and assess the adequacy of those records. The scheduled survey will also supplement those records as needed with additional maps and site forms, as well as surveying the unsurveyed portions.

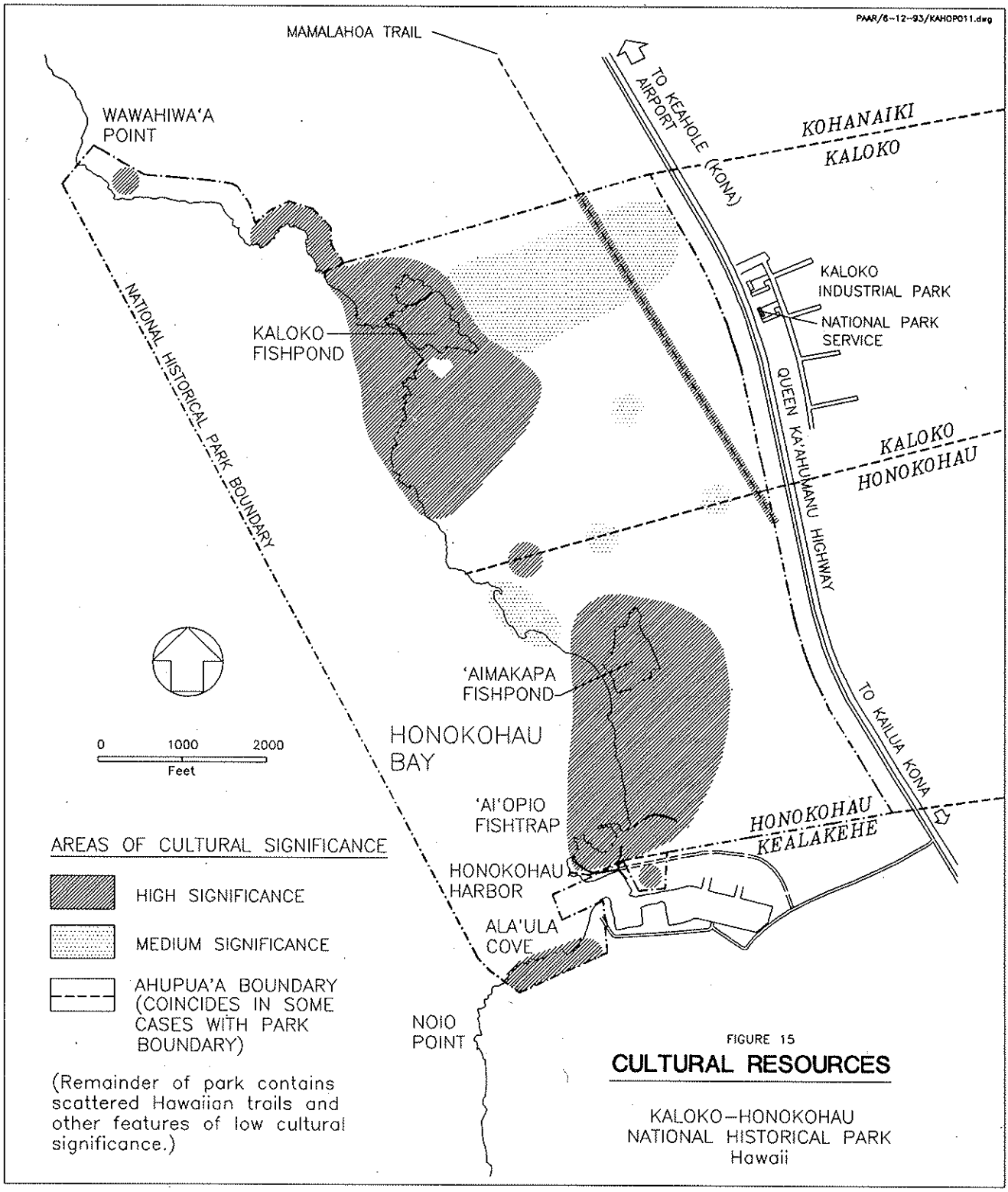


FIGURE 15

CULTURAL RESOURCES

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

To date, 205 archeological sites have been recorded and another 200 or so have been noted in the park. There may be more, both on land and submerged. All of these sites substantiate prehistoric and historic occupation by many people who utilized the sea and adjacent lands. It was an area not only used by *maka'āinana* (common people), but also by *ali'i* until close to the twentieth century.

Another physical resource with much historical significance is a portion of the Māmalahoa Trail, also known as the King's Highway. The trail extends around the island of Hawai'i and was built between 1822 and 1855. Parts of the trail outside the park have been destroyed by development.

The traditional Hawaiian economy was based on agriculture and utilized the resources of the land and the sea. This land use was tied to a system of land divisions called *ahupua'a* that ran from the forested uplands, across agricultural lands, and out to the coast and sea. The lower portions of the *ahupua'a* of Kaloko and Honokōhau are within the boundaries of the national historical park, as are parts of the lower portions of the *ahupua'a* of Kealakehe and Kohanaiki (see Figures 2 and 7). The *ahupua'a* concept is regarded to be an important cultural resource.

The system of *mauka-makai* trails in Honokōhau were used by Hawaiians to travel and communicate within the *ahupua'a*. These *mauka-makai* trails were extremely important to the subsistence of the ancient Hawaiians. These trails should be looked at as lifelines, for it was the common practice of Hawaiians living *makai* to take ocean products, fish, salt, *limu* (seaweed), and other items up to their *'ohana* living *mauka*. In return, they were given agricultural food products such as taro and other items unavailable to them *makai*. This form of exchange was the basis of the Hawaiian economy, and the system of trails provided the physical means to make it possible.

At Kaloko-Honokōhau cultural values are more than just the sum total of the archeological sites and individual features found there now. The *ahupua'a* of Kaloko and Honokōhau are profoundly bound up with the history of the Hawaiian kingdom. According to noted Hawaiian archeologist, Kenneth Emory and others, the *ahupua'a* of Kaloko and Honokōhau with their fishponds were reserved for important Hawaiian chiefs. Kaloko, with its large fishpond, was set aside for Kamehameha V, the grandson of Kamehameha the Great. Honokōhau Nui, with its very large fishpond, went to Kekau'ōnohi, a cousin of Kamehameha V and a granddaughter of Kamehameha the Great. Honokōhau Iki, with its fish trap, went to Leleiōhōkā, the husband of Princess Ruth Ke'elikōlani, great granddaughter to Kamehameha the Great. So, the relationship between the sites and the history of Hawai'i is key; in fact, the two are inseparable. Kaloko-Honokōhau's spiritual values are embodied in its history, and it is the Hawaiian people who both feel and understand this best. To many of

them, Kaloko-Honokōhau represents a microcosm of their cultural past.

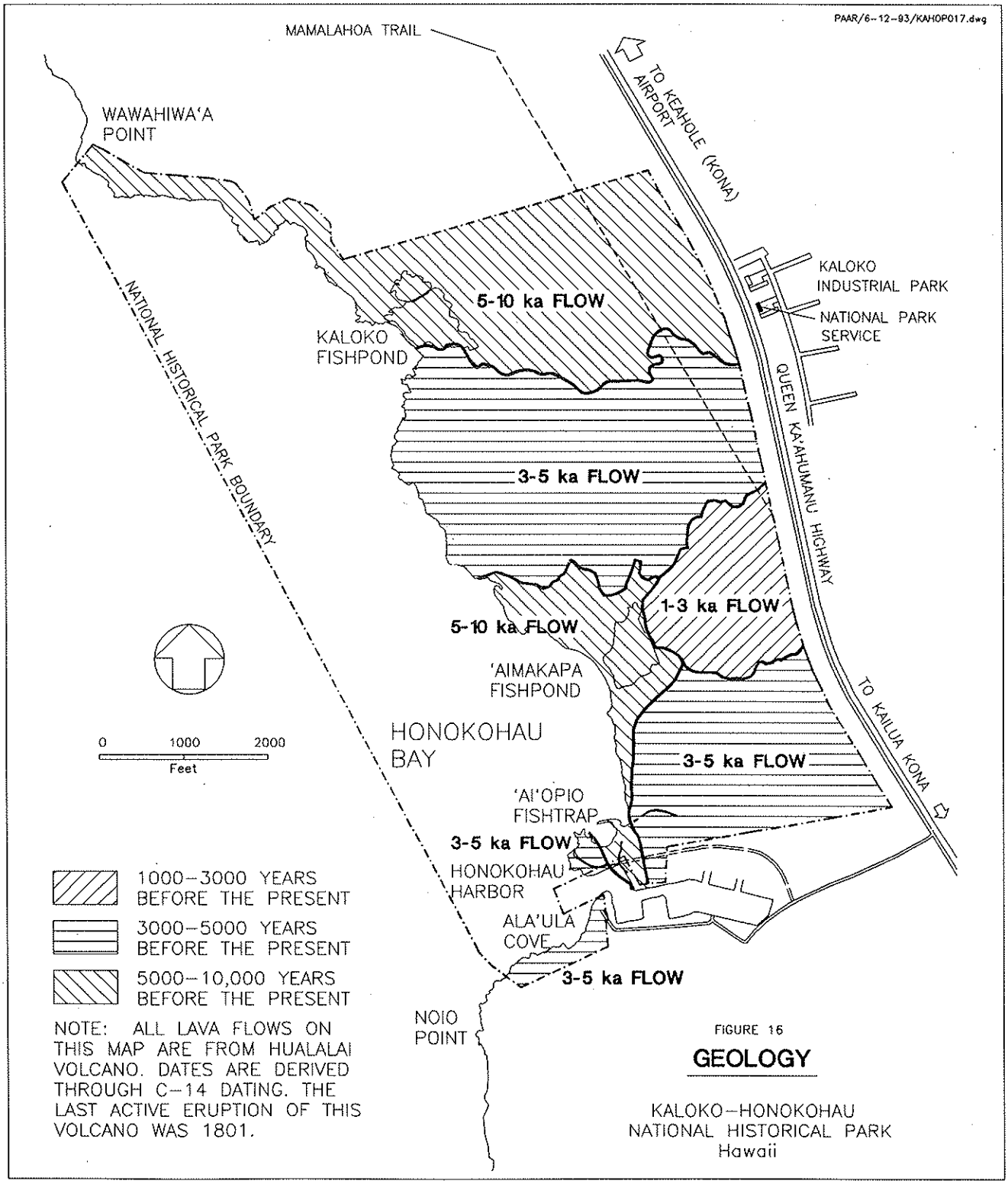
Natural Resources

Climate. The climate of Kaloko-Honokōhau is generally warm and dry. Climatic conditions in the park are largely determined by its location at the base of the leeward slopes of Hualālai volcano. Though characteristic of the leeward coastal regions of the major islands in the Hawaiian chain, the park differs because of an unusual diurnal sea and air circulation system. From late morning to early evening air moves inland in a sea breeze, and from early evening to late morning winds are offshore. In contrast to the rest of Hawai'i, the Kona coast receives its maximum rainfall in the summer rather than winter. Seasonal changes are small, except for infrequent convective storms (locally known as "Kona storms") during the winter.

The average annual rainfall is about 20 inches. More than 50 percent of the rainfall usually occurs during the five-month period, May through September. Mountain masses intercept tradewinds and effect a minimal orographic rainfall.

During Kona or southwesterly storms which occur on an average of two or three times a year, winds are frequently gusty with velocities as high as 30 to 40 mph. Hurricanes, with wind velocities of 75 mph and higher, are infrequent but have touched the island four times during the past 25 years. Tropical storms occur about twice a year. Within the park high surf usually occurs during these storms. Nine major storms including two hurricanes occurred during the 15-year period, 1947 through 1961. More recently, during Hurricane Ewa in 1982 and Hurricane Iniki in 1992, the park's shoreline was subjected to very large storm waves which caused considerable run-up. The permittee dwellings located near 'Ai'ōpio were either completely destroyed or heavily damaged.

Geology. The park area is comprised of prehistoric lava flows from Hualālai volcano. These prehistoric flows are 1,000 to 10,000 years old. The lava is mostly *pāhoehoe*, with several large areas of *'a'ā*, and is characterized as alkaline olivine basalt. These flows are highly permeable and contain lava tubes. The area is classified by the U. S. Soil Conservation Service as well drained to excessively drained. The park contains very little soil development. Where present, the soil is thin, brown to black in color, and may be expected to have high levels of iron and aluminum and low levels of silica and bases which are usually leached away. Soil material falls into the Great Soil Group of "red desert, reddish brown, low humic latisol, lithosol" and is dominantly lithosol. The slope of the land is generally less than 15 percent, with slopes less than one percent near the shoreline.


PAAR/6-12-93/KAHOP017.dwg
MAMALAHOA TRAIL
TO KEAHOLE (KONA) AIRPORT
WAWAHIWA'A POINT
NATIONAL HISTORICAL PARK BOUNDARY
5-10 ka FLOW
KALOKO FISHPOND
KALOKO INDUSTRIAL PARK
NATIONAL PARK SERVICE
QUEEN KA'AHUMANU HIGHWAY
3-5 ka FLOW
1-3 ka FLOW
5-10 ka FLOW
'AIMAKAPA FISHPOND
HONOKOHAU BAY
TO KAILUA KONA
3-5 ka FLOW
'AI'OPIO FISHTRAP
3-5 ka FLOW
HONOKOHAU HARBOR
ALA'ULA COVE
3-5 ka FLOW
NOIO POINT
0 1000 2000
Feet
1000-3000 YEARS BEFORE THE PRESENT
3000-5000 YEARS BEFORE THE PRESENT
5000-10,000 YEARS BEFORE THE PRESENT
NOTE: ALL LAVA FLOWS ON THIS MAP ARE FROM HUALALAI VOLCANO. DATES ARE DERIVED THROUGH C-14 DATING. THE LAST ACTIVE ERUPTION OF THIS VOLCANO WAS 1801.
FIGURE 16
GEOLOGY
KALOKO-HONOKOHAU NATIONAL HISTORICAL PARK
Hawaii

The Kaloko-Honokōhau shoreline is predominantly rough lava and rocky in appearance, owing to the geologic recency of the volcanic activity. There is a coral sand beach fronting Honokōhau Bay. It is the only large sand beach in the vicinity.

Geologically, the coastline here is sinking or slumping along the sea edge of the Kona coast (around one-half to one foot per century). The topography of the park is almost flat, rising in elevation from sea level to approximately 90 feet along the *mauka* portion. Although the general slope is relatively smooth, the actual surface is very rough as a result of past lava flows.

Freshwater Resources. At the park groundwater occurs near sea level. Recharge is mainly from places of higher rainfall on the upper slopes of Hualalai (or even Mauna Loa). There is a considerable shoreward outflow of freshwater all along the park coastline. Near the sea, groundwater has a high chloride content. Further inshore, the chloride content decreases. The park's location below the southwest slopes of Hualālai volcano is where the degree of saltwater intrusion is generally found to be at its greatest extent inland along the Kona coast. Here, the observed range of seawater intrusion and mixing, as indicated by the brackish qualities of several wells, is about three-quarters mile inland. Consequently, the park's groundwater is well within the zone of seawater intrusion.

The wetlands at Kaloko-Honokōhau are of great importance. The marshy area around 'Aimakapā fishpond is recognized as one of the few remaining quality wetlands in the State of Hawai'i.

In the park, in addition to the two large fishponds, there are many small freshwater to brackish pools and ponds that vary in volume and chloride content with the tides. These anchialine ponds have extraordinary vertebrate and lower plant ecosystems. They are rare in Hawai'i and have endemic invertebrate species that vary substantially from pond to pond.

Plants. At Kaloko-Honokōhau both coastal and recent lava substrate support a rather limited flora. Without such introduced trees and shrubs such as *kiawe* (*Prosopis* sp.), mangrove *(Rhizophora)*, and *koa haole* (*Leucaena leucocephala*), the area must have had a more open appearance. Strictly speaking, introductions by aboriginal Hawaiians probably had nearly as great an impact on the native vegetation. Without *milo* (*Thespesia populnea*), coconut (*Cocos nucifera*), *noni* (*Morinda citrifolia*), and *kou (Cordia subcordata)*, the coastline's appearance would certainly be altered. After Hawaiian settlement, these and other species like *hala* (*Pandanus*), for example, were likely cultivated in the park area and were probably far more abundant than today.

