

Kalaupapa National Historical Park

Fire Management Plan

Environmental Assessment



December 2011

Executive Summary

This Environmental Assessment (EA) evaluates a Fire Management Plan (FMP) for Kalaupapa National Historical Park on the island of Moloka'i within the State of Hawai'i. Kalaupapa National Historical Park was established in 1980 following the initiative of the Kalaupapa community to preserve the history of Hansen's disease on the Kalaupapa Peninsula and allow the current patient residents to live out their lives in their homes. In a bill signed by President Jimmy Carter (Public Law 96-565) Congress outlined the principal purpose of Kalaupapa National Historical Park: "to preserve and interpret the Kalaupapa settlement for the education and inspiration of present and future generations."

All Parks of the National Park Service (NPS) with burnable vegetation are required to have a FMP that is consistent with federal law and the NPS *2006 Management Policies*. The FMP for Kalaupapa National Historical Park will direct a fire management program that responds to the Park's natural and cultural resource objectives and addresses the health and safety of Park residents, staff and visitors. Two alternative fire management strategies are examined in this FMP EA: Alternative A – Current Fire Management Strategy, and Alternative B – Increased Protection Strategy. Alternative A is the No Action alternative required in all National Environmental Policy Act assessments. Alternative B of the FMP assesses the effect of enhancing the fire-break around the settlement of Kalaupapa and utilizing strategically arranged areas of fuel-reduction to reduce fire-hazard across the Peninsula and within the settlement.

Based on the comments received from the public on this FMP EA, the NPS will either issue a Finding of No Significant Impact (FONSI) or continue the assessment process by preparing an Environmental Impact Statement (EIS). If reviewers do not identify significant environmental impacts, this EA will form the basis of a FONSI for NPS Pacific West Regional Director approval. The completed FMP would constitute a guiding document to which additional compliance documents would be tiered to achieve full compliance on individual projects. For instance, prescribed burns, pile burning, broadcast burns, and other treatments would need additional EAs or Categorical Exclusions before implementation.

The printed document can be viewed at several public libraries (Hawaii State Library, and the Kahului, Lanai, Molokai, Wailuku Public Libraries) and limited copies are available on request. The complete FMP EA is also online at the NPS Planning, Environment and Public Comment (PEPC) website at <http://parkplanning.nps.gov>. Comments on the document can be sent directly to the Park through that website by selecting the FMP EA from the list of Documents Open for Public Comment. Comments may also be mailed to the Park Superintendent: Stephen Prokop, Kalaupapa NHP, P.O. Box 2222, Kalaupapa, HI 96742. For further information on the FMP EA, please check the website noted above or call the Park for assistance at 808-567 6802 ext. 1103.

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Hawaiian Words Used in Text

ahupua'a – A major land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (pua'a) or because a pig or some other tribute was laid on the altar as a tax to the chief.

'āina – The living earth.

hā'uokeuke – Edible variety of sea urchin.

he'e -- Octopus

heiau – Hawaiian temple platform; used for many purposes (agricultural prosperity, fishing, surfing, *hula*, etc).

hīhīwai – Grainy snail (*Neritina graposa*), in both fresh and brackish water, eaten cooked or raw.

hō'i'o – A large native fern with subdivided fronds.

'ili'ili – Pebbles.

imu – Underground oven.

kama'aina – Native born Hawaiian; person familiar from childhood with any locality; in modern usage it refers to all long-time residents.

kanaka maoli – Full-blooded Hawaiian person.

kīkānia – Plant of tomato family bearing red/orange fruit used for making lei.

kōkua¹ – “Pulling with the back,” pitching in to help, helper, volunteering.

kuleana – Responsibility, implied reciprocity; plot of land from Mahele era

lā'au lapa'au – Medicine.

lānai – Porch, roofed construction with open sides near a house.

lau kī – Ti leaf

lei – Wreath, necklace of flowers.

limu – edible seaweeds.

lū'au – Hawaiian feast named for the taro tops served at such occasions.

maile – A native vine with shiny fragrant leaves used for decorations and leis.

makai – Toward the sea; at the coast.

mauka – Towards the mountains.

mauka-makai – Refers to trails that run from the mountains to the sea.

'ohana – Family, relative, kin group.

'o'opu – General name for fishes included in the families Eleotriade, Gobiidae, Blennidae

'opihi – Several species of limpets (*Cellana spp.*).

pali – A cliff or precipice.

poi – Made from cooked taro corms pounded and thinned with water.

wana – edible Sea urchin

See Appendix A for a full glossary including technical terms and acronyms

CHAPTER 1. INTRODUCTION

DESCRIPTION OF THE FIRE MANAGEMENT PLAN PLANNING AREA

Kalaupapa National Historical Park (Kalaupapa NHP; the Park) is located on the island of Moloka'i, which at 38 miles long, six to ten miles wide, and encompassing approximately 259 square miles, is the fifth largest island in the State of Hawai'i (Figure 1). The Park consists of a relatively flat peninsula (the Peninsula) located midway along the north shore of Moloka'i and is backed by three deeply carved valleys and steep cliffs (pali) rising from 1,600 feet at the western end of the Park to more than 3,000 feet at the highest elevation of the pali. The National Park boundaries extend one-quarter mile offshore and include the islands of Huelo and `Okala.

The Park differs significantly from most other national parks in that nearly all of the 8,725 acres of land, 2,000 acres of water and improvements within the authorized boundary remain in non-Federal ownership, to be managed by the National Park Service (NPS) through cooperative agreements. In addition to small private holdings at the top of the cliffs, land and facilities within the National Historical Park boundaries are administered by the State of Hawai'i Departments of Health, Land and Natural Resources, Transportation, and Hawaiian Home Lands. The NPS owns only 23 acres that includes two historic houses and four outbuildings that surround the Moloka'i Light Station.

In 1980, Kalaupapa National Historical Park became a unit of the National Park System to preserve the story of the forced relocation of people from Hawai'i with leprosy (now officially called Hansen's disease) to this remote peninsula during the period 1866 - 1969. The Kalaupapa Leprosy Settlement (the Settlement) was designated a National Historic Landmark (NHL) in 1976, and the Park is listed on the National Register. The boundary of the Park and the NHL are virtually the same.

The leprosy settlement began on the eastern or windward side of the Peninsula in the area of Kalawao. The primary surviving structures here are two churches: the 1866 Siloama Church (Protestant) and the 1872 St. Philomena Church (Catholic). St. Philomena is associated with Saint Damien who worked with the residents of the Settlement, contracted leprosy and died in 1889. He was canonized on October 11, 2009. By the 1890's, the population and facilities were shifting from Kalawao to the warmer Kalaupapa area on the southwestern, leeward shore of the Peninsula. Today, the settlement is still occupied by patients who have long been cured of the disease, but have chosen to remain in Kalaupapa because it is their home. The residences and support structures of the Kalaupapa settlement, housing for State and NPS employees, State and NPS offices, and maintenance yards are all located in Kalaupapa. There is no vehicle access from the park to the rest of Moloka'i, referred to locally as "Topside". Pedestrian and equestrian access is via a steep, multi-switchback trail, which a mule train descends six days a week bringing tourists. The park is also served several times a day, weather permitting, by twin-engine

planes landing at the airstrip at the northwestern tip of the Peninsula. A barge lands once a year in the lee of the Peninsula at the Kalaupapa pier.

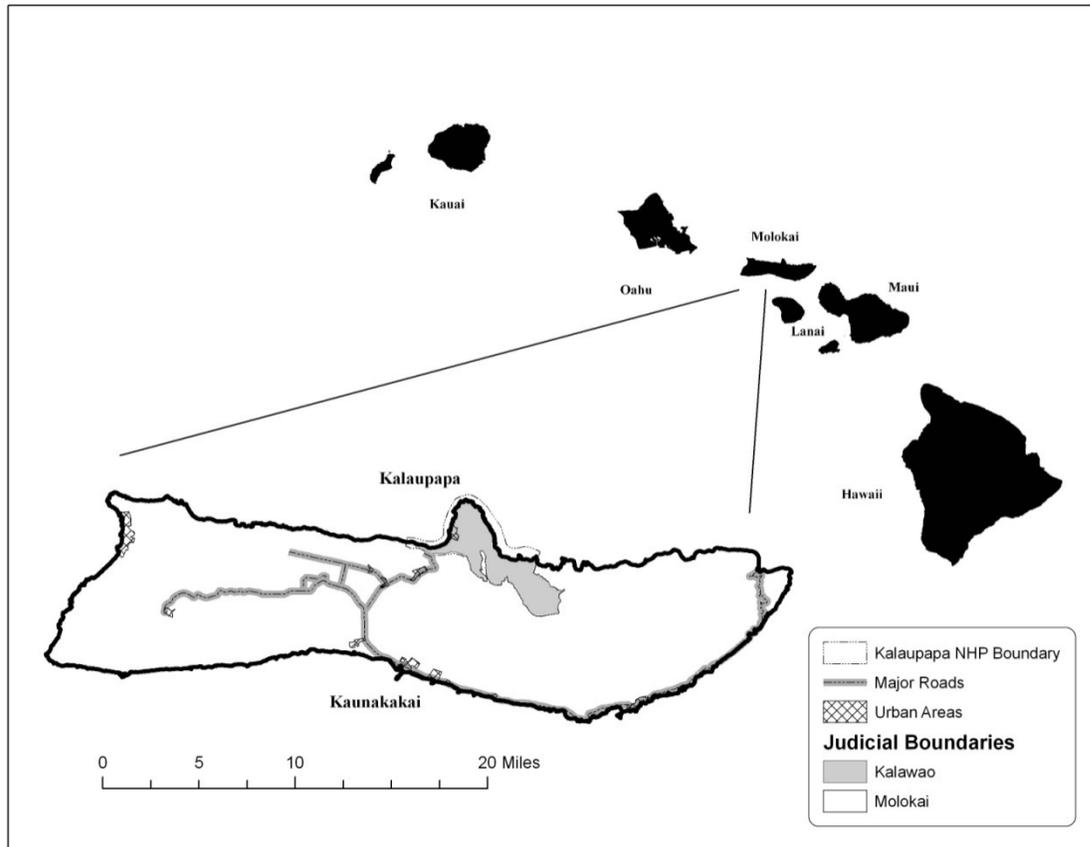


FIGURE 1- KALAUPAPA NATIONAL HISTORICAL PARK LOCATION

The Peninsula is divided into ahupua`a -- an ancient Hawaiian land division still used in land descriptions today. As is typical of Hawaiian land ownership, the ahupua`a extend from mountain (mauka) to sea (makai). With the exception of Nihoa, which is part of Maui County, the four ahupua'a of the Park comprise Kalawao County, a standalone county in the State under the direct management of the Kalaupapa Administrator of the Hawai'i State Department of Health. The Director of the State Department of Health may adopt such rules and regulations as considered necessary to manage the community.

Each ahupua`a contains unique cultural and natural resources (Figure 2). Waikolu (3,361 acres) is recognized for the freshwater aquatic habitat in Waikolu Stream, rare plants on the offshore islands, native mesic and rainforest plant communities, an historical water supply infrastructure, and other archaeological resources. Kalawao (1,982 acres) includes the Kalawao settlement area, historic churches, archaeological resources, and native coastal vegetation. Makenalua (1,905 acres) is important for its prehistoric structures, archaeological resources, native coastal vegetation, and the Moloka'i Light Station, which is listed in the National Register as a separate

historic property. Kalaupapa (1,250 acres) contains the settlement of Kalaupapa, archaeological resources, and rare plants at the top of the pali. Nihoa (96 acres) remains undeveloped and unpopulated, is covered with disturbed coastal vegetation, and contains significant archaeological resources. The entire Park is surrounded by marine resources.

Many areas within these ahupua`a have special designations reflecting the unique resources found within the Park boundaries. The NPS has designated eight Special Ecological Areas (SEAs) within the park that support rare species, many of which are listed as threatened or endangered under the Endangered Species Act. The 27,100-acre North Shore Cliffs National Natural Landmark was established in 1972 and covers 27,100 acres from Kalaupapa to the eastern end of Moloka'i at Cape Halawa. The portion of the Park within the National Natural Landmark includes the Waihānau, Wai`ale`ia and Waikolu Valleys and the sheer cliffs rising above them.

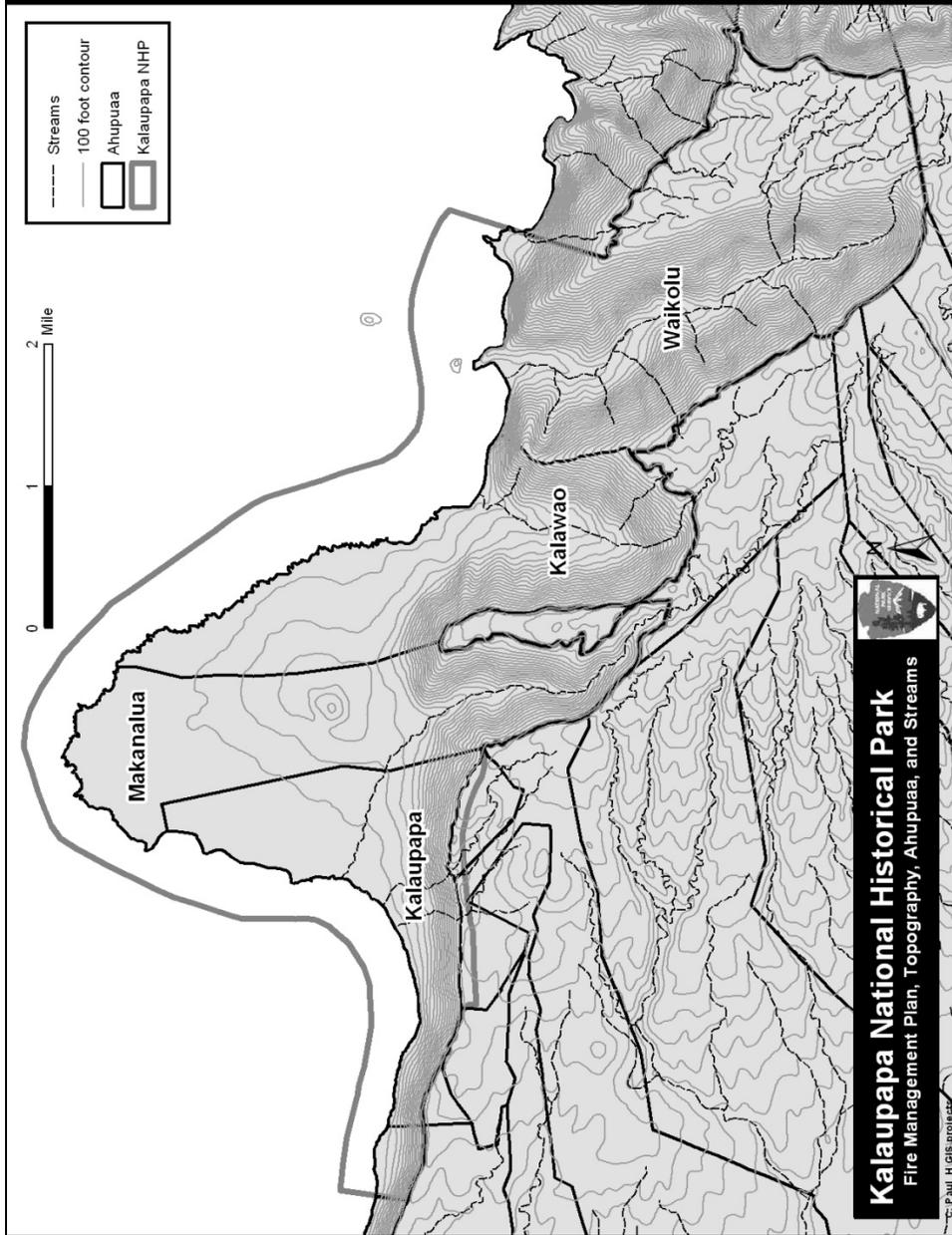


FIGURE 2 - AHUPUA'A COMPRISING KALAUPAPA NATIONAL HISTORICAL PARK

INTENT OF THE FIRE MANAGEMENT PLAN

Guidance for implementation of Federal Wildland Fire Management Policy (2009) and NPS Management Policies require that all federally managed lands with burnable vegetation have a Fire Management Plan (FMP) that conforms to current standards of federal wildland fire management policy. The FMP for Kalaupapa National Historical Park will: (1) provide guidance for suppression response, (2) provide guidance for mechanical fuel reduction and prescribed burning and (3) be the basis for future funding requests for suppression and wildland fire management. While the FMP will conform to nationwide federal wildland fire management policy, its specific strategies will reflect the Park's distinct characteristics, special legislative obligations, and unique environmental and social considerations. This Environmental Assessment (EA) is prepared to help decision makers determine the scope of the strategy that will ultimately guide the Park in conducting wildland fire management activities.

This Environmental Assessment is prepared as part of the public planning process proscribed under the 1972 National Environmental Policy Act (NEPA) that requires all federal agencies to consider the relative potential adverse and beneficial outcomes of their decisions prior to implementation. Development of the FMP strategy is a dynamic and interdisciplinary process that incorporates public and agency input, and addresses conformance with federal environmental laws such as the Endangered Species Act and National Historic Preservation Act. The NPS will consider all comments received during the public comment period to resolve deficiencies in the environment assessment and/or the proposed fire management strategy including mitigation measures. If found deficient, the NPS will either modify the proposed strategy to avoid significant environmental effects (in which case a Revised EA would be prepared) or prepare an Environmental Impact Statement (EIS) as required by NEPA. Otherwise, the FMP EA will be adopted by the NPS and the decision and NPS commitment to adhere to the FMP EA will be documented by the signing of a Finding of No Significant Impact (FONSI) by the NPS Pacific West Regional Director.

This EA for the Fire Management Plan for Kalaupapa National Historical Park conforms to NPS Management Policies (NPS 2006) and the requirements of Federal Wildland Fire Management Policy (NIFC 2001). The document has been prepared in accordance with NEPA, regulations of the Council of Environmental Quality (40 Code of Federal Regulations [CFR 1508.9], NPS Director's Order 18, Wildland Fire Management, and NPS Director's Order 12, Conservation Planning, Environmental Impact Analysis and Decision-Making. The Director's Orders 12 and 18 have accompanying Reference Manuals that provides specific guidance for implementing NEPA through a public input process and preparing fire management plans, respectively. These Director's Orders, Reference Manuals, and the 2006 NPS Management Policies are available to the public through the NPS policy and regulatory website: www.nps.gov/policy.

Related Authorities, Laws, NPS Policies, and Planning Documents

In addition to incorporating the principles of federal wildland fire management policy and following the guidance on preparation of the FMP in Director's Order 18, the FMP must conform to and promote the overarching mandate of the NPS and the management guidelines which direct the agency's actions. In addition, the FMP must conform to the purposes for which Congress established Kalaupapa National Historical Park as well as resource and land use plans adopted by the NPS to further the achievement of the Congressional intent.

Authorities

1916 National Park Service Organic Act

The key provision of the legislation establishing the National Park Service, referred to as the 1916 Organic Act is: "The National Park Service shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified . . . by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (16 USC 1)."

The National Park Service must determine that no actions which may be implemented would lead to an impairment of resources as discussed in the National Park Service Organic Act and the General Authorities Act. If there would be impairment the action may not be approved. An impairment is an impact that would harm the integrity of Park resources or values (NPS 2006). Not all impacts constitute impairment. Severity, duration, and timing of the impact help determine whether the integrity of a Park resource or value would be irreparably compromised. The NPS's determination of no impairment will be provided as an Attachment to the FONSI.

1970 National Park Service General Authorities Act (as amended in 1978 – Redwood Amendment)

This act prohibits the National Park Service from allowing any activities that would cause degradation of the values and purposes for which the Parks have been established (except as directly and specifically provided by Congress in the enabling legislation for the Parks). Therefore, all units are to be managed as National Parks based on their enabling legislation and without regard for their individual titles.

1980 Kalaupapa National Historical Park Enabling Legislation

The 1980 legislation that established the Park directs the NPS to provide for the preservation of the unique nationally and internationally significant cultural, historic, educational, and scenic resources of the Kalaupapa Peninsula (Public Law 96-565).

2009 Evaluating Climate Change Impacts in Management Planning (Department of the Interior Secretarial Order 3289)

This Order provides guidance to bureaus and offices within the Department of the Interior (DOI) on how to provide leadership by developing timely responses to emerging climate change issues.

Resource Protection Laws

National Environmental Policy Act (42 USC 4341 et seq.)

The National Environmental Policy Act (NEPA) requires the identification and documentation of the environmental consequences of federal actions. Regulations implementing NEPA are set by the President's Council on Environmental Quality (40 CFR Parts 1500-1508). CEQ regulations establish the requirements and process for agencies to fulfill their obligations under NEPA.

Clean Water Act (33 USC 1241 et seq.)

Under this act, the chemical, physical, and biological integrity of the nation's waters must be maintained or restored to enhance the quality of water resources, and to prevent, control, and abate water pollution. Section 401 of the Clean Water Act as well as NPS policy requires analysis of impacts on water quality. NPS Management Policies provide direction for the preservation, use, and quality of water in national parks.

Endangered Species Act (16 USC 1531 et seq.)

The Endangered Species Act (ESA) requires federal agencies, in consultation with the Secretary of the Interior, to use their authorities to carry out programs for the conservation of listed, endangered, and threatened species (16 USC 1535 Section 7(a)(1)). The ESA also directs federal agencies to ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any endangered or threatened species or to result in the destruction or adverse modification of designated critical habitat (16 USC 1535 Section 7(a)(2)). Consultation with the United States Fish and Wildlife Service (USFWS) is required if there is likely to be an effect.

National Historic Preservation Act (1966 as amended; 16 USC 470)

Sections 106 and 110 of the National Historic Preservation Act (NHPA) direct federal agencies to take into account the effect of any undertaking (a federally funded or assisted project) on historic properties. A historic property is any district, building, structure, site, or object that is eligible for listing in the National Register of Historic Places because the property is significant at the National, State, or local level in American history, architecture, archeology, engineering, or culture. The NHPA also provides the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) an opportunity to comment on the undertaking. The 1992

amendments to the act have further defined the roles of American Indian Tribes and the affected public in the Section 106 process.

Archeological Resource Protection Act of 1979 (Public Law 96-95; 16 U.S.C. 470aa-mm)

The Archeological Resource Protection Act (ARPA) establishes a legal context for protecting cultural resources from intentional or unintentional impacts, and establishes penalties for excavating, removing, or damaging such resources without authorization. Both ARPA and NHPA contain provisions for maintaining the confidentiality of information on archeological resources. The direction for surveying public lands is part of ARPA, as is the requirement to file a research plan and obtain a permit for archeological research whether conducted by NPS staff, contractors, or parties under an interagency or cooperative agreement. ARPA also requires the development of plans for surveying public lands for archeological resources. Areas proposed for fire management actions that have the potential to disturb or damage archeological resources must be surveyed prior to project implementation. If sensitive resources are found within a project area, the project may need to be modified to avoid damaging cultural resources.

NPS Policies

NPS Director's Order 18: Wildland Fire Management

Policies and directives in NPS Director's Order 18 (DO-18) specifically require the development of a fire management plan for each park with burnable vegetation. DO-18 also specifies that until a fire management plan is approved, park areas must take aggressive suppression action on all wildfires, taking into account firefighter and public safety and the resources to be protected within and outside the park. DO-18 directs that each approved FMP will:

- Make the safety of firefighters and the public the first priority.
- Describe wildland fire management objectives, which are derived from land, natural, and cultural resource management plans, and address public health issues and values to be protected.
- Address all potential wildland fire occurrences and consider the full range of wildland fire management actions.
- Promote an interagency approach to managing fires in conformance with natural ecological processes and the conditions characteristic of the ecosystem.
- Include a description of rehabilitation techniques and standards that comply with resource management plan objectives and mitigate immediate safety threats.
- Be developed with internal and external interdisciplinary input, reviewed by appropriate subject matter experts and all pertinent interested parties and approved by the park superintendent.
- Comply with the NEPA, NHPA, and any other applicable regulatory requirements.
- Include a wildland fire prevention analysis and plan, a fuels management analysis and plan, and procedures for short- and long-term monitoring to document that overall programmatic objectives are being met and undesired effects are not occurring.

Federal Wildland Fire Management Policy Requirements for Fire Management Plans (1995, 2001)

The Guiding Principles of Federal Wildland Fire Management Policy provide the following direction on the preparation and adequacy of federal FMPs:

- Firefighter and public safety must be the first priority in every fire management action.
- The role of wildland fire as an essential ecological process must be incorporated into the FMP. Land use and resource management plans set the objectives for the use and desired future condition of the public lands; FMPs support the achievement of these objectives.
- Sound risk management is one of the foundations for fire management actions. Risks and uncertainties must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.
- Fire management programs and actions must be economically viable, based upon values to be protected, costs, and planning objectives.
- FMPs and actions are to be based on the best available science and active research.
- FMPs and fire management actions must incorporate public health and environmental quality considerations.
- Agencies at all levels must share responsibilities and mandates for the implementation of ever increasing and more complex fire management tasks, and FMPs must address coordination, cooperation, and pooling of resources.
- The FMP must conform to the federal objective of standardizing procedures, plans, and actions to improve operations among federal agencies.

National Park Service Management Policies (2006)

The fundamental purpose of the National Park Service, established by the Organic Act and reaffirmed by the General Authorities Act, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. However, the laws do give the NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values (NPS 2006, Policy 1.4.3). The following policy excerpts from Management Policies 2006 (see also Appendix B) provide guidance for the development of the FMP for Kalaupapa National Historical Park:

Policy 4.1. General Management Concepts

“The Service [the NPS] will not intervene in natural biological or physical processes, except...to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities.”

Policy 4.1.5. Restoration of Natural Systems

“The Service [NPS] will reestablish natural functions and processes in parks unless otherwise directed by Congress. Impacts on natural systems resulting from human disturbances include the introduction of exotic species... The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function. Efforts may include, for example: removal of exotic species...and restoration of native plants and animals.”

Policy 4.4.1.3. Definition of Native and Exotic Species

“Native species are defined as all species that have occurred, now occur, or may occur as a result of natural processes on lands designated as units of the National Park System. Native species in a place are evolving in concert with each other. Exotic species are those species that occupy or could occupy parklands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as non-native, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place.”

Policy 4.4.2.4. Management of Natural Landscapes

“Landscape and vegetation conditions altered by human activity may be manipulated where the park management plan provides for restoring the lands to a natural condition. Management activities to restore human-altered landscapes may include, but are not restricted to: maintaining open areas and meadows in situations in which they were formerly maintained by natural processes that now are altered by human activities.”

Policy 4.4.4. Management of Exotic Species

“Exotic species will not be allowed to displace native species if displacement can be prevented.”

Policy 4.4.4.2. Removal of Exotic Species Already Present

“All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species: Interferes with natural processes and the perpetuation of natural features, native species, or natural habitats...disrupts the accurate presentation of a cultural landscape, or significantly hampers the management of park or adjacent lands.”

“High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled.”

“The decision to initiate management should be based on a determination that the species is exotic. For exotic species where management appears to be feasible and effective, superintendents should (1) evaluate the species’ current or potential impact on park resources; (2) develop and implement exotic species management plans according to established planning procedures; (3) consult, as appropriate, with Federal, Tribal, local, and State agencies as well as other interested groups; and (4) invite public review and comment, where appropriate.”

“Programs to manage exotic species will be designed to avoid causing significant damage to native species, natural ecological communities, natural ecological processes, cultural resources, and human health and safety.”

Policy 4.5. Fire Management

“Parks with vegetation capable of burning will prepare a fire management plan that is consistent with federal law and departmental fire management policies, and that includes addressing the need for adequate funding and staffing to support the planned fire management program. The plan will be designed to guide a program that: responds to the park’s natural and cultural resource objectives; provides for safety considerations for park visitors, employees, and developed facilities; addresses potential impacts on public and private neighbors and their property adjacent to the park; and protects public health and safety.”

Kalaupapa Cooperative Agreements

The NPS owns little of the acreage of the Park outright and was directed by its enabling legislation to enter into cooperative agreements and leases with landowning entities to permit the NPS to begin protection and management of park resources. The NPS leases the area of the Kalaupapa settlement, the trail to topside, and a portion of the cliffs from the State Department of Hawaiian Home Lands. Cooperative Agreements are in force with the three State agencies (Department of Land and Natural Resources, Department of Health and Department of Transportation) and two religious entities (the Roman Catholic Church and the United Church of Christ). Through these agreements, the NPS provides infrastructure maintenance, non-medical patient services, cultural and natural resource protection, assistance with operation maintenance of the historic churches, and structural stabilization and rehabilitation for those resources integral to the historic fabric of the Kalaupapa settlement. The FMP will help the NPS meet its responsibilities by planning for the protection of residents, staff, and resources from wildland fire, and by contributing to the protection of natural and cultural resources through the maintenance of defensible space and the application of prescribed burning, where appropriate.

Intra-agency Wildfire Fighting Agreement

Kalaupapa NHP and Hawai'i Volcanoes National Park have an intra-agency agreement whereby Hawai'i Volcanoes provides staff for wildland fire management actions to Kalaupapa NHP.

Mutual Aid Agreement with the NPS Statewide for Fire Suppression Assistance

Kalaupapa NHP has a Memorandum of Understanding with the Maui Fire Department and the Hawai'i Department of Forestry and Wildlife describing the cooperative relationship between these agencies and the Park (G. Hughes, pers. comm. and Joe Molhoek, pers. comm.).

Kalaupapa National Historical Park Draft Foundation Statement and forthcoming General Management Plan

The Foundation Statement for Kalaupapa NHP is the original statement of the park's core purpose and reference for future planning and management. The Foundation Statement also records the park's significance, resources and values, primary interpretive themes, special mandates, and legal and policy requirements. The Foundation Statement forms the anchor for the General Management Planning process by defining the most important Park goals and objectives. The FMP will contribute to the protection of the Park's fundamental resources and values as identified in the Foundation Statement:

“Significance Statement 1: Kalaupapa National Historical Park preserves the only intact historic institutional settlement in the United States created for the sole purpose of isolating Hansen's disease (leprosy) patients from the rest of society. Legislation: P. L. 96-565: sec. 101, 102.1, 102.2, 105.2, 105.4.

Fundamental Resources and Values [for this Significance Statement]: 1) Historic Architecture – the buildings and structures associated with the Hansen's disease settlement. 2) Historic Landscape – the cultural landscapes associated with the Hansen's disease settlement. 3) Museum Collections – that document the evolution of the built environment of the Kalaupapa leprosy settlement. 4) Archeological Resources – the physical remains that contribute to understanding the patients' histories and sites that are associated with the Hansen's disease settlement (NPS 2009, p. 9).”

The National Park Service is undertaking a conservation planning and environmental impact analysis process for developing a General Management Plan (GMP) for Kalaupapa National Historical Park. The GMP is intended to set forth the basic management philosophy for this unit (Kalaupapa National Historical Park) of the National Park System and provide the strategies for addressing issues and achieving identified management objectives. This Fire Management Plan

will be completed before the release of the final GMP, so activities resulting from the implementation of the FMP would result in an “existing condition” within the GMP.

Kalaupapa National Historical Park Advisory Commission

The 1980 enabling legislation which established the Park also established the Kalaupapa National Historical Park Advisory Commission for a period of twenty-five years (PL 95-565, Section 108, 12/22/80). Congress extended the authority of the Commission until 2025 in 2005 (PL 109-54, Sec. 128, 8/2/05). The FMP EA will be submitted for review and comment to the Advisory Commission members.

North Shore Cliffs National Natural Landmark

The National Natural Landmarks (NNL) Program recognizes and encourages the conservation of outstanding examples of our country's natural history in public and private ownership. The NPS administers the NNL Program, and if requested, assists NNL owners and managers with the conservation of these important sites. National Natural Landmark Status does not impose land use restrictions other than those already in place. Landowners must grant permission for the federal government to include private lands in a NNL and impacts to the Landmark status of an area must be considered when development or changes to land use or resource management, such as in the FMP, are proposed.

The North Shore Cliffs of Moloka'i, including those above the Kalaupapa settlement, were designated by the Secretary of the Interior as a National Natural Landmark in December 1972. The landmark includes 27,100 acres along 17 miles of the northeast coast of the island from Kalaupapa on the west to Halawa on the east. The Park comprises roughly 1/5 of the total area of the Landmark. The valleys, uplands, and cliffs within the Landmark are of scenic and scientific importance, representing one of the oldest periods of volcanism in the Hawaiian Islands.

Plans

Kalaupapa Resource Management Plan (December 2000)

The Resource Management Plan (RMP) describes the status of cultural and natural resources within the Park and lists: 1) threats to natural and cultural resources from non-native plants and animals and from human actions, 2) data gaps where additional information is needed in order to determine resource status, and 3) other management concerns. The RMP reiterates Resource Objectives first developed in 1987 for the Park's Statement of Management. The RMP goals and objectives stress the protection of life and property at the Settlement and protection and increased security for the residents and contributing elements to the National Historic Landmark District. The RMP encourages research that furthers the protection of the Park's natural and cultural resources including archaeological sites.

Cultural Landscape Inventory, Kalaupapa and Kalawao Settlement, Kalaupapa National Historical Park (2005)

The Cultural Landscape Inventory is a comprehensive inventory of historically significant landscapes within Kalaupapa NHP. The inventory identifies and documents their location, physical development, significance, National Register of Historic Places eligibility, and condition, as well as other valuable information for park management.

Assessment of Natural Resources and Watershed Conditions for Kalaupapa National Historical Park (2010)

This report collates current natural resource conditions within Kalaupapa NHP, including: 1) condition/ecological status of the terrestrial, freshwater, and marine resources at the Park based on available surveys, 2) existing and emerging threats or stressors that act on those resources, and 3) important information gaps and recommended future studies that address additional information needs.

CHAPTER 2. PURPOSE AND NEED

Federal Wildland Fire Management Policy (2001) requires all land management agencies within the Department of Interior have FMPs for areas with burnable vegetation under their jurisdiction. NPS policy for implementing this federal policy is set forth in Director's Order 18 (DO18) with expanded guidance in Reference Manual 18 (RM18).

Without an approved FMP, parks have few options in case of a wildfire other than immediate, full suppression of the fire. With a FMP in place, a park can choose to manage a wildfire for the beneficial effects the fire may have on natural or cultural resources, such as reestablishment of a landscape to one that is closer to what an area looked like during its most historically significant period. Having an FMP also allows parks to conduct other management actions, such as prescribed burns.

RM18 requires that each FMP be accompanied by a five-year implementation plan for attaining FMP objectives. The five-year plan is revisited annually during the FMP review; completed projects are checked off and rescheduled for future maintenance if necessary. New or modified projects are added to the plan and assessed for conformance with the NEPA record for the FMP.

The need for a FMP arises from a range of environmental conditions contributing to fire hazard on the Kalaupapa Peninsula, including:

Changes in Park Fire Regime Due to Invasive Plants

Though there have been numerous structural fires during the Kalaupapa Settlement's history (NPS 2005), there are no records of wildland fires on the Peninsula, the pali, or more remote uplands during the same period. Lightning being a rare natural occurrence, there would have been few ignition sources for naturally occurring fire prior to Polynesian settlement (McCoy 2008; NOAA 2009). The fire regime of the native plant community has been labeled "fire independent," having evolved largely without fire as a disturbance factor (Smith et al 1992, LaRosa, et al. 2008), with the possible exception of pili grass, which can be considered part of the cultural landscape and managed as such (Daehler 1998). Following settlement of the Peninsula roughly 1600 Y.B.P., fire was probably used by the Polynesians in the lowlands to clear land for agriculture, as it is throughout Polynesia (Pratt 1998).

The large-scale introduction of non-native plants that began with European settlement and cattle grazing roughly 200 years ago has resulted in lowland plant communities that are predominately non-native and largely drought resistant compared to the native species they supplanted (Medeiros et al 1996). In general, the lowland areas of the Park, with the exception of the coastal spray zone, are a mix of predominately non-native grasses, shrubs and trees, that have formed dense, nearly impenetrable stands, with only remnant native plants (Figure 3). Predominant are woody plants and trees such as Christmas berry (*Schinus terebinthifolius*), Java plum (*Syzygium*

cumini), koa haole (*Leucaena leucocephala*), lantana (*Lantana camara*), and grasses including molasses grass (*Melinis minutiflora*), sourgrass (*Digitaria insularis*), orchardgrass (*Dactylis glomerata*), and guinea grass (*Panicum mazimum*).



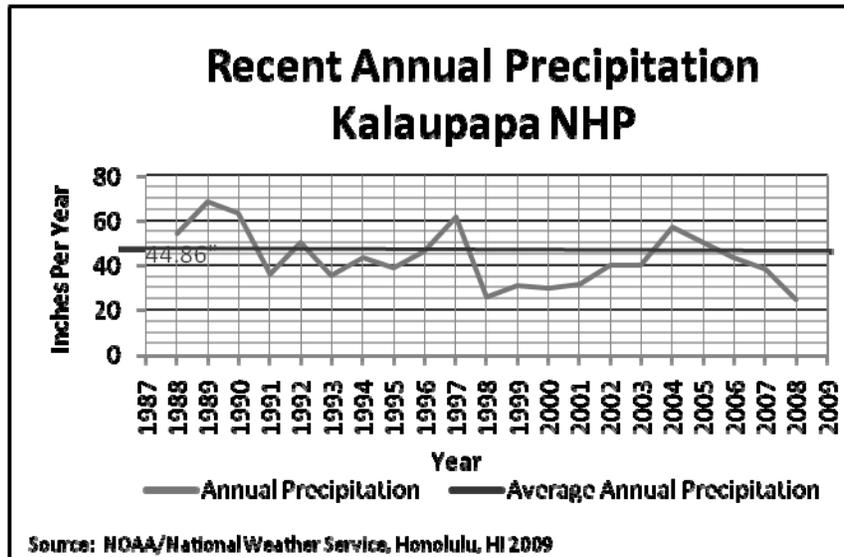
FIGURE 3 – DENSE STAND OF CHRISTMAS BERRY ALONG DAMIEN ROAD

Though there is a low risk of wildfire in the Park due to the limited ignition sources and high humidity, many of the non-native plants are fire-adapted and would resprout or reseed readily after fire (LaRosa et al. 2008 citing Ainsworth et al. 2005).

Alteration of the Fire Regime

Throughout much of the history of the Settlement, cattle and other livestock grazed freely on the Peninsula (Green 1985). However, in 1985, evidence of bovine tuberculosis was detected on Moloka'i, and in keeping with Department of Agriculture regulations, all cattle on the island, including at Kalaupapa, were destroyed. With the cessation of grazing, much of the landscape has converted from low-statured shrub to impenetrable stands of Christmas berry, koa haole, Java plum, and lantana.

Native plant communities remain on the steeper cliffs above the Peninsula, in the valleys, and within the southwest inner slopes of Kauhakō Crater. One of the primary threats to the remnant populations of native plants is browsing and trampling by feral ungulates, primarily axis deer (*Axis axis*) and wild pigs (*Sus scrofa*). National Park biologists and managers of surrounding preserves have been installing fencing to protect the native plant communities that remain. Areas within the settlement and Natural Resource Management units with reduced numbers of feral deer show a dense understory of tall non-native grasses such as molasses grass (*Melinis minutiflora*), sourgrass (*Digitaria insularis*), orchardgrass (*Dactylis glomerata*), and guinea grass (*Panicum mazimum*). An abundance of grass could increase the threat of wildfire. For example, in Hawai'i Volcanoes National Park, more than 90% of the recorded lowland fires occurred following the proliferation of grasses after feral goats were removed (Tunison, et al. 1994; J. Williams 1990). The combination of fine fuels, woody shrubs, and trees provide the potential for fast-moving intense fire with downwind spotting by firebrands.



**FIGURE 4 - RECENT ANNUAL PRECIPITATION AT
KALAUPAPA NHP**

Extended Periods of Drought

Every island in Hawai'i has experienced drought conditions during the past decade (See Figure 4). The drought is partially the result of high-pressure systems associated with the Pacific El Niño, reducing the amount of precipitation that reaches the islands during winter storms (Pogue and Collum 2006).

Changed Conditions in the Settlement

The decrease in the number of permanent residents and staff in the Settlement coupled with reduced State budgets and maintenance staff has inadvertently resulted in an increase in hazardous fuels in and around the Settlement. As unoccupied structures and outbuildings are abandoned, they can become dilapidated and the gardens and vacant lots overgrown with dead and downed limbs, grass thatch, and weeds. These lots become scattered weak spots in the Settlement's defensible space. As suppression resources are limited at the Park and additional response is from topside, provision of adequate defensible space and fire-safe modifications to culturally significant resources should be addressed in the fire management plan to provide increased protection to the Park's resources.

Changes in Climate

Scientists and planners are increasingly aware that global climate change will become a major influence on the long-term relevancy of planning documents like the FMP. As temperatures continue to rise, the Hawaiian Islands are likely to experience increases in: the number of strong hurricanes and associated downpours, summer rains, air and ocean surface temperatures, average and peak windspeeds, and overall rainfall rates. The Hawai'ian Islands have seen relative sea

level elevation rise from 2 – 4 inches in the western islands and 4 to 6 inches in the eastern portion of the chain, a combination of climate change and land subsidence. Windspeeds and rainfall rates are predicted to continue to increase in the future (Karl, et al 2009). It is not known if the rate of lightning may increase with the increase in intensity and frequency of storms.

While increased summer moisture might reduce the probability of ignition during the dry season, the higher temperatures could exacerbate the accumulation of fuels and fire intensity when fire does occur. The predicted higher rainfall might favor hand-cut, pile and burn/chipping or mechanical fuel-reduction (archaeological resources permitting) over prescribed fire as a method of fuel-reduction because of a shortened prescribed fire season.

FMP GOALS AND OBJECTIVES

Federal Wildland Fire Management Policy guidelines along with agency, NPS staff, and public input received during the scoping period and objectives from the Park’s Resource Management Plan provided the framework from which the FMP goals and objectives were developed. The FMP goals mirror the Wildland Fire Management Policy goals while the objectives are specific to the issues and concerns of Kalaupapa National Historical Park, while conforming to Federal Wildland Fire Management Policy. The goals and objectives for the Kalaupapa FMP are:

Goal 1. Ensure that firefighter and public safety is the highest priority for all fire management activities.

Objectives:

- The Superintendent will ensure that the Park FMP includes a Guideline for Determining Need for Park Closure/Evacuation (based on Exhibit 4, in Reference Manual 18, Chapter 5) and a Closure and Evacuation Plan. The Guideline will define the wildfire situational thresholds that could trigger partial closure, full closure, and evacuation of the Park. The Closure and Evacuation Plan, which will be completed by the third annual review and added to the FMP, will address how best to protect the residents, visitors, and staff in the event of a wildfire, including communication, transportation, safety zones, and provisioning. The Guideline and Plan should be developed in coordination with the residents, the Hawai'i Department of Health, the Maui County Fire Department, and other stakeholders. (Source: RM18 Chapter 5)
- The Park Fire Management Officer will ensure that all red-carded employees are kept current with training requirements and provided with the equipment needed to meet their responsibilities. (Source: RM18 Chapter 10, FMP Scoping)
- The Superintendent and the Fire Management Officer (FMO) will foster community fire safety by:
 - ◇ Inspecting and maintaining defensible space for all Settlement structures annually.
 - ◇ Conducting at least one fire safety meeting each year prior to the beginning of the fire season, reviewing defensible space standards, the Closure and Evacuation Plan, and other emergency procedures with Settlement residents and staff.

- ◇ Annually inspecting and maintaining low fuel conditions along those roadways designated by the FMO as critical for suppression and evacuation.
- ◇ Inspecting all fuel breaks on a schedule set by the Network FMO and maintaining the fuel breaks to the approved, prescribed standard.
- The FMO will familiarize Park staff having fire management responsibilities with the safety standards and guidelines identified within the Interagency Incident Business Management Handbook, Interagency Standards for Fire and Fire Aviation Operations (Red Book) and RM-18. (Source: RM18 Chapter 3). The Network FMO will also assure all red carded staff receives an annual refresher and appropriate work capacity test.

Goal 2. Reduce wildland fire risk to private and public property.

Objectives:

- Maintain a file on the park server where potential fire and/or safety hazards within the Park can be listed as they are identified. Continue to reduce potential fire hazards and include each year's accomplishments in an appendix to the FMP as part of the annual FMP review, beginning with the first annual review.
- The FMO and Park staff will continue to improve upon the Park FMP in keeping with National Interagency Fire Center (NIFC) standards for FMPs, adding Park-specific information on fuels, fuel models, fire behavior, fire effects, fire regimes, and hazards and incorporating actions targeting public safety, fire prevention, education, research, and/or benefits to natural and cultural resources. The plan will continue to reassess and update as needed the procedures to follow in event of a structural or wildland fire within the Park. (Source: RM18 Chapter 4, RMP KALA-I-017)
- Develop and implement a Settlement-wide Fuel Reduction Plan to improve the protection of the contributing structures to the NHL District designation. The components of the Fuel Reduction Plan will include:
 - ◇ Defensible space. Within 30 feet of all contributing structures, grassy areas should be mowed, and if planted, have scattered individual plants pruned to provide separation between shrubs and tree crowns. Lower tree limbs should be limbed up and tree limbs should cut back to provide a distance of 10 feet from structures. All dead wood on trees or shrubs should be removed. Within the next 70 feet from structures, grasses should be mowed and developed gardens planted with non-pyrophytic plants. All dead wood on trees or shrubs should be removed.
 - ◇ Palms. Wherever possible, lower stature palm trees windward of the Settlement or within the Settlement and windward of structures should be cleared of dead fronds prior to the fire season and re-inspected once midway through the fire season to determine if additional removal is needed. Dead or failing palms should be completely removed.
 - ◇ Roadsides and Driveways. A map of principal roads and driveways will be designated by the FMO in conformance with the Closure and Evacuation Plan. The FMO will develop a site specific Vegetation lining principal roads and driveways should be maintained to allow safe passage/access in the event of fire (Source: RMP KALA-I-017, FMP Scoping).
 - ◇ Mechanical Fuel Reduction. Provide additional protection of life, property, and contributing elements to the National Historic Landmark District by mapping vacant

parcels west of the fuel break and scheduling these parcels for regular mechanical fuel reduction throughout the year to maintain fuels near ground level. (Source: RM18 Chapter 7, FMP Scoping)

- To ensure that priorities are realigned to respond to changes in setting and operation, prior to conducting the annual review of the FMP and updating the five-year implementation plan the Fire Management Officer will annually resurvey and reevaluate fire hazards and values at risk in the Park. (Source: RM18 Chapter 4)
- Improve preparedness and the protection of life, property, and park resources by constructing and maintaining a fuel break adjacent to the housing area wide enough to reduce the potential for heat radiation from an advancing fire to ignite vegetation or structures across the fuel break. (Source: RMP KALA-I-017, RM18, Chapter 7, FMP Scoping)

Goal 3. Foster and maintain interagency fire management partnerships and contribute to the firefighting effort at the local, State, and National level.

Objectives:

- Maintain cooperative fire management agreements with Maui County Fire Department (MCFD). Meet annually with local firefighting agencies (MCFD and State Department of Land and Natural Resources firefighters) prior to fire season to review procedures, **Minimum Impact Suppression Tactics (MIST)** strategies and distribute maps depicting restrictions and values at risk, pointing out any changes from the prior version. (Source: RM18 Chapter 5, FMP Scoping)
- Continue intra-agency coordination and cooperation with the NPS fire management staff in Hawaii and coordinate regularly to update procedures. Participate in fire management activities at the other Hawaii parks to gain management experience. (Source: RMP KALA-I-002, FMP Scoping)
- Participate with other wildland firefighting agencies in periodic wildland fire scenarios to build basic wildland firefighting skills, identify training gaps and assure all necessary equipment is fire ready. (PWR Fire Staff).