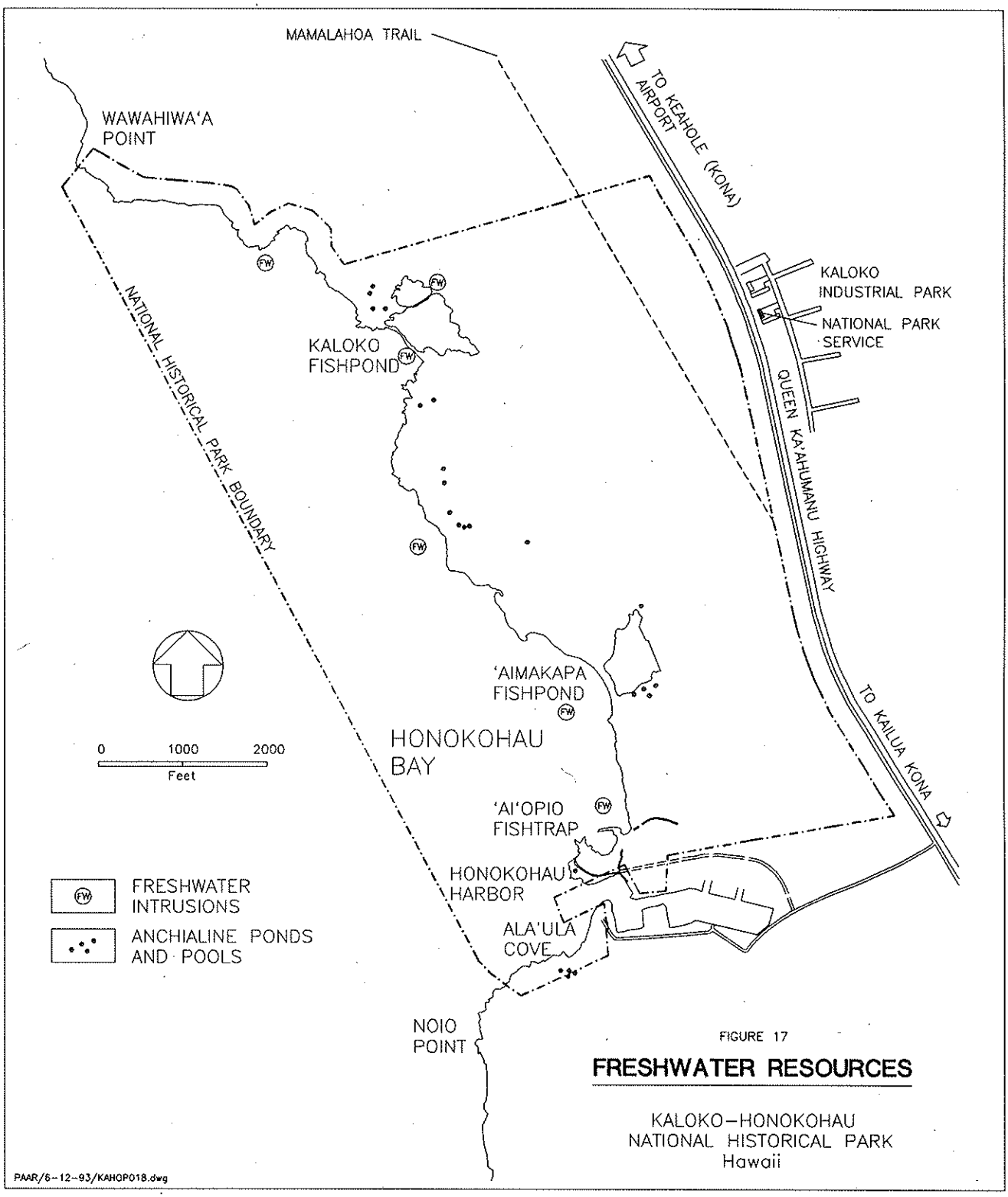


FIGURE 17

FRESHWATER RESOURCES

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

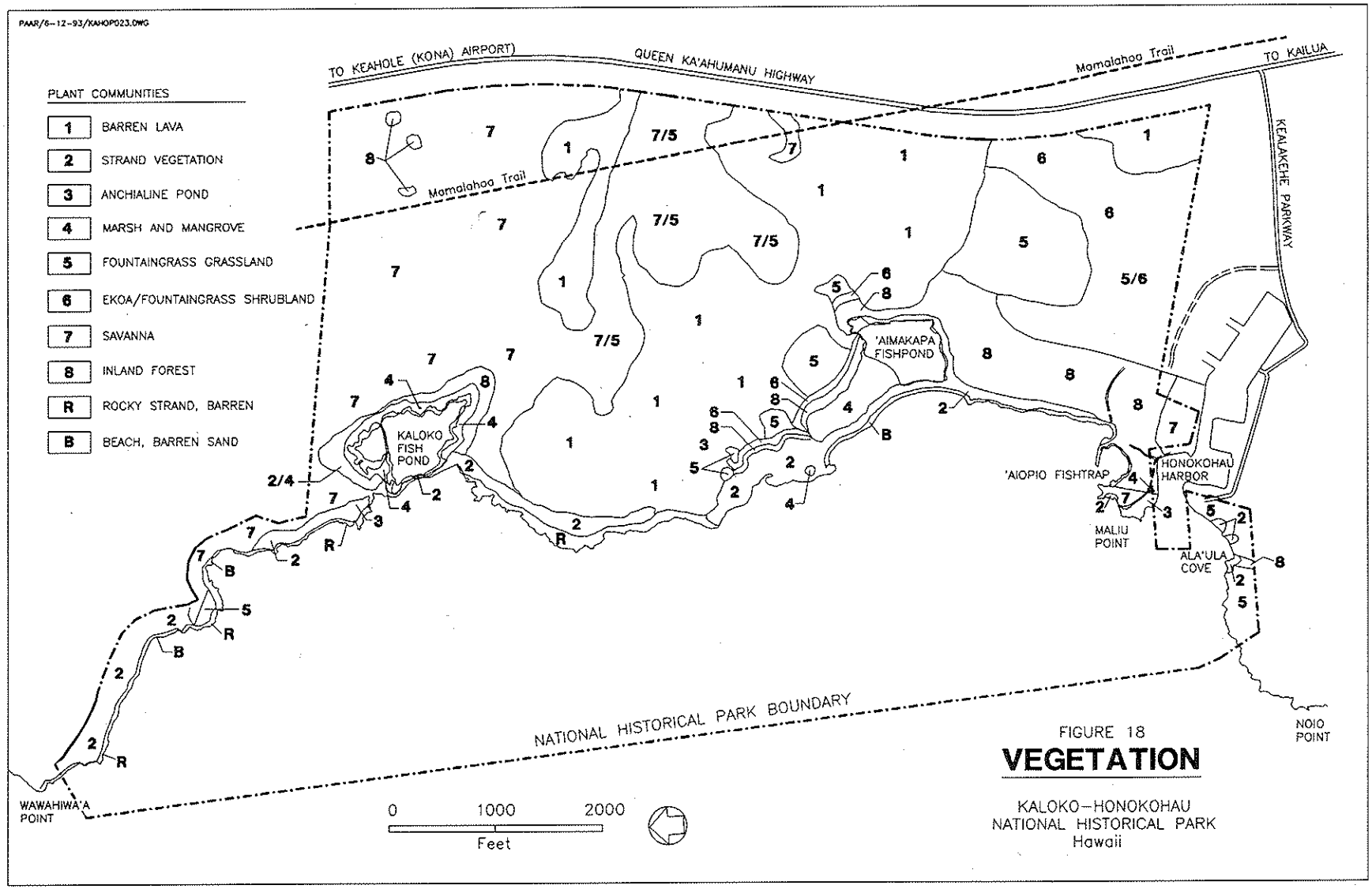


FIGURE 18

VEGETATION

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Native species likely to have been more abundant before European or Polynesian introductions include *naio* (*Myoporum sandwicense*), *hala*, and perhaps *alahe'e* (*Canthium*), *puakala* (*Argemone*), *'ilima* (*Sida fallax*), and *ko'oko'olau* (*Bidens hawaiiensis*). Species formerly at the site probably include *'ōhi'a* (*Metrosideros*), *'iliahialo'e* (*Santalum*), *'āma'uma'u* (*Sadleria*), *nehe* (*Lipochaeta*), *'emoloa* (*Eragrostis*), *maiapilo* (*Capparis sandwichiana*), and *Ischaemum byrone*. Less likely but potential original components are *loulu* (*Pritchardia*), *wiliwili* (*Erythrina sandwicensis*), *ohe* (*Reynoldsia*), *pūkiawe* (*Styphelia*), and *'ōhai* (*Sesbania tomentosa*).

Grazing of alien herbivores in the area has likely affected the vegetation, although not nearly as much as elsewhere in Hawai'i. The rough terrain and naturally sparse vegetation must have discouraged grazing. However, as late as 1974, grazing was reported on what is now the park's *mauka* boundary.

The low level of human habitation within the park in recent years, now limited to a few remaining families near the 'Ai'opio fish trap, indicated relatively little human impact on the site. While sunbathers and some fishermen frequent the coast and the Honokōhau boat harbor is certainly a high density area, the park appears little disturbed. The leveling of a large area of the *'a'ā* flow *mauka* of 'Aimakapā fishpond and several bulldozed tracks are the most obvious signs of disturbance.

Within the last decade red mangrove, an alien plant, became established along the marshy border of Kaloko fishpond and also is found in very small patches along the park's coastline. This non-native caused major changes in Kaloko fishpond so that it no longer served as habitat for several species of waterfowl, including two Hawaiian water birds listed as endangered.

The vegetation of Kaloko-Honokōhau National Historical Park was surveyed in 1987. Plants were identified in the field or from voucher specimens. Two lichens, 3 ferns, and 69 flowering plants were found within the park's authorized boundary. Fifty-three percent of the plants in the park are considered alien; that is, introduced since 1778. Thirty-one percent are indigenous, nine percent endemic, and seven percent of Polynesian introduction. There are no known federally listed threatened or endangered plant species in Kaloko-Honokōhau National Historical Park.

Eleven of the historic introductions are considered noxious by the Hawai'i State Department of Agriculture. Eight species pose a potential threat to archeological sites. Red mangrove has already damaged the Kaloko fishpond and adjacent archeological remains. Because of their frequency in areas with many archeological sites, it is quite likely that *kiawe*, Christmasberry, *koa haole*, pluchea, and *noni* have also disturbed some sites. Two grass species, fountaingrass

(Pennisetum), and Natal redtop (*Rhynchelytrum*) produce a fine fuel that constitutes a very serious fire hazard.

Eight major plant communities and four lesser plant communities were distinguished at Kaloko-Honokōhau. They have been mapped based on dominate growth form, species composition, and substrate. The communities consists of:

1 Nearly barren *'a'ā*, alien-dominated *'a'ā* community covering about 25 percent of the park.

2 Strand vegetation covers perhaps 10 percent of the park. Occupying a narrow belt along the coastline, it is comprised of four subcommunities: low strand, strand scrub, shrubby strand, and strand forest. The first two subcommunities are native-dominated while the second two are alien-dominated.

Milo, a plant species brought to the Hawaiian islands more than 1,000 years ago by the first Polynesian settlers, is found along the coastal portions of the park.

3 The anchialine pond community occupies less than one percent of the park. This community is found on *pāhoehoe* flows at anchialine ponds.

4 A marsh and mangrove forest community covers about five percent of the park. The mostly alien-dominated vegetation grows on thin organic muck overlaying *pāhoehoe*. It surrounds and has invaded both fishponds plus 'Ai'opio fish trap.

5 An alien-dominated grassland community occupies perhaps 20 percent of the park, primarily inland.

6 The alien-dominated inland scrub community grows on *pāhoehoe* or *'a'ā* in about ten percent of the park, primarily in the southeastern third.

7 The alien-dominated savanna community occurs on *pāhoehoe* and *'a'ā* on about 25 percent of the park, especially inland.

8 The last major community, alien-dominated forest occupies about five percent of the park. Found primarily inland, it surrounds marsh and mangrove vegetation at the fishponds and extends across the southern Honokōhau *ahupua'a mauka* of the strand vegetation.

A more recent survey, completed in 1992, added 32 species of flowering plants — 7 native species and 25 alien species. The 1992 survey also found two species present in the park that were former candidates for endangered status.

See Appendix B for listings of the plant species found in each community.

Animals. Because of the shoreline and fishponds within the park, the most apparent forms of wildlife are the water birds. Of major significance are the *āe'o* (Hawaiian black-necked stilt) and the *'alaeke'oke'o* (Hawaiian coot). The *koloa* (Hawaiian duck) previously occurred in the park. All three are officially listed as endangered species and protected under the Endangered Species Act.

'Aimakapā, the largest of the fishponds, has attracted much of the water bird population. Kaloko attracted many water birds until it was taken over by red mangrove. Counts by federal and state biologists have revealed *āe'o* populations ranging up to 32 birds, and a record high of 158 *'alaeke'oke'o* at 'Aimakapā in August 1983. Past surveys have also shown the presence of *āe'o* in Kaloko as well. 'Aimakapā is used as a nesting area by the *'alaeke'oke'o* and *āe'o*. In the past, the *koloa* has occasionally used 'Aimakapā for wintering. 'Aimakapā has been identified as essential habitat for the endangered water birds by the U. S. Fish and Wildlife Service in the Hawaiian Waterbirds Recovery Plan (1985).

The black-crowned night heron, a native resident, frequents both fishponds and many anchialine pool areas throughout the park. Several species of migratory waterfowl often winter at the pond, including northern pintail, northern shoveler, American wigeon, and blue-winged teal. The latter species produced young at 'Aimakapā in 1982 and 1983. These were the first breeding records of migratory waterfowl in the Hawaiian Islands. Pied-billed grebes are seen regularly and a few now nest at the pond. Several species of migratory

shorebirds, such as golden plovers, wandering tattlers, sanderlings and ruddy turnstones also regularly winter at 'Aimakapā.

A wide variety of accidental or rare stragglers have been recorded at the ponds and along the park coastline. This list includes snowy egret, white-fronted goose, brant, green-winged teal, mallard, cinnamon teal, Eurasian wigeon, canvasback, ring-necked duck, hooded merganser, semipalmated plover, lesser yellowlegs, bar-tailed godwit, several species of sandpipers, dunlin, long-billed dowitcher, red-necked phalarope, franklin's gull, ring-billed gull, caspian tern, and black tern.

This black-necked stilt, called the *ae'o*, utilizes 'Aimakapā fishpond for breeding. Future resource management projects include ecological studies of the pond to maintain and enhance it as habitat for the stilt and other Hawaiian water birds.

Other birds frequently seen in the park are northern cardinal, yellow-billed cardinal, house finch, zebra dove, saffron finch, grey fracolin, spotted dove, ricebird, mynah, Japanese white-eye, yellow-fronted canary, and the *pueo* (Hawaiian short-eared owl).

The island of Hawai'i has very few wetlands suitable for native and migratory water birds. Thus, key areas such as 'Aimakapā and Kaloko become especially important as habitat for protecting rare and endangered bird species. The only other comparable area on the island is 'Ōpae'ula, a small brackish water pond a few miles north of Kaloko. 'Aimakapā and 'Ōpae'ula at Makalawena are the only areas on the island of Hawai'i listed as "essential" water bird habitat in the U. S. Fish and Wildlife Service's Hawaiian Waterbirds Recovery Plan.

The most noticeable mammal in the park is the mongoose, an unwise introduction to the islands which played a part in upsetting the fragile

terrestrial ecosystem of Hawai'i. In addition to the mongooses, rats and feral cats prey on the eggs and young of ground nesting birds. Pet and feral dogs harass the water birds.

Feral goats and pigs which cause major problems throughout the island's ecosystems are uncommon in the park and there is little evidence of damage by these aliens.

Threatened and Endangered Species. Kaloko-Honokōhau's 'Aimakapā fishpond and its adjoining wetlands provide one of the most valuable water bird habitat on the island of Hawai'i. 'Aimakapā is used throughout the year, including as a nesting area, by the federally endangered Hawaiian stilt (*Himantopus mexicanus knudseni*) and the Hawaiian coot (*Fulica americana alai*). The Hawaiian duck (*Anas wyvilliana*) also listed as endangered, has in the past occasionally used 'Aimakapā for wintering.

The loss of wetland habitat is regarded to be the primary cause of the marked decline in numbers state-wide of the three endangered water birds. This loss occurred at Kaloko-Honokōhau due to the encroachment of mangrove, an alien plant, around Kaloko fishpond prior to its acquisition by the National Park Service. This mangrove has since been removed. The loss of wetland habitat at Kaloko fishpond was probably also heavily influenced by its slumping seawall which has allowed direct encroachment of ocean water. As permanently protected wetlands, the two fishponds become even more valuable, not only as habitat for the endangered water birds, but as wintering areas for migratory species of waterfowl.

A serious threat to Kaloko-Honokōhau's endangered water birds is the presence of predators such as the mongoose, rats, and feral cats and dogs. There is also the possibility that domestic ducks and geese could enter the park and bring bird diseases with them. Also, human disturbance to 'Aimakapā's endangered water birds from recreation use of nearby Honokōhau beach is occurring.

The park area is also used to an unknown degree by other rare species of wildlife. These include the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Newell's shearwater (*Puffinus auricularis newelli*), and the Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*). Sightings of these species in the park have been recorded, but the importance of the area as habitat has not yet been determined.

Green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) sea turtles are respectively threatened and endangered. Although the Northwestern Hawaiian Islands, primarily French Frigate Shoals, continue to be the breeding area for the green turtle, in recent years nesting has occurred on some beaches in the main Hawaiian islands. Most juvenile and mature green turtles reside in the near-shore habitat of the main islands. Land basking on sand beaches is rare among sea

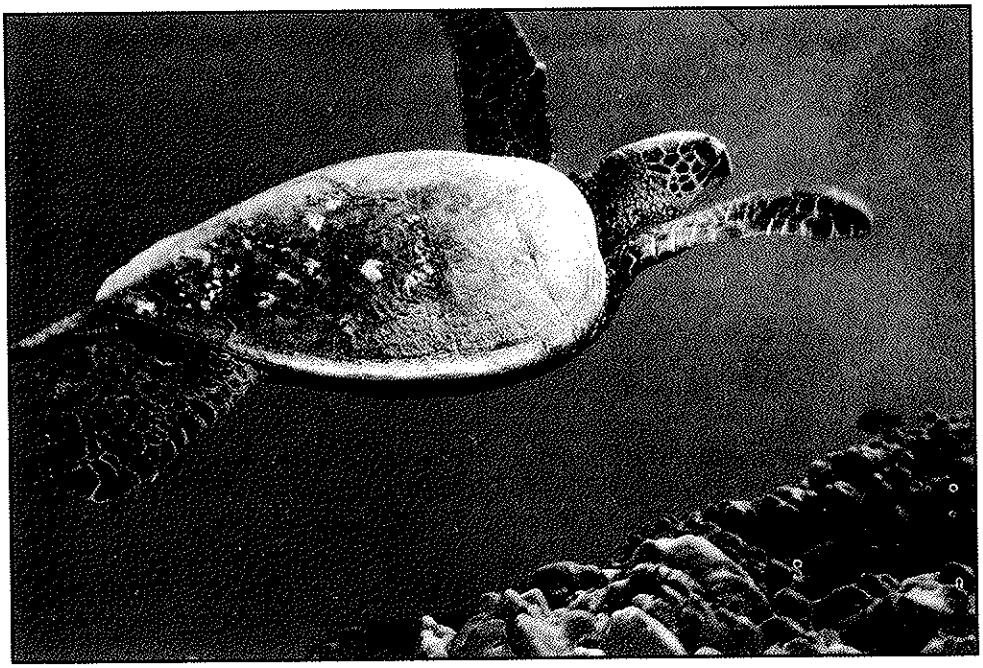
turtles, limited to a few populations of green sea turtles found only in the Pacific. Hawksbill nesting only occurs in the main Hawaiian islands, primarily on several small sand beaches along the east coast of the island of Hawaii. It is estimated that overall there are no more than a dozen Hawksbills nesting annually on the beaches in Hawai'i. Two of these locations are at remote beaches within Hawaii Volcanoes National Park.

A significant aggregation of immature green sea turtles is known to occur in the offshore waters of Kaloko-Honokōhau. However, little information exists on their ecology in park waters. The hawksbill has been observed occasionally in park waters. Either species may nest along Kaloko-Honokōhau's beaches since tracks have been observed in the sand.