Goal 4. Protect natural resources from adverse effects of fire and fire management activities, and use fire management techniques for natural resource benefit.

Objectives:

- In creating shaded fuel breaks, favor the retention of native vegetation or landscape plants that contribute to the NHL and manage invasive non-native plants. (Source: RM18 Chapter 7, FMP Scoping)
- Develop maps for distribution to responding emergency service providers showing:
 - ◇ preferred locations for helispots and staging areas
 - ◇ existing conditions and facilities such as helipads, fuel breaks, water supply, hazardous material storage, evacuation stations, fuel types, and fuel breaks
 - ◇ areas to avoid for specific actions (landing, water charging, retardant application).
Maps must indicate that water should not be taken from the lake in Kauhakō Crater. (Source: RM18 Chapters 5 & 7, FMP Scoping)

- Consider the use of prescribed burning for natural resource benefit by implementing scientifically constructed and peer reviewed research burns that include consultation on research design with subject matter experts at Hawai'ian network parks.
- The Superintendent will identify staff member(s) who will serve as Resource Advisor(s) (READ). A READ will be assigned to all wildland fires within the park boundaries.
- The Chief of the Resources Division, in coordination with the Network FMO, will develop a Resource Advisor Kit for the Park including maps of sensitive resources, areas to avoid, and existing facilities relevant to firefighting. The Kit will be reviewed for adequacy by the Division Chief and updated annually as needed. (Source: RM18 Chapter 5 & 7, FMP Scoping)
- Develop standards for the use of salt water, and fire suppression chemicals, including retardants, used in fire management activities. Research the sensitivity of native plants and wildlife to retardants, and, if warranted, map areas of the park where use of retardants should be avoided if feasible. (Source: RM18 Chapter 5 & 7, FMP Scoping)

Goal 5. Preserve the National Historic Landmark District, cultural landscape, and archeological resources from adverse effects of fire and fire management activities, and use vegetation management and fire management wherever appropriate to rehabilitate or restore the cultural landscape.

Objectives:

- Provide defensible space for the churches and associated resources at Kalawao and other contributing historic properties in Kalaupapa. (Source: RM18 Chapter 7, FMP Scoping)
- Research the effectiveness of exterior roof mounted sprinklers for the churches at Kalawao that could trigger automatically, or be remotely triggered, in the event of fire. (Source: FMP Scoping)
- Develop a safety checklist, similar to a fire marshal inspection checklist, for securing empty contributing structures against accidental fire starts, and conduct an inspection each time there is a change in status or a fire safety complaint. Checklist should address accumulations of grass and trash outside of a structure, trash and flammable liquids stored inside, grease accumulation, unsecured doors, exposed wiring, and other hazards. Checklist should include inspection and repair to the churches at Kalawao. (Source: FMP Scoping)
- Prior to conducting mechanical fuel reduction or prescribed burns that could affect surface soils, conduct surveys for archeological resources. Avoid ground disturbance of known sensitive areas for archeological resources. Where work is required in an area of sensitive resources, coordinate with cultural resource staff to protect surface resources by avoidance or temporary burying or bridging. (Source: RM18 Chapter 7, FMP Scoping)
- Once the cultural landscape representing the period of greatest historic significance has been identified, determine if prescribed burning would be useful in recreating a similar landscape type. Conduct research burns to determine the feasibility of the use of fire and test the effectiveness of techniques.. (Source: RM 18 Chapters 7 & 8, Interagency Prescribed Fire Guide 2008, FMP Scoping)

Goal 6. Refine management practices by improving knowledge and understanding of fire management activities.

Objectives:

- In the event of a wildfire in the Park, the network FMO will ensure that all “lessons learned” from that incident are incorporated back into the FMP through the annual review process.
- Prescribed burning may be conducted in the Park for research purposes. Results of the research burns will be used to refine fire management objectives and inform fire management actions including subsequent larger prescribed burns.
- Park staff, in cooperation with the network FMO and regional fire staff, will provide the most accurate data possible for future fire management mapping and modeling projects, including refining FLAMMAP runs for the Park.
- Coordinate with other Hawai'i parks in research efforts to determine if prescribed fire can be useful as a primary or adjunct method to eradicate a target non-native plant species. (Source: Interagency Prescribed Fire Guide 2008, FMP Scoping)
- Annually review and update (if needed) the FMP based on lessons learned through research, after action reviews, and from new sources of information.

Goal 7. Develop and maintain staff expertise in all aspects of fire management.

Objectives:

- Maintain requirements and training for current crew of certified wildland firefighters.
- Develop training plans for each employee with NPS fire management responsibilities to reach target qualifications for their position. (Source: RM18, Chapter 3)

Goal 8. Effectively integrate the fire management program into park activities and park-wide projects.

Objectives:

- The Park Superintendent will encourage interdisciplinary pre-project planning for fire management activities by ensuring that actions are reviewed for regulatory compliance by an interdisciplinary group of subject matter experts. (Source: RM18, Chapter 7, FMP Scoping)
- Conduct outreach programs on the Park's fire management activities for residents and staff at the Settlement to keep them informed of changes to routines, to make them more fire safety conscious, and to keep the Park FMO apprised of their changing concerns. (Source: RM18 Chapter 21, FMP Scoping)
- Integrate wildland fire management issues into the Park's interpretive program. (RM18 Chapters 4 & 21)

Goal 9. Minimize smoke generation during prescribed burning.

Objectives:

- The Park FMO shall confer regularly with Air Resources staff at the NPS Pacific West Regional Office, other parks, fire agencies, and the Hawaiian Department of Health,

Clean Air Branch to keep current on best management practices and non-burning alternatives. (Source: RM18, Chapter 9, FMP Scoping)

- The Park FMO shall maintain current information on smoke-related health issues affecting firefighters, such as exposure limits, exposure monitoring, risk minimization, and respiration technology, and ensure that red-carded Park staff are informed of new issues and provided with the necessary equipment. (Source: RM18, Chapter 9, FMP Scoping)
- Park staff will consider alternatives to burning or alternative burning strategies that would meet resource management and/or fuel reduction objectives while minimizing smoke generation. (Source: RM18, Chapter 9, FMP Scoping)
- The Hansen's disease patient community will be consulted by the NPS prior to any planned prescribed fire and special attention will be made to assure that planned prescribed fires do not adversely affect the health of the patient community. Prescribed fires will not be implemented if there is significant opposition from the patient community.

IMPACT TOPICS INCLUDED IN THE ENVIRONMENTAL ASSESSMENT

NEPA requirements and scoping comments led to the inclusion of the following impact topics in this EA:

- **Air Quality.** Impacts to air quality from smoke and other emissions generated by prescribed burning, and fire suppression actions.
- **Soil Resources.** Impacts to soils from wildfire, prescribed burning, disturbance from mechanical treatments, and fire suppression actions.
- **Water Resources.** The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters, to enhance the quality of water resources, and to prevent, control, and abate water pollution. NPS Management Policies provide direction for the preservation, use, and quality of water in National Parks.
- **Floodplains.** Impacts to floodplains from mechanical fuel reduction, prescribed burning, and wildfire suppression actions.
- **Wetlands.** Impacts to wetlands from mechanical fuel reduction, prescribed burning, and wildfire suppression actions.
- **Native Vegetation.** NEPA calls for examination of the impacts of proposed actions on the components of affected ecosystems. NPS policy is to protect the natural abundance and diversity of Park native species and communities, including avoiding, minimizing, or mitigating potential impacts from proposed projects.
- **Non-native Plant or Animal Species Introduction or Promotion.** Impacts to non-native plants and animals from mechanical fuel reduction, prescribed burning, wildfire suppression actions.
- **Wildlife and Fish.** NEPA calls for examination of the impacts of proposed actions on the components of affected ecosystems. NPS policy is to protect the natural abundance and

diversity of park native species and communities, including avoiding, minimizing, or mitigating potential impacts from proposed projects.

- Unique or Important Wildlife Habitat. Impacts to native wildlife habitat from mechanical fuel reduction, prescribed burning, and wildfire suppression actions.
- Special Status Species. The ESA requires an examination of impacts to all federally listed threatened or endangered species, and mandates that the NPS promote the conservation of all federal threatened and endangered species and their critical habitats within the Park boundary. NPS policy also requires an analysis of impacts to State-listed threatened or endangered species and federal candidate species. Management Policies include the additional stipulation to conserve and manage species proposed for listing.
- Long-term management of Resources or Land/Resource Productivity. Long-term benefits or disadvantages of fire management strategies on natural resource productivity.
- National Historic Landmark. National Historic Landmarks (NHL) are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. Today, fewer than 2,500 historic places bear this national distinction. The NHL boundary encompasses the entire park and the project area is within one of the contributing sites.
- Historic Buildings and Structures .The NPS defines buildings and structures as “an enclosed structure with walls and a roof, consciously created to serve some residential, industrial, commercial, agricultural, or other human use,” and “a constructed work, usually immovable by nature or design, consciously created to serve some human activity.” Examples are buildings of various kinds, monuments, dams, roads, railroad tracks, canals, millraces, bridges, tunnels, locomotives, nautical vessels, stockades, forts and associated earthworks, Indian mounds, ruins, fences, and outdoor sculpture. In the National Register program "structure" is limited to functional constructions other than buildings.” (NPS- 28, Cultural Resource Management Guideline)
- Archeological Resources. The relative seclusion of the Kalaupapa Peninsula has resulted in the preservation of a rich complex of archaeological sites and artifacts from the Precontact, Protohistoric and Historic periods.
- Cultural Landscapes. The NPS defines a cultural landscape as “a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values” (NPS - 28, Cultural Resource Management Guideline). The project area is within a designated Cultural Landscape. Heritage plants, including trees, shrubs, and herbaceous plants established by historic and pre-contact inhabitants of the Old Baldwin Boys Home area, are considered a component of the cultural landscape.
- Museum Collections. The Hala Malama Archival Center houses collections of cultural, historical , ethnological, and biological objects. This EA examines the influence of alternatives on existing collections and objects of interest remaining in the field.
- Soundscapes. Soundscapes characteristic of the park include coastal and inland soundscapes.
- Visitor Experience. Providing for visitor enjoyment is one of the fundamental missions of the NPS, according to the Organic Act of 1916 and Management Policies (NPS 2006). Dependent on the selected alternative, impacts to visitor use and/or interpretive programming may occur.

- Maintenance. Impacts to maintenance and visitor services are often considered in project plans to disclose the degree to which proposed actions would change park management strategies and methods.
- Infrastructure. Impacts to transport, water, and power supply systems from prescribed burning, fuel reduction and wildfire suppression.
- Safety/Security. Providing for the safety and security of visitors and resources alike is one of the fundamental missions of the NPS, and is critical to a positive visitor experience. Accurate directional and informative signs and warnings about natural hazards all increase visitor safety.

IMPACT TOPICS NOT INCLUDED IN THE ENVIRONMENTAL ASSESSMENT

The following impact issues were considered by the NPS as having either no potential for impact from fire management actions or only short-term minimal impact. These impact topics will not be addressed in this EA:

- Geological resources (lava tubes and caves) and geohazards (with the exception of soils). There is little potential for wildfire suppression or wildland fire management actions to disturb caves or subsurface geologic features, or increase exposure of the public or staff to hazardous geologic conditions such as landslides or earthquakes. Potential impacts to geological features as habitat are considered under “Unique and Important Wildlife Habitat”.
- Land use. Implementation of the FMP would have no effect on the current pattern of land use at the Park. The Park is in the initial stage of developing a General Management Plan that will address future land use for the NPS management area.
- Unique ecosystems, biosphere reserves, or world heritage sites. Implementation of the FMP would not impact unique ecosystems, biosphere reserves, or world heritage sites as the Park lands proposed for FMP actions are not part of areas with these designations. The North Shore Cliffs National Natural Landmark includes the cliffs of Kalaupapa. However, no FMP actions are proposed for this area.
- Recreation resources. There are no public recreational resources at the Park due to its visitation restrictions.
- Socioeconomics. Implementation of the FMP would be restricted to the Park and would not impact socioeconomic conditions topside on the Island of Moloka'i. The government is practically the sole employer and source of income within the Park so there is nearly no private enterprise that could be affected by fire management actions.
- Minority or low income populations. Implementation of the FMP would benefit settlement residents and State and Federal staff by increasing public safety for the population as a whole and would not advantage or disadvantage particular segments of the Settlement.
- Energy and resource use. Implementation of the FMP would not involve consumption of important or irreplaceable energy resources or biotic or mineral resources.

- Urban gateway community. As Kalaupapa National Historical Park has strict limitations on the number of visitors and type of recreational opportunities, there is no gateway community at the entrance to the trail from topside and very limited commercial opportunities within the settlement.
- Other Agency or Tribal Land Use Plans or Policies. Implementation of the FMP would not conflict with the Cooperative Agreements the NPS has entered into with State Agencies and religious entities or with State policies governing the settlement and the care of its residents.

CHAPTER 3. DESCRIPTION OF ALTERNATIVES

INTRODUCTION

The formulation of alternatives for the FMP was based on issues raised during the scoping period, changed conditions at the Park that have increased the potential for wildfire, and the unmet need for meaningful defensive capabilities to ensure the protection of residents, historic structures, archaeological resources, and native plant communities. The alternatives (no-action and action) were developed by an interdisciplinary team of NPS staff including representatives from wildland fire management, public safety, wildlife biology, vegetation ecology, historic structure preservation, archaeology, planning, and utilities maintenance.

In many FMPs, computer models simulate fire behavior and assess the degree of wildfire hazard to help focus the development of fire hazard reduction goals and objectives. In 2004, an interagency team of NPS, U.S. Forest Service, and Hawai'i Department of Forestry and Wildfire staff modeled the fire behavior conditions for the island of Moloka'i using FLAMMAP (<http://www.firemodels.org/index.php/national-systems/flammap>) (Neill, et al. 2004, *unpub.*). The inputs to the model were fuels (fuel model and canopy cover), weather (wind and fuel moisture), and topography (slope, aspect, and elevation). The weather data used for Moloka'i represented worst-case scenario weather data from Moloka'i Airport. Model outputs of flame length and rate of spread were used to define relative fire hazard across the landscape. Modeling of the data for the Kalaupapa Peninsula produced the highest level of hazard (“very high”) for nearly the entire Kalaupapa Peninsula except for the coastal dunes, the area around the Kauhakō Crater, the base of the cliffs, and parts of the Settlement (Figure 5).

The alternatives described in this FMP EA include Alternative A (the Current Management Strategy) – the “No Action Alternative” required in all NEPA assessments, and the preferred Alternative B (the Increased Protection Alternative) that proposes to improve protection for the residents of the Settlement and structures that comprise Kalaupapa National Historical Landmark.

Fire suppression is the primary management response to a wildland fire in the Park, regardless of alternative. The Increased Protection Alternative offers the opportunity to manage the wildfire to increase resource benefits and/or avoid or minimize resource damage by allowing different suppression tactics. The Increased Protection Alternative also permits the use of prescribed burning for resource benefit or fuel reduction at the research project scale or broadcast burn scale in circumstances where fire is an appropriate tool.

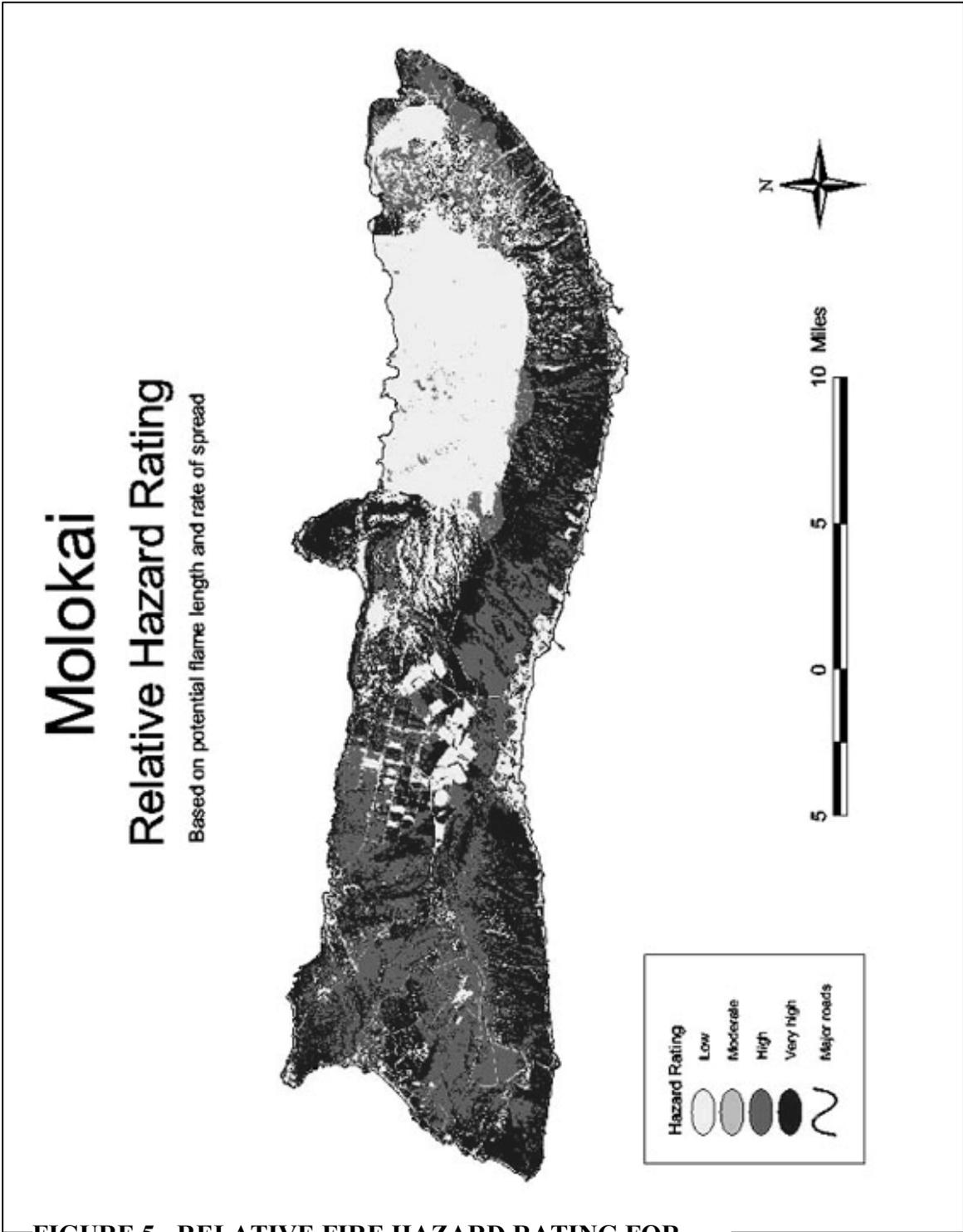


FIGURE 5 - RELATIVE FIRE HAZARD RATING FOR MOLOKA'I

Elements Common to All Alternatives

Planning and preparation against wildfire at Kalaupapa is supported by the FMO at Hawai'i National Park who also serves as Fire Management Officer (FMO) to Kalaupapa NHP and other National Parks in the Pacific Islands Network.

According to 2009 Federal Wildland Fire Management policy, the term “wildfire” applies to all fires started by an unplanned ignition (lightning strike, an arcing power line, sparks thrown off by mowers, and deliberately set fires including escaped campfires and acts of arson). “Wildfire” also includes other unexpected events, such as a shift in environmental conditions allowing a prescribed fire to go out of prescription and be declared a wildfire (NPS 2009c). Federal policy states that the initial action on human-caused fires is to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety (FEC 2009).

The following components of the FMP would be implemented only following the initiation of an unplanned wildfire at the Park.

Wildfire Suppression

The key objective of wildfire suppression at Kalaupapa NHP would be to limit the wildfire size in addition to reducing costs and impacts to natural and cultural resources. Immediate suppression would be the initial response to all unplanned wildfires in the Park. If public safety and/or the Park's primary resources (the Kalaupapa Community) are threatened, limiting the fire size may mean an aggressive firefighting approach with the potential for impacts to cultural and natural resources.

Wildland fires at Kalaupapa will be managed with the support of trained NPS fire fighters, the Hawai'i Department of Forestry and Wildlife, and staff of the Maui County Fire Department (MCFD). First responders to wildfire may be one or two of the members of the Kalaupapa Volunteer Fire Department composed of the red-carded Park staff. Kalaupapa firefighters would try to extinguish fires using hand tools and backpack pumps in addition to the Park's fire engine. However, due to the heavy brush covering most of the Peninsula and the few firefighters available in the Park, a request for firefighters would likely be made immediately following confirmation of a wildfire. With three stations on topside Moloka'i, MCFD would likely be the first fire department to respond to a fire in the Park. Additional support from the NPS at Hawai'i Volcanoes National Park would be requested as needed.

Wildland fire suppression would be conducted at the minimum cost necessary to safely protect values at risk, while minimizing the impacts from suppression activities. With very limited heavy equipment available for firefighters at Kalaupapa, helicopters and fire crews would perform the majority of the suppression actions. During the fire season, a helicopter is available on Moloka'i for use by MCFD, and additional helicopter support is available by contract to the National Park

Service. Helicopter manager support may be available from Kalaupapa National Historical Park or Hawai'i Volcanoes National Park. Helicopters would likely use seawater to douse the fire, but there may be a need to use chemicals in an attempt to stop the forward progress of a wildfire if it approached the Settlement or Kalawao. Three of the four types of chemicals used in fire suppression (with the exception of wetting agents) can also be applied by fire engines, pumper trucks, or backpack sprayers. Chemical applications include:

- Long-term retardants, which contain fertilizer salts that change the way fuels burn, even after the water has evaporated. These products can increase available nitrogen in the soil where it has been applied, resulting in an increase in plant biomass, often of weedy species. Retardants are often mixed with a pigment that allows the pilot and coordinator to see where the drop has landed. Mixtures are available using fugitive dyes that also color vegetation but degrade rapidly to minimize the visual impact of the retardant use.
- Fire suppressant foams, which are combinations of wetting and foaming agents added to water to improve the effectiveness of the water. They are not effective once the water has evaporated. Like retardants, foam may be applied from the air or pumped out by engines.
- Wetting agents, which are chemicals that are added to water to reduce its surface tension, causing the water to spread and penetrate into objects more effectively than the untreated water.
- Water enhancers, including firefighting gels, which are products added to water to improve one or more of the physical properties of water. They are often used for structure protection and are not effective once the water has evaporated, but can often be rehydrated. (NWCG 2009).

Hand crews could be used but the density and continuity of fuels across the Peninsula would make fire line construction very slow going. As water and retardant drops are being made, fire crews could be used to widen the existing perimeter fuel break east of the Settlement or to protect structures from embers within the Settlement.

In the event of a wildfire, resource advisors will prepare relevant resource and infrastructure information for the Incident Command team. During the suppression effort, park subject matter experts will be available to provide the Incident Command team with clarification on MIST (Minimum Impact Suppression Tactics) strategies, Park values at risk, location of infrastructure, where to avoid retardant use, avoidance of impacts to Park resources, etc.

Once the wildfire is controlled, the Incident Commander would direct fire crews to begin repairing areas of the Park damaged by the suppression efforts. With guidance from Park staff, it is the responsibility of the suppression team to repair suppression damage before demobilizing from a fire site. Suppression damage repair is funded through the Wildland Fire Operations, Emergency Suppression subactivity and overseen by the Incident Commander of the fire suppression effort. Repairs could include stabilizing a cultural resource site that has been exposed and/or damaged by repeated vehicle passage or rehabilitating a fire line cut through endangered species habitat..

Post Fire Emergency Stabilization

Following suppression of a wildfire, Park subject matter experts would advise or help staff develop a Burned Area Emergency Response (BAER) team as part of their Emergency Stabilization (ES) efforts. Interdisciplinary BAER teams are charged with the rapid assessment of resource damage and threats to life and property caused by the wildfire itself, rather than by actions to suppress the wildfire. The NPS follows the Interagency Burned Area Emergency Response Guidebook (DOI 2006a) in developing BAER plans and subsequently implementing projects. BAER/ES projects are funded as emergency appropriations from the Wildland Fire Operations Activity, Emergency Stabilization subactivity. These projects must be completed within one year of wildfire containment; monitoring and maintenance of the repairs may be funded for up to three years.

Projects would include stabilizing and preventing unacceptable degradation to natural and cultural resources, minimizing threats to life or property, and constructing physical improvements that prevent degradation of land or resources. Techniques used to control plant species invading as a result of wildfire, such as hand pulling or using hand tools to dig out weeds, would have minimal impacts. Herbicide application could be required if infestation is widespread. The BAER team would consult with USFWS as part of the BAER plan compliance and would address pesticide application in critical habitat at that time.

Burned Area Rehabilitation

Long-term restoration actions or Burned Area Rehabilitation (BAR) projects also mitigate damage from wildfire but are considered nonemergency repairs (no eminent threats to life, property, or critical natural and cultural resources). Funding for BAR projects is available for up to three years after wildfire containment. The BAR process provides a later stage evaluation of the potential long-term impacts to cultural and natural resources and focuses on areas that are unlikely to recover naturally from the effects of the wildfire. Allowable actions under BAR include direct treatment of invasive species, seeding or planting to restore ecosystems or prevent the establishment of exotics, and repair/replacement of fire-damaged minor infrastructure. Implementation guidance is provided in the Interagency Burned Area Emergency Response Guidebook (DOI 2006b).

BAR plans are designed to recreate to the degree feasible the pre-fire ecosystem structure, function, diversity, and dynamics in conformance with approved land management plans for the impacted areas. In areas where changed conditions make ecosystem restoration infeasible, BAR plans are charged “to restore or establish a healthy, stable ecosystem in which native species are well represented (DOI 2006b). In the event of wildfire at Kalaupapa, park staff should consult with subject matter experts at Hawai'i Volcanoes National Park on techniques they have developed that would be applicable to conditions at Kalaupapa.

Fire Prevention, Education, and Community Assistance

As there is no record of wildfire or prescribed burning at Kalaupapa NHP and little interpretive information has been presented to the public on fire prevention and education, the FMP EA will be circulated for public review and notices of document availability will be mailed or emailed to the Kalaupapa NHP mailing list. The document will be posted on the Park website and linked to the NPS Planning, Environment and Public Comment website. Hardcopies of the document will be made available at the principal libraries on Molokai, Lanai, Maui, and Oahu.

Alternative A (Current Fire Management Strategy)

For the FMP, the No Action Alternative is Alternative A. Alternative A would continue the current fire management strategy in the absence of a FMP.

Summary of Wildland Fire Management Strategy for Alternative A

The primary focus of the fire management strategy of Alternative A would be the immediate suppression of all wildfires and conformance with the goals of the Federal Wildland Fire Management Policy. The strategy under Alternative A would focus on:

- Preventing wildfires to protect human health and safety, property, and the contributing elements to the NHL status of the Park.
- Managing wildfires with suppression as the primary objective: “Initial action on human-caused wildfire will continue to be the suppression of the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety” (NWCG 2009). Fire managers would be able to pursue more than one objective in suppressing a wildfire, though all actions must be supported by an FMP and appropriate compliance. Managers may consider the circumstances under which a wildfire occurs and the likely outcomes on firefighter and public safety and natural and cultural resources when determining the appropriate suppression response.
- Manual and Mechanical fuel reduction to maintain the existing fuel break, and using mounted sprinklers to slow or stop a fire heading towards the Settlement.
- Mowing to maintain defensible space around structures and fields within the Settlement.
- Park staff maintaining their red-carded status with annual training and fire assignments outside the Park when feasible.

Fire Management Units

The isolated nature of the Park, lack of fire history, and precariousness of the wooden structures favor a suppression objective following the occurrence of a wildfire. Considering immediate full suppression of wildfire with priority on the protection of life is the principal management strategy, the definition of one Fire Management Unit (FMU) was considered adequate.

Manual and Mechanical Fuel Reduction

Manual fuel treatments refer to projects that typically involve crews using hand tools or equipment to reduce fuels and achieve fire and resource management goals. The most common method of manual/hand fuel reduction is the use of chain saws to thin or remove targeted vegetation, which is then piled for curing and later burning. Alternatively, cut vegetation can be fed into a chipper to create mulch. The Park currently uses mechanical treatments such as mowing to maintain open grass fields throughout the Settlement, to remove hazardous fuels around structures in the Settlement, for roadside clearing, and to maintain the existing Kalaupapa perimeter fuel break. For roadside fuel reduction along fire roads, large mowers with brush-cutting attachments can be used to pare back vegetation from the road edge.

Under Alternative A, the existing 50-foot wide fuel break around Settlement structures would be maintained once or twice annually as needed (see Figure 6). Maintenance would take place early in April or May at the start of the drier part of the year to remove new annual growth. Work could be performed by the Pacific Islands Network fuels crew, Park staff, a qualified contractor, Conservation Corps crew, or other youth crews. Cut vegetation would be trucked to the recycling area, chipped, and mulched. Park staff would monitor the fuel break during the dry season and notify the FMO when repeat treatment is needed. Park staff would continue mowing open grounds every two to four weeks during the growing season within the Settlement to keep fine fuels low and prevent conversion of the larger tracts of land to heavier woody fuels.

If herbicides are proposed for use on non-native plants as part of a manual or mechanical fuel reduction project, the Park must submit a request for pesticide use to the Park's Integrated Pest Management (IPM) coordinator who, in turn, forwards the request on to the Washington Office IPM coordinator. All proposed pesticide use will be reviewed for conformance with the FMP EA. If the conditions of use and assessment of effect do not conform to the assessment in the FMP EA then a separate NEPA compliance process will be conducted. All use of herbicide must follow Federal, State, and County regulations.

Following the mechanical treatment, the site may be surveyed by cultural resources staff to examine and assess any newly uncovered resource material. The site would be monitored to capture changes in vegetation community over time following the mechanical treatment.

Prescribed Burning

Prescribed burning for fuel reduction or resource benefit would not occur under Alternative A.

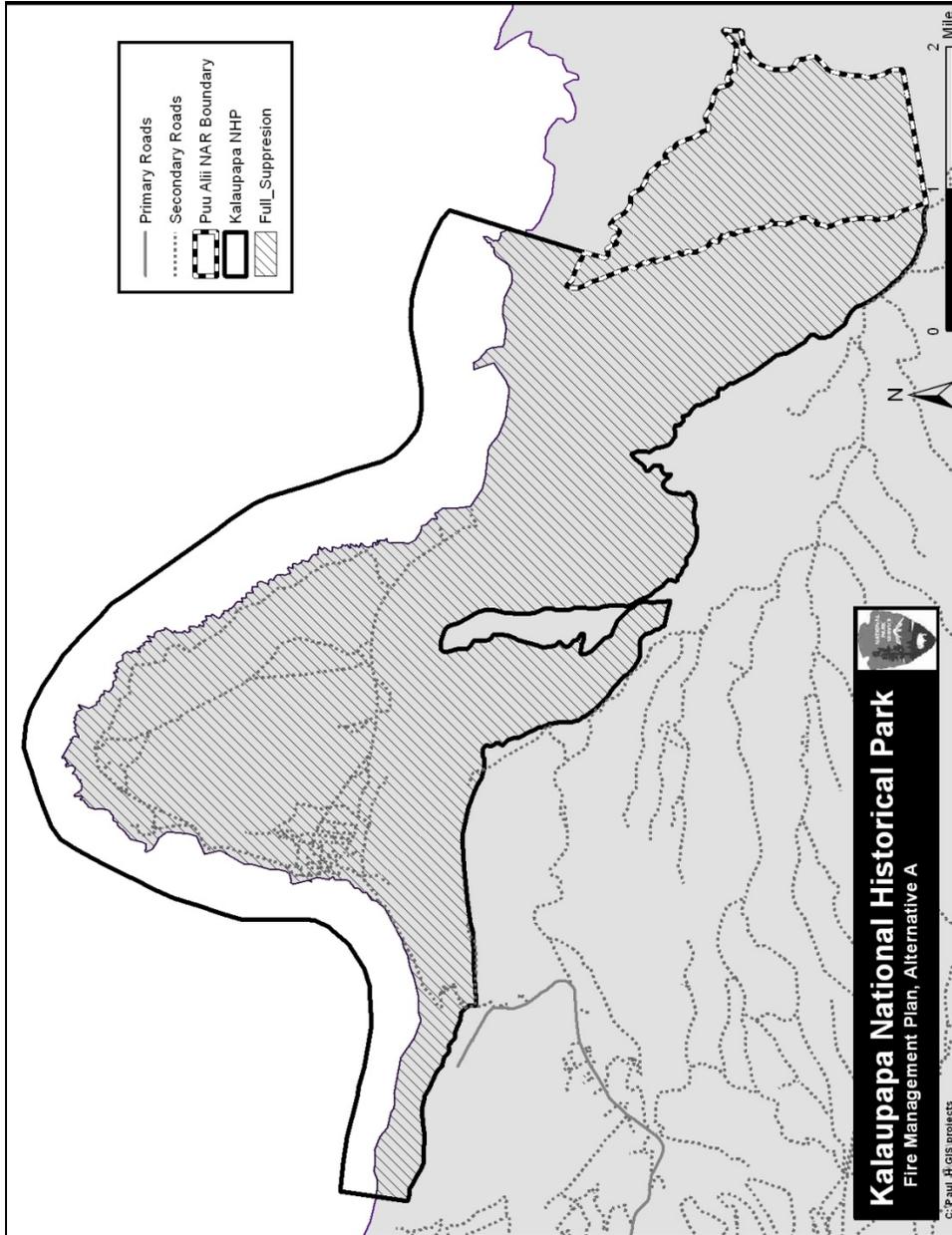


FIGURE 6 - KALAUPAPA FIRE MANAGEMENT PLAN, ALTERNATIVE A

Research and Monitoring

Without an active prescribed fire or mechanical fuel reduction program, there would not be an active fire effects research and monitoring program at the Park.

Alternative B (Increased Protection Strategy)

The range of options available under Alternative B has a greater potential to achieve the Park's desired future conditions for fire management and to conform to federal Wildland Fire Management goals. The desired future condition for the FMP is a Park where residents, staff, and visitors and the NHL itself are well protected from unplanned ignitions, and where fire is used to promote reasonably predictable and beneficial natural and cultural resource outcomes.

Alternative B is the Park's Preferred Alternative.

Summary of Wildland Fire Management Strategy for Alternative B

Under Alternative B, mechanical treatments and prescribed burns would focus on:

- Reducing the potential for a wildfire east of the Settlement spreading fire within the Settlement.
- Improving and expanding upon defensible space within the Settlement to provide more effective protection of lives, property, and the contributing elements of the NHL.
- Relocation of an expanded perimeter fuel break to increase its effectiveness in protecting the Settlement from an advancing wildfire.
- Increasing areas of low, open grassland within the Settlement to reduce fuel loading and aid firefighters in slowing or stopping the spread of fire in the event of unplanned ignition.
- Using prescribed fire on a limited scale to answer research questions relating to control of non-native plant species, enhancement of native plant populations, effectiveness in converting existing shrublands and forest to grasslands, and other stated natural and cultural resource management objectives.
- Using prescribed fire on a landscape scale to accomplish research-supported natural and cultural resource management objectives identified in adopted planning documents.

Fire Management Units

The examination of the Park's goals and objectives for wildland fire management brought up distinctions among the issues, vegetation types, physical setting, sensitive resources, risks, and opportunities in different areas of the Park. Alternative B proposes three FMUs for the Park (see Figure 7, Kalaupapa Fire Management Plan, Alternative B): the Wildland Urban Interface FMU, the Open Space FMU, and the Natural Area FMU. Wildland fire management is approached differently in each FMU and there are differences in the FMP objectives of each FMU.

The **Wildland Urban Interface FMU** includes all developed areas of the Park including the Kalaupapa Settlement north to the airport and lighthouse complex, the Kalawao Area containing the churches and adjacent grasslands and roadways, Damien Road between Kalaupapa and Kalawao, and the spur road to the water pumping facility. The term wildland urban interface, or WUI, refers to the boundary lands where structures and other human development meet or intermingle with undeveloped wildlands or vegetative fuels (NWCG 2008). In addition to the structures and facilities, the FMU includes the extensive landscape plantings, the majority of the cemeteries, the waste recycling area, the road network south and west of the airport, the wharf, the shoreline, the water system in Waihānau, and the adjacent Kauhakō Crater area inclusive of important archaeological resources.

The **Wildland Urban Interface FMU Vegetation** is a mosaic of mowed and manicured areas, old home sites that have not been maintained, grass fields that are periodically mowed, and naturalized largely non-native forests that have grown in areas that have not been mowed, maintained, or used as pasture as they were in the past. The dominant naturalized vegetation is a haole koa (*Leucaena leucocephala*) dry forest with mixed ornamental plant species and fruit trees. The haole koa forest is approximately 4-5m in height and contains an understory dominated by sourgrass (*Digitaria insularis*). The largest patches of this forest are found within the Settlement in front or northwest of the McVeigh complex and behind or south of the McVeigh complex running west all along the southern end of the settlement. A mixed Christmas berry (*Schinus terebinthifolius*)/Java plum (*Syzygium cumini*) shrubland grows behind the beach houses along the road to the airport, as in the Open Space FMU.

The primary **objective** for the Wildland Urban Interface FMU is to protect the lives of all residents, employees, and visitors at Kalaupapa National Historical Park. While the protection of life is paramount, the near counterpart priority is the protection of the primary resources of the Park – the elements that comprise Kalaupapa National Historic Landmark.

To meet these objectives, Alternative B proposes to:

- Redesign an effective fuel break that provides reasonable protection for the Settlement while minimizing costs and the maintenance work load. Relocate the fuel break to build upon 100-foot wide zones of defensible space created for structures in the McVeigh and Staff Row areas of the Settlement. Within the buffer, trees and shrubs will be trimmed and limbed up and grasses will be mowed to decrease available fuels and protect the structures.

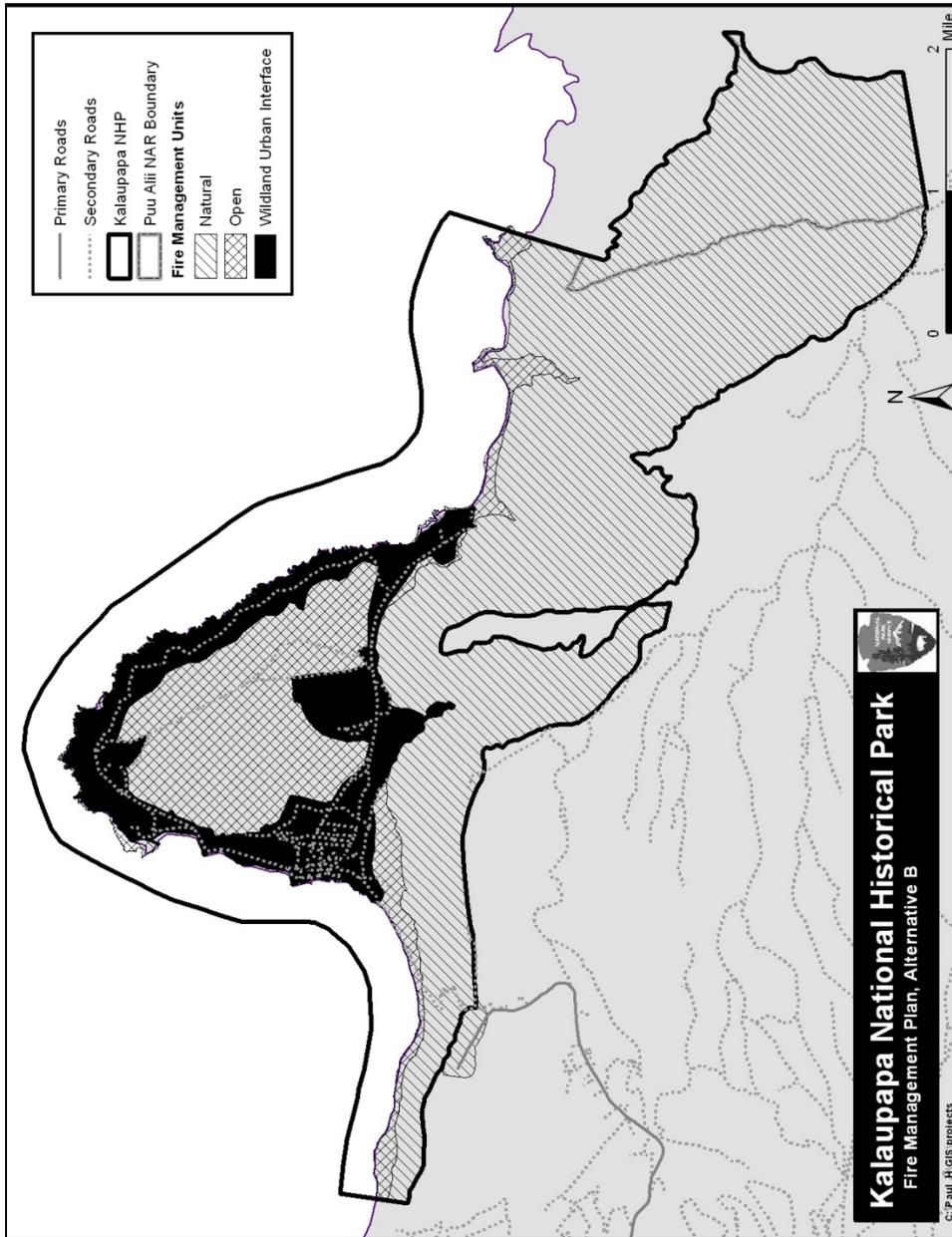


FIGURE 7 - KALAUPAPA FIRE MANAGEMENT PLAN, ALTERNATIVE B

- Provide a highly conservative NEPA assessment through the FMP EA to provide project level compliance for fuel break construction.
- Add additional infill and outlying areas within the FMU to the areas regularly mowed.
- Develop an evacuation plan for the Settlement in cooperation with residents and State employees.

The **Open Space FMU** includes the central area of the Peninsula below 200ft outside of the WUI and the trail to topside buffered to 25 feet on each side. The FMU contains the rare Coastal Spray Zone plant community that provides habitat for the federally listed endangered *Centaurium sebaeoides* and the threatened *Tetramolopium rockii* var. *rockii*. The Open Space FMU has abundant archaeological and historic resources which, to the greatest extent feasible, must be protected from impact during all fire management actions.

Inland portions of the **Open Space FMU Vegetation** are now covered with dense stands of introduced species including sourgrass (*Digitaria insularis*), lantana (*Lantana camera*), and Christmas berry (*Schinus terebinthifolius*), interspersed with Java plum (*Syzygium cumini*) and koa haole (*Leucaena leucocephala*). Mango (*Mangifera indica*) and coconut (*Cocus nuciferus*) are present in scattered locations, usually as remnant vegetation in the vicinity of old house sites. The lowland areas are consistently a mosaic of Christmas berry and Java plum with the exception of the mouths of the valleys where hala (*Pandanus tectorius*) trees persist, typically in areas that may have been Hawaiian house or field sites.

The FMP **objectives** for the Open Space FMU are: Promoting safe ingress and egress by reducing fuels along principal roads and the road to the water system; Converting suitable areas to a more native mix of vegetation that reduces available fuels and more closely conforms to the landscape type during the period of historic significance, and; Protecting isolated areas with important cultural and natural resources from further degradation and encroachment.

To meet these objectives, Alternative B proposes:

- Using prescribed fire as part of the overall strategy available for researching methods to help re-establish a more native mix of plants in suitable areas of the Peninsula, and to enhance existing remnant native plant areas.
- Using prescribed fire or mechanical methods to reduce fuels in key locations to protect important park resources.

- Mapping all known sensitive resources to be avoided during wildfire suppression. Waikolu Stream should be mapped as a restricted area for fire retardant use. The resource base will be continually updated as areas of the Park are surveyed.
- Coordinating regularly with NPS Network Fire and Maui County Fire Department on resource protection issues.
- Using prescribed fire to type convert scrublands and forest to a landscape more in conformance with the Settlement's period of historic significance from 1866 to 1969. At that time, the vegetation of the Peninsula was largely open and used for agriculture including crops and cattle grazing. It has since become overgrown with dense non-native invasive vegetation (NPS 2005).

The **Natural Areas FMU (NA FMU)** covers the parklands above the 200-foot contour including the cliffs, the three valleys (Waikolu, Wai'ale'ia, and Waihānau), the offshore islands, and Kauhakō Crater. The FMU contains the upper reaches of Waikolu, Wai'ale'ia, and Waihānau Streams. Traditional Hawaiian trails connect the valleys to topside Moloka'i. Scattered prehistoric and historic cultural resource sites are found throughout the FMU.

Three valleys including **Natural Areas FMU Vegetation** dissect the pali walls on the back of Puu Uao shield: west to east are Waihānau, Wai'ale'ia, and Waikolu Valleys. Valley bottoms, formed from waterfalls flowing into streams at the base of 1,000 meter high cliffs, are dominated with non-native forests of kukui (*Aleurites moluccana*), guava (*Psidium guajava*), strawberry guava (*Psidium cattleianum*), and Java plum (*Syzygium cumini*). Native lama (*Diospyros sandwicensis*) forests with a variety of native tree species such as 'iliahi (*Santalum ellipticum*), *Bobea sandwicensis*, kōpiko (*Psychotria hawaiiensis*), and 'ohe (*Tetraplasandra hawaiiensis*) persist on steep ridges and lower cliff areas on the walls of all the valleys.

Native dominated mesic and wet forests occur in the Park on top of the cliffs east of Waihānau. Higher elevation plateau habitats contain the highest native species richness and have the highest habitat integrity. Several sub-species or varieties of ōhi'a (*Metrosideros polymorpha*) dominate the forest with various areas co-dominated by ōlapa (*Cheirodendron trigynum*) and kōpiko (*Psychotria mariniana* and *P. mauiensis*). Hapu'u (*Cibotium* spp.) and uluhe ferns also dominate the understory in many areas and thick layers of moss cover the ground and tree trunks in the wet, higher elevation forest. A well-developed shrubby understory composed of alani (*Melicope* spp.), ha'iwale (*Cyrtandra* spp.), and kanawao (*Broussasia arguta*) is common.

Fire management actions in the NA FMU **objectives** are be limited to mechanical fuel reduction to protect sensitive resources in case of wildfire and mapping sensitive cultural and natural resources that are subject to restrictions in the event of wildfire. The upper elevations of the FMU support over 34 rare plant species and habitat for several rare native bird species and should be given extra protection in the event of a wildfire.

To meet these objectives, Alternative B proposes:

- The Park will meet annually with Maui County Fire Department, the Hawai'i Department of Natural Resources and other NPS fire staff to plan for suppression events and review protection measures for sensitive resources.
- A READ advisor kit will be prepared to help inform the Incident Commander during wildfire suppression.
- Mapping all known sensitive resources to be avoided during wildfire suppression. Waikolu Stream should be mapped as a restricted area for fire retardant use and Kauhakō Crater will be mapped as restricted for fire retardant use or water dipping. Maps will be updated as areas of the Park are surveyed.