Section 7 of the Endangered Species Act requires that any federal agency that funds, authorizes, or carries out actions that "may affect" federally listed species or designated critical habitat consult with the U. S. Fish and Wildlife Service. Informal consultation for Kaloko-Honokōhau National Historical Park under Section 7 was initiated in late 1989 during scoping sessions held for the undertaking of the park's first resource management plan. In April 1991, the Section 7 coordinator for the Fish and Wildlife Service's Pacific Islands Office visited the park for the purpose of briefing staff there on applicable provisions of the Endangered Species Act and provided the park with a list of theatened and endangered species that may be present at Kaloko-Honokōhau. Informal consultation with the Fish and Wildlife Service has been maintained, including utilization of their *Hawaiian Waterbirds Recovery Plan.*

The National Marine Fisheries Service's Draft Hawaiian Sea Turtle Recovery Plan (1989) provides the outline for cooperation between federal and state agencies to undertake research and management actions needed to ensure the recovery of Hawaiian sea turtles. The plan's goal is to secure habitat, and restore and maintain populations of Hawaiian sea turtles at levels commensurate with the carrying capacity of the habitat. The plan calls for designation of nesting and basking beaches on the main Hawaiian islands as natural preserves. The National Park Service has been identified as one of the principal agencies in this plan.

The endemic damselfly, *Megalagriou xantomeles*, is found at Kaloko fishpond. There is a species of shrimp, *Palaemonella burnsi*, found in Hawaii's anchialine ponds which may be present at Kaloko-Honokōhau. The damselfly and the shrimp are listed by the U. S. Fish and Wildlife Service as Category 2 species. This means the species is possibly appropriate to list, but there presently is not enough information to support a proposed rule.



The green sea turtle, including a significant population of juveniles, inhabits the park's offshore waters and may nest along its beaches.

As noted, no federally listed threatened or endangered plant species are known to exist within Kaloko-Honokōhau National Historical Park.

At the present time there are no additional animals or plants listed under the State of Hawaii's Endangered Species Act that are found in the park.

Marine Resources. The offshore waters and the resources they contain are an integral part of the park. The relationship which the ancient Hawaiians maintained with the shore waters was vital to their way of life. These waters were a major source of their food and careful management was practiced to keep these waters productive. At present, the park's offshore waters have low turbidity and nutrient levels, except near the mouth of Honokōhau Harbor. Park waters fall into the State Department of Health's "AA" classification. The objective of this class of waters is that they remain in as nearly their natural pristine state as possible with an absolute minimum of pollution or alternation from any source. The uses to be protected in this class include the support and propagation of shellfish and other marine life, conservation of coral reefs, compatible recreation, and aesthetic enjoyment.

The park's marine waters are influenced by groundwater discharge. The layer of shallow, brackish groundwater that flows seaward through the porous lava eventually discharges into the ocean at or near the shoreline. Thus, the park's marine environment is affected by the

quality of the groundwater flowing through the park from *mauka* lands.

Marine life, both offshore and within the fishponds, is particularly abundant because of the presence of a shallow inshore area — an unusual situation in west Hawai'i. Moreover, this resource was, and still is, used as an important food source.

Low tide exposes part of the coral reef and the intertidal zone, both of which contain numerous life forms. *Limu* (seaweed) was present in large amounts, but is less abundant now due to frequent food-gathering by local citizens. *'Opihi* (a species of limpet) clings to rocks on the inter-tidal zone and the splash zone. This delicacy is becoming scarce throughout Hawai'i as demands increase for its use. *Pipipi* (periwinkle) has a delicate flavor when boiled and is found in the reef areas. *Wana, hāwa'e, 'ina* and *hā'uke'uke* (sea urchins) were caught at various depths (usually in shallow water and tide pools) and served as an important food supplement to Hawaiians, although they are little used today. *'A'ama* and *pāpa'i* (crab) are usually eaten raw and often caught by flashlight.

The brackish water pools are also food sources. *Hīhīwai* (similar to periwinkle) was used extensively by ancient Hawaiians for food. *'Opae* (shrimp) are also common and are eaten raw or dried. Their traditional use as bait continues today. Still observed today within Kaloko fishpond are schools of *'ama'ama* (mullet). Also reported to be in the pond are *awa*, (milk fish), *manini*, (*Acanthurus sandvicensis*), *āholehole* (*Kuhlia sandvicensis*), *pāo'o* (goby fish), and *'opae*. Large *awa* have been observed occasionally breaking the surface at 'Aimakapā and Kaloko. *Palolo* (fireworms) live in the coral, dead clams, and silt in the bottom of both fishponds and constitute a hazard to anyone venturing into these waters.

An offshore snorkeling survey at Kaloko showed a number of species of fish. Spotted in the surge zone were *pāku'iku'i* (*Acanthurus achilles*), *manini kole* (*Ctenochaetus stigosus*), yellow tang, *maiko* (young *palani*) and *na'ena'e* (surgeon fish). Farther out, as the shelf drops to a depth of 30 to 40 feet, several large *uhu* (*Scarus perspicillatus*) and schools of *kala* (*Teuthidae*), *palani* (*Acanthurus dussumieri*), *weke* (*Mullidae*) and *kūmū* (*Upeneus porphyreus*) were spotted.

Most of the coral growth is located at Honokōhau Bay and Ala'ula cove, although there is some live coral offshore at Kaloko. The reefs and shallows furnished the nutritional values of protein and minerals, which historically supplemented *mauka* agricultural produce (carbohydrates) and established a balanced diet for ancient Hawaiians. This natural food source is an integral part of the land-sea philosophy of resource use that permeated all aspects of traditional Hawaiian lifestyle.

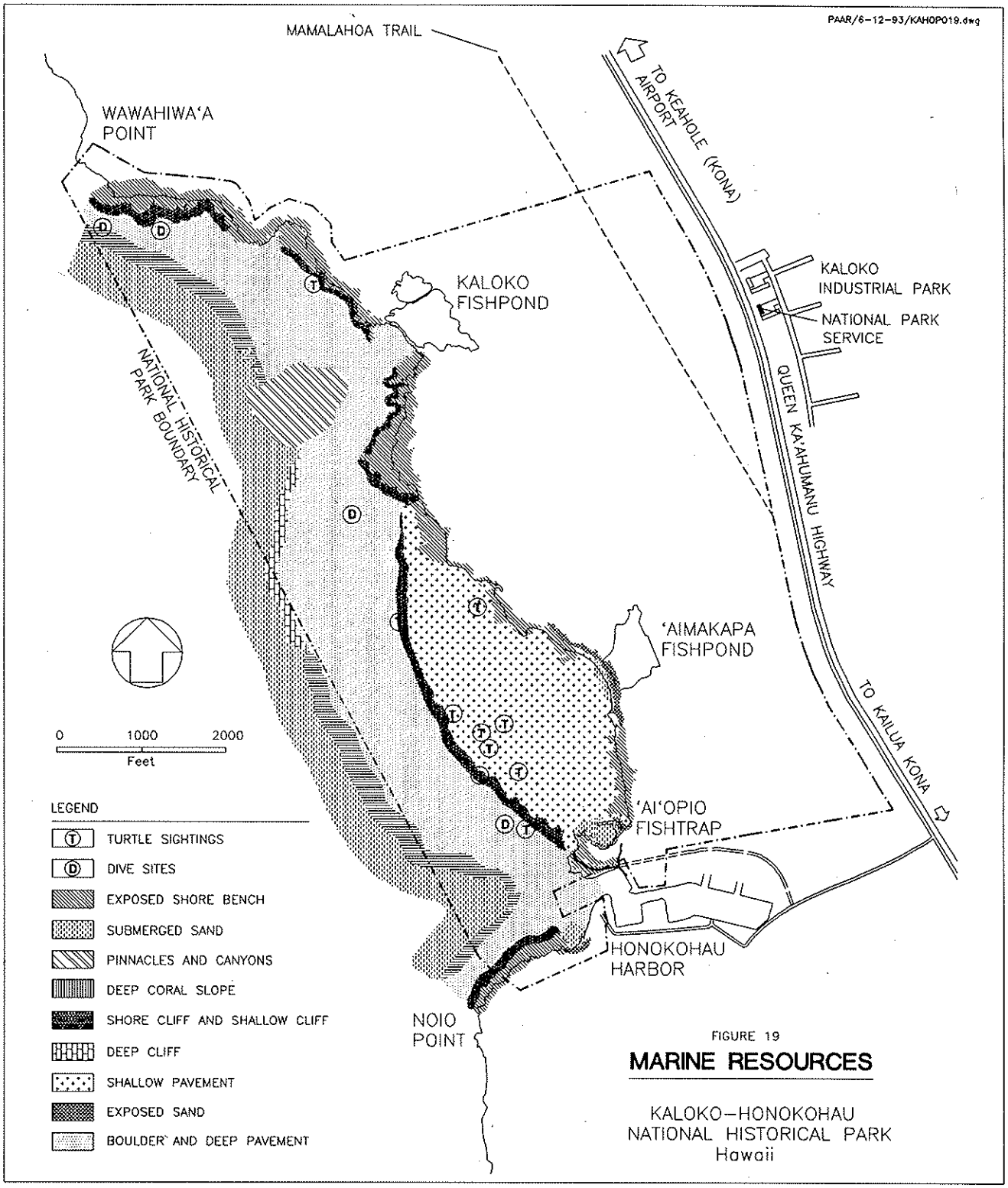


FIGURE 19

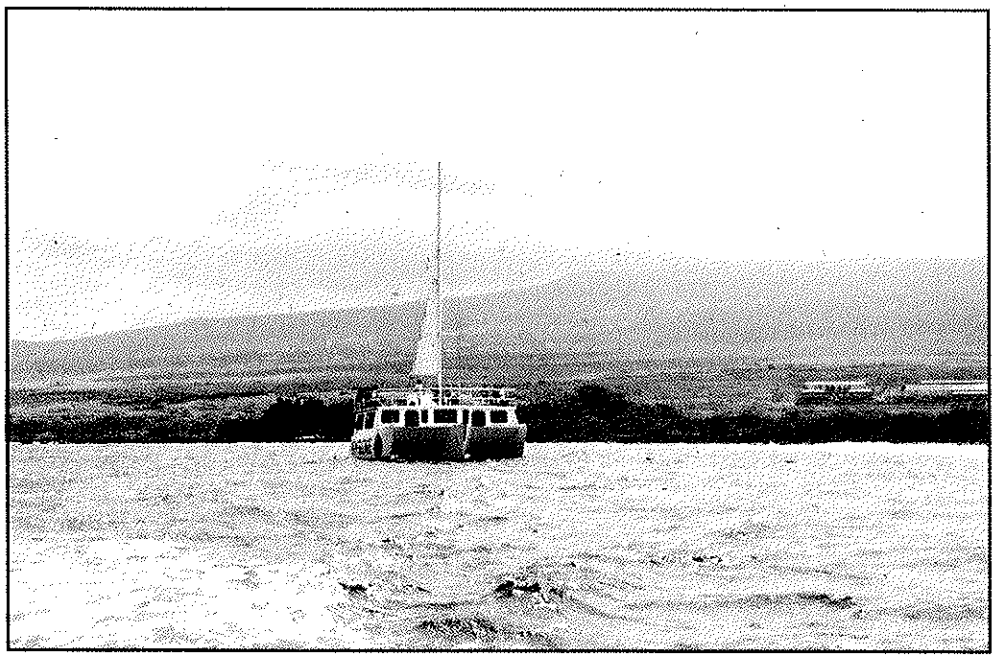
MARINE RESOURCES

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Green sea turtles are common throughout park waters. A relatively small locality offshore from Honokōhau beach, called the "turtle grounds" appears to be a favored day-time resting area for many sub-adult turtles. During the winter months, humpback whales often can be seen from the park shoreline.

Most of Kaloko-Honokōhau's shoreline consists of a bench of *pāhoehoe* lava, ranging in width from a few feet to about 200 feet. Much of this bench is exposed along most of the shoreline during the good part of most days. A narrow bank along the immediate outer fringe of the bench is the prime tide pool habitat for many marine organisms. One of the largest groups of tide pools along the park's shoreline is near the tip of Wāwāhiwa'a Point.

There are three sand beaches at Kaloko-Honokōhau. The largest fronts 'Aimakapā fishpond. It is not regarded as a high quality area for swimming or wading. In fact, recreational use of the park's offshore waters is not for the inexperienced swimmer, snorkeler, or scuba diver due to strong beach currents. The beach itself receives heavy use from sunbathers. Another beach exists at the 'Ai'ōpio fish trap near the dwellings occupied by permittees. Restricted circulation, shallow water, and a scattered exposed hard bottom reduce the recreational value of this beach. The smallest of the three beaches at Ala'ula cove near Noio Point is an attractive beach and popular for swimming and wading.



The pristine offshore waters of the park are a popular spot for recreational scuba divers. Studies are needed to determine if the existing level of activity is impacting Kaloko-Honokōhau's benthic and shoreline communities.

Fishing takes place in the park's offshore waters from shore and by boat. Presently, it is not a heavy use and does not appear to be depleting the resource. This may be partly due to the limited road access to the park. Gill netting or spear fishing with scuba gear does not appear to be an established use within park waters at this time.

Air Quality. At present, there are no air monitoring stations on the west side of the island of Hawai'i. Volcanic activity along the Kīlauea east rift zone in recent years has had a detrimental effect on the park's air quality during periods of eruption. (Air quality over much of the island of Hawai'i deteriorates during these eruptive periods and visibility can be affected when wind conditions are right.) Smoke from the existing waste disposal site located about one-half mile *mauka* also has been detrimental to the park's air quality. This condition was more apt to occur during the early part of the day when tradewinds dominate. Despite the volcanic eruptions and smoke from the nearby refuse site, air quality in the park remains good most of the time. Construction activities in the vicinity such as site preparation, building, and on-site road construction are likely to detrimentally affect the park's air quality in the future.

The preservation, protection, and enhancement of the air quality in units of the national park system is an important component of the federal Clean Air Act, as amended. As part of that effort, the Act created three classifications of varying degrees of restriction of allowable air quality deterioration. Under the terms of this classification, Kaloko-Honokōhau National Historical Park was designated Class II. Under this designation, the maximum allowable increase of particulate matter and sulfur dioxide has been established as follows:

Maximum Allowable Increase
(micrograms per cubic meter)

Particulate matter:

Annual geometric mean	19
Twenty-four hour maximum	37

Sulfure dioxide:

Annual arithmetic mean	20
Twenty-four hour maximum	91
Three-hour maximum	512

Flood Hazard. Most of the park is covered with ancient *'a'ā* and *pāhoehoe* lava flows. Due to the porous character of these flows, their rapid permeability, and the low rainfall, no defined drainage ways or streams exist within the park. Porous lava flows and the absence of streams on *mauka* lands serve to eliminate any flood hazard from upland areas. Surface runoff occurs only under conditions of intense

rainfall, which occurs very rarely. Kaloko and 'Aimakapā fishponds are the final discharge points for most of the storm surface runoff. No floodways or flood zones have been identified or recorded in the park.

Flood insurance rate maps prepared for the area have identified coastal hazard areas in terms of susceptibility to flooding from the sea — tsunami and storm wave runup. The park has not been designated as potentially susceptible to flood hazard other than by tsunami or inundation by winter storm waves or hurricanes. Storm waves can be particularly hazardous if they occur during high tide.

Winter storms occur along the park's shoreline fairly regularly. Over the past decade an average of two per year have been severe enough to cause some flooding in the coastal portions. In 1982 and 1992, hurricanes caused flooding and damage along the park's shoreline. The frequency of tsunamis has been considerably less. In 1946, wave runup from a tsunami was recorded at 11 feet in Kailua three miles south of the park. Tsunamis were recorded in Kailua in 1952, 1957, and 1960, with runups of two, five, and eight feet, respectively.

Coastal Zone Management (CZM). Kaloko-Honokōhau National Historical Park is within the Special Management Area (SMA) under Hawaii's Coastal Zone Management Program. The Coastal Zone Management Act requires Federal agencies to conduct their planning, management, and development in a manner consistent with Coastal Zone Management Act programs. Nearly all of the actions proposed in this draft general management plan and environmental impact statement for the future use and development of Kaloko-Honokōhau National Historical Park are to occur on federal lands. It has been determined that the proposed action is consistent with the Hawai'i Coastal Zone Management Program objectives and policies as contained in Section 205A-2, Hawai'i Revised Statutes. Essentially, these policies and objectives call for ensuring that coastal developments do not cause any permanent loss of valuable resources and that access to publicly owned beaches, recreation areas, and natural resources is provided. It is also judged that the proposed action will not have any spillover effects that significantly affect the coastal zone.

Although not a requirement, at the appropriate time, the National Park Service will seek to obtain a Special Management Area (SMA) use permit from Hawai'i County for developments proposed in this general management plan.

Regional Setting

Lands around Kaloko-Honokōhau National Historical Park, from the Keāhole (Kona) Airport south to Kailua town and from the shoreline *mauka* to the original Conservation-Agriculture district boundary line, though still mostly undeveloped, are in the process of becoming

rapidly urbanized. Today, tourism is the primary economic activity in North Kona. Nearly all of the labor force here is connected with the visitor industry and associated services, such as retailing, real estate, and financial services. The construction of large-scale development projects now planned for North Kona will create a significant additional number of employment opportunities here. Direct construction employment to build these projects would tend to be more short-term, but, once completed, these developments would generate additional long-term operational employment opportunities. With this increase in the residential population, there will be a need for additional housing too. The Hawai'i County Planning Department has developed population projections for the Keāhole-Kailua area based on the State's projections for the island of Hawai'i. These projections for the year 2010 show a more than 200 percent increase in the resident population and a nearly 300 percent increase in the number of residential units for the North Kona area, from Keāhole to Kailua.

Recognizing that the area is a prime candidate for urbanization in the near future, the Keahole to Kailua Development Plan has been prepared by Hawai'i County to address future development needs here. The 1990 plan has as its goal to "develop a mixed residential, commercial, resort, industrial, and recreational community, with approximately 8,000 or more residential units..." to be built out over the next 20 years.

In 1978, the year the park was authorized, nearly all of the surrounding lands were classified Conservation District by the State of Hawai'i. Now, only a small portion of these lands presently remain in the Conservation District. These lands have either already been reclassified as Urban, or been petitioned for reclassification by the landowner, or the Office of State Planning is recommending their reclassification as part of their five-year boundary review. Similarly, the Hawai'i County General Plan shows most of these surrounding lands as Urban Expansion or Industrial. Land ownership here, both public and private, is in a few large parcels.

The several large-scale development projects proposed for construction in this area over the next five to ten years will require new infrastructure. The existing infrastructure — potable water, wastewater collection and treatment, electrical power and roads — is presently inadequate to support these proposed developments.

Lands in the vicinity of the park are now mostly undeveloped lava flows with low agricultural potential. Some agricultural uses and cattle grazing take place on the *mauka* portions where there is a thin soil cover. There are also scattered residential subdivisions on the *mauka* lands. The lowland *makai* areas consist of very porous, barren *'a'ā* and *pāhoehoe* flows. Rainfall is relatively low here, the mean annual being about 20 inches. Defined drainage channels are absent and there are no streams.