Mechanical Treatment

The primary defense against wildfire would be the passive fire prevention precautions put in place on the perimeter and throughout the Settlement. The mechanical treatments proposed under Alternative B would primarily reduce fire hazards and fuel loading in the WUI FMU. Under Alternative B, the existing fuel break would be abandoned and the sprinkler system demounted from the fence and used elsewhere in the Settlement. A new fuel break would be constructed to the west as shown in the foregoing Figure 7. To reduce the potential for heat from a wildfire igniting vegetation or structures across the fuel barrier by heat radiation alone, this new fuel break would be up to 1,000 feet wide. It would be located adjacent to the outer edges of the defensible space around the easternmost structures in the Settlement, providing a larger buffer around these homes.

A fuel break wider than the current 50-foot fuel break would provide a safer location for firefighters to launch suppression efforts against embers that cross the barrier. The fuel break could also be a location to start a backfire to burn towards an ongoing wildfire. Light fuels, such as grasses, carry fire quickly, especially with trade winds blowing the fire forward. Low grassy fuels within the fuel break would be easier to suppress than the high, dense scrub at the current fuel break.

Prior to any construction of a fuel break, fire simulation modeling would be run to determine the fuel break width necessary to substantially slow down or halt the spread of a likely wildfire. The FARSITE model, for example, could be used to run the possible progression of a wildfire from the areas of the Park where an ignition is more likely to occur. The model would use data specific to the Park on fuel characteristics, weather conditions, topography, and wind direction and strength to determine the rate of spread and flame lengths at the fire front of an example wildfire. The model could then be rerun to demonstrate the effect of a variety of fuel treatment lengths, widths, and locations to determine which iteration is the most reasonable to construct while providing the most protection against spotting and radiation across the fuel break.

Under Section 106 of the NHPA, the area of the proposed fuel break would need to be inventoried (or at least given consideration) for cultural resources prior to construction. In conjunction with SHPO consultation, the cultural resources inventory would likely necessitate on-site monitoring and inventory by an archaeologist in conjunction with initial construction (due to thick vegetation obscuring the ground surface). It is anticipated that the fuel break area would contain numerous prehistoric and historic resources, including rock walls, house sites, gravestones, platforms, mounds, depressions, rock structures, and other cultural resources that are on or fixed in the upper layer of the soil. When clearing is completed, cultural resources staff would assess the findings of the surveys and determine if the resources are significant contributing elements to the NHL. Consultation with the SHPO and other consulting parties would be conducted if resources within the fuel break were considered eligible for inclusion in the NHL.

Biological resources would also be considered, though most vegetation close to the Settlement is non-native invasive plants. Important specimens of individual native plants could be salvaged for transplantation or use at the nursery, or, with FMO approval, left in place to create a shaded fuel break. Non-native vegetation within the fuel break would be stump cut as close to ground level as possible and either chipped or piled for later burning. A qualified pesticide applicator would then immediately paint or spray herbicide onto the stumps of those species known to resprout readily. If immediate treatment is not possible, stumps of readily resprouting species would be left higher to allow for later stump cutting and herbicide application.

Over the long-term, the most practical method of maintaining the fuel break would convert the fuel break area to a mowable vegetation type and soil surface. The use of mowers within the Community would be expanded under Alternative B. Vacant parcels within the Settlement that have not been mowed in the past will be mapped and scheduled for mowing. Cultural resources staff would identify plants that represent historic landscaping, and all non-contributing landscaping including trees and shrubs that have spread beyond original planting areas would be removed. Stands of invasive weeds that are not part of the cultural landscape would be removed and stumps treated with herbicide.

Defensible space would be cleared around the structures that contribute to the NHL status, the medical facilities, and the residences. Because of the Settlement's isolation and the lack of available heavy equipment to create fuel breaks as part of suppression, the defensible space cleared should conform to a very conservative width to provide a high level of protection. For that reason, defensible space standards will conform to the current standard used in California (CA Public Resources Code 4291) which calls for a 100-foot radius of defensible space around each inhabited structure. The standard prescription is to clear most vegetation from within 30 feet of the home. Individual trees or shrubs that are limbed up to 10 feet above ground level with all dead and dying limbs removed can be retained. If there is sufficient water in the Settlement, this 30-foot buffer could be a green zone around the house planted as an irrigated and mowed lawn, annual flower garden, native plant garden, or succulent rock garden. Of particular danger

close to house are palm trees. Dead palm fronds have proved to be an enormous fire hazard exploding into thousands of flying embers during Southern California wildfires.

From 30 to 100 feet is a zone of reduced fuels; woody vegetation should be thinned and all dead and dying branches removed. Small diameter trees should be removed but larger trees can be retained if limbed up to 10 feet above ground surface with all limbs trimmed back ten feet from the roof of the residences and from all power lines. Understory vegetation below trees should be removed or cut low. Spacing should be created horizontally and vertically between shrubs. All vents and chimneys should have screens over the outlets with one-half inch mesh to prevent embers from entering. Gutters should be cleaned of debris and the ground surface should be raked clear of fallen leaves, needles, twigs, bark, cones, and other burnable debris. Additional guidance (and even a song) can be found on the CALFIRE website:

http://www.fire.ca.gov/communications/communications_firesafety_100feet.php.

Prescribed Fire

Individual prescribed burns would be permitted at Kalaupapa NHP in Alternative B. Prescribed burns are planned ignitions designed to meet specific resource and/or fuel reduction objectives under predefined fuel and weather conditions. Prescribed fires are used to manage natural systems, reduce hazardous fuel loads, restore cultural landscapes, and conduct research to improve upon these objectives. Prescribed burns are also used in conjunction with other tactics such as mechanical fuel reduction, hand pulling, and herbicide spraying to combat non-native invasive plants and restore native plant and wildlife populations.

Representative project types include using prescribed burning to:

- Periodically reduce fuels in swaths to the east-northeast of the Settlement and other key areas to protect sensitive resources from the effects of a more severe wildfire.
- Convert key areas of the landscape to a type more in physical conformance with that which existed at the height of the Settlement (1866 – 1969), when grazing cattle and horses kept much of the Peninsula in open grassland/shrubland.
- Protect pre-contact and historic stonewalls, burial mounds, terraces, and platforms from displacement and/or disintegration by plant roots.
- Reveal stonewalls, habitations and shelters of the traditional field system for study and interpretation.
- Conduct research burns to assess the effects of timing, burn intensity, combination treatments, and other variables (for example, reseeding) to contribute to developing a strategy for reducing the amount of acreage given over to non-native plants and rebuilding remnant native plant populations.

Prior to conducting a prescribed burn, a burn plan is prepared. The burn plan estimates the percentage of the burn unit covered by different fuel types (i.e., grass, timber, shrubs) and the tons per acre of material within the unit. The BEHAVE fire model is used to determine potential fire behavior based on a range of possible environmental factors that may be present during burn

Kalaupapa National Historical Park

operations: wind speed and direction, temperature, relative humidity, slope, aspect, and fuel moisture. A decision is then made about the optimal burning conditions that will achieve the desired goals and remain within the control abilities of firefighters on the ground. This prescription is written into the burn plan (Jordan Reeser, pers. comm.).

Onsite fuel loading information is also fed into an air quality model (SASEM) for the burn, which estimates the amount of particulate matter that would be released into the air during the burn and its potential direction based on various wind models (Jordan Reeser, pers. comm.). The completed burn plan must be reviewed and approved by the qualified technical reviewer and signed and approved by the Park Superintendent (NPS 2008b). Depending on the scope of the burn plan developed, NEPA compliance could take the form of a Memo to the File of this FMP EA if the scope and potential effects were addressed in this document. If the scope of the burn plan is significantly different from the actions anticipated in this FMP, separate NEPA compliance would be required. Compliance with the NHPA would be required prior to ground disturbance.

All burn plans for prescribed fires must comply with the federal Clean Air Act (CAA), which is regulated by the Hawai'i Department of Health, Clean Air Branch (CAB). The CAB and federal EPA share general oversight responsibilities for enforcing the CAA. The CAB regulations do not require a permit for a federal agency to conduct a prescribed burn on federal lands but standard practices do require that the CAB Director review and approve prescribed burns before they proceed (Gary Wu, Environmental Health Specialist, pers. comm.). To obtain the Director's approval, the Park would write to the Director requesting approval and providing a general description of the prescribed burn, its size, the planned burn period, and the burn objectives. Approval would be granted in the form of a letter of reply from the Director. Approval can be sought months in advance of implementation.

The CAB Administrative Regulations address prescribed burning in Subchapter 3, § 11-60.1-51 (Definitions) in the definition of Forest Management:

Forest Management is “wildland vegetation management using prescribed burning procedures which have been approved by the forestry division or responsible federal agency prior to the commencement of any burn and which are being conducted by a public agency or through a cooperative agreement involving a public agency. The fire department may be consulted for advice and guidance as part of the prescribed burning procedure.”

“Fires to abate a fire hazard, provided that the director receives notification prior to the commencement of any burn, that the hazard is so declared by the fire department, forestry division, or federal agency having jurisdiction, that a prescribed burning plan, if applicable, has been submitted to and approved by the jurisdictional agency prior to the commencement of any burn, and that no burning occurs during a no-burn period as provided in section 11-60.1-55; The Park will

follow all applicable guidance and regulations when using fire for debris disposal.
[§ 11-60.1-52 (b) (3)]

As the day of the burn nears, onsite weather information is gathered to predict the day's weather and future trends, and to ensure that conditions fall within desired conditions. The Park should stay in contact with the CAB Inspector for Maui County who has the authority to declare "no burn" due to widespread haze. With prior approval from the CAB Director, and an allowable burn day, the prescribed burn will comply with the CAA. A detailed Go/No-Go checklist is completed immediately before the burn and receives the Superintendent's final signature. A Resource Advisor (READ) familiar with park natural and cultural resources should be present at the prescribed burn to advise the Burn Boss on how best to avoid or minimize impacts to park resources as the burn progresses.

Following the burn, the burn boss determines whether "mop-up" is necessary to ensure that all fire is completely extinguished. Mop-up activities include digging, cutting, trenching (to prevent debris from rolling), chunking (putting smoldering material into one pile and letting it burn up), and mixing dirt with water from backpack pumps or from hoses. Any smoldering material causing excessive smoke is extinguished. Fire personnel monitor the fire until dark or until the perimeter is secured. The burn area is patrolled daily until the fire is determined to be completely out.

Pile Burning

Under Alternative B, the Park could follow up mechanical fuel reduction with pile burning of the cut vegetation. If the proposed fuel break is constructed, the amount of vegetation debris may be too much to be chipped and reused at the recycling area. It may be necessary to dispose of the debris by pile burning. Pile burning may also be used in conjunction with prescribed burning (in the preparation phase) to reduce fuel loads to a level that allows burning over the landscape. Pile locations are sited to minimize impacts from intensive soils heating. Piles are allowed to dry and then typically burned during wet conditions when the probability of fire extending beyond the piles is low. This can occur any time of the year, depending on weather conditions.

Pile burning in NPS lands requires a burn plan (J. Molhoek, pers. comm.). Any material being burned for debris disposal must be classified as permissible to burn under applicable Federal, State, Tribal, and Local regulations. The Park would follow the applicable guidance and regulations from RM18. The Park would also be required to get a permit from the Hawai'i Department of Health, CAB (G. Wu, pers. comm.).

The Hawai'i Department of Health, CAB, administers the CAA in the State and issues permits for agricultural or open burning under Hawai'i Administrative Rules, Title 11, Department of Health, Chapter 60.1, Air Pollution Control, Subchapter 3. Pile burning would fall under the definition of open burning in the CAB Administrative Regulations, Subchapter 3, §11-60.1-51.

"Open burning" means the burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the ambient air without passing through an adequate stack or flare."

Pile burning of cut vegetation from mechanical fuel reduction projects would not fall under the categories exempted from unpermitted open burning: "Open burning is permitted for the training of firefighters with advance notice given to the Director of CAB [§ 11-60.1-52 (b)(5)], to abate a fire hazard through a prescribed burn [[§ 11-60.1-52 (b)(3)], for recreation purposes such as a campfire [§ 11-60.1-52 (b)(2)], for cooking food [§ 11-60.1-52 (b)(1)], and for the burning of relatively small quantities of vegetation by individual residents [§ 11-60.1-52 (b)(8)].

The Park would need to apply for an agricultural burn permit under CAB regulations. The permit applies to persons "engaged in any agricultural operation, forest management, or range improvement". Normally, the application requires a commercial agricultural license, but as a forest manager the Park Superintendent may be able to apply to the CAB director for a waiver. The permit would allow the Park to conduct pile burning of vegetation debris from mechanical fuel reduction projects.

Research and Monitoring

Under Alternative B, research would focus on the resource management needs of the Park. Potential research topics would focus on the effects of fire on non-native plant species and the effectiveness of using fire to reduce fuel loads and manage fire hazards.

All prescribed burns must also be monitored to allow the Park to document basic information, detect trends, and ensure that the park meets its fire and resource management objectives. By studying trends, park staff can identify specific concerns, develop hypotheses, and identify specific research projects to develop solutions to problems. Using results from a high-quality monitoring program to evaluate a park's prescribed fire management program is important to successful adaptive management.

Fire monitoring support will be coordinated with the Network FMO. Nationwide, the NPS uses a standardized fire effects monitoring program as a data collection procedure. The benefits of establishing standardized data collection procedures in a fire monitoring program include documenting basic information, detecting trends, identifying future research needs, and facilitating information exchange between resource protection staff and fire suppression agencies.

Monitoring during prescribed burning includes mapping, weather data collection, site and fuel measurements, and direct observation of fire characteristics such as flame length, rate of spread, and fire intensity. Operational monitoring provides a check to insure that the fire remains in prescription, and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions and changes such as fuel conditions and species composition. Ecological changes such as species composition and structural changes will also be

monitored for several years after a fire. This information will be very useful in adjusting the prescribed fire program to better meet short- and long-term resource objectives.

Fire Prevention, Education, and Community Assistance

A program of public education regarding wildfire prevention and potential fire benefits and dangers will be conducted to help support Park goals. Due to the restricted visitation at the Park, much of the interpretive effort will be made through the Park website and community programs in the Settlement and topside. The Network fire prevention and education specialist may assist the Park for its fire prevention, education, and community assistance programs.

Park employees will be provided with information about fire prevention, the objectives of the fire management program, and the dangers and benefits of prescribed fire and wildfire. Employees will be kept informed about changes in the fire situation throughout the fire season. To keep Moloka'i residents and local agencies informed about fire management actions, Park staff will use the Park's regular mailing list and solicit additional subscribers through the Park website and at Park meetings to build a community notification electronic mailing list. Park staff will send out press releases for local print, radio, and television news outlets.

Park staff will meet annually with adjacent land management agencies (e.g., The Nature Conservancy, Hawai'i Department of Lands and Forestry, Hawai'i State Parks) to discuss upcoming projects and opportunities to work cooperatively to achieve shared objectives. Cooperative ventures can help agencies achieve objectives by allowing improvements or surveys to span a watershed or another discrete but shared geographic feature. Agencies can share costs, supplies, staffing, volunteers, or data to build on the total benefits accrued through cooperation.

When a prescribed fire is proposed, a Park interpreter could be assigned to the State Park at the top of the cliff to provide information on fire education and the operation under way to alleviate public concern and discuss the objectives and benefits of prescribed burning.

Preferred Alternative

The NPS has selected Alternative B as the Preferred Alternative. The Park Superintendent has reviewed the EA and evaluated how well the two alternatives (summarized in Table 1) meet the fire program objectives and fit in with the General Management Plan planning process, and examined the beneficial and adverse impacts of each alternative on all resource topics. As compared to Alternative A, Alternative B offers the best combination of benefits with a high protection of life and property and greater potential for long-term natural and cultural resource benefits.

TABLE 1 -- COMPARISON OF ALTERNATIVES

FMP Component	Alternative A: No Action Alternative	Alternative B: Increased Protection Alternative
Wildland Fire Management Policy	Full suppression. WFDSS decision documentation in case of a wildfire. No prescribed burning. Minimal fuel reduction zone with sprinkle system. Sprinkler system installed on less than 25 historic structures at Kalawao and Kalaupapa.	Initial action on all non-naturally ignited wildfires is to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. Response to wildfire will be based on potential ecological, social, and legal impacts and with circumstances dictating the appropriate response. WFDSS decision documentation. Prescribed burning for fuel reduction and resource enhancement. Increase in number and width of fuel reduction zones. Alarm and sprinkler systems to cover all historic building structures or clusters in the NHL and residences. Automatic notification to Park and Maui Fire.
Fire Management Units	1 FMU for the Park. 1 primary strategy Park-wide, 8727 acres.	3 FMUs: WUI FMU: 507 acres Open Space FMU: 1,902 acres Natural Area FMU: 6,319 acres
Wildfire Suppression	Yes, limited initial attack. Two red-carded employees with one day of schedule overlap. Maui County Fire with 3 stations on Moloka'i is the primary responder.	Yes, limited initial attack. Two red-carded employees with one day of schedule overlap. Maui County Fire with 3 stations on Moloka'i is the primary responder
Structural Firefighting	Yes, limited initial exterior-only suppression with pumper truck and PPE.	Yes, limited initial exterior-only suppression with pumper truck and PPE.
Fuel Reduction	50 foot wide fire-break, eastern edge of settlement with sprinklers spaced along high exclusion fencing that keeps out non-native pigs, goats, and deer.	Up to 1,000 foot wide fire-break, regular maintenance of defensible space to CALFIRE standards, fuel-reduction of brushy areas within settlements, roadside, and strategic areas of the Peninsula.

FMP Component	Alternative A: No Action Alternative	Alternative B: Increased Protection Alternative
Defensible Space	Mowing of open areas in the Settlement.	Strategic fuel reduction to connect defensible space around the easternmost homes to the western edge of the fuel break. Defensible space clearing throughout the community could result in selective thinning of roughly 1/10 of the acreage of the residential portion of the Settlement (11 acres out of 110 acres).
Prescribed Burning	Not permitted.	Permitted for research burns for non-native plant species abatement and effectiveness for fuel reduction.
Pile Burning	Not permitted.	Permitted with Clean Air Branch permit.
Preparedness	Heli-pad at barrel-yard, Fire-break, evacuation points.	Develop maps for distribution to MCFD and NPS FMO of helipads, water infrastructure, hydrants, Kauhakō Crater, NHL structures, evacuation center(s), areas to avoid with retardant.
Training	Training supported for red-carded staff.	Training and fire assignments supported for red-carded staff.
Additional Prevention	Contract for installation and maintenance of sprinklers and alarms at additional NHL contributing structures. Consideration of exterior sprinklers at Kalawao and a means to remotely activate the systems. The network FMO will coordinate annual inspections of Settlement structures for fire safety and annual fire extinguisher training for all staff	Contract for installation and maintenance of sprinklers and alarms at additional NHL contributing structures. Consideration of exterior sprinklers at Kalawao and a means to remotely activate the systems. The network FMO will coordinate annual inspections of Settlement structures for fire safety and annual fire extinguisher training for all staff
Cultural Landscape	No change.	Explore the potential of using fire to restore the cultural landscape through research burns.
Natural Resource Benefit	No FMP contribution to natural resources.	Use prescribed burning in conjunction with other methods where appropriate to control invasive non-native plants. Mechanical fuel reduction may also yield natural resource benefits.

CHAPTER 4. AFFECTED ENVIRONMENT

This chapter provides a general description and context the Kalaupapa NHP landscape. Methods and measures of resource analyses are described.

LANDSCAPE/WILDLAND FIRE CONTEXT

Land Use

The 250-square mile island of Moloka'i, part of Maui county, is a sparsely settled island with a population estimated at 7,127 residents. Kalaupapa National Historical Park is the sole National Park on the island and Pala'au State Park on the cliffs above the Park is the only State Park on Moloka'i. There are very limited tourist accommodations on the island and the guided visit to Kalaupapa NHP is a prime destination for travelers. The Peninsula contains the structures, features, and landscapes that comprise the Kalaupapa National Historic Landmark (NHL) and the Kalaupapa Settlement. The Kalaupapa Settlement, owned and administered by the State of Hawai'i, is the primary land use currently at the Park. The Settlement is home for several surviving Hansen's disease patients whose memories and experiences are cherished values.

Access to the Park is limited. There is no vehicle access; overland access is a foot trail that starts on the top of the cliffs in Pala'au State Park and enters the southwestern edge of the Peninsula between Nihoa and the Kalaupapa Settlement. A mule train descends each day bringing up to 18 tourists who take a guided bus tour of the Peninsula's historic sites. Small commuter planes serve the Peninsula daily, weather permitting. Entry of privately owned boats and personal watercraft into park waters or landing on park shoreline is not permitted without a permit from the Hawai'i Department of Health. A barge brings in supplies once or twice a year.

In the Park, NPS employees are focused on resource management, security concerns, grounds maintenance, infrastructure, historic preservation, scientific research, and structural maintenance. During the course of the day, most agency staff and residents are within the bounds of the Settlement, although there may be staff and residents in other areas of the Peninsula either working or recreating. Most travel is by private or government vehicles, bicycle, or by foot. The tour bus visits Kalawao on the windward side of the Peninsula during each tour.

Evidence of pre-contact land-use has been found throughout the Kalaupapa Peninsula and the Park's three valleys. The valleys are currently inaccessible by vehicle, with the exception of a short stretch of road into the Waihānau Valley, terminating where the Settlement's wells, water treatment plant, and reservoirs are located. In the pre-contact and early Settlement period, a trail, referred to as 'Ili'ilika'a or Father Damien's Trail, ran along the western ridge of Waihānau and was the principal route between topside and the Peninsula. Waikolu Valley was the source of drinking water for much of the Settlement's history. Many kama'āina thrived on the Peninsula and the adjoining Waikolu Valley when the historic Leprosy Settlement was established. These

kama`āina were slowly displaced from the landscape, some of them receiving land exchange offers on topside Moloka'i. Early in the settlement history, taro was grown in the valley and sold to the Settlement. Until sometime in the latter half of the 20th century, Hawaiians continued to live for part of the year in Waikolu Valley, as they had traditionally (R. Watanuki, pers.comm.).

The Kalaupapa Lookout in the 223-acre Pala'au State Park at the top of the pali is a popular tourist spot for photographing the Peninsula and the north coast (See Figure 8). Camping for up to ten people is allowed at the State Park with each permit. A second and older lookout of the Peninsula is situated at the Pali trailhead and also affords a superb view. The upper terminus of the Kalaupapa Trail is within the State Park on the southwest boundary of Kalaupapa NHP.

In addition to Kalaupapa NHP, eastern Moloka'i preserves 2,774 acres of rainforest in the Nature Conservancy's Kamakou Preserve near the summit of Kamakou Peak. The Nature Conservancy schedules monthly guided tours of the Preserve. The 5,714-acre Pelekunu Preserve, also owned by the Nature Conservancy, is not open to the public.

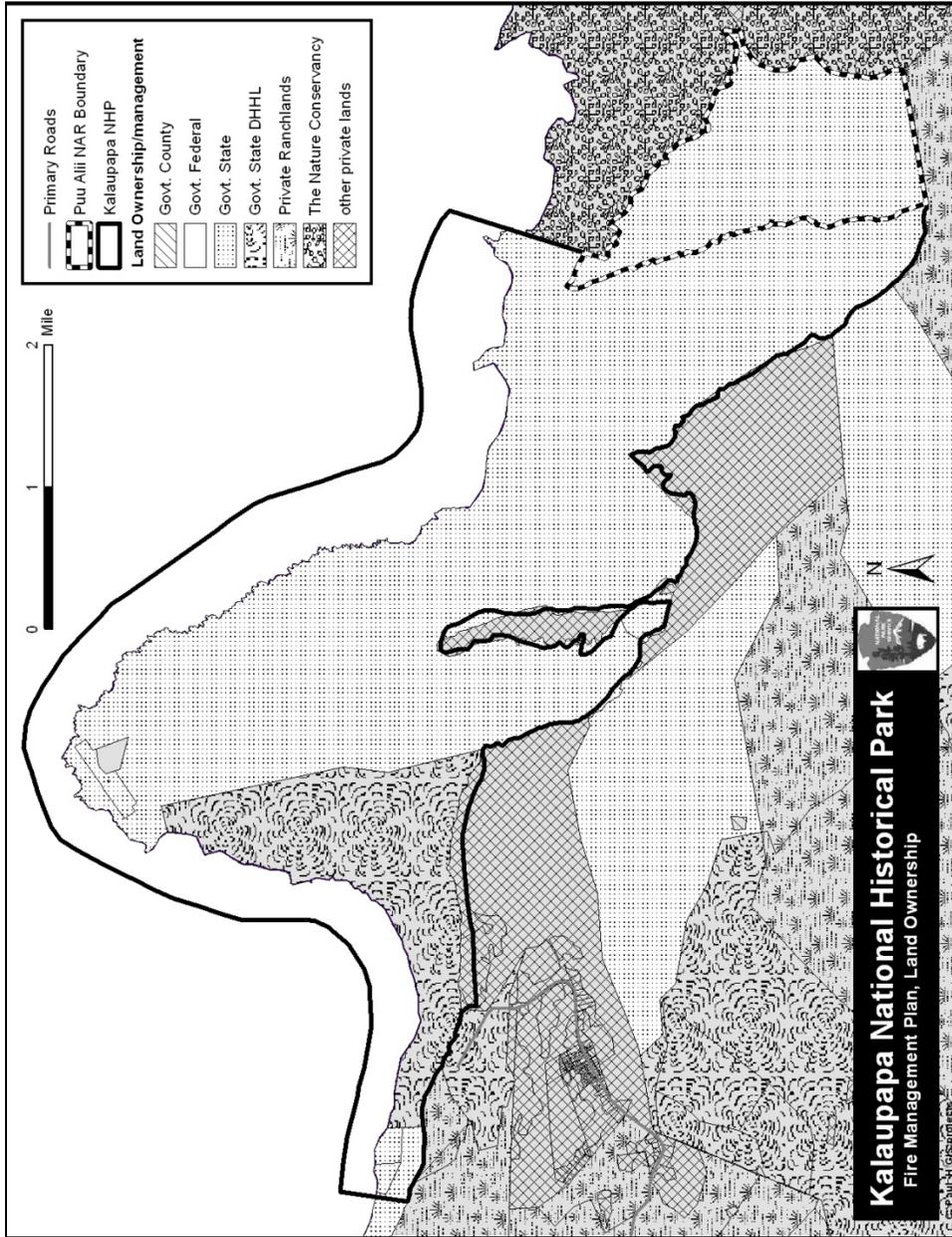


FIGURE 8 - ADJACENT RESOURCE MANAGEMENT AREAS

Weather

The Hawaiian climate is characterized by a two-season year with mild and fairly uniform temperature conditions everywhere except at high elevations, marked geographic differences in rainfall, generally humid conditions, and high cloudiness except on the driest coasts and at high elevations, and by a general dominance of trade winds, especially at elevations below a few thousand feet (WRCC 2006, Figure 9).

Kalaupapa is located in a tropical climate zone with a well-defined rainy season. It has warm temperatures with an annual average of 74 degrees Fahrenheit, with normal fluctuations of 6 or 7 degrees above or below year-round (see Figure 10). Occasional highs in the 90's are reached in July. During the winter months (November through March), the nighttime temperatures may drop into the lower 60's with heavier rainfall.

Trade winds from the northeast quadrant prevail roughly 80 to 95 percent of the time during the summer months. The trade winds are caused by the outflow of air from the Pacific Anticyclone, a large mass of high pressure whose typical location during the summer is well north and east of the Hawaiian Islands. From November through April, the air mass moves south and the Hawaiian Islands are north of the center of the trade winds, so the trades blow less frequently, roughly 50 to 80 percent of the time. These winds can be lighter and more variable, with strong storms occurring two to six times per winter.

Storms brought by the trade winds come up against the steep pali when they hit the Moloka'i coast. As moist air rises, it cools, dropping most of the precipitation on the windward side of the east Moloka'i highlands. Little rain from the trade winds reaches the southern or leeward side of the island, which lies in the highland's rain shadow (Pogue and Collum 2006). Most of the rain reaching the leeward side comes from wet, southern Kona storms bringing 8 to 10 inches of rain once or twice a year during the winter. The annual mean precipitation is 15 inches on the leeward coast of western Moloka'i and 35 inches on eastern Moloka'i; the rainfall on the high windward slopes of eastern Moloka'i can reach 160 inches per year (Mitchell, et al. 2005). The dry season at Kalaupapa runs from spring to fall with the winter months being the wettest. Median annual precipitation normally ranges from 25 inches up on the northern tip of the Peninsula to 75 inches on the cliffs. Consequently, the Pu'u Ali'i-'Ohi'ale Plateau and Waikolu Valley are among the wettest spots in the Park. From 2002 – 2008, the island of Moloka'i experienced drought conditions that exacerbated the normally dry summertime conditions, resulting in cutbacks in Moloka'i's agricultural water allocation program. The drought appears to have eased in 2009.

Relative humidity, or the amount of water vapor in the air, is moderate to high year-round at Kalaupapa and showers are very common. While some storms bring very heavy rainfall, the vast majority of precipitation falls as light and brief showers. Heavy showers are so rarely accompanied by thunder and lightning that lightning can be discounted as an ignition source for

wildfire. The National Climatic Data Center has no reports of lightning for the years 1971 to 2000 at Kalaupapa (<http://www4.ncdc.noaa.gov>).

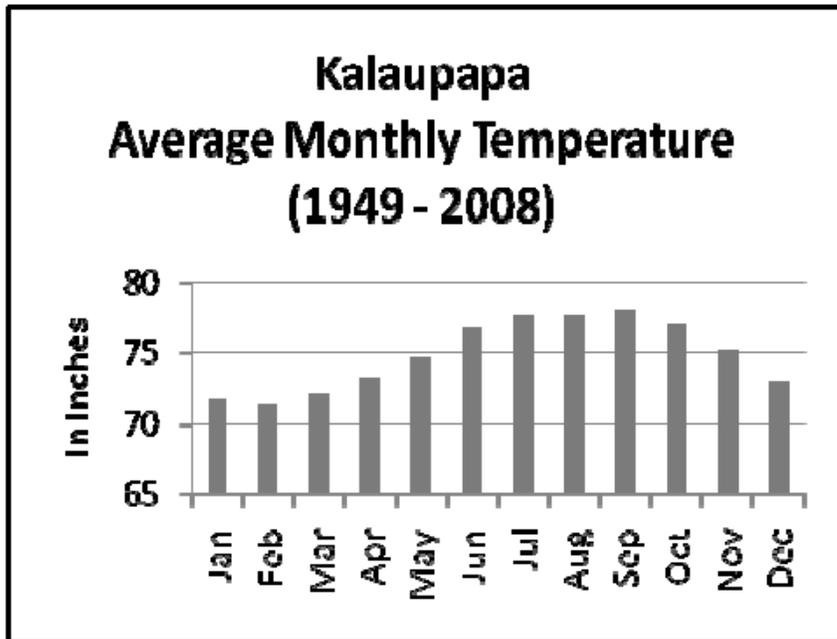


FIGURE 9 - AVERAGE MONTHLY TEMPERATURE

Source: Western Regional Climate Center website data for Station 512896 Kalaupapa 563: www.wrcc.dri.edu

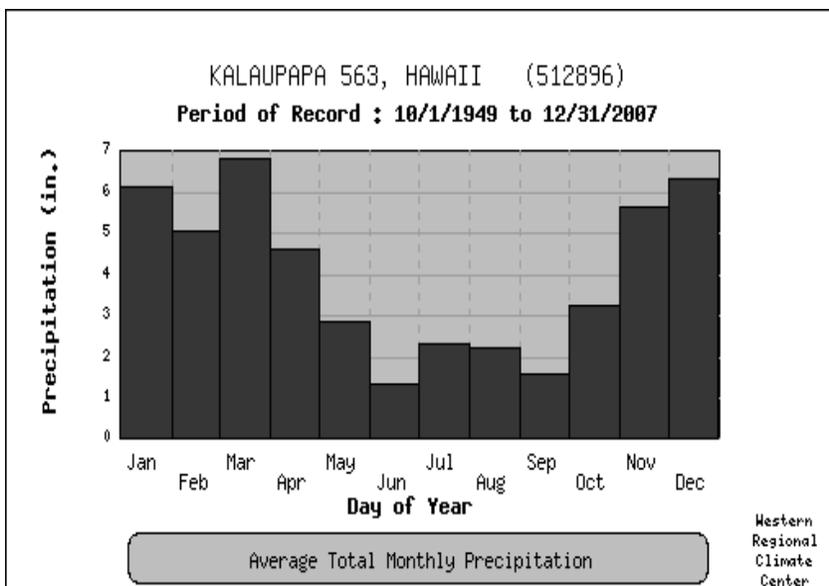


FIGURE 10 - AVERAGE MONTHLY PRECIPITATION

Source: NOAA, 2009. <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?hi2896>

Wildfire and Prescribed Fire Seasons

The existing amount of fine-size wildland fuels, the regularity of the trade winds, and the impacts of prolonged drought on vegetation favor wildfire. The northern Peninsula receives an average of only 20 inches of rainfall annually, making wildfire most feasible within this dry area. Under normal late spring and summer fire season conditions, when trade winds can routinely blow 25 to 30 miles per hour, wild fire control problems could be in the moderate to extreme range (J. Molhoek, pers. comm.).

The approximate weather window for prescribed burns in grassland at Kalaupapa is from June to November. Burning could begin in some areas after grasses have initiated summer dormancy, which does not normally occur until mid-June to early July. While areas with grasses generally have the most flexible burn windows, burns must still be timed to occur before the onset of trade winds later in the day.

In shrublands and forested areas, burning can be extremely difficult due to the narrow burning window from late September to early October when fuels dry out. Northeast wind events during this same timeframe can result in Red-Flag Days during which no prescribed or pile burning is allowed. “Burn days,” or days when burns would be in prescription, often do not coincide with weather conditions appropriate for burning (J. Molhoek, pers. comm.).

RAWS Data

There is a Remote Automated Weather Station (RAWS) within the Park south of the Kalaupapa Airport runway. The Makapulapai RAWS (MKPH1) records temperature, relative humidity, wind speed and direction, speed of peak gusts, dew point, solar radiation, fuel temperature, and 10-hour fuel moisture. Also recorded are 1-hour, 3-hour, 6 hour, and 24-hour precipitation measurements.

The National Weather Service uses the RAWS data combined with regional data to issue a daily fire weather forecast at 5:30 am each morning for use by fire agency personnel in planning for pre-suppression, suppression, and prescribed burning actions. The National Weather Service can also issue localized spot forecasts to support wildfire suppression and prescribed burning at the request of the fire agency. The elements of the fire weather planning forecast posted online from the RAWS are sky cover (degree of cloud cover), precipitation type (droplet size), lightning activity level, maximum and minimum temperature, maximum and minimum relative humidity, mixing height of winds (to comply with Clean Air Act requirements of a minimum of 1700 feet to allow prescribed burning), and transport wind speed (wind speed at the mixing height).

Fire Behavior

No wildland fires have been recorded in the historic period of Kalaupapa so fire behavior elements are not well described. The lack of historic wildland fire and the high frequency of rainfall would suggest that the wildfire hazard is low in the Park. The non-native woodlands

would carry fire only under extreme drought. However, the potential for a large fire with extreme fire behavior to occur is great, and fire intensities could be extreme because of the high loadings of 1000-hour fuels. Fire potential could even increase after a wildfire due to the removal of stand structure allowing for increased wind penetration and faster curing of fine fuels, unburned litter, and duff that have a high reburn potential.

Fire behavior does not conform to established mainland fuel models, and research is ongoing by LandFire Group to see if customized fuel modeling will work for parks in Hawai'i. LandFire, or Landscape Fire and Resource Management Planning Tools Project, is a five-year, multi-agency project aimed at producing standardized maps and reliable data to guide the selection and prioritization of fuel reduction efforts across the United States. All land management agencies in the Department of the Interior and the US Forest Service are involved. Fuels models reflecting the vegetation predominant in the Park will be developed and used to prepare a wildfire hazard map to design fuel reduction projects to protect the Park's residents and visitors and the vulnerable historic structures.

Fire Regime

Most vegetation ecologists agree that, prior to human settlement of the Hawaiian Islands and the subsequent infestations of invasive plants, fire was infrequent outside of areas experiencing active volcanism. The rarity of wildfire is evidenced by its rare occurrence in soil profiles as well as the infrequency of natural ignition sources, low flammability of native vegetation, and discontinuous distribution of natural fuels. Researchers have found evidence of charcoal layers in rainforest vegetation indicating that intervals between fires may have been as long as 700 to 1,000 years (Mueller-Dombois 1981). The apparent ability of some native plants, such as the native koa, to recover after fire may indicate that fires were more common in montane areas or it may be a generalized adaptation to disturbance in a volcanic landscape.

The conclusion of many researchers is that the fire regime of the Park's native (and now historic) vegetation can probably be characterized as fire-independent (Smith and Tunnison 1992, Mueller-Dombois 1981). In a fire-independent fire regime, fire is an infrequent perturbation from which vegetation eventually recovers rather than a regular or frequent disturbance that becomes a significant ecological or evolutionary factor. The following passage addressing the response of native Hawaiian vegetation to wildfire is from Fire and Alien Plants in Hawai'i by Smith and Tunnison (1992):

“The fact that other native plants can resprout after fire does not imply that they are specifically adapted to fire. Mueller-Dombois (1981) suggested that adaptations to various natural stress factors provide a good explanation for fire tolerance of some native species. In addition, ancestral populations of certain species may have been adapted to fire prior to their establishment in Hawai'i. The ability to resprout after fire is found in species characteristic of plant communities unlikely to carry fire. For example, many rain forest woody plants (*e.g.*, kawa'u, *Ilex anomala*) and tree ferns (*e.g.*, *Cibotium glaucum*) resprout vigorously after

fire. Yet, many lowland trees in Hawai'i, *e.g.*, lama (*Diospyros sandwicensis*) and wiliwili (*Erythrina sandwicensis*), which grow in relatively dry environments, do not resprout. Recovery of native plants from fire is also difficult to evaluate in Hawaiian ecosystems because it is strongly influenced by competition from alien vegetation. Native vegetation may recover adequately from fire, but it is often masked by the prolific spread of alien plants.” (p. 392)

The historic fire regime at the Park may be effectively a moot point given the preponderance of non-native vegetation, especially on the Peninsula, where the fire hazard may be the highest. Invasive species, such as Christmas berry and the predominant perennial grasses of the park, recover well after wildfire and will continue to out-compete the remaining native plant species.

Recent Fire History

Recent research has outlined the history of agricultural development in the Park using radiocarbon dating. The earliest evidence of people in the study area dates to 800 to 1,2000 years ago based on three radiocarbon dates (McCoy 2008). The first evidence of charcoal in the soil horizon of the Peninsula linking fire use to agricultural clearing dates from the 1200's. A shift in vegetation and an increase in the frequency of charcoal in the soils are found between 1450 and 1550 (McCoy and Hartshorn 2007). McCoy (2005b) found evidence of pre-historic agriculture on both the windward and leeward sides of the Peninsula. Recent archaeological investigations support the theory that the densely developed Kalaupapa field system was probably built before European contact (Kirch 2002, cited in McCoy and Hartshorn 2007).

Following European contact, Kalaupapa fields were used for cattle grazing and for growing food crops that were shipped to California to supply the miners during the gold rush (Ladefoged 1993 cited by McCoy 2008). In 1866, the leprosarium was established, effectively eliminating commercial agriculture on the Peninsula (McCoy and Hartshorn 2007). During the late 19th and early 20th century, the Settlement shifted to the leeward side of the Peninsula as Kalaupapa became the focus of the Settlement. Though no wildland fires are recorded during this period, the first significant structural fire appears to have occurred in 1906 when St. Francis Church was destroyed by fire. Other structural fires during the 20th century destroyed the Bay View Home for the Aged (1915), the McVeigh Home (1928), the Baldwin Home for Boys and Men in Kalawao (1932), the Bakery near Kalawao (1948), and the Hospital built in 1931 in Kalaupapa (1989) (NPS 2005).

The incidence of large wildland fires on the island of Moloka'i has increased over the past two decades (Pogue and Collum 2006). The increase in area burned may be related to the inaccessibility and lower population density of much of the island. The more populated island of Maui has had hundreds more fires than Moloka'i during the same period but nearly all fires were contained to a small area (Pogue and Collum 2006). Figure 11 maps the burn area of larger fires that occurred between 1980 and 1998. Table 2 lists the annual acreage burned by wildfire on Moloka'i in the twenty years between 1985 and 2004.

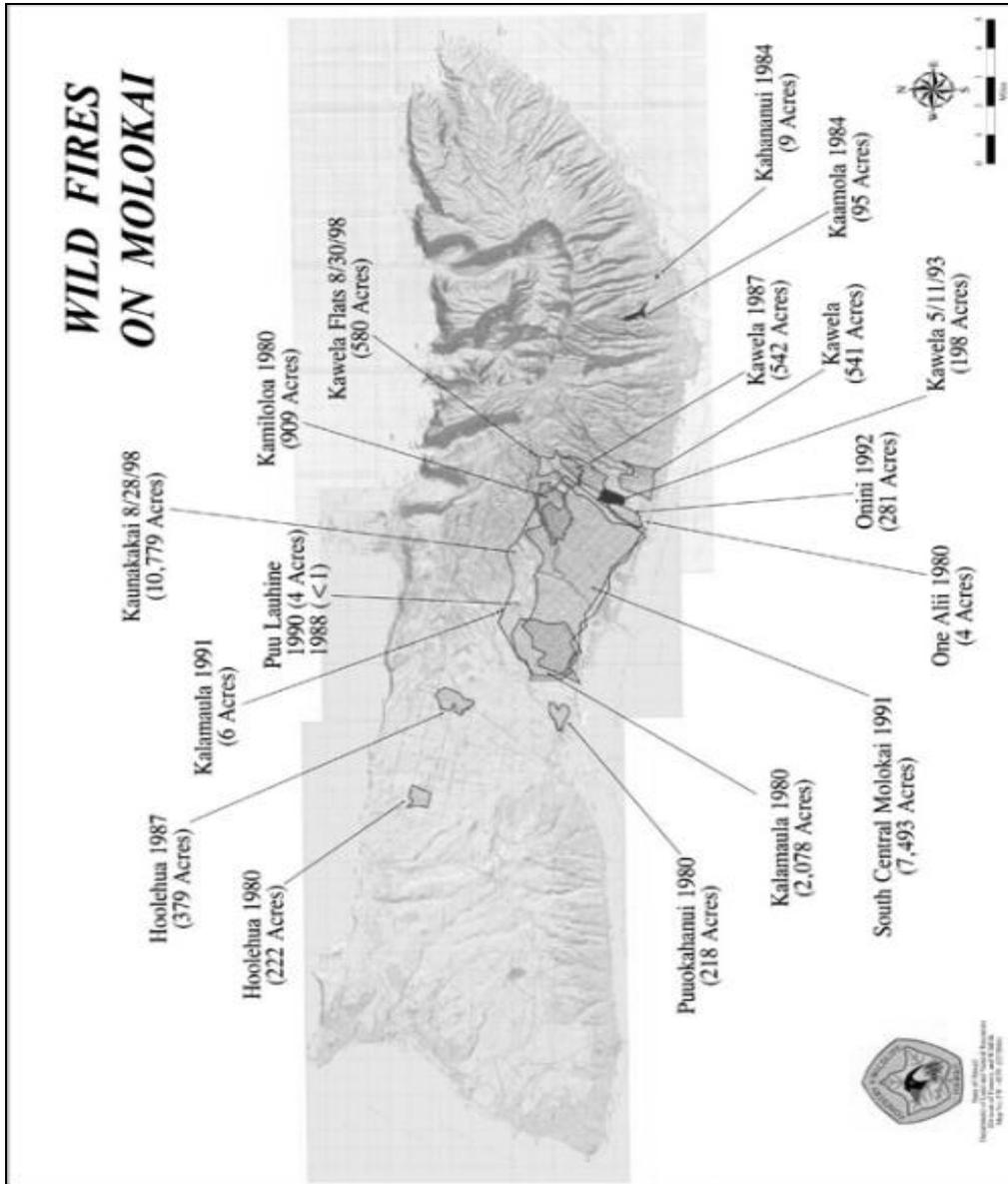


FIGURE 11 - WILDFIRES ON MOLOKA'I, 1980-1998

TABLE 2 - MOLOKA'I, ACRES BURNED BY WILDFIRES, 1985 - 2004

YEAR	ACRES BURNED	YEAR	ACRES BURNED
1985	43.1	1995	1,241.0
1986	13.0	1996	0.5
1987	880.1	1997	17.6
1988	10,735.4	1998	14,041.5
1989	136.6	1999	62.4
1990	327.4	2000	151.8
1991	12,656.3	2001	94.2
1992	460.9	2002	0.2
1993	24.0	2003	4.6
1994	1395.9	2004	626.4

Source: Pogue and Collum, 2006.

Methods for Assessing Impacts

NEPA requires that EAs disclose the environmental impacts of a proposed federal action, reasonable alternatives to that action, and environmental effects that cannot be avoided should the proposed action be implemented. NEPA requires consideration of impacts including the context, intensity, duration, type, and measures to mitigate impacts. This section analyzes the environmental impacts of project alternatives.

Context of Impact: Impacts are considered at their local, regional, or national context as appropriate.

Intensity of Impact (except Special Status Species, Cultural and Ethnographic Resources):

Impacts are considered **negligible** if the measurable or anticipated degree of change would not be detectable or would be only slightly detectable. Localized or at the lowest level of detection.

Impacts are considered **minor** if the measurable or anticipated degree of change would be have a slight effect, causing a slightly noticeable change of approximately less than 20 percent compared to existing conditions, often localized.

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Impacts are considered **moderate** if the measurable or anticipated degree of change is readily apparent and appreciable and would be noticed by most people, with a change likely to be between 21 and 50 percent compared to existing conditions. Can be localized or widespread.

Impacts are considered **major** if the measurable or anticipated degree of change would be substantial, causing a highly noticeable change of approximately greater than 50 percent compared to existing conditions. Often widespread.

Intensity of Impact (Special Status Species):

No Effect implies the project (or action) is located outside suitable habitat and there would be no disturbance or other direct or indirect impacts on the species. The action will not affect the listed species or its designated critical habitat (USFWS 1998).

May Effect, Not Likely to Adversely Effect implies the project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the effect on the species is likely to be entirely beneficial, discountable, or insignificant. The action may pose effects on listed species or designated critical habitat, but given circumstances or mitigation conditions, the effects may be discounted, insignificant, or completely beneficial. Insignificant effects would not result in take. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects or 2) expect discountable effects to occur (USFWS1998).

May Effect, Likely to Adversely Effect implies the project (or action) would have an adverse effect on a listed species as a result of direct, indirect, interrelated, or interdependent actions. An adverse effect on a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not discountable, insignificant, or beneficial (USFWS 1998).

Intensity of Impact (Cultural and Ethnographic Resources):

See Table 3.