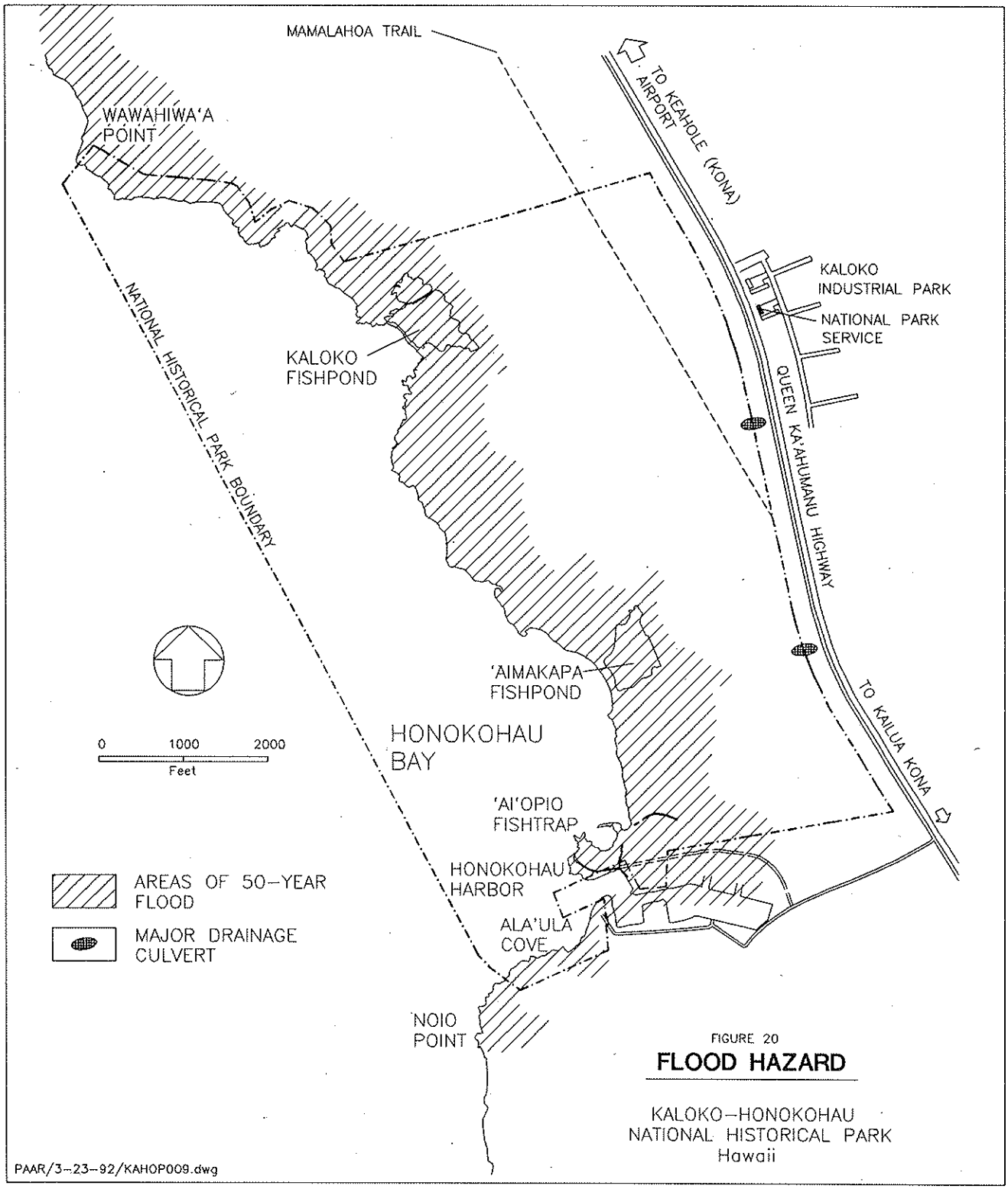


FIGURE 20

FLOOD HAZARD

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Along the *makai* lands north of the park, existing uses include the Natural Energy Laboratory of Hawai'i (NELH), the Hawai'i Ocean Science and Technology Park (HOST), and the Keāhole Airport. These large facilities are located on State lands. NELH is a publicly funded testing facility for ocean thermal energy conversion and cold-water aquaculture. Facilities there accommodate several research and development projects. The neighboring HOST park provides the land and the cold-water infrastructure for commercial mariculture operations. Existing *mauka* uses include the Keāhole Agricultural Park, several residential subdivisions, rock quarries, a construction yard, a concrete batch plant, and the Kealakehe sanitary landfill. Honokōhau Harbor, the major pleasure boat, commercial and charter fishing anchorage for West Hawai'i, is the land use south of the park. A major sewage treatment, just recently constructed, is located south of the harbor.

The State of Hawai'i is the largest landowner in the Keāhole to Kailua area, followed by the Queen Lili'uokalani Trust lands. Large private holdings include the lands owned by Nansay Hawai'i, Lanihau Corporation, the American Trust Company of Hawai'i, Kahala Capital Corporation, and Takemasa International.

The Keāhole Airport provides the major air access to all West Hawai'i. Two State highways, the Queen Ka'ahumanu and the Māmalahoa, are the major surface access. Both highways run north-south.

The State Department of Transportation (DOT) Highways Division is presently considering design alternatives for the widening and upgrading of the primary arterial, the Queen Ka'ahumanu Highway, from Kailua north to the airport.

The State's future long-range expansion plans call for grade separated interchanges and a frontage road system. Major intersections are planned at the Keāhole Airport and at Kealakehe just south of the park. The Kealakehe interchange is proposed as a four-lane divided roadway. Upgrading to six lanes is to occur near the proposed business and civic center to the south of the park. The expansion to six lanes will require additional right-of-way. The upgrading is to be a cooperative effort involving Hawai'i County and the major landowners as well as the DOT.

Utilities (electrical and telephone) are in place along both the Queen Ka'ahumanu and Māmalahoa highways. Approval has been given for the Hawaii Electric Light Company to install a new generator at its Keāhole power plant. The new generator is scheduled to begin producing electricity by June 1995.

Potable water for the area is provided by wells located on *mauka* lands to the north at about the 600 feet level. Available potable groundwater is limited in the Keāhole to Kailua area because the levels of chloride here are now exceeding drinking water standards.

Water consumption for this area, based on the build-out to occur over the next 20 years, is projected to exceed the known groundwater resources now available. In fact, there is evidence that the municipal water system has already reached its capacity because farmers *mauka* of the Keāhole Airport are now experiencing inadequate flow and pressure. There are plans to drill exploratory wells to locate future water sources. These wells are to be drilled far enough inland to minimize salinity, probably at the 1500 to 1800 feet elevation. Even with the new wells, potable water may have to be brought in from the wetter parts of the island of Hawai'i in the future.

Wastewater in the area is presently disposed of by cesspools, except at the airport where a treatment plant is utilized. The present use of cesspools to dispose of liquid wastes continues to be a problem here. The permeable underlying lava substrate readily admits liquid wastes causing contamination of the underlying groundwater. Another problem is the illegal use of lava tubes to dispose of liquid wastes.

Hawai'i County has constructed a new sewage treatment plant on State lands at Kealakehe. The existing treatment plant located in Kailua town is presently operating at capacity. Now completed, but not yet operational, the Kealakehe sewage treatment plant is located south of Honokōhau Harbor just *makai* of the Queen Ka'ahumanu Highway. The facility covers about 30 acres and has a 20-year design period capacity of 2.8 mgd average flow. Later phases of the new plant will increase capacity to approximately 7.8 mgd for a 40 year design period. If further increases beyond the 7.8 mgd are required, the Kealakehe sewage treatment plant can be further expanded by conversion of the treatment process from aerated lagoons. This further expansion, however, is expected to be limited by the effluent disposal capacity of the area. The planned nearby municipal golf course, with seepage ponds as back-up, is to be the site for effluent disposal. When it becomes operational, wastewater from the newplant is to be recycled to irrigate the golf course to be built just *mauka* of the highway.

The existing solid waste disposal landfill at Kealakehe is now full and is scheduled to be closed. For several years the landfill had been causing air pollution from constantly burning subterranean fires. Smoke from these fires escaped through the cinder covered landfill so noxious fumes were emitted continuously. A new and larger landfill site has been identified. Hawai'i County proposes to utilize State-owned lands at Pu'uanahulu several miles to the northwest to dispose of solid wastes for all of West Hawai'i. A total of 300 acres is to be set aside for the new site.

For the coastal State lands at Kealakehe *makai* of the highway, a regional recreational park is now in planning stages. The proposed park is to be developed for active recreational activities with playing fields, tennis courts, rest rooms, parking, etc.

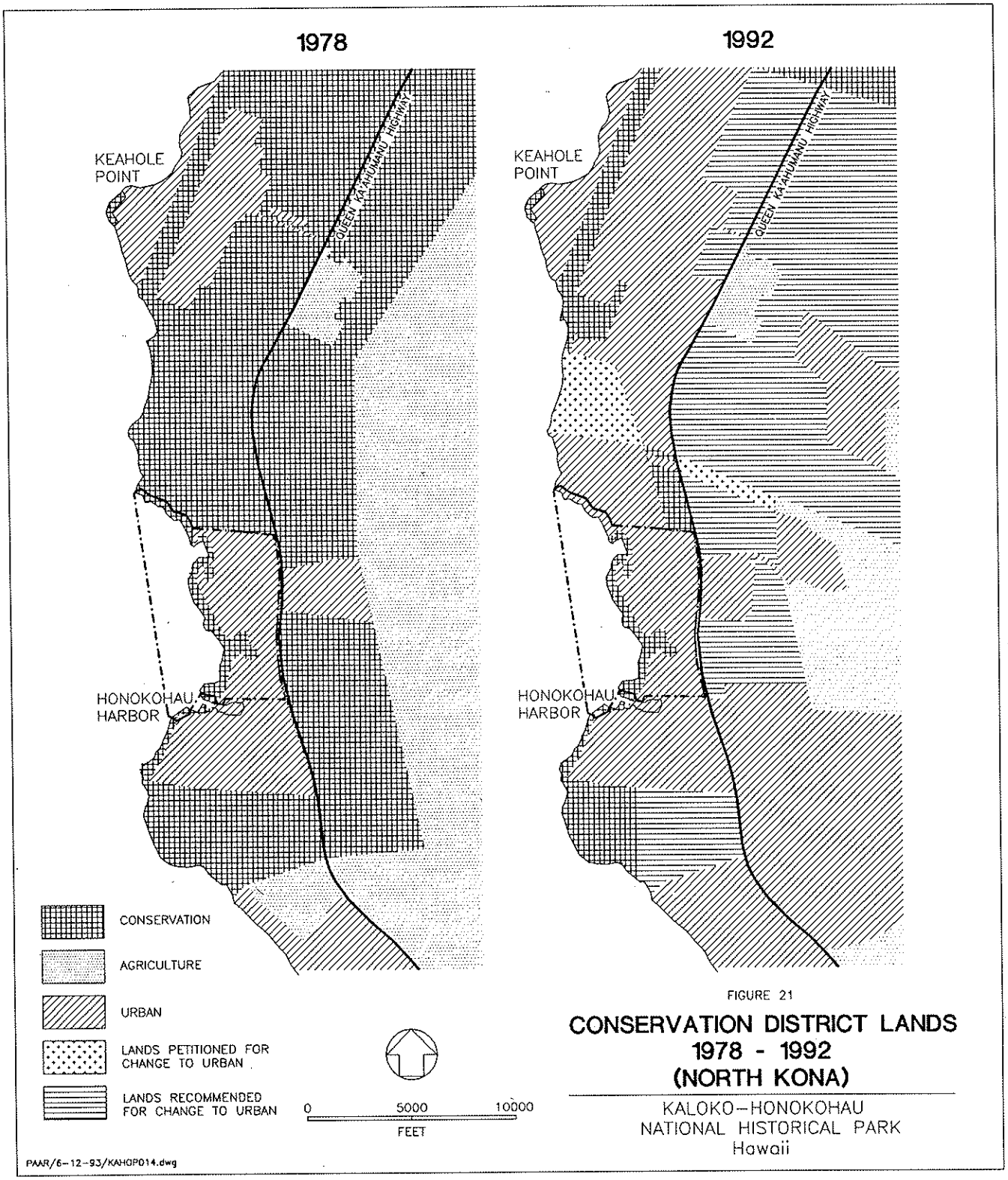


FIGURE 21

CONSERVATION DISTRICT LANDS 1978 - 1992 (NORTH KONA)

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

There are several development projects being proposed for the lands around Kaloko-Honokōhau. They are all large-scale and on lands that are presently undeveloped. These projects include:

Kealakehe Planned Community. South of the park and *mauka* of the highway, approximately 960 acres of State (810 acres) and Queen Liliuokalani Trust (150 acres) lands are being proposed for development as a residential community. The project is to contain approximately 4,100 units, 60 percent of which will be affordable for sale and rental housing units. The project is to be funded and built by the Housing Finance and Development Corporation (HFDC) of the State of Hawai'i. The State intends to purchase the Queen Lili'uokalani Trust lands. The project is to include schools, public facilities, commercial areas, along with highway construction and improvements. The project is also to include the golf course which is to be irrigated by the treated effluent from the new sewage treatment plant. The public course is to be developed by Hawai'i County. Work on the construction of roads and underground utilities is underway. Full build out is expected to occur in approximately 20 years.

HFDC's plans for resort development on the State lands *makai* of the highway were dropped from the project. More recently, the Office of State Planning prepared a plan to develop coastal portions of these lands as a regional park.

Lili'uokalani Trust Keahuolū Lands. Located just south of the Kealakehe planned community, the project encompasses about 1,135 acres of Trust-owned lands to be leased or sold for development as the rest of the planned new urban center. North of Kailua town, the project consists of a commercial area, including a regional shopping center, offices, public facilities, a business expansion area and a residential community. The residential community is to be sold to the State of Hawai'i and could accommodate approximately 2,700 units. Project lands to be developed by the Trust will be constructed in phases by individual developers. Major improvements in the regional roadway system are also a part of this project. Full build out is expected to take 20 or more years.

Kohana Iki Resort. Owned by Nansay Hawai'i, this resort development project is located on lands immediately north of the park, with a portion (18 acres) lying within the authorized boundary. The project totals 470 acres and consists of two resort hotels, approximately 800 condominium units, a golf course, marina, 200 single-family units, 150 multi-family units of support housing, and a wastewater treatment plant.

Honokōhau Harbor Expansion. Plans call for additional harbor developments and related facilities to be built on this 65-acre area. The expansion is designed to accommodate boating needs for the area for the next two decades. Expansion is to take place to the south of the existing harbor developments. Long-term plans are for an

expansion to accommodate about 200 more slips for privately-owned boats. The related facilities consist of commercial marine related structures and businesses, including shops, a restaurant, marine equipment supply stores and boat maintenance facilities.

'O'oma II. About 300 acres owned by Kahala Capital Corporation is being proposed for development. Located north of the Nansay Hawai'i Kohana Iki project, this one calls for an ocean science center, professional conference complex, a water-oriented recreation park, golf course, 70-100 residential lots, up to 200 condominium units, a retail center, hotel, and a wastewater treatment plant. The project is scheduled for completion by 1999.

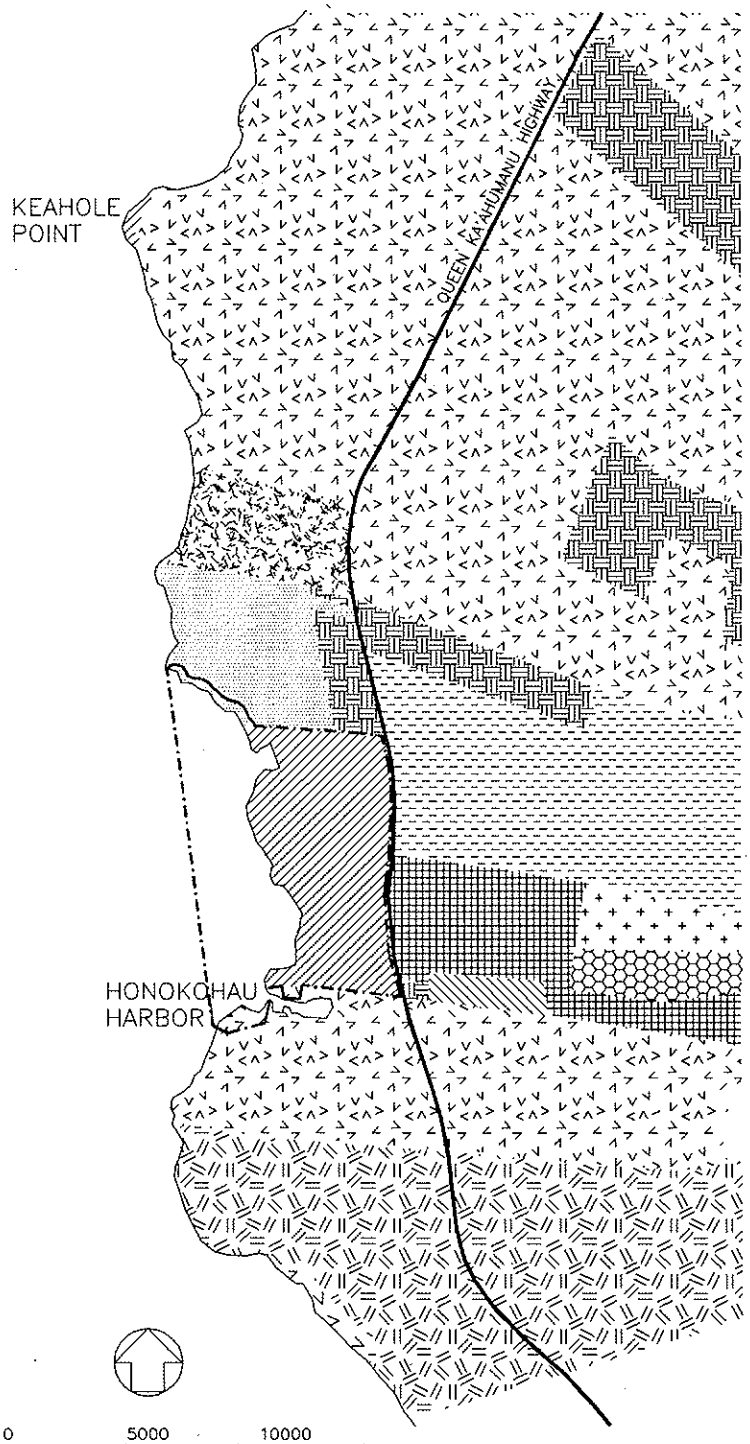
Honokōhau Industrial Park. Light industrial uses are proposed on about 90 acres of land *mauka* of the park. They include production and sale of concrete; boat storage, sales and repair; lumber and hardware sales; automotive sales, service, and repair; vehicle and equipment storage; offices and nurseries. In some instances, these are a continuation or expansion of existing uses. Full development is expected within the next few years.