TABLE 3 - DESCRIPTIVE TERMS DEFINING IMPACTS TO CULTURAL RESOURCES

Cultural Resource Intensity	
<i>Negligible:</i>	The impact is at the lowest level of detection or barely measurable, with no perceptible consequences, either adverse or beneficial, to cultural resources. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .
<i>Minor:</i>	The impact would affect historic properties with the potential to yield information important in prehistory or history. The historic context of the affected site(s) would be local. For purposes of Section 106, the determination of effect would be <i>no adverse effect</i> .
<i>Moderate:</i>	The impact would affect historic properties with the potential to yield information important in prehistory or history. For a National Register eligible or listed historic district, the impact is readily apparent and/or changes a character-defining feature(s) of the resource to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be <i>adverse effect</i> .
<i>Major:</i>	The impact would affect historic properties with the potential to yield important information about human history or prehistory. The impact is severe for eligible or listed historic districts. The impact changes a character defining feature of the resource, diminishing the integrity of a National Register eligible or listed resource to the extent that it is no longer eligible or listed on the National Register. For purposes of Section 106, the determination of effect would be <i>adverse effect</i> .
Ethnographic Resource Intensity	
<i>Negligible:</i>	Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor alter the relationship between the resource and the affiliated group's body of beliefs and practices. There would be no change to a group's body of beliefs and practices.
<i>Minor:</i>	Impact(s) would be slight but noticeable and would neither appreciably alter resource conditions, such as traditional access or

	site preservation, nor alter the relationship between the resource and the affiliated group's body of beliefs and practices.
<i>Moderate:</i>	Impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's beliefs and practices, even though the group's beliefs and practices would survive.
<i>Major:</i>	Impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices, to the extent that the survival of a group's beliefs and/or practices would be jeopardized.

Duration of Impact: Duration is a measure of the time period over which the effects of an impact persist. The duration of impacts evaluated in this EA may be one of the following:

- *Short term* impacts are those that can be reversed relatively quickly. Short term impacts typically occur only during construction and last less than one year.
- *Long term* impacts are those that are reversed more slowly. Long term impacts usually last more than one year.

Type of Impact

- *Adverse* impacts are those that change the affected environment in a manner tending away from the natural range of variability.
- *Beneficial* impacts are those that change the affected environment toward the natural range of variability.
- *Direct* impacts include such impacts as animal and plant mortality, damage to cultural resources, or creation of smoke that occur at the time and place of the action.
- *Indirect* impacts are those that occur at a different time and/or place than the action. Indirect impacts include changes such as species composition, structure of the vegetation, or range of wildlife. Indirect impacts could occur off-unit and include erosion-related impacts or general economic conditions tied to park activities.
- *Cumulative* impacts are those impacts on the environment that result from the incremental (i.e., additive) impact of direct and indirect impacts when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Mitigation of Impacts

- *Avoid* conducting management activities in an area of the affected environment.
- *Reduce* the type of impact to an affected environment.
- *Minimize* the duration or intensity of the impact to an affected environment.
- *Repair* localized damage to the affected environment immediately after an adverse impact.
- *Rehabilitate* an affected environment with a combination of additional management activities.
- *Compensation* of a major long-term adverse direct impact through additional strategies designed to improve an affected environment as much as is practical.

PROJECTS CONTRIBUTING TO CUMULATIVE IMPACTS

Because federal projects have the potential to cause or be affected by similar or connected projects within or beyond the park boundary, NEPA requires an assessment of the cumulative effects of a federal project. Cumulative effects can occur when the adverse or beneficial effects of the action under review are added to or interact with effects of other projects in a particular place and within a particular timeframe. The cumulative effect is the combination of these effects, and any resulting environmental degradation that could occur. To assess cumulative impact, the federal agency must consider what other past, present, or reasonable foreseeable future projects, in combination with the current proposal, could impact similar sensitive resources and compound the potential environmental effect. Projects considered for cumulative analysis may be proposed for lands beyond the park boundary and by other agencies or private landowners. Projects included in the cumulative impact scenario may be completed, currently underway, or in an earlier planning phase.

Projects considered to contribute to Cumulative Impacts are briefly described in the following section focusing on the potential for environmental effects on resources also being assessed for impact in the FMP.

Kalaupapa NHP Projects

Kalaupapa NHP Wastewater System Upgrade

The purpose of this project was to provide a wastewater disposal system meeting current environmental regulations that will eliminate the use of 21 large-capacity cesspools (flows greater than 1,000 gallons per day) as the primary wastewater treatment within the Kalaupapa Settlement on the island of Moloka'i, per State and EPA mandates. Currently 95 percent of wastewater produced in the park goes untreated into the ground through cesspools. The continued use of cesspools is a significant threat to public health and park resources. Fourteen of the 21 facilities in this project have existing cesspools within 500 feet of the shoreline. Kalaupapa Settlement is located on a Peninsula of volcanic geologic formations and lava tubes and is within close proximity to the ocean. The potential for polluting the beaches, coral reefs,

and the general near shore environment is extremely high. This is of particular concern for the federally listed endangered Hawaiian Monk Seals who have used these beaches to rear pups in recent years.

The project provides septic tanks for primary treatment of wastewater and use either seepage pits or leachfields for the disposal of effluent. Project work also provides a solid waste handling facility for the dewatering and disposal of solids from the septic tanks. The upgrade has brought beneficial effects to the marine and groundwater environments, to public health and safety, and to the Hawaiian Monk Seal by substantially decreasing the potential for effluent to contaminate groundwater and subsurface soils within the Peninsula or be conducted offshore to the marine environment.

Kalaupapa NHP Electrical Upgrade

The NPS has conducted a preliminary investigation into the condition of the electrical system that recommended improvements to the electrical system. It is likely some or all of these improvements will occur within 5 to 15 years. Items identified included:

- Re-conductor the entire overhead primary distribution system.
- Replace approximately 25% of the existing wood poles directly impacted by the primary re-cabling work with new poles, and
- Provide a portable engine generator unit to serve as a back-up power source for the Settlement during cable replacement work and blackouts.

The project is anticipated to have beneficial effects on public health and safety by improving the reliability of emergency notification and communication systems in the Park and decreasing the potential for power outages, the possible ignition of wildfires due to weakened cables, and pole failures during high winds. Impacts to surface and subsurface cultural resources could occur during excavations for pole replacements needed for the electrical system upgrade in the WUI and Open Space FMUs.

Kalaupapa NHP Dock Repairs

During the winter months of 2004-2005, continuous sizeable swells impacted the coastline along the western side of the Kalaupapa Peninsula, having a direct effect on some of the existing structures in the Kalaupapa harbor. The harbor consists of several works including a concrete and armor stone breakwater, a concrete pier including line fasteners and tie-downs, and a concrete and stone masonry bulkhead wall. Emergency repairs were made to the bulkhead in 2006. A subsequent engineering report recommended the following improvements to the dock:

- Bulkhead wall repair,
- Bitt and bollard replacement on the breakwater,
- Pier structural repair,
- Breakwater repair,

- Bulkhead toe structure repair, and
- Berthing and turning basin expansion.

Only above-water structural repairs to the dock have been implemented as of 2011. Other repairs are pending.

Kalaupapa Memorial Construction

On March 30, 2009, President Barack Obama signed Senate Bill 22, Section 7108, the Omnibus Public Land Management Act, which contained legislation that authorized Ka ‘Ohana O Kalaupapa to establish the Kalaupapa Memorial within the boundaries of Kalaupapa National Historical Park (Attachment A). The Memorial would list the names of the estimated 8,000 people who were taken from their families and sent to Kalaupapa due to government policies regarding leprosy, now called Hansen’s disease, from 1866 to 1969. The Memorial is to be established at the site of the former Baldwin Boys Home within the historic settlement of Kalawao. An environmental assessment has been completed, and a finding of no significance signed on the 15th of August 2011.

State Department of Land and Natural Resources Projects

Pu'u Ali'i Natural Area Reserve

Located on State Department of Land and Natural Resources (DLNR) land, Pu'u Ali'i Natural Area Reserve is part of the State’s Natural Area Reserve System managed by the Division of Forestry and Wildlife. The Reserve lands are within the Kalaupapa National Historical Park boundary and managed jointly by DLNR and NPS through a cooperative agreement. The 1,330-acre Reserve covers a high plateau (3000 to 4000 feet elevation) overlooking Waikolu Stream to the west. Planned fencing was completed as of 2011. Other actions to reduce non-native animal populations include bringing in volunteer hunters by helicopter for one or two day hunts (W. Evenson, pers. comm.) and aerial hunts in remote areas of the Moloka'i North Shore Cliffs.

Hawai'i Natural Area Partnership Program

The State’s Natural Area Partnership Program (NAPP) aids private landowners by providing matching funds towards the management of native ecosystems on privately-held lands that are permanently dedicated to conservation. On Moloka'i, the Nature Conservancy manages three NAPP Preserves: Kamakou, Mo‘omomi, and Pelekunu, and is the main coordinator/manager of the East Moloka'i Watershed Partnership (EMoWP) which is directly responsible for management programs in Kamalō, Kapualei, and Kawela. The three NAPP preserves total 9,454 acres and the EMoWP (including Kamakou and Pelekunu Preserves) encompasses over 30,000 acres. Management programs include ungulate and weed control programs. Program actions include monitoring, trail maintenance, and non-native animal species control by staff or volunteer hunters (E. Wight, pers. comm). Weed control projects use manual (pulling or cutting) and chemical control for priority pest plants. Herbicide use is limited to glyphosate formulations

such as Garlon and Roundup. Heavy equipment is not used for weed control in the Kamakou or Pelekunu Preserves (TNC 2002).

Pala'au State Park Improvements

The Hawaiian Tourism Authority awarded a \$90,000 grant to Ke `Aupuni Lokahi, Inc. (KAL), a nonprofit organization on Moloka'i which promotes community improvement. The grant funds a planning process for a project to restore historic trails crossing Pala`au State Park above Kalaupapa National Historical Park. The planning process includes a plant survey of the park, boundary survey, historical research, public outreach, and environmental compliance related to trail development. The project objectives are to provide cultural interpretation, new recreational opportunities, and rare forest plant species restoration. The State Park also completed a \$1,500,000 upgrade the water system, pavilion, and camping area.

East Moloka'i Watershed Partnership

The 26,000-acre East Moloka'i watershed encompasses the rainforested mountains of east Moloka'i and the remote valleys and sea cliffs along its spectacular northern coast. Since its formation in 1999, the East Moloka'i Watershed Partnership has completed a five-mile contour fence to protect the remaining acres of montane rainforest and has begun programs to reduce goat populations. Partners include the Ke 'Aupuni Lokahi Enterprise Community Governance Board, The Nature Conservancy, Kamehameha Schools, Kapualei Ranch, State Department of Land and Natural Resources, U.S. Fish & Wildlife Service, Maui County, Maui Department of Water Supply, Moloka'i/Lana`i Soil and Water Conservation District, USDA Natural Resource Conservation Services, U.S. Geological Survey, Kalaupapa National Historical Park, U.S. Environmental Protection Agency, and the State Department of Health.

CHAPTER 5. ENVIRONMENTAL CONSEQUENCES

For each resource topic (e.g. air quality or historical structures), background information is first presented that describes the particular resource in its current state. Parameters are presented to explain the descriptors used to describe the type and intensity of potential project influences on each resource. An assessment of impact, or an analysis of the potential for the fire management actions under each of the two alternatives to have environmental effects on resources, is described. Where relevant, a discussion of the effectiveness of mitigation measures in reducing or avoiding the potential effect is included.

NATURAL RESOURCES

Air Quality

Air quality at Kalaupapa is regulated by the Environmental Protection Agency (EPA) and the Hawai'i Department of Health (DOH). The EPA has established National Ambient Air Quality Standards (NAAQS) to protect the health and welfare of the public for six so-called "criteria" or conventional pollutants - carbon monoxide, ozone, nitrogen oxides, sulfur dioxide, lead and particulate matter (PM10 and PM2.5). In addition to the federal standards, DOH has adopted into State law the same or more stringent standards for the criteria pollutants and has also set a standard for hydrogen sulfide. Table 4 shows the State and Federal standards. The State of Hawai'i is responsible for developing and implementing plans that assure compliance with EPA standards. New source review permitting is a part of the State's implementation plan. In addition to programs to achieve and maintain the NAAQS, States are also responsible for conducting air quality monitoring, evaluation, and regulation of hazardous air pollutants and the regulation of industrial sources, motor vehicles, and area sources (e.g., open burning, and small companies like dry cleaners and gasoline stations). At this time, neither agency (EPA and DOH) specifically regulates greenhouse gases such as carbon dioxide, methane, and nitrous oxide.

The Code of Federal Regulations Title 40 requires that each State create a network of air monitoring stations (CFR 1995). The nearest stations to Kalaupapa are on O'ahu and Maui. The data from O'ahu and Maui is of limited value because of the distance between the islands.

In 1977, the Clean Air Act was amended to include the designation of Class I, II, and III areas, where emissions of particulate matter, sulfur dioxide, and nitrogen dioxide were to be restricted to control impacts on visibility from haze and smog. Class I areas are international parks, national wilderness, and national memorial parks greater than 5,000 acres and national parks greater than 6,000 acres that were in existence in 1977. Kalaupapa NHP is a "Class I area", defined as areas that are national monuments, national primitive areas, national preserves, national recreation areas, national wild and scenic rivers, national wildlife refuges, and national

lakeshores or seashores that were in existence (or authorized) on August 7, 1977 and exceed 10,000 acres, and national parks and wilderness areas established after August 7, 1977.

Observations indicate that Kalaupapa has good air quality. Persistent trade winds blowing from the north east, the more remote location and the absence of major air polluting activities, suggest high air quality. On O`ahu, where it is measured, trade winds blow almost constantly (calm less than 3.2% of the time) suggesting wide dispersion of air pollutants in the region.

Potential sources of air pollutants at Kalaupapa include dust from roads and construction and emissions from small engines, vehicles, and airplanes. These sources generate a small amount of particulate pollution and carbon dioxide pollution. The winds generally blow from the north-east reducing the potential for air pollutants traveling from other islands to Kalaupapa.

TABLE 4 - NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

AIR POLLUTANT	AMBIENT AIR QUALITY STANDARDS	
	Hawai'i (State Ambient Air Quality Standards)	Federal (National Ambient Air Quality Standards)
Carbon Monoxide 1-Hour 8-Hour	10 mg/m³ (9 ppm) 5 mg/m³ (4.4 ppm)	35 ppm (40 mg/m ³) 9 ppm (10 mg/m ³)
Nitrogen Dioxide 1-Hour 24-Hour Annual	-- -- 70 µg/m³ (0.04 ppm)	-- -- 0.05 ppm (100 µg/m ³)
Sulfur Dioxide 3-Hour 24-Hour Annual	1300 µg/m³ (0.5 ppm) 365 µg/m³ (0.14 ppm) 80 µg/m³ (0.03 ppm)	— 0.14 ppm (365 µg/m ³) 0.03 ppm (80 µg/m ³)
Ozone 1-Hour 8-Hour	— 157 µg/m³ (0.08 ppm)	0.12 ppm (235 µg/m ³) 0.08 ppm (157 µg/m ³)
PM10 24-Hour Annual	150 µg/m ³ 50 µg/m ³	150 µg/m ³ 50 µg/m ³
Lead Calendar Qtr.	1.5 µg/m ³	1.5 µg/m ³
Hydrogen Sulfide 1-Hour	35 µg/m³ (25 ppb)	---
PM2.5 24-Hour Annual	--- ---	65 µg/m ³ 15 µg/m ³

Seasonal episodes of southern airflow occur during winter “Kona winds”. During extended periods of southerly wind, the air can be hazy from the volcanic fumes from the island of Hawai‘i creating short periods of “Vog”. The effects of “Vog” are slight and infrequent.

The Fire Management Plan will be in compliance with the Clean Air Act. The objectives for smoke management and compliance with the Clean Air Act are similar to those for fire management: to encourage a natural process so long as it does not endanger public health and safety. Smoke levels become unacceptable when they impair visibility to such a degree that they detract from visitor enjoyment of the primary Park resource with emphasis on the vistas of Kalaupapa.

When written burn plans are required, especially for fires on publicly owned lands, they should include such information as the: location and description of the area to be burned, - personnel responsible for managing the fire, - type of vegetation to be burned, - area (acres) to be burned, - amount of fuel to be consumed (tons/acre), - fire prescription including smoke management components (discussed below), - criteria the fire manager will use for making burn/no burn decisions, - safety and contingency plans addressing smoke intrusions.

Impacts of Alternative A (No Action)

Direct Effects – Wildfire events would continue to be rare and are likely to be of short duration and thus considered to have negligible short-term localized adverse direct effect on air quality under Alternative A.

Indirect Effects – Negligible adverse indirect effects are expected.

Cumulative Effects – No other projects implemented within Kalaupapa NHP and environs produce significant emissions, resulting in negligible adverse cumulative effects with Alternative A.

Mitigation Measures - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects - Wildfire events and prescribed fire will continue to be rare and are likely to be of short duration and thus considered to have negligible short-term localized adverse effect on air quality under Alternative B.

Indirect Effects - Negligible adverse indirect effects are expected.

Cumulative Effects – No other projects implemented within Kalaupapa NHP and environs produce significant emissions, resulting in negligible adverse cumulative effects with Alternative B.

Mitigation Measures –

AIR-1 If recommended by Department of Health, Clean Air Branch, smoke management plans submitted by the NPS can be modified to reduce production of pollutants by reducing the amount of fuels available for burning. Options for reducing the amount of fuels available and emissions produced include reducing the area to be burned, reducing fuel loading (e.g., mowing and understory thinning), managing the rate of fuel consumption, and redistributing the emissions.

AIR-2 The NPS will develop a Smoke Communication Strategy to guide management of smoke events during prescribed fires and wildfires in the park. Notification of proposed burns will be disseminated locally to provide adequate advance notice to persons with sensitivities to smoke.

AIR-3 To reduce smoke and pollutant generation during the prescribed burning efforts will be made to burn fuel concentrations, piles, landings, and jackpots during winter months under south or west wind conditions.

AIR-4 To avoid public health and nuisance impacts to residents in the Settlement, information about an upcoming prescribed burn, including guidance to those who are sensitive to smoke, will be provided to residents, staff and visitors. Prescribed burns will be conducted using firing techniques, and under meteorological conditions that best avoid smoke drift into the Settlement or topside residential areas.

AIR-5 Parameters for debris burning are: temperature that is less than or equal to normal average high temperature for the month, wind speed less than 10 mph, relative humidity greater than 40%, fine fuel moisture of surrounding fuels is greater than 20%, and atmospheric mixing height is equal to or greater than 500 meters.

AIR-6 Debris burning in the natural areas of the Park (as opposed to developed areas) requires an approved burn plan.

AIR-7 Debris burning in the natural areas of the Park (as opposed to developed areas) requires an approved burn plan.

Conclusion (Alternatives A and B) – The short and ephemeral nature of wildfire and prescribed fire together with the application of mitigation measures result in negligible short-term localized adverse direct and indirect effects by Alternatives A and B. The lack of other projects contributing to a degradation of air quality result in negligible cumulative effects by alternatives A and B.

TABLE 5 – SOIL MAP LEGEND

Map Unit Symbol	Map Unit Name
CO	Colluvial land
HcB	Haleiwa silty clay loam, 0 to 10 % slopes
HdC	Haleiwa very stony silty clay loam, 0 to 15% slope
HID	Halawa silty clay, 3 to 25% slopes
HID3	Halawa silty clay, 3 to 25% slopes, severely eroded
JaC	Jaucas sand, 0 to 15% slopes
KATD	Kahanui gravelly silty clay, 3 to 20% slopes
KFID	Kalaupapa very rocky silty clay loam, 3 to 25% slopes
OFC	Olelo silty clay, 3 to 15 percent slopes
rRK	Rock land
rRO	Rock outcrop
rRR	Rough broken land
rRT	Rough mountainous land
rSM	Stony alluvial land
rSO	Stony colluvial land
Source: USDA, National Resources Conservation Service, 2008	

along the base of cliffs (Foote et al., 1972). Figure 12 shows soil units and geologic features of the Park Peninsula and the portion of pali and eastern canyons closest to the Peninsula.

The Kalaupapa series is the most common soil type on the Peninsula and consists of extremely very rocky, silty, clay loam that formed in material weathered from volcanic ash overlying pahoehoe lava. The soils are well-drained and fairly shallow, with a depth to pahoehoe lava of 6 to 20 inches (15 to 51 cm). Kalaupapa soils occupy most of the central Makanalua ahupua'a and the eastern and western slopes of the Kauhakō Crater; slopes range from 3 to 25 percent (Foote et al 1972).

The colluvial soils at the base of the cliff face are derived directly from the cliffs above and are typically very stony, well-drained, silty clay soils that quite deep for Kalaupapa, with a depth ranging from 5 to 6.6 feet (1.5 to 2 meters) to bedrock.

In the stream drainages at the base of the cliff face are alluvial deposits of the Haleiwa soil series. These silty clays with much deeper soil profiles those of the Kalaupapa series, having formed from the basic igneous material eroded in the principal stream drainages to alluvium. As shown in Figure 12, the Haleiwa soils underlie the southern portion of the Kalaupapa Settlement, the lowlands of Kalawao, the valley drainages and drainages roughly parallel to the pali (see

areas marked HdC and HcB). Topsoil is silty clay, showing evidence of tillage or other disturbance to the soil profile, ranging from 10 to 18 inches deep (25 - 45 cm); soils become rockier with depth. Topsoils are moderately susceptible to wind erosion and well drained. Depth to bedrock is typically more than 80 inches (203 cm).

The vegetated coastal areas of the Peninsula have Jaucas Series soils, very deep, excessively drained and very permeable sands formed in calcareous sand deposits with coral and shell fragments. The sands demarcate the limits of the agricultural fields of the Native Hawaiians who settled on Kalaupapa prior to the historic period.

The trade winds blow nearly continually from the northeast, a constant erosional force. Evidence indicates that much of the Kalaupapa Peninsula was forested prior to 1500, affording soils a degree of protection from wind erosion (McCoy and Hartshorn, 2007). With the present low stature exotic vegetation, soils closest to the windward side of the island may demonstrate the effect of increased wind erosion following the clearing of forests for agricultural use. Soils closer to the windward coast of the island have decreased levels of nitrogen, magnesium, calcium, carbon and phosphorus compared to the central and leeward portions of the Peninsula (McCoy and Hartshorn, 2007) which could be an artifact of the vegetation conversion by Native Hawaiians.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action)- Soils would be subjected to potential erosion as a result of fire and fire suppression activities for a short time because of rapid regrowth of vegetation. Adverse effects from suppression activities include scraping soil to bedrock, displacing minimal amount of soils within the park. Suppression of all wildfires would have a negligible short-term localized adverse direct effect on soils.

Indirect Effects of Alternative A (No Action) - No indirect effects are expected, resulting in negligible adverse indirect effects to soils.

Cumulative Effects of Alternative A (No Action) - Other projects are very localized, resulting in minor long-term localized cumulative adverse effects to soils by the combination of wildfire and other projects.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - The impacts to soils as a result of wildfire suppression would be less than for Alternative A, but supplemented by fuel reduction activities, resulting in a negligible short-term localized adverse direct effect on soils.

Indirect Effects of Alternative B (Increased Protection) - No indirect effects are expected, resulting in negligible effects to soils.

Cumulative Effects of Alternative B (Increased Protection) - Other projects are very localized, resulting in minor long-term localized cumulative adverse effects to soils by the combination of wildfire and other projects.

Mitigation Measures of Alternative B (Increased Protection) –

- SW-1** Preparation for prescribed burning will avoid or minimize disturbance of surface soils or burning intensity that would expose bare mineral soil. Subject matter experts will ensure that the erosion control plan for each action is sufficient to prevent long-term moderate or major impacts on the rate of soil erosion.
- SW-2** Following planned or unplanned ignitions, visual monitoring will be conducted and the results recorded downslope of the area burned during subsequent rains for evidence of increased soil erosion and sedimentation. If eroding soils are found, emergency stabilization techniques will be applied per the recommendations of natural resources staff.
- SW-3** Following wildfires or prescribed burning, all fire lines, roads, staging areas and other areas disturbed by equipment or vehicles will be rehabilitated as quickly as possible to prevent erosion, discourage the spread of non-native plants and address soil compaction. Burned area rehabilitation techniques, such as soil stabilization techniques, scarification, removal and monitoring of non-native invasive plants, may be part of the rehabilitation efforts. On unplanned ignitions, stabilizing or repairing suppression impacts, such as those created by heavy equipment, falls under the realm of “Fire Suppression Activity Damage Repair”. Both BAER and BAR funding can be used to address specific issues—the treatment of invasive species in particular—in areas affected by suppression actions. For planned ignitions, repair of holding lines and other disturbed areas is paid from the fuels project account. These various programs are more thoroughly explained in Chapter 19 of Reference Manual 18 (http://www.nps.gov/fire/download/fir_wil_rm18.pdf).
- SW-4** Unless no feasible alternative is available, heavy equipment working on fire management actions will not be used in areas with soils that are undisturbed, saturated, supporting native vegetation or subject to extensive compaction. Burned area rehabilitation techniques, such as soil stabilization techniques, scarification, removal and monitoring of non-native invasive plants, may be part of the rehabilitation efforts.
- SW-5** Staging areas for vehicles, equipment and supplies sited will be clearly demarcated by stakes, flagging, fencing or other readily visible means to mark the limits of disturbance.