Kohanaiki Mauka. Located *mauka* of the proposed Kohana Iki Resort, this project calls for the subdivision of about 70 acres into parcels ranging in size from one-half acre to three or more acres. These lots are to be developed for light industrial and commercial uses. Lots are to be individually sold or leased.

Ke-āhole Airport Expansion. The ongoing expansion includes an extension of the present 6,500-foot runway to 11,000 feet and the eventual construction of new and larger terminal facilities to accommodate wide-bodied aircraft.

Infrastructure Construction for the Hawai'i Ocean Science and Technology Park (HOST). This 547-acre State operated industrial park for high-tech aquaculture, mariculture, and ocean science business is in the process of expanding its infrastructure for ocean-related technology, including marine microbiology and ocean engineering.

As part of the for the Kealakehe Planned Community development, there are plans to improve the Queen Ka'ahumanu Highway intersection with the present Honokōhau Harbor access road (Kealakehe Parkway) to the south of the park. This project will include the construction of a grade separated interchange at the intersection with the Queen Ka'ahumanu Highway, and utility relocation. The project also includes construction of the Kealakehe Parkway, the new road *mauka* of the highway which is to connect with the Māmalahoa Highway. Long-range plans call for linking the portion of the Kealakehe Parkway *makai* of the highway with Ali'i Drive in Kailua town.



FEDERAL LANDS

KAHALA CAPITAL CORP.

NANSAY HAWAII

STATE OF HAWAII

OTHER PRIVATE LANDS

TAKEMASA INTERNATIONAL INCORPORATED

LILIUOKALANI TRUST

LANIHAU CORPORATION

ROBERT S. McCLEAN

R. GREENWELL

PALANI RANCH CO.

Source: Tax Map, State of Hawaii

FIGURE 22

LAND OWNERSHIP (NORTH KONA)

Adjacent Lands

KALOKO–HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

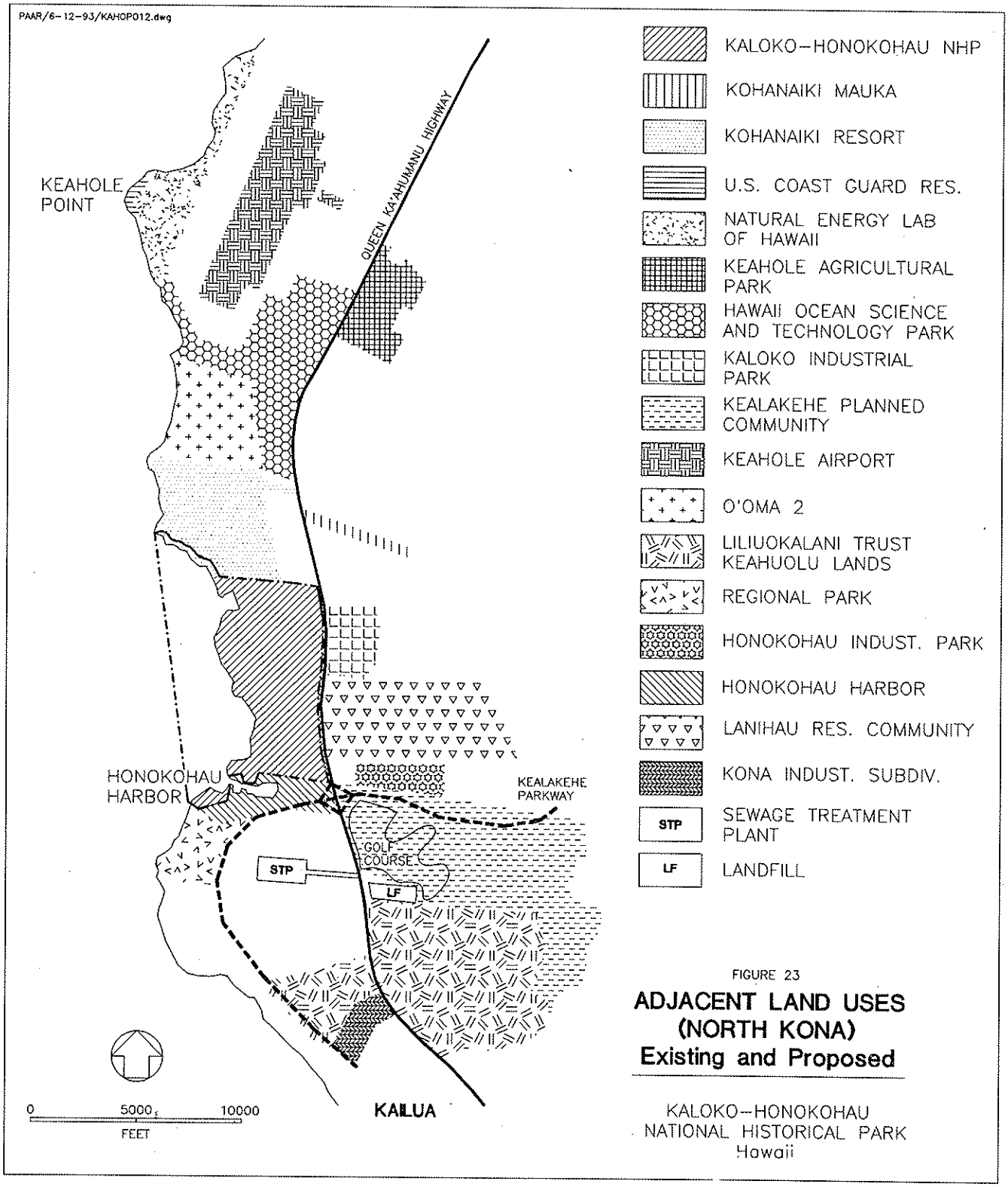


FIGURE 23

ADJACENT LAND USES (NORTH KONA)
Existing and Proposed

KALOKO-HONOKOHAU
NATIONAL HISTORICAL PARK
Hawaii

Visitor Use Data

North Kona has experienced about a doubling in the number of visitor accommodations (hotel rooms and condominium units) over the past decade and, as just described, considerably more is planned. North Kona has become the principal visitor destination area for the island of Hawai'i. In the next five to ten years, construction of several large-scale resort residential complexes would bring significantly greater numbers of off-island visitors to the North Kona area. Assuming that the now proposed visitor accommodations are built out over the next five to ten years, an additional increase of about 240 percent in the number of hotel rooms and more than a 260 percent increase in the number of condominium units would occur in North Kona. It is reasonable to expect that a great many of the occupants of these hotels and condominiums will want to visit Kaloko-Honokōhau National Historical Park.

Presently, visitor use at Kaloko-Honokōhau consists of interpretive tours of the park's cultural and natural resources and values (these group tours are taking place in the Kaloko portion of the park) and recreational use (mostly nude sunbathing) of the sand beach at Honokōhau. The former use is usually led by a National Park Service interpreter, while the latter use usually does not involve direct contact with the National Park Service. Typically, the tours consist of visitors meeting an interpreter at the existing gate across from headquarters for a guided tour of the cultural resources found in the Kaloko area.

The average length of stay in the park is about four hours. Nearly all the visitation is by local residents rather than by off-island visitors. All of the visitation is day use. Major activities include hiking, swimming, sunbathing, and interpretive talks/guided tours. No formal visitor surveys have been conducted in the park to establish use patterns.

In January 1988, the first month visitor statistics were kept, there were 118 visits, including three group tours. By January 1991, the first month that visitor use statistics included the large Honokōhau parcel, monthly visitation had jumped to 3,558. In 1991, a total of 46,790 visits were recorded for the park. Of these, 35,440 were recorded at Honokōhau beach, about three-quarters of the total. Beach use at Honokōhau peaks on the weekends and is mostly from off-island visitors. Only a very small number of park visitors come directly to park headquarters on the *mauka* side of the highway.

Kaloko-Honokōhau is a new park, only partially opened to the public and completely lacking in any on-site facility development. Consequently, its statistical use history has limitations for making projections for possible future use. For those reasons nearby Pu'uhonua o Hōnaunau National Historical Park is used here for comparison purposes.

Pu'uhonua o Hōnaunau, located on the Kona coast to the south of Kaloko-Honokōhau, contains similar cultural resources and represents the same cultural context in its park themes as Kaloko-Honokōhau. Pu'uhonua o Hōnaunau, however, is smaller in size (less than 200 acres) and more remotely located. Nonetheless, it can serve as an example to make some projections regarding future visitor use at Kaloko-Honokōhau.

In the nearly three decades since authorization, visitation at Pu'uhonua o Hōnaunau has increased more than ten-fold — from 37,800 in 1962 when the park opened to 401,540 in 1991. Visitation, however, has fluctuated over the past few years. In 1986, 1987, and in 1989 it exceeded 400,00, and in 1978, the peak year thus far, it was 491,378.

In 1991, visitation to Kaloko-Honokōhau doubled over the previous year. During this period the park lacked any on-site visitors use facilities and was still unknown to the vast majority of off-island visitors.

It is anticipated that visitation to Kaloko-Honokōhau will increase dramatically in the coming years. This is attributed to the park's location near a major airport and adjacent to a rapidly urbanizing area geared primarily to the visitor industry. It is from these off-island tourists, many of whom will be international in origin, that most of Kaloko-Honokōhau's future visitors will come.

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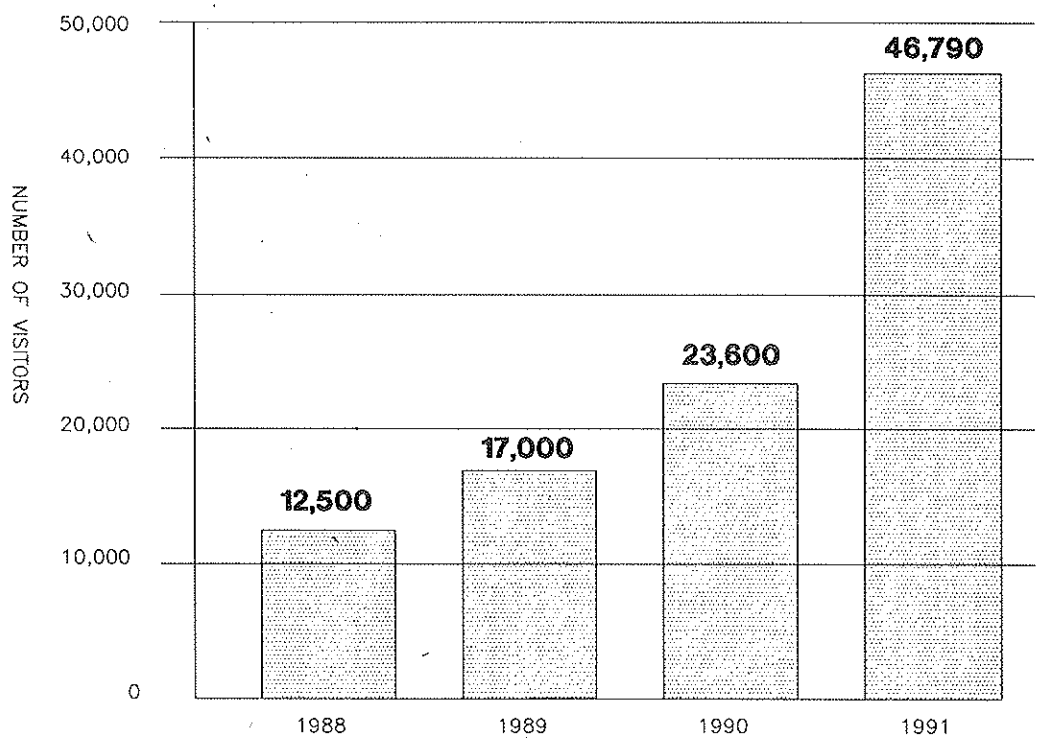
TABLE 1.

ANNUAL VISITATION



NOTE:
ALL VISITS ARE CONSIDERED RECREATIONAL.
VISITATION FIGURES FOR 1988, 1989 AND 1990 DO NOT INCLUDE VISITORS TO THE 235-ACRE HONOKOHAU PARCEL.

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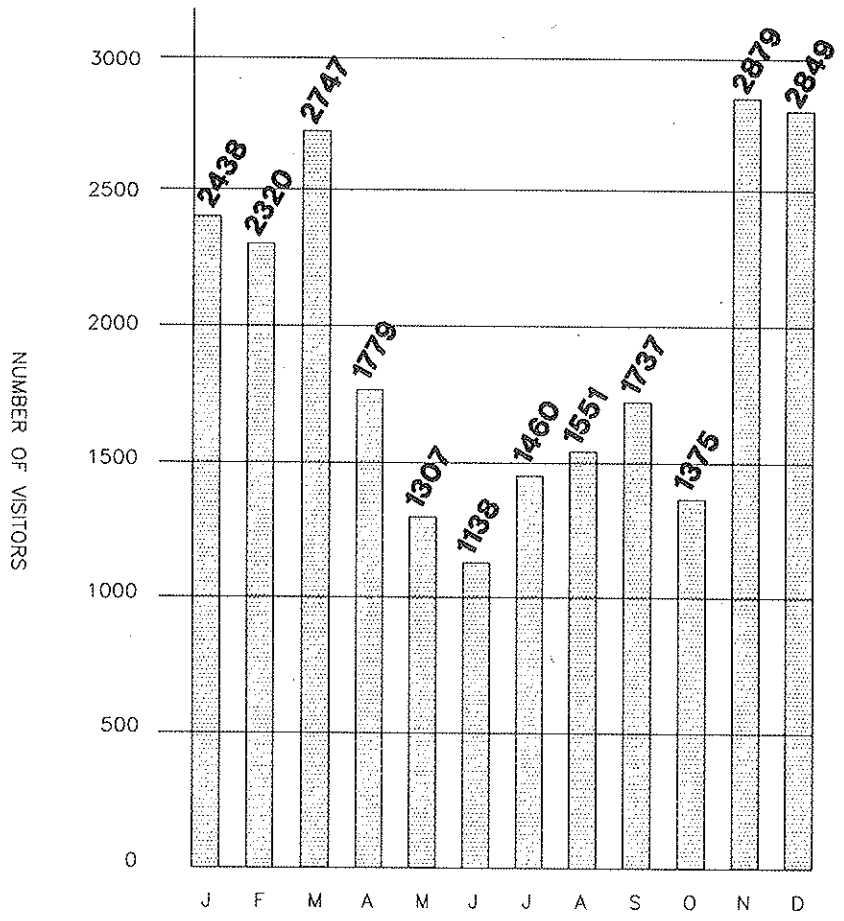
TABLE 2.

MONTHLY VISITATION - 1990

(RECREATIONAL USE)



(Note: Use figures do not include Honokohau Beach)

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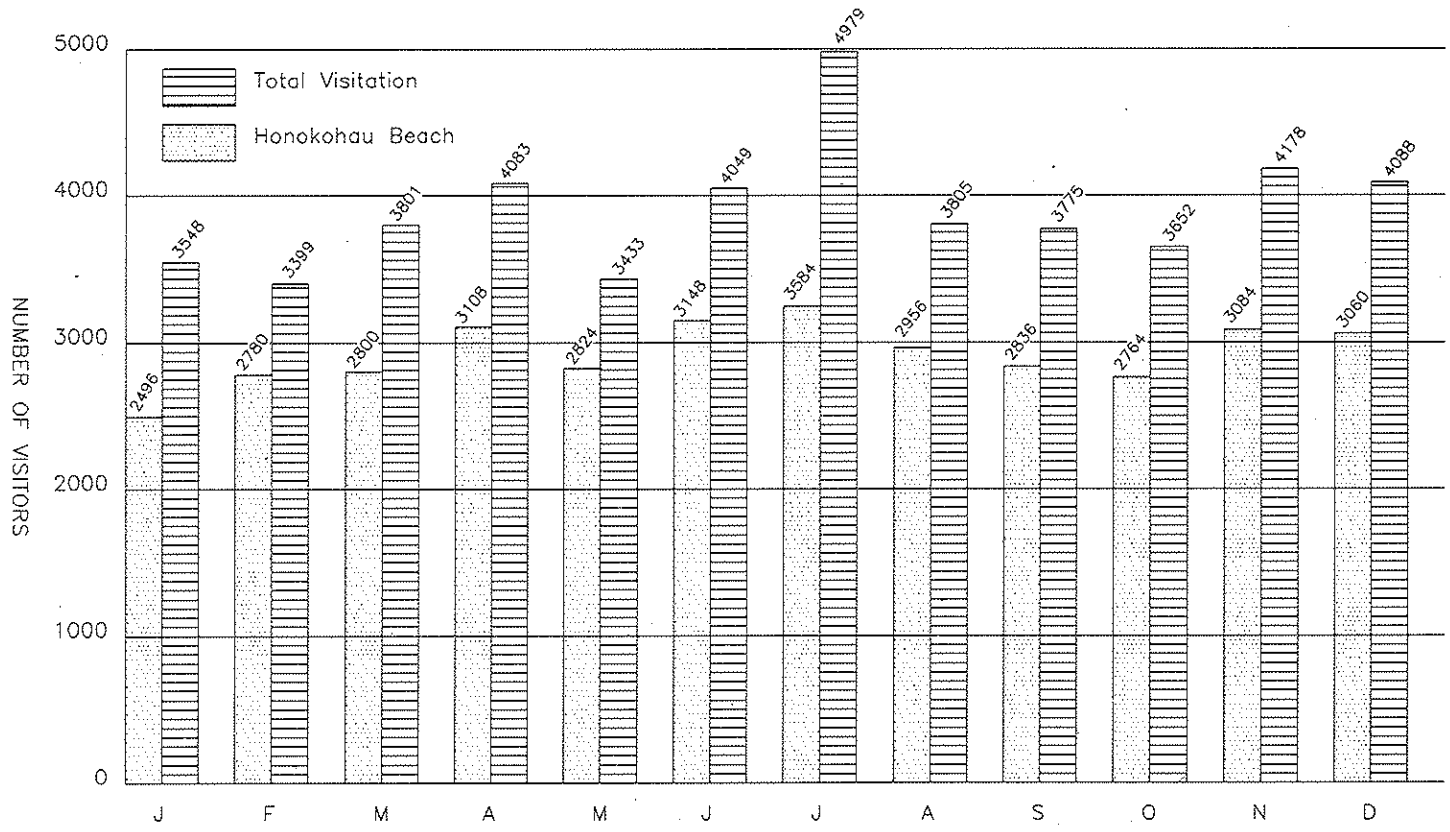
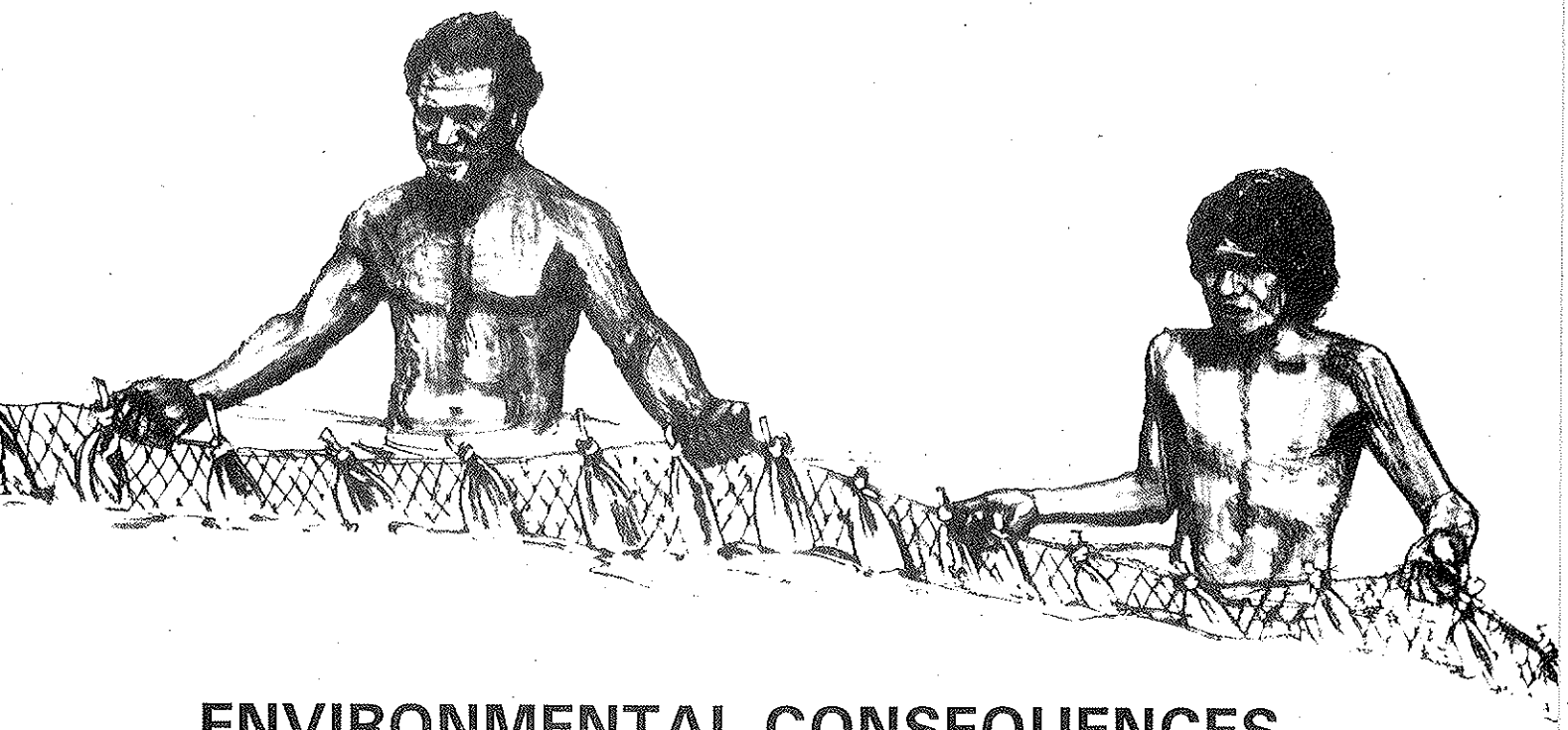
TABLE 3.

MONTHLY VISITATION - 1991

(RECREATIONAL USE)





ENVIRONMENTAL CONSEQUENCES

No Action Alternative

The impacts associated with the no-action alternative are described primarily to determine the consequences of continuing the present course of park operations; and secondly, to provide a basis for comparison with the effects of the other alternatives, all of which call for specific actions to deal with issues now facing the park.

Impacts on Cultural Resources. There is to be no construction of facilities in the park under the no-action alternative. No ground disturbing activities are to take place due to park development. The setting aside of a portion of the sandy area next to Kaloko fishpond as a place to recreate traditional Hawaiian activities would cause minor disturbance of the ground surface, but since no archeological sites are known to exist here and the site has already been partially disturbed by earlier development there would be no adverse effect. Therefore, the possibility of adverse impacts on archeological sites from these activities would not exist under this alternative. This is regarded as beneficial.

Existing use of unimproved roads, trails, and tracks is to continue under this alternative. Due to the lack of a main park entrance road and a visitor orientation center and a limited park staff, visitor use in the park remains largely unstructured. Without a major visitor contact point, it will be more difficult to structure visitor use away from areas requiring special management, such as Hawaiian burial sites. Also, existing trails and unimproved roads pass near these burial sites. These would all be regarded as a threat to the park's cultural resources. This threat is long-term and, along with the expected increase in visitation, will increase over time. There is potential for archeological

sites being damaged by visitors who might wander off existing trials. Much of this damage would likely be inadvertent by those visitors who may not recognize cultural sites or are unaware of their significance. This alternative has the greatest potential for artifact removal and vandalism of sites in the park. These are major adverse effects. The adverse effects could be mitigated through the use of information signs along the park's existing trails, particularly those near fragile cultural resources.

The lack of any demarcation or boundary fencing would also pose a threat to the park's cultural resources. The existing unstructured access into the park by vehicles and by foot traffic from the Kohanaiki lands, from the small boat harbor and from along the highway would continue. This threat to cultural resources would be made greater by the limited staff not being able to adequately patrol park boundaries.

Under this alternative, approved strategies designed to deal with cultural resource management issues will be more difficult to implement. The many archeological resources in the park now in a poor state of preservation because of neglect and the effects of waves, vegetation, and human impacts will continue to deteriorate. Cultural resource evaluation and selected stabilization and preservation of sites would be difficult to undertake at the existing staff level.

Field checking of recorded sites would be held up indefinitely. Knowledge of archeological sites found within the Honokōhau *ahupua'a* will continue to be limited. There would be no park staff available to receive needed training to make possible the curation of the park's museum collection. Restoration work on Kaloko fishpond's seawall would be not take place in the foreseeable future. Moreover, ethnographic research and oral history documentation would be difficult to carry out. Delays in obtaining ethnographic data and oral history interviews from knowledgeable Hawaiians and others could result in the permanent loss of this information to the National Park Service. Archeological sites in the park would continue to be adversely impacted by alien vegetation. These effects are regarded as adverse and long term.

Impacts on Natural Resources. Implementation of this alternative would have little or no adverse impact on the park's geology. None of the park's surface or subsurface is to be disturbed by the construction of facilities. The use of the sandy area next to Kaloko fishpond as the setting for a live-in cultural education facility would have only a very minor and localized disruptive effect on the surface material.

Since park boundaries are to remain unmarked, unfenced, and unscreened, off-road vehicles would be able to enter the park via the highway, Kohanaiki lands, or the small boat harbor. Therefore, in the

long term, some surface disturbance from illegal off-road vehicle entry would likely occur.

There would be a long-term adverse impact on the park's primary freshwater resource, its anchialine ponds. Continuation of a business as usual approach would allow for only minimal actions by the National Park Service to try to influence land uses on *mauka* lands outside the park. Consequently, the park's resource management strategy for effectively managing and protecting the extraordinary vertebrate and lower plant ecosystems found in these ponds would be seriously compromised. *Mauka* discharges into injection wells, septic systems, cesspools, and lava tubes would continue to be little influenced by the park's presence *makai*. The lack of a marine biologist and the existing level of resource management staff would make it extremely difficult to accumulate needed scientific data to identify the external sources of pollution to the park's groundwater and its anchialine ponds and fishponds. The no-action alternative will likely mean the unabated continuation of polluted liquids entering into the park's groundwater system and the continued eutrophication of the ponds.

Implementation of the no-action alternative permits the removal of the alien plant, red mangrove, from around Kaloko fishpond and other areas. Once removed, the pond's potential to attract water birds, including endangered species, will be increased. However, at the existing staff level it will be difficult to keep the mangrove from reappearing in this part of the park since it originates from a nearby seed source outside park boundaries. With the existing park resource management staff, other smaller stands of mangrove and *kiawe*, Christmasberry, and *koa haole* could be removed on a piece-meal basis. These are regarded as beneficial effects. Despite these efforts, however, the park would continue to be dominated by alien plant species. The resource management goal of eventually restoring the character of the park's vegetation to its condition before non-Hawaiian introductions would probably not be achieved. Under existing staff levels, it would be difficult to undertake the needed fountaingrass research to develop effective measures for its control within the park. Consequently, a fire hazard would continue to build up in the park. If fires were to occur, the fire-adopted fountaingrass would spread, eventually forming a homogeneous stand and disrupting primary plant succession in the park. Finally, the planting of native species in the park, based on a needed vegetation management plan, would not occur in the foreseeable future. All of these effects would be adverse and long term.

The long-term protection of the park's wetlands around 'Aimakapā fishpond as habitat for the endangered Hawaiian coot and stilt would be difficult to achieve under existing conditions. The implementation of needed predator control measures to protect the park's water birds would be constrained by a limited resource management staff.

Limited staff would also not be able to undertake the long-term restoration of Kaloko fishpond as water bird habitat.

Under the no-action alternative, the park's air quality would be more apt to be adversely affected by uses and activities occurring on adjacent lands. Having only a limited staff available would likely mean that efforts to gather data, conduct research and monitoring to determine sources of air pollution would not occur. This alternative, however, does not provide for the development of any visitor parking facilities in the park. Except for vehicles entering the park illegally, there would be no adverse effect on the park's air quality from vehicle emissions occurring within park boundaries.

Socio-Economic Impacts. This alternative is inconsistent with several of the recommendations contained in the Spirit of Ka-loko Hono-kō-hau. A major adverse effect connected with implementing this alternative would be the increasing pressure from the Hawaiian community and others to develop the park in accordance with the intent of Congress and the recommendations contained in the study report, the Spirit of Ka-loko Hono-kō-hau.

Visitor Use Impacts. Visitors would have very little sense of having arrived at a unit of the national park system. Visitor services at Kaloko-Honokōhau eventually would become substandard. Orientation, information, and interpretation are provided only at the very minimal level; most of these services are provided off-site. The major visitor contact point will continue to be the less than adequate existing facility at the Kaloko Industrial Park. This facility provides no physical connection with the nationally significant resources of the park. Consequently, visitors would not be provided with a quality introductory park experience. There would be no interpretive facilities, no museum exhibits, and an inadequate interpretive staff. No opportunities would exist for visitors to participate in cultural or living history demonstrations, or the sampling of Hawaiian foods grown in the park. Moreover, it would be impossible for visitors to capture the spiritual essence of Kaloko-Honokōhau at this off-site location. With the passage of time, the visitor experience at Kaloko-Honokōhau will deteriorate as the expected increase in visitation places more burdens on existing park staff to provide basic services.

The lack of an interpretive division at the park could be mitigated to some degree by the use of VIP's (Volunteers-in-the-Parks) to conduct certain services such as cultural history demonstrations. Existing knowledge indicates that individuals with the lore do reside in the area.

Visitors walking in from the highway to Kaloko fishpond via the existing service road have the potential to disturb participants attempting to recreate traditional Hawaiian ways at the nearby cultural site. Moreover, the participants would have to share the existing chemical toilet near Kaloko fishpond with visitors. These are considered to be adverse effects.

The continuing presence of fountaingrass in the park creates a fire hazard for visitors. The unstructured nature of visitor use under this alternative would tend to increase this safety hazard.

There would be no source of potable water in the park for visitors and no facilities for the physically disabled. Visitor rest rooms would continue to consist of the existing chemical toilet near Kaloko fishpond plus the composting toilet near Honokōhau beach. These units would have to be periodically serviced by park ATV's using existing service roads.

Under this alternative, it is anticipated that visitor satisfaction would eventually deteriorate. It is also likely that the expected future increases in park visitation would lower it more. Also, under this alternative, there would be no major tourist information center established at the park to disburse information on park and recreation opportunities along the Kona-Kohala coast. These effects are adverse and long term.

Traffic Impacts. Since there is to be no formal vehicle access built for visitors to enter the park from the Queen Ka'ahumanu Highway and no visitor parking or orientation center for visitor contact are to be constructed, use patterns will remain unchanged. The lack of parking means that, as visitation to Kaloko-Honokōhau increases, visitors eventually will be forced to park their vehicles along the highway shoulders. Those visitors coming from Kailua (traveling north) would either have to cross the highway on foot after parking or make an illegal U-turn in order to park on the *mauka* side. Parking vehicles along the shoulders of the highway would create unsafe and congested traffic conditions in the vicinity of Kaloko-Honokōhau for park visitors and through traffic alike, and is considered to be a long-term adverse effect.

Implementation of this alternative would have very little effect on the local economy — either beneficial or adverse. There are no construction projects connected with implementing this alternative, so no new jobs will be created and no construction supplies and materials will be purchased. The park's annual expenditures to local businesses would remain about the same as the park's operating budget would remain at or near its existing level. No new jobs would be created due to an expanding park staff.

As this is a new park, there is very little data available on the impact of the park's visitor expenditures on the local economy. At this time, under existing visitation levels, these effects are considered to be negligible.

Conclusion. Under the no-action alternative, the protection and preservation strategies contained in the park's resource management plan would stand little chance of being implemented. Because of this, over the long term, there would be wide-spread deterioration and, in

some instances, a loss in the park's cultural resources. Particularly affected would be sensitive resources like Hawaiian burial sites. Also, holding up the obtaining of information on ethnographic resources could result in their permanent loss. Alien plants would continue to dominate the park's vegetation, allowing the fire hazard condition to worsen. Restoration of fishponds as endangered water bird habitat or for fish production would be held up indefinitely. Although the no-action alternative would have no adverse effects on geology, vegetation, wildlife, and cultural sites from the on-site development of park facilities, this benefit would be more than offset by degradation to park resources and inadequate visitor services. No on-site facilities and substandard visitor services will result in unstructured use of the park which in the long-term will adversely affect the above resources.

Visitor services at the park, already limited and constrained by the existing small staff and the lack of adequate on-site facilities, will eventually become substandard. Park visitors will not receive the quality experience expected at a unit of the national park system. Many visitors would leave the park with little or no appreciation or understanding of the Hawaiian culture.

Essentially, the no-action alternative falls short of the intent of both the park's authorizing legislation and the Spirit of Ka-loko Honokōhau.

Cumulative Effects. The following are effects the development and use of Kaloko-Honokōhau under the no action alternative would have on existing and proposed developments and/or actions on the lands adjacent to and in the vicinity of national park.

In the foreseaable future, because of the limited access under this alternative, there would be traffic congestion along the national park portion of the Queen Ka'ahumanu Highway from visitors attempting to park their vehicles along the *makai* side of the right-of-way. As the State begins construction on the widening of the highway, this congestion would worsen and unsafe conditions would be created for park visitors. Also, in the future more and more park visitors would be attempting to park their vehicles in the adjacent Honokōhau Harbor area, creating traffic and congestion problems here too. The State would ultimately close off the harbor area to park visitors.

The proposed development and use of Kaloko-Honokōhau under this alternative would have only minor effects on the nearby Kaloko Industrial Park and the proposed Kohana Iki development. Park headquarters would continue to be located at the industrial park and in the future increasing number of park visitors would go there seeking information. Due to the limited space here for vehicle parking, congestion would eventually occur. The proposed Kohana Iki development would be enhanced by the presence of a national park next door.

The limited development proposed at Kaloko-Honokōhau under this alternative would effect regional open space. The cumulative effect on adjacent lands in the foreseeable future would be beneficial by providing a visual open space buffer to the surrounding developments.

Proposed Action

Information is provided here about the anticipated environmental effects as a consequence of implementing the proposed action, and the measures proposed to mitigate those consequences which will have an adverse effect.

Impacts on Cultural Resources. The construction of a large (extending over about four acres) visitor orientation center and parking on the already disturbed portion of the *'a'ā* lava flow *mauka* of 'Aimakapā fishpond, as proposed, will not adversely affect any known archeological sites or features. There is a remote possibility that subsurface cultural features may be uncovered during the site preparation phase of construction. This is unlikely, however, because the bulldozing which took place here earlier scraped off all of the jagged loose clinker surface lava down to the solid lava. If any cultural features were uncovered, however, all construction activities will be halted and a qualified archeologist consulted.

This construction will introduce non-Hawaiian developments (buildings, a paved parking area, an entrance road, and utilities) into what heretofore was an open area. These introductions will have a long-term adverse effect on the historic scene and the intangible cultural values associated with this particular place.

The construction of a maintenance facility nearby similarly would place man-made structures into what is now undeveloped open space. To date, no intensive archeological surveys have taken place at the proposed site. Superficial surveys indicate that there may be scattered sites of low significance in this general area. Prior to any development taking place at the site, an intensive archeological survey would be carried out there. If during site preparation any cultural resources were revealed, construction activities would be halted and a qualified archeologist would be consulted. The proposed maintenance facility would be designed and built to avoid surface remains.

Measures to mitigate the adverse effect on the cultural landscape would consist of the visitor center building, amphitheater, and maintenance facility being designed with low elevation and of a color and texture that will blend in with the surrounding terrain. Also, the visitor orientation center site is located on the bulldozed portion of the *'a'ā* flow. The rough, irregular top layer has been removed, leaving a relatively smooth surface which is lower than the surrounding natural topography. Consequently, these developments will not adversely affect coastal views. The construction of low lava rock walls around

the visitor parking area would furthur mitigate the visual impact from motor vehicles.

Other major developments proposed include the live-in cultural education complex, a replica Hawaiian village, rest rooms near Honokōhau beach, and a small parking area south of Honokōhau Harbor. Utility lines will be needed to connect the Honokōhau rest rooms with the visitor orientation center. Moreover, sewer lines will need to be run from the visitor orientation center to the new sewage treatment plant at Kealakehe, south of the park. The remaining development connected with the proposed action consists of the construction of boundary fencing and trail improvement.