SW-6 Use of heavy equipment in or disturbance to the streambed and riparian corridor of Waikolu stream will be avoided to the greatest extent possible during suppression actions unless public and/or firefighter safety would be threatened by such avoidance. . It may be used as a natural boundary to help contain a wildfire but the control line will be sited outside the riparian corridor. Trample lines (rather than dug lines) may be used if it is necessary to site the control line within the wetland.

Conclusion (Alternatives A and B) Alternatives A and B would both impart a negligible short-term localized adverse direct effect on soils. Negligible indirect effects are expected from either alternative. Cumulative effects for both alternatives would result in minor localized cumulative adverse effects to soils by the combination of wildfire and other projects.

Water Quality

As shown in Figure 13, the parklands fall into three major watersheds named after their primary drainages – Waihānau, Wai’ale’ia and Waikolu. Waihānau and Wai’ale’ia are intermittent streams fed only by surface runoff. Underlying the Waikolu Valley are perched aquifers and water retained by subsurface dikes, which feed Waikolu Stream, the only perennial stream in the Park. Waikolu Stream has elevated nutrient, coliform and turbidity levels requiring treatment to meet drinking water standards. Water drawn from the Waikolu Valley to supplement the farmers served by the Moloka'i Irrigation System (MIS) is used for irrigation and does not require treatment. MIS stores 1.4 billion gallons in the Kualapuu Reservoir topside from the Park. The area where the wells are located, five miles southeast of the Kalaupapa Settlement, averages 75 to 100 inches of rain per year (Hawai'i DLNR, 1994). MIS facilities were upgraded in the mid 1990's.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible adverse direct effects would be expected, particularly with the implementation of appropriate wildfire fighting Mitigation Measures under alternative B.

Indirect Effects of Alternative A (No Action) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible indirect effects would be expected.

Cumulative Effects of Alternative A (No Action) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible cumulative effects would be expected.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible direct effects would be expected, particularly with the implementation of the advocated Mitigation Measures.

Indirect Effects of Alternative B (Increased Protection) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible indirect effects would be expected.

Cumulative Effects of Alternative B (Increased Protection) - Since wildfire is unlikely to burn within watersheds beyond the Kalaupapa Peninsula, the source of water to Moloka'i Irrigation System and Kalaupapa, negligible cumulative effects would be expected.

Mitigation Measures of Alternative B (Increased Protection) –

- SW-7** Use of retardants on or near Kauhakō Crater or Waikolu Stream during suppression actions shall be avoided to the greatest extent possible, unless public and/or firefighter safety would be threatened by such avoidance.
- SW-8** Drawing water from Waikolu Stream will be avoided for prescribed fires and wildfires unless public and/or firefighter safety would be threatened by such avoidance. Water from Kauhakō Crater cannot be used for any suppression action including bucket refill. Ocean water is the preferred water sources for fighting wildfires in the Park.
- SW-9** Monitor any chemical retardant drops in sensitive aquatic habitats for effects and, if necessary, taking necessary corrective action(s) using as a guide a recent USFS DEIS for chemical fire retardants on FS lands (see http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/71615_FSPLT2_050375.pdf).

Conclusion (Alternatives A and B) – Negligible direct, indirect, or cumulative effects would be expected with the implementation of either alternative A or B.

Floodplains

All the floodplains within the sphere of influence of the FMP are intermittent. The principal drainage of the Kalaupapa Peninsula, Waihānau, runs an average of 3.8 percent of the year (NPS, unpublished data). The floodplains and mouths where Waihanau and other streams enter the ocean are armored by boulders. Historic anecdotes record flood events in subsidiary drainages following intense rain events. As described previously, use of heavy machinery is unlikely and barred from riparian areas. Under alternative B mitigation measures are aimed at preventing the use of fire retardants within the principal drainages of the park. Fuel reduction across the Peninsula (Alternative B) is restricted within the Waihānau floodplain to the creation of “Gallery Forest”, thus reducing ladder fuels and maintaining shade on the streambed. Proposed fuel-reduction areas currently dominated by trees are most likely to convert to shrub (lantana) domination – the principal plant growing on historically cleared and currently mown areas outside of the Kalaupapa Settlement. The dense and lower-statured lantana is likely a more effective ground-cover than Java plum or tall Christmasberry.

Due to its low-lying elevation, Kalaupapa is susceptible to inundation during tsunamis (Thornberry-Ehrlich, T. 2010). One tsunami reaches the Hawaiian islands on an average of every 7 years. Historic tsunamis undoubtedly entered the floodplains of streams crossing the Kalaupapa Peninsula to enter the ocean. While historic impacts to streams and floodplain are not known, one historic photo possibly records damage to the bridge crossing Waihanau. Streambank morphology and floodplain remain much now as it did then (1946).

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - The low likelihood of water flow during a fire-event, the restricted use of heavy machinery within floodplains would result in negligible short-term localized adverse effects on floodplains following the implementation of Alternative A.

Indirect Effects of Alternative A (No Action) - Heavy winds might result in the drift of fire retardants into floodplain areas. However, the low probability of waterflow during a fire event would result in negligible indirect effect following the implementation of Alternative A.

Cumulative Effects of Alternative A (No Action) - No other projects are known to overlap with floodplains, so the implementation of Alternative A would have negligible adverse cumulative effects on floodplains.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - The low likelihood of water flow during a fire-event, the restricted use of heavy machinery within floodplains, the rapid proliferation of low-statured lantana in cleared areas, and mitigation measures preventing the use of fire retardants within and adjacent floodplain would result in negligible adverse direct effects on floodplains following the implementation of Alternative B.

Indirect Effects of Alternative B (Increased Protection) - Heavy winds might result in the drift of fire retardants into floodplain areas. However, the low probability of waterflow during a fire event would result in negligible adverse indirect effect following the implementation of Alternative B.

Cumulative Effects of Alternative B (Increased Protection) - No other projects are known to overlap with floodplains, and the rapid proliferation of low-statured lantana in cleared areas would offer increased protection against possible tsunamis, so the implementation of Alternative B would have negligible short-term localized adverse cumulative effects on floodplains.

Mitigation Measures of Alternative B (Increased Protection) –

SW-6 Where multiple burn piles are constructed on bare soils potentially having a native seed bed, the size of the piles will be kept small with sufficient distance between piles to minimize impacts on soils from high-intensity fires and to facilitate reestablishment of mycorrhizal fungi and soil microorganisms from adjacent unburned land.

Conclusion (Alternatives A and B) – The low likelihood of water flow during a fire-event, the restricted use of heavy machinery within floodplains, and mitigation measures preventing the use of fire retardants within and adjacent floodplain would result in negligible direct and indirect effects on floodplains following the implementation of Alternatives A and B. No other projects are known to overlap with floodplains, so the implementation of Alternative A or B would have negligible cumulative effects on floodplains.

Wetlands

Wetland commonly exist throughout the high elevation tropical rainforest and valleys associated with perennial streams. Waihānau has seasonal wetlands during the rainy season. The only wetlands on the Kalaupapa Peninsula likely to be affected by wildfire are seasonal and located at the northwestern limit of the Peninsula adjacent to the airport. The area is associated with pavement like pahoehoe lava forming a relatively impermeable substrate. Ponds fill and adjacent soils become water saturated for four to six months following the start of the wet season. The site is highly disturbed by historic livestock use and purported fish aquaculture. A well from which water was pumped into the ponds to maintain sufficient water within the ponds to allow aquaculture remain on site. Much of the pond substrate is occupied by a native sedge (*Bulboschoenus maritimus*). Adjacent soils dominated by non-native sourbush (*Pluchea indica*), lantana (*Lantana camara*), Christmasberry (*Schinus terebinthifolius*), and exotic herbaceous plants.

Direct Effects of Alternative A (No Action) - The low likelihood of water presence during a fire-event, and the restricted use of heavy machinery within wetlands would result in negligible short-term localized adverse effects on floodplains following the implementation of Alternative A.

Indirect Effects of Alternative A (No Action) - Heavy winds might result in the drift of fire retardants into the wetland area. However, the low probability of water presence during a fire event would result in negligible adverse indirect effect following the implementation of Alternative A.

Cumulative Effects of Alternative A (No Action) - No other projects are known to overlap with floodplains, so the implementation of Alternative A would have negligible adverse cumulative effects on wetlands

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - The low likelihood of water presence during a fire-event, the restricted use of heavy machinery within floodplains, and mitigation measures preventing the use of fire retardants within and adjacent wetlands would result in negligible short-term localized adverse effects on wetlands following the implementation of Alternative A.

Indirect Effects of Alternative B (Increased Protection) - Heavy winds might result in the drift of fire retardants into the wetland area. However, the low probability of water presence during a fire

event would result in negligible adverse indirect effect following the implementation of Alternative A.

Cumulative Effects of Alternative B (Increased Protection) - No other projects are known to overlap with wetlands, so the implementation of Alternative A would have negligible adverse cumulative effects on wetlands.

Mitigation Measures of Alternative B (Increased Protection) –

SW-6 Where multiple burn piles are constructed on bare soils potentially having a native seed bed, the size of the piles will be kept small with sufficient distance between piles to minimize impacts on soils from high-intensity fires and to facilitate reestablishment of mycorrhizal fungi and soil microorganisms from adjacent unburned land.

SW-9 Monitor any chemical retardant drops in sensitive aquatic habitats for effects and, if necessary, taking necessary corrective action(s) using as a guide a recent USFS DEIS for chemical fire retardants on FS lands (see http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/71615_FSPLT2_050375.pdf).

Conclusion (Alternatives A and B) – The scarcity of heavy machinery at Kalaupapa, the restricted use of heavy machinery within wetlands, and mitigation measures preventing the use of fire retardants within and adjacent the wetland would result in negligible direct and indirect effects on wetlands following the implementation of Alternatives A or B. No other projects are known to overlap with the wetlands, so the implementation of Alternative A or B would have negligible cumulative effects on floodplains.

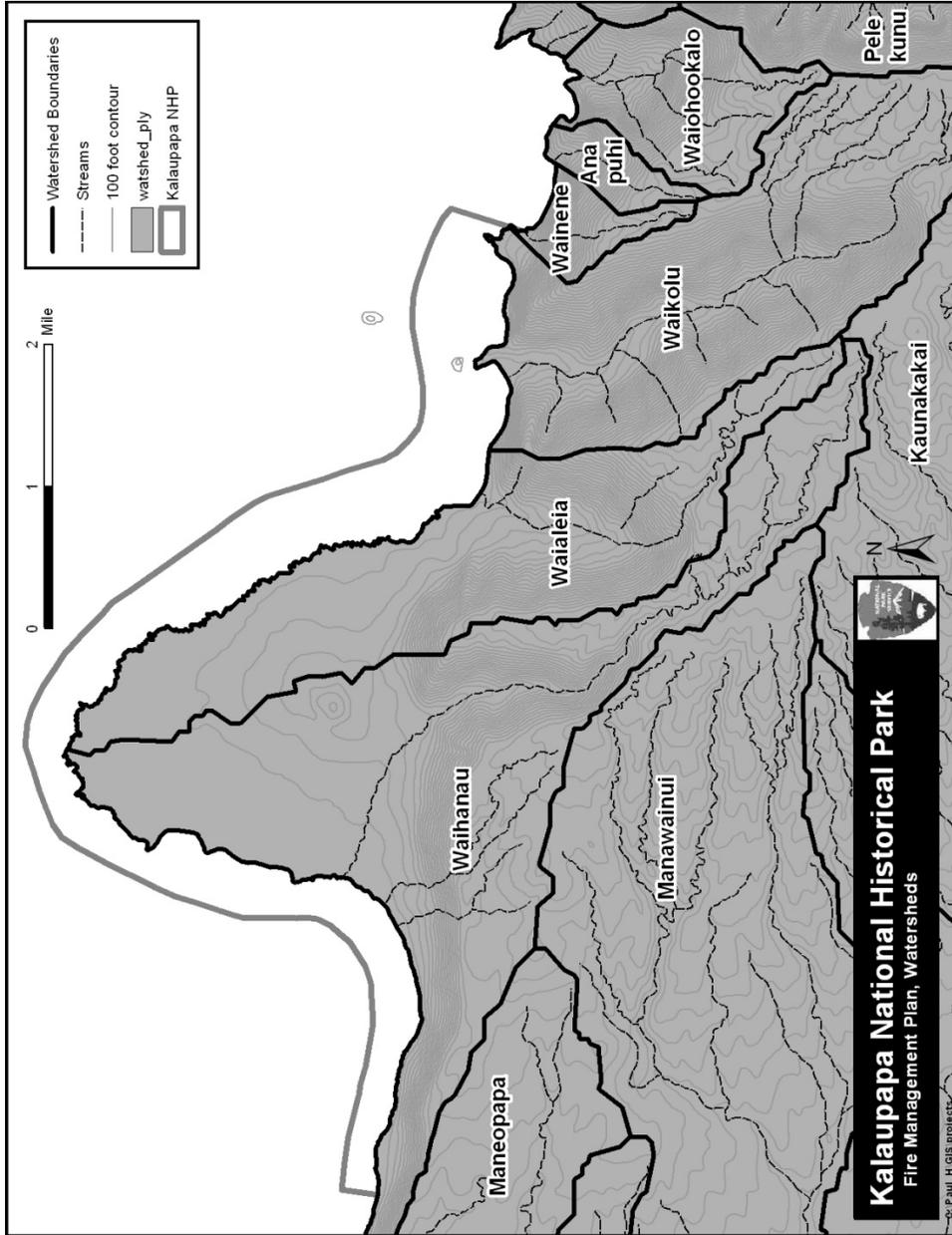


FIGURE 13 - KALAUPAPA NATIONAL HISTORICAL PARK WATERSHEDS

Native Vegetation

Areas containing valuable natural resources including native plants and animals have been designated as Special Ecological Areas (SEAs). These have been determined to be the most intact, diverse, unique and manageable sites in the park. These areas need to be managed to preserve the ecosystem as a whole and, in doing so, preserve the native plants and animals found there. There are eight SEAs within Kalaupapa (Figure 14) including: the coastal spray zone on the northeast shore of the Peninsula; Pu`u Ali`i Natural Area Reserve; Waikolu Valley; the Kauhakō Crater; caves and lava tubes; the Kauhakō Trench/Lava Tube; the cliffs (pali); and the submerged lands surrounding the Peninsula.

Listed below is a brief description of the native vegetation found within each of the Special Ecological Areas:

Coastal Spray Zone: This area is located along the northeast shore of the Peninsula and is one of the best examples of the vegetation type in the State. The spray zone contains plant communities dominated by native species. The community contains at least one threatened plant, *Tetramolopium rockii* var. *rockii*.

Pu`u Ali`i-`Ohi`alele Plateau: This area is in the southeast corner of the park and supports one of the best examples of `ohi`a rain forest in Hawai`i. This area is currently operated by a cooperative-operating agreement with the State of Hawai`i `s Department of Land and Natural Resources. The area is designated as a Natural Area Reserve by the State and access is limited.

Waikolu Valley: This valley contains remnants of native vegetation, particularly in the high elevation headlands. Much of the cliff sides and valley floor are converted to non-native vegetation due to historic agricultural practices.

Kauhakō Crater: The rim of the crater (elev: 123 meters) is about 2 miles in diameter. The crater was formed by the Pu`u Uao volcano and contains remnant `Ohe makai-wiliwili forest also known as Summer-Deciduous Dry Forest. This is the only remaining windward coast community of its type known of in the State. Much of the land within the crater has been used for agriculture.

Kauhakō Trench: This is a major lava tube running north from Kauhakō Crater. It is about one mile in length. Several portions have collapsed allowing vegetation to become established in an environment protected from wind and ocean spray as well as browsing and trampling by cattle, deer and pigs.

Cliffs (Pali): The 2,000 to 3,000 foot cliffs separate the Peninsula from the rest of the island of Moloka`i. In many places native plants survive, due to the steepness of the cliffs and the inaccessibility to goats, deer and pigs. Currently, three endangered plant species, *Canavalia molokaiensis*, *Schiedea lydgatei*, and *Peucedanum sandwicense* grow on the cliffs. The cliffs

probably contain caves and lava tubes, which need to be inventoried for cultural and natural resources.

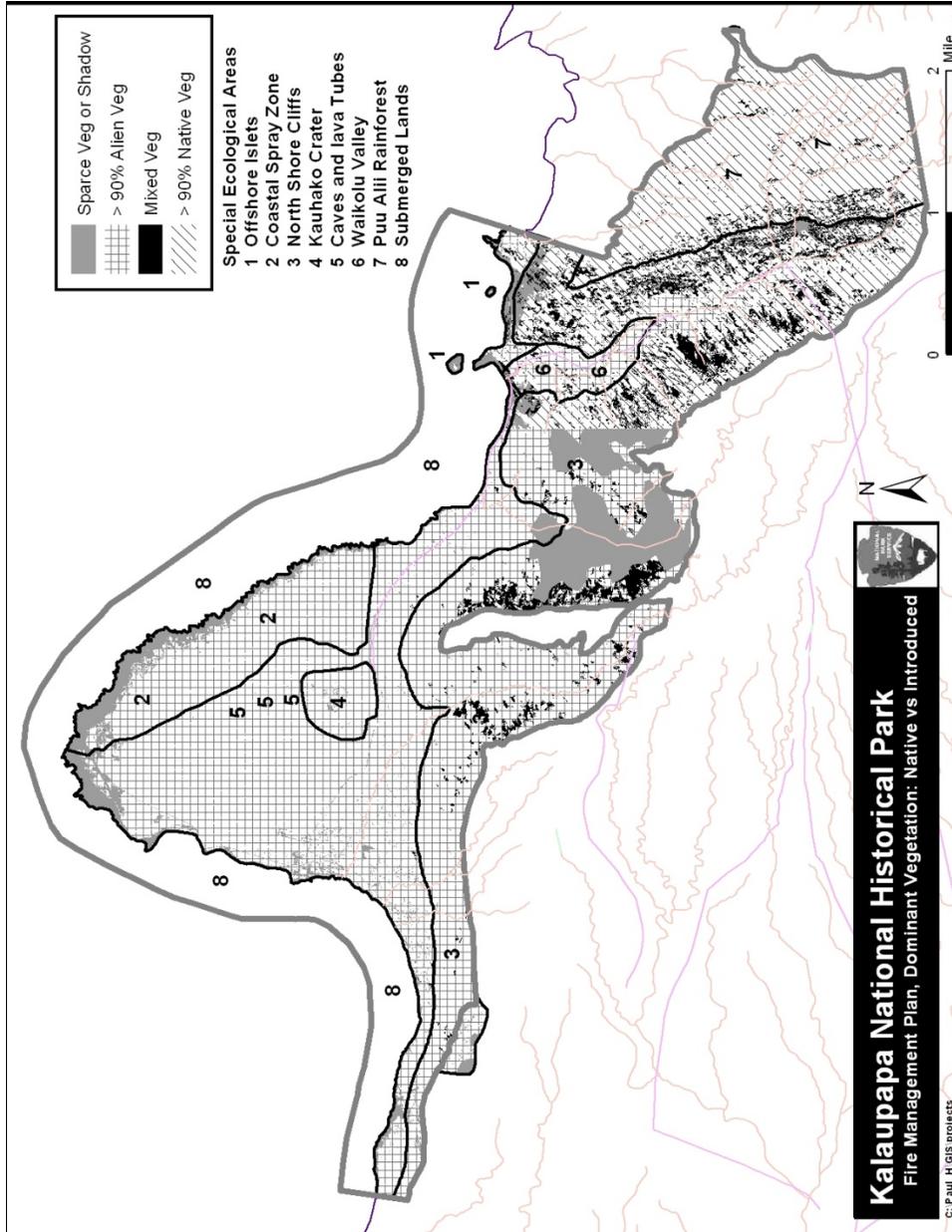


FIGURE 14 - KALAUPAPA NATIONAL HISTORICAL PARK PRIMARY VEGETATION TYPE AND SPECIAL ECOLOGICAL AREAS

The park's boundary extends for a quarter mile offshore and includes 2,000 acres of ocean, two small islets and wet shorelines which support two Federally endangered plants, *Brighamia rockii* and *Pritchardia hillebrandii*.

Wildfire is most likely to occur on the Kalaupapa Peninsula outside of the low-fuel coastal spray communities. The understory coastal spray communities (*Fimbristylis cymosa*) is coarse and of relatively low flammability. Remnant 'Ohe makai (*Reynoldsia sandwicensis*)-Hala pepe (*Pleomele auwahiensis*) and Wiliwili (*Erythrina sandwicensis*)-Ohe makai forests on the crater rim an interior are likely the most substantial native vegetation susceptible to wildfire. The pali (cliffs) and especially the higher elevation rainforest are unlikely to experience wildfire.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire within the dryland forest associated with the crater would likely be stand-replacement resulting in the loss of the individual tree growth form. Key native species are likely to stumpsprout from epicormic buds. Loss of the tree growth-form would be considered a major long-term localized adverse effect.

Indirect Effects of Alternative A (No Action) – Wildfire would induce strong regrowth from seed and sprout of the non-native elements of the vegetation across the Peninsula resulting in strong competition with resprouting native trees. The subsequent loss of native vegetation would be considered a major long-term localized adverse effect.

Cumulative Effects of Alternative A (No Action) – Pending funding, restoration of crater dryland forests would result in the reduction of fuels around native trees resulting in a beneficial moderation of the direct and indirect effects noted above.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – Fuel reduction within the crater area would reduce the intensity of wildfire within remnant dryland forests of the crater resulting in a moderate long-term localized adverse effect in the event of wildfire.

Indirect Effects of Alternative B (Increased Protection) – Fuel reduction would allow the survival of a greater portion of extant native trees within the crater, thus moderating the indirect effects of competition following wildfire - a moderate long-term localized adverse effect.

Cumulative Effects of Alternative B (Increased Protection) - Pending funding, restoration of crater dryland forests would result in the reduction of fuels around native trees resulting in a

moderation of the direct and indirect effects noted above. Cumulative effects would beneficially moderate the effects of wildfire.

Mitigation Measures of Alternative B (Increased Protection) –

NATVEG 1 Develop maps showing locations of native plant communities and remnant individual native trees to allow planning to avoid wildfire fighting and fuel-reduction impacts to remaining native vegetation.

NATVEG 2 Use maps of natural resources to juxtapose fuel reductions to reduce the impact of wildfire on remaining natural resources.

Conclusion (Alternatives A and B) – Direct and indirect effects under alternative A are both major localized long-term adverse effects in comparison to moderate localized long-term adverse effect for alternative B. Cumulative impacts by other ongoing projects are ranked as beneficial under both alternatives.

Non-Native Plant or Animal Species Introduction or Promotion

The introduction of non-native grasses and forbs has impacted the ecology of Kalaupapa NHP. During the late 1840s and 1850s, much of the Peninsula was used to grow sweet potatoes commercially for the California Gold Rush. During the earliest period of the leprosy settlement, most of the Peninsula was grazed by cattle and horses, and the valleys contained taro (*Colocasia esculenta