The developments connected with the live-in cultural education complex will be low key, Hawaiian in character, and would not involve any grading or subsurface disturbance. Moreover, the site selected is an open, sandy area previously disturbed and not known to contain any cultural sites or features. Those known cultural features nearby will be utilized to delimit the complex and would not be disturbed during construction. Consequently, the development of a live-in cultural education complex will not adversely affect the historic scene here.

The construction of a replica Hawaiian village also would not involve any subsurface activity and no known archeological sites or features have been identified on the surface of the selected site. The development proposed here is to be modest, covering less than one acre, but will introduce new structures into an area not previously disturbed by development. Although the structures proposed are to be built to replicate those which were found in a traditional Hawaiian village, they still must be considered to be a disruption of the historic scene at this location since none previously existed here. This would be a long-term adverse effect.

The construction of visitor rest rooms near Honokōhau beach will have a long-term adverse effect on the historic scene at the selected site. Along the trenching line for the underground utilities, there would be a short-term adverse effect on the historic scene. There are no known archeological sites or features here, but construction of the rest rooms will involve subsurface disturbance, as will the installation of underground utilities. If any cultural features are uncovered, work would be stopped and a professional archeologist consulted. Mitigation here would include covering over the utility trenches to restore the surface and re-establish the historic scene.

The proposed parking area for visitors to access the cultural sites and recreation opportunities found at nearby Ala'ula cove is to be constructed on lands already partially disturbed by the existing activities of the Honokōhau Harbor. No archeological sites or features are known to exist here. None of the subsurface would be disturbed by the proposed parking lot. Therefore, there would be no adverse effect associated with this construction.

Under the proposed action, trenches for the laying of utilities (two will be needed; one for electric lines and the other for sewer and water lines) are to run from the visitor orientation center to the public rest rooms to be located near Honokōhau beach. So as to minimize the possible adverse effect on cultural resources, these trenches would, as much as possible, be dug along existing unimproved roads and trails (non-historic) in the park. In some areas no trails exist and it may be necessary for the trenching to go across lands where the surface is undisturbed. Here, the alignments will be carefully surveyed before any trenching takes place to ensure that no cultural sites or features exist along them. In those possible instances where subsurface features are discovered during trenching, the following mitigation measures would take place: all work activities would be stopped to allow examination by professional archeologists to evaluate significance and to recommend the appropriate actions to be taken. Mitigation measures would include restoring the surface along the trench lines to its former appearance as much as possible.

In order to bring utilities (power and water) in the park from the existing lines along the *mauka* side of the highway, underground trenches will have to be dug across the state's right-of-way, including the highway itself. After crossing the highway, these trenches will cross the disturbed portion of the *'a'ā* lava flow to the site of the proposed visitor orientation center. These construction activities will not adversely affect any known archeological sites. Here again, if during the trenching subsurface sites are revealed, work will stop and a qualified archeologist would be called in.

Under the proposed action sewer lines will need to be placed underground from the visitor center and maintenance facility sites to connect with the new sewage treatment plant on State of Hawai'i lands at Kealakehe, south of the park. These lands are outside of Kaloko-Honokōhau's authorized boundary. Some of these lands have already been developed with facilities related to the Honokōhau Harbor or to the sewage treatment plant itself. Other lands may be part of the proposed expansion of Honokōhau Harbor. The exact alignment for the needed sewer line running from the park to the treatment plant will have to be worked out with the State of Hawai'i, including the State Historic Preservation Officer, and Hawai'i County to secure needed approvals and permits and to ensure that any cultural resources in the area are avoided and/or appropriate mitigation efforts undertaken.

Boundary fencing called for under the proposal consists of building a fence line along the park's southern boundary. No major cultural resource sites are known to exist along the proposed alignment. At the northern end of the park, the boundary line is to be clearly delineated. It is possible, however, that previously unknown cultural resources may be encountered during construction of the fence line along the southern boundary. If this occurs, specific plans to mitigate any adverse effects on cultural resources will be developed in consultation

with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). Rerouting fences to avoid resources will always be the preferred mitigation plan, but such action may not be possible in all cases. When this is not possible, however (for example when trails are specifically routed through cultural resource areas so they can be interpreted), measures to mitigate any adverse effects will be developed in consultation with the SHPO and the ACHP.

The planting of screening along selected portions of the park's *mauka* boundary would cause some disruption of the historic scene here. Mitigation measures would consist of the plantings being either with natives or Polynesian introductions. The adverse effect will therefore be minor.

Implementing the proposal will result in improved services aimed at giving visitors an appreciation of the park's considerable and important Hawaiian resources and values. Through the establishment of an orientation center designed to serve as the primary visitor contact point, the development of a replica Hawaiian village where cultural and living history demonstrations would take place, along with interpretive walks and programs — all designed to give visitors a basic understanding of the traditional lifestyle of Hawaiians — the cultural resources of the park, both the tangible and the intangible, will be indirectly benefitted. This would be a long-term benefit.

Damage to cultural resources due to inadvertent actions taken by uninformed and unguided visitors will be avoided or at least reduced to minimal levels. The establishment of a park-wide trail system to National Park Service standards through the modification of the existing uncoordinated network of unimproved roads, trails, and tracks will permit visitor access to cultural features and makes possible the structuring of visitor use to protect particularly sensitive cultural resources such as sacred Hawaiian burial sites. This is considered to be a beneficial and long-term effect.

Impacts on Natural Resources. Developments under the proposed action would have only a minor adverse effect on the park's geology. The proposed visitor orientation center developments will require grading, but at the selected site the surface lava flow material already has been scraped away. The additional amount of earth-moving required to prepare for development will not adversely impact the site to any great degree.

The traditional Hawaiian-type structures proposed at the live-in cultural education complex and the replica Hawaiian village are to be low-key and will not require any major grading. No adverse effect on the park's geology will result from the construction of these two developments.

Rest rooms to be constructed near Honokōhau beach will require grading and are to be located at a site where the ground surface has not been disturbed. Consequently, there would be an adverse effect here on the geology. The effect would be localized, but long term.

The construction of the paved parking lot, entrance road, and visitor center structures would create about four acres of impervious surface in the park. This would cause an increase in surface runoff at the site. Moreover, possible leaks and emissions from up to 200 vehicles utilizing the parking lot, when combined with surface runoff, could introduce small amounts of petrochemicals into the park's groundwater. This would be a long-term adverse effect. It will be localized and, because of low rainfall and the porous nature of the surrounding terrain, is not considered to be a major problem. Adverse effects on the park's groundwater from storm water runoff, however, would be considered during the design phase for the proposed paved parking lot. The need for the development of a drainage infrastructure, including storm water treatment facilities, will be ascertained at that time.

The introduction of sewer lines into the park has the potential to adversely affect its fishponds, anchialine pools, and nearshore waters. Any break in the lines would allow effluent to enter the porous lava substrate and contaminate the underlying groundwater. Contamination of the park's groundwater would be an adverse effect of major significance. Mitigation measures will consist of the use of ductile iron pipes for the sewer lines from the visitor orientation center to the rest rooms at Honokōhau beach. The overall effect resulting from the introduction of sewer lines in the park, however, would likely be beneficial since the construction of rest rooms would significantly reduce the contamination of anchialine pools, fishponds, and nearshore waters by human wastes now occurring.

Overall, the proposed action would have a beneficial effect on the park's anchialine ponds through the implementation of resource management plan strategies. Proposed staff increases would allow for improved protection at well-known places like the anchialine pond surrounded by *ahu*, thereby lessening the impact of visitors on the fragile biota of this and other ponds in the park.

The developments proposed would have very little effect on the plants in the park. The live-in cultural education complex developments may require the removal of a few coconut palms. The tree is regarded as a Polynesian introduction and thereby suitable for the park. Any removed could easily be replanted nearby. Some *kiawe* trees/shrubs may need to be removed to construct the replica Hawaiian village and the rest rooms near Honokōhau beach. This would be a beneficial rather than an adverse effect since the plant is an alien species. The park's resource management plan calls for its removal from the park.

Under the proposal, the potential for implementation of resource management strategies designed to remove alien plants would be greatly increased. Similarly, there would be greater potential for the eventual plantings of natives and Polynesian introductions in the park. The removal of alien grasses from the park will greatly reduce the fire hazard. These are all long-term and beneficial effects.

The boundary fencing will necessitate some removal of vegetation, but nearly all of the plants removed would be alien species. As noted, their removal is in keeping with strategies contained in the park's resource management plan. Thus, this would not be considered to be an adverse effect.

All trail development in the park would be routed so as to avoid the native strand and other important plants. The development of an interpretive trail system in the park would mitigate adverse effects on natural resources such as water bird habitat and anchialine ponds by structuring visitor use in these fragile areas. The proposed development and/or improvement and use of visitor trails for interpretive purposes along the *mauka* side of 'Aimakapā fishpond could disturb the endangered Hawaiian stilt and coot inhabiting the pond and its adjacent wetlands during the nesting season. To mitigate any possible adverse effect, the proposed visitor viewing platforms will be well screened by plantings and visitors would be encouraged to stay on delineated trails. During the nesting season, certain portions of the trail will be closed off to visitors.

During the construction phase of park development, particularly the ground-preparing activities connected with the visitor orientation center and parking, air quality could be temporarily lowered by air-blown dust particles. This adverse effect would be confined to the construction area itself where the surface is bare lava that has been bulldozed. The dust will affect the rest of the park only in a minor way. The airborne dust could be controlled to some degree by daily watering of the area during construction, the covering of dirt-hauling trucks, and the use of wind screens. There will also be a slight lowering of air quality in the park after construction from vehicular emissions in the visitor's parking lot, principally in the form of carbon monoxide, nitrogen oxides, and photochemical oxidants. These latter adverse effects will be localized, but long term.

Implementation of the proposed action would permit the National Park Service to be actively involved in the management of the State-owned offshore waters. This would include baseline surveys and monitoring made possible by the addition of the marine biologist position and would provide a greater level of on-site protection to the resources found here — both natural and cultural. The effect would be beneficial and long term.

Socio-Economic Impacts. Implementation of the proposed action would have beneficial effects on the local economy. These could

occur in the form of expenditures from construction projects in the park, visitor expenditures in the surrounding area, increases in the park's operating budget and jobs generated by the park.

Implementation of the proposal potentially could generate about $13 million in total construction costs. The magnitude of the effect on the local economy will depend on how many projects were awarded to local contractors, what proportion of needed construction supplies and materials were purchased from local businesses, and what proportion of the construction-related work force was made up by local residents. All of these construction-related economic benefits would be short term.

Because Kaloko-Honokōhau is a new, undeveloped park and because no visitor surveys have been taken, it would be difficult to calculate how much additional visitor expenditures in the area could be attributed to the development of the national historical park. However, since tourism plays a very important role in the local economy, the effect would be positive and beneficial.

Expenditures such as the park's increased payroll, utilities, business services, supplies, etc. would provide long-term benefits to the local economy. Again, the extent of these benefits will depend on how many jobs went to local residents and how much business went to local firms. The overall effect, however, would be beneficial.

Visitor Use Impacts. Implementation of the proposed action will serve to enhance the quality of the visitor experience at Kaloko-Honokōhau. Visitor understanding and appreciation of the ancient Hawaiian culture would increase. The construction of on-site facilities for interpretation will allow visitors to become informed about opportunities in the park — introduce them to its resources, both cultural and natural, and encourage them to discover more about these resources through walks and/or short hikes along the park's proposed trail system, thereby enriching their knowledge and appreciation of the traditional Hawaiian way of life. The visitor experience at Kaloko-Honokōhau would be made safer by the eventual control of fountaingrass, a fire hazard, from the park. All of the above are considered to be long-term and beneficial.

Implementation would in the long-term bring more visitors into the park area, including the coastal portions. The proposal also calls for the development of a live-in cultural education complex near the coast. The park's coastline, generally up to and along the ten-foot contour line, is susceptible to flooding caused by high waves generated by winter storms and hurricanes. There is also the possibility of tsunamis striking the coast. Placing visitors and live-in participants in this coastal high hazard area is a risk to public safety. This is considered to be an adverse effect.

Mitigation measures would consist of implementing the in-place park evacuation plan. This would take place in the event of notification by County Civil Defense of approaching storms that are judged to be of a magnitude great enough to require that such an action be taken. Evacuation procedures would apply to any and all approaching tsunami. Park staff is trained and prepared to evacuate visitors on an emergency schedule. The proposal calls for staff increases to ensure that any required evacuation would be carried out in an expeditious manner.

The implementation of the proposed management zoning system, the increases in park staffing, particularly resource management and interpretation, to handle the expected increases in visitation are regarded as beneficial to park management and operations.

Traffic Impacts. The development of direct access to Kaloko-Honokōhau from the Queen Ka'ahumanu Highway calls for the construction of a new intersection. During construction, highway traffic will experience slowdowns due to the marking of turn lanes on the highway leading to the new intersection. The slowdowns will occur only during certain times of the day as the traffic volumes here are presently not high. The effect would be short-term and adverse.

Following construction of the park entrance road, an additional intersection along the highway will cause some slow-downs in traffic from visitors accessing the park. The highway is presently operating at capacity. Much of the expected traffic increases in the future will come from surrounding developments.

Disruption of traffic flow on the Queen Ka'ahumanu Highway will also occur while trenches are being dug across the highway to contain the underground water and power lines for the park. Existing highway traffic consists of an aggregate of commuting traffic going to work in Kailua, residential related traffic, and service traffic. During commuting hours congestion and slowdowns will occur in the vicinity of the construction site, causing motorists to experience delays. These short-term, adverse effects would be mitigated by doing the trenching and intersection modification work at the same time and the trenching and installation of utility lines during non-peak traffic hours. Other mitigation measures will include use of proper signs, barricades, and sign persons to ensure ease and safety of the affected motorists.

The short-term, adverse effects caused by the disruption of traffic on the Queen Ka'ahumanu Highway would be offset by the long-term benefits derived from providing convenient and safe access for future visitors to Kaloko-Honokōhau National Historical Park.

There will be an increase in noise level from the use of heavy equipment to construct visitor orientation center developments. This adverse effect would be short term. The increase in noise level from

the movement of vehicles in the *mauka* sections of the park, though slight, will be an adverse effect and it will be long term.

Conclusion. Implementation of the proposed action would provide for increased protection, management, and appreciation of Kaloko-Honokōhau's cultural and natural resources. Particularly sensitive cultural resources such as Hawaiian burial sites would be ensured adequate protection. The park's endangered water birds and threatened green sea turtle would be better managed and receive greater protection. This will be accomplished primarily through the implementation of the strategies identified in the park's resource management plan and the provision of needed visitor services, particularly interpretation. All trail developments in the park would be routed so as to avoid the native strand vegetation and other important plants. Overall, the development of an interpretive trail system in the park would mitigate adverse effects such as water bird habitat and anchialine ponds by structuring visitor use around these fragile areas. These are all regarded as a long-term and beneficial effects.

Implementation of the proposal will definitely bring some benefits to the local economy. Some of these benefits, those related to construction, will be short-term while others, those related to park and visitor expenditures, will be long term. The overall impact of Kaloko-Honokōhau on the regional economy of West Hawaii would likely be fairly small, but even these small levels of increase in employment, personal income, and business activity should be considered an important benefit to the local economy because they will be both steady and long term.

The construction of park facilities is to take place primarily on *mauka* lands and designed so as to not unduly interfere with the historic scene and be consistent with perceptions of what traditional Hawaiian landscapes looked like. Altogether, about six acres of park lands would be altered. As much as possible, developments are to be located away from areas known to contain cultural and natural resources. Visitors will cause minor adverse effects on the cultural and natural resources and some modification of the historic scene. These are unavoidable. Measures would be taken to mitigate these effects.

Implementation of the proposal would place some visitors and participants at the live-in cultural education complex in a coastal high hazard area susceptible to flooding from winter storm waves. This is considered to be an adverse effect. Mitigation measures would include implementation of the park's evacuation plan.

The development of park access and the installation of underground utility lines across the highway will cause a short-term disruption of traffic on the highway resulting in congestion and the creation of a safety hazard. These would be offset by the long-term benefits connected with providing park visitors with safe access and sanitary

facilities. The introduction of underground sewer lines into the park creates the potential for spilling sewage into the substrate resulting in contamination of the groundwater. This would be a long-term adverse effect and is considered to be the most serious environmental consequence associated with implementation of the proposed action. The use of iron ductile pipe to carry sewage from park rest rooms is considered to be the best way to prevent this from occurring.

Cumulative Effects. Although proposed developments on lands adjacent to and in the vicinity of Kaloko-Honokōhau call for the protection of archeological sites and features, there would be a net loss of cultural resources in the region resulting from the development. This loss would be offset to some degree by the permanent protection afforded cultural resources within the national park by the proposed action. Implementation of the proposed action would have a positive cumulative effect on regional efforts to protect cultural resources and their settings. The proposed action would also provide increased opportunities region-wide for cultural education/interpretation in the traditional Hawaiian lifestyle.

Kaloko-Honokōhau's wetlands — its numerous anchialine ponds, two fishponds, and tidal area — support important habitat for threatened and endangered waterbirds and sea turtles on the island of Hawai'i. The long-term protection of wetlands as habitat, under the proposed action, would have a positive cumulative effect on other projects in the region to restore and maintain wetlands, particularly as habitat for endangered waterbirds.

Native plant habitat in the region has already been lost to the introduction and spreading of alien species and to development. In the foreseeable future, as the numerous and large-scale developments now proposed are built, more of this habitat will be lost. Under the proposed action, the restoration of native plant species and removal/control of aliens in the national park would contribute to the perpetuation of individual native species and native plant communities throughout the region. Implementation of the natural and cultural resource management strategies described under the proposed action would enhance the proposed Kohana Iki resort-residential development.

Under the proposed action, construction of the entrance road to the national park, including the undergrounding of utilities, would cause some temporary disruption of traffic on the adjacent Queen Ka'ahumanu Highway. The addition of another turning lane along this highway for the entrance road would slow traffic somewhat in the vicinity of the national park. This would be a long-term adverse effect on traffic flows in the immediate area.

In the foreseeable future, the proposed action, when added to the several major development proposals on nearby lands, would not significantly affect the regional environment.

Minimum Requirements Alternative

Impacts on Cultural Resources. This alternative calls for the development of a small visitor center, a parking area, and an entrance road at the same location as described under the proposed action, the already disturbed portion of the *'a'ā* lava flow *mauka* of 'Aimakapā fishpond. Here again, because of the location, there would be no adverse effect on any known archeological sites or features. Mitigation measures would be the same as those described in the proposed action — that is, if during construction any cultural features were uncovered, work would stop and a qualified archeologist consulted. Since under this alternative, the park's administrative headquarters and the maintenance operation are to remain off-site at the nearby Kaloko Industrial Park, there would be no adverse effect on cultural resources from these developments. The smaller visitor center structure and the absence of any administrative and maintenance facilities mean that the adverse effect on the historic scene in this part of the park would be less under this alternative than under the proposed action. As with the proposed action, the adverse effect on the historic scene and coastal views would be mitigated by the design and siting of developments.

As under the proposed action, utilities (water and power) would be brought into the park from existing lines along the *mauka* side of the highway. This would involve digging trenches across the disturbed *'a'ā* flow to the site of the proposed visitor center. These construction activities would not effect any known archeological sites, but if any subsurface sites were uncovered during trenching, work would be halted and a qualified archeologist called in.

This alternative also calls for sewer lines to be placed underground in the park from the proposed visitor center. As with the proposed action, the exact alignment for the proposed line will have to be worked out with the State of Hawai'i, including the Historic Preservation Officer, and Hawai'i County to ensure that any cultural resources found in the area are avoided and/or appropriate mitigation efforts undertaken.

The other major developments proposed under this alternative consist of the live-in cultural education complex and the replica Hawaiian village. The live-in complex is to be at the same site as under the proposed action, but is to contain only minimal development using only traditional Hawaiian materials. Consequently, this development's effect on the historic scene at the site would be negligible. The replica Hawaiian village development is to be at the same site as under the proposed action and would consist of the same kinds and numbers of structures. So, as with the proposed action, new structures, even though Hawaiian in character, would be introduced into an area not previously disturbed and there would be a disruption to the historic scene at this location. This would be a long-term adverse effect.

The rest rooms proposed near Honokōhau beach under this alternative would be a composting type and no trenching for utilities would be needed. There would be no adverse effect on cultural resources but the historic scene would be disturbed somewhat at the site. This would be regarded as a minimal but long-term adverse effect.

This alternative also calls for the modification of the existing network of unimproved roads, trails, and tracks in the park to create a new trail system that would permit visitor access to cultural sites. It also allows the National Park Service to structure visitor use away from certain sensitive areas such as Hawaiian burial sites. As under the proposed action, this is considered to be a beneficial and long-term effect.

This alternative calls for boundary fencing along the park's southern boundary, delineation of the northern boundary, and selected plantings to serve as screening from nearby development along the *mauka* boundary exactly as described under the proposed action. No major park cultural resources would be adversely affected by these proposed actions. The mitigation measures undertaken for this alternative would be the same as those described for the proposed action.

Implementing this alternative would result in an improvement in visitor services. Visitors would gain an appreciation of the Kaloko-Honokōhau's significant Hawaiian resources and values and the tangible cultural resources would be indirectly benefitted. These benefits would be somewhat constrained by the limited number of interpretive staff proposed under this alternative. Interpretive walks and programs to give visitors a basic understanding of the traditional Hawaiian lifestyle would not be as numerous as under the proposed action. This would be mitigated to some degree by the visitor center proposed under this alternative which would be designed to be largely self-guiding.

The more limited staff proposed under this alternative would likely mean that the potential for inadvertent actions by uninformed visitors that could damage cultural resources would be greater than under the proposed action. This would be an adverse effect.

Impacts on Natural Resources. As with the proposed action, developments proposed under this alternative would have only a minor effect on the park's geology. The parking area, the largest development proposed under this alternative, has the greatest potential to adversely affect geological resources, but since surface lava material has already been scraped away at the proposed site, there would not be much greater disturbance to grade the parking area and the adverse effect would be very minimal.

The live-in cultural education complex proposed under this alternative would not adversely affect any geological features. The replica

Hawaiian village developments are to be very low key and would not require any grading; consequently, no adverse effect on geological features would occur. The rest rooms proposed near Honokōhau beach under this alternative are to be the composting type, requiring some localized ground disturbance. No major adverse effect on the park's geology would occur from that proposed development.

As with the proposed action, the construction of visitor center structures, the paved parking lot, and entrance road would create about four acres of impervious surface in the park. The adverse effect connected with the potential introduction of petrochemicals into the park's ground water would be as described under the proposed action. Mitigation measures to be taken under this alternative would also be the same as those described in the proposed action.

Under this alternative, sewer lines would be introduced into the park only in the proposed visitor center area. Here again, any breaks in the lines would allow effluent to enter the porous lava substrate and contaminate the groundwater. Under this alternative, there would be less possibility that the park's fishponds, anchialine pools, and offshore waters could be affected by such breaks because of the greater distances involved between the lines and these resources. As with the proposed action, mitigation measures would consist of the use of ductile iron pipes for all park sewer lines. The potential to adversely affect the park's groundwater exists under this alternative, but at a lower level than under the proposed action, particularly with regard to *makai* oriented fishponds and the offshore waters.

Implementing this alternative would have a more limited beneficial effect on the park's endangered water birds and threatened green sea turtle, its anchialine ponds and offshore waters than under the proposed action because implementation of resource management strategies are constrained by the smaller staffing level proposed. Staffing levels proposed under this alternative are considered to be at the minimal level to carry out needed resource management strategies. Lack of a marine biologist position under this alternative would significantly undermine the park's capability to carry out resource management strategies for the protection of threatened and endangered species and the anchialine ponds.

As with the proposed action, developments under this alternative would have a negligible effect on the park's plants. The development of the live-in cultural education complex could involve removal of a few coconut palms and some *kiawe* trees/shrubs might be removed to construct the replica Hawaiian village. The palms are a Polynesian introduction and could be easily replaced, while the *kiawe* is an alien species to be removed from the park.

Under this alternative, there would be an increase in the potential for carrying out management strategies for removal of alien plant species and the planting of natives and Polynesian introductions, but at a

lower level and over a longer period than under the proposed action. As with the proposed action, there would not be any adverse effect on park vegetation connected with the proposed boundary fencing.

This alternative also calls for the development of a park-wide interpretive trail system to structure and guide visitor use. As with the proposed action, this development would have a beneficial effect on the park's endangered water birds and anchialine ponds. As under the proposed action, the adverse effect on water birds from visitors would be mitigated by placing screened viewing platforms off trails at designated locations.

The adverse effects on the park's air quality during the construction phase of the visitor center, parking, and entrance road and during park operations would be the same as those described under the proposed action. Mitigation measures would be handled in the same manner.

Under this alternative, the lack of a marine biologist position would severely curtail the park's ability to conduct baseline surveys and monitoring of resources found in its offshore waters. This is considered to be a long-term adverse effect.

Socio-Economic Impacts. As under the proposed action, beneficial effects on the local economy from park construction projects, park jobs, visitor expenditures, and increases in the park's operating budget would occur. The short-term beneficial economic effects described in the proposed action in connection with park construction activities and the long-term benefits connected with jobs would occur under this alternative, but at a somewhat lower level.

Visitor Use. Implementation of this alternative would improve the quality of the visitor experience at Kaloko-Honokōhau, as described under the proposed action. However, this improvement would likely be at a lower level due principally to the more self-guiding nature of the proposed visitor center and the smaller number of interpretive staff. Over the long-term, as visitation increases, there may be a decrease in visitor services under this alternative. The lack of a major visitor orientation center as described in the proposed action, designed to serve as the contact point for all park visitors, would result in less opportunities for visitors to obtain knowledge and gain an appreciation for the traditional Hawaiian way of life.

Implementation of this alternative would place about the same number of visitors in the coastal portions of the park under the proposed action. These areas are susceptible to flooding from winter storm waves and possibly even tsunamis. Consequently, the risks to public safety and the mitigation measures to counter this risk would be the same as those described in the proposed action.

The expected increases in park visitation will occur under this alternative too, but because of the lower levels of staffing proposed, particularly in resource management and interpretation, the proposed management zoning system would be more difficult to implement than under the proposed action. The beneficial effect on park management and operations consequently would also be less.

Conclusion. Implementing this alternative would have about the same total adverse effect on the park's historic scene as the proposed action — in all, about six acres would be affected. Under this alternative though there would be less chance of the park's groundwater being adversely affected by any breaks in sewer lines.

As under the proposed action, implementing this alternative would result in increased protection and better management and appreciation of Kaloko-Honokōhau's cultural and natural resources. Here again, this would be accomplished primarily by carrying out strategies developed in the park's resource management plan and providing needed visitor services. However, the lower levels of staffing proposed under this alternative, particularly in resource management and interpretation, and the lack of a marine biologist position would limit the park's capability to carry out these strategies.

Park construction proposed under this alternative would have only a minimal adverse effect on cultural and natural resources. There would be less chance of a sewage spill occurring in the park and, if it did occur, less chance of it adversely affecting fishponds and anchialine pools.

Anticipated increases in visitation to the park will be just as apt to occur under this alternative. The capability of the self-guiding visitor center and limited interpretive staff to provide a quality experience would decrease over time as visitation increases. Ultimately, park resources and visitor safety would be adversely affected.

Cumulative Effects. Under this alternative, the effects the development and use of Kaloko-Honokōhau would have on existing and proposed developments and/or actions on adjacent lands in the vicinity would be similar to those described in the proposed action. The cumulative effects region-wide on archeological sites and features, on wetlands as endangered species habitat, and on native plant habitat would be about the same under this alternative as those described in the proposed action. However, under this alternative these cumulative effects would be constrained somewhat by the smaller staff's limited capability to implement the applicable resource management strategies.

Under this alternative, park headquarters (administration and maintenance) would continue to be located at the Kaloko Industrial Park. Consequently, the cumulative effect under this alternative would be similar to that described under the no action alternative, that

is, due to the limited space here for vehicle parking, congestion would eventually take place.

Maximum Development Alternative

Impacts on Cultural Resources. The visitor orientation center, a paved parking area, and entrance road proposed under this alternative are exactly the same as the proposed action and are to occur at the same site. Consequently, the effects of these developments on archeological sites and features, the historic scene, and the intangible cultural values connected with the site would be the same as those described under the proposed action. The maintenance facility proposed under this alternative is likewise the same as that described under the proposed action and at the same site. The effects on any cultural resources at the site would thus be the same too. Mitigation measures would be the same as those described under the proposed action.

Other developments proposed under this alternative which are the same type and at the same location as the proposed action consist of the replica Hawaiian village, the rest rooms near Honokōhau beach, and the small parking area south of Honokōhau Harbor. The long-term adverse effects on known archeological sites or features would be the same as those described under the proposed action for the replica village and the rest rooms. As with the proposed action, there would be no adverse effect on cultural resources connected with the construction of the small parking area.

Under this alternative, the live-in cultural education complex would be larger, more permanent, and include modern structures and amenities. Some grading and subsurface development would be needed at the construction site. The site proposed for the development of the complex is different than under the proposed action. This one remains relatively undisturbed and the general area is known to contain a series of both prehistoric and historic platforms and walls. Even though the complex would be sited to avoid these cultural features, there is the possibility that additional ones could be uncovered during site preparation. If any were uncovered, all activities would be halted and a qualified archeologist consulted. The development of the live-in cultural education complex proposed under this alternative could adversely affect cultural sites and features and would definitely adversely affect the historic scene in the immediate area.

This alternative calls for major developments over and above the proposed action. These consist of two paved visitor parking areas, two paved park roads, highway modification for another intersection, a park entrance road, and a rest room. All of these proposed developments would disrupt the park's historic scene and some would adversely affect cultural resources.

One of the visitor parking areas is proposed at the disturbed sandy area near Kaloko fishpond, the site of the live-in cultural education complex under the proposed action. The paved parking area, sized for 50 vehicles, and the public rest room proposed nearby would disrupt the historic scene here. Since the site has been previously disturbed and known not to contain any archeological sites or features, there would be no adverse effect on cultural resources. The other visitor parking area is proposed on the *mauka* side of the rest room proposed near Honokōhau beach. This 100-vehicle paved area is to be located in an area known to contain highly significant cultural resources and its construction would have a major adverse effect on cultural resources. Both parking areas would disrupt the historic scene.

Mitigation measures at the proposed parking area near Honokōhau beach would consist of locating it so as to avoid any sites or features. Prior to construction, an intensive archeological survey would be carried out at the proposed location by a qualified archeologist to ensure that no archeological features were present. If any features were revealed, the parking area would be designed and built to avoid any surface remains.

The two parking lots are to be connected to the highway by paved roads. The existing unimproved road to Kaloko fishpond is to be kept open and paved under this alternative. Moreover, the existing jeep track branching off this road just *mauka* of the fishpond would be extended and paved up to the site of the proposed live-in cultural education complex. The other additional paved road proposed under this alternative would be new construction. Both roads would cross areas of high cultural significance at their *makai* ends and would adversely affect cultural resources along their corridors.

In addition to the trenching activities for underground utilities described in the proposed action, this alternative calls for additional utilities to be run to the proposed live-in cultural education complex and the rest room proposed near Kaloko fishpond. The mitigation measures described in detail under the proposed action for the laying of utility lines in other parts of the park would apply here.

The mitigation measures described in the proposed action connected with the construction of boundary fencing and plantings to visually screen would be the same under this alternative.

Under this alternative, the long-term indirect benefit to the park's cultural resources due to the improved visitor services and programs would likely be at a higher level than under the proposed action because of the larger interpretive staff proposed. Also, implementing this alternative, which like the proposed action calls for the establishment of a park-wide trail system, makes possible the structuring of visitor use to protect sensitive cultural resources. Here again, the larger staff would be beneficial.

Impacts on Natural Resources. Implementing visitor orientation center, main parking and entrance road proposals under this alternative would have the same effect on the park's geology as that described under the proposed action. The same would be true for the rest room proposed near Honokōhau beach, the maintenance facility, the replica Hawaiian village, and the small parking area near Ala'ula cove. The additional developments proposed under this alternative — visitor parking areas, roads, a rest room, and more trenching for utilities — would have an adverse effect on the park's geology. Likewise, the different location proposed for the live-in cultural education complex would also adversely affect geological features at the site.

The additional developments proposed under this alternative would substantially increase the amount of impervious surface created in the park as compared to the proposed action — to about nine acres in all — and calls for additional sewer lines to be laid. Since much of the increases in impervious surface would be due to paved parking areas, the adverse effect on the park's groundwater due to the introduction of petrochemicals from vehicle leaks and emissions would be greatly increased under this alternative by the presence of the nearby line. This alternative calls for sewer lines to run to the rest room proposed near Kaloko fishpond. Thus, the potential for the pond's waters to be adversely affected by any break in the line would be greatly increased under this alternative. This could be a major and long-term adverse effect. Mitigation measures would be the same at those described in the proposed action for the other sewer lines.

Under this alternative the additional development proposed for roads and vehicle parking would place large numbers of visitors in close proximity to Kaloko and 'Aimakapā fishponds and their adjacent wetlands. This has the potential to cause major adverse effects on the endangered and migratory water birds and shorebirds who utilize the fishponds for feeding and nesting. This would be a long-term adverse effect.

This alternative also would bring greater numbers of visitors into coastal portions of the park, including its beaches and offshore waters. This would have an adverse effect on the threatened green sea turtle which is found in those areas. Mitigation would consist of encouraging visitors to stay on interpretive trails and closing off the areas to visitors during nesting time.

The adverse effect on endangered water birds and the threatened green sea turtle would be mitigated somewhat under this alternative by the higher level of staffing proposed which would permit full implementation of resource management strategies and increases in ranger services. Higher staffing levels would also allow for increased management and protection of the park's anchialine ponds, as well as protection and management of the park's offshore waters.

Resource management strategies related to alien plant control, removal and the plantings of natives and Polynesian introductions and eliminating the fire hazard in the park would have the greatest chance to be fully implemented under this alternative because of the higher staffing levels proposed.

The long-term adverse effects on the park's air quality from facility development construction activities and the introduction of motor vehicles would be greater under this alternative.

Socio-Economic Impacts. Implementation of this alternative would have the greatest beneficial effect on the local economy. This would be mainly due to expenditures from implementing construction projects in the park, from the jobs provided at the park, and proposed increases in the park's operating budget. As with the proposed action, of the more than $20 million in total construction costs connected with this alternative, it would be difficult to ascertain how much of the total would directly benefit the local economy. Visitor expenditures in the area attributable to the park would likely be about the same as under the proposed action.

Visitor Use Impacts. Like the proposed action, implementing this alternative would also enhance the quality of the visitor experience at Kaloko-Honokōhau. The additional increases in staffing proposed under this alternative, primarily in interpretation, would maximize visitor services in the park. This would be a long-term beneficial effect.

Implementing this alternative would have both beneficial and adverse effects on visitor safety. The proposed location of the live-in cultural education complex would be outside of the coastal high hazard area, thus eliminating the risk to participants here from winter storm waves or tsunamis. This would be a long-term benefit. On the other hand, the proposed addition of two vehicle parking areas within the coastal high hazard area would place considerable greater numbers of visitors at risk. This would clearly be an adverse effect. Mitigation measures would be the same as those described for the proposed action.

Traffic Impacts. The adverse effects described in the proposed action connected with the development of access to the park from the Queen Ka'ahumanu Highway would be much greater under this alternative since an additional intersection is proposed. Mitigation measures for both intersections would be the same as those described for the proposed action.

Conclusion. The additional facility developments and their location proposed under this alternative would adversely affect Kaloko-Honokōhau's cultural and natural resources. Many of them are on *makai* lands close to park resources. The visitor parking and rest room proposed near Kaloko fishpond, the visitor parking for Honokōhau beach users, constructing paved roads to *makai* sections of the park —

all of these would disrupt the park's historic scene and some of them are proposed in areas known to contain cultural resources of high significance. On the natural resource side, these developments would adversely affect the park's groundwater and thus its fishponds and anchialine pools. Endangered water birds and threatened green sea turtles would be adversely affected as well.

Implementing this alternative would have the greatest beneficial effect on the local economy. The higher staffing levels proposed under this alternative would mean that resource management strategies could be fully implemented and visitor services maximized. Both are long-term beneficial effects.

This alternative calls for running sewer lines out to a site near Kaloko fishpond, thereby increasing the potential for this important park resource to be adversely affected by any leaks which might develop in the lines.

Implementing this alternative would introduce the greatest numbers of visitors to the park's coastal areas who would stay longer . This would result in both beneficial and adverse effects. It would provide visitors with additional opportunities for beach and ocean recreation opportunities, but would have the greatest potential to disturb endangered water birds and threatened sea turtles.

Cumulative Effects. Under this alternative, effects on existing and proposed developments and/or actions on lands in the vicinity of Kaloko-Honokōhau would be the same as those described under the proposed action. The only difference would be, under this alternative, these cumulative effects would tend to be enhanced by the larger staff's increased capability to implement the applicable resource management strategies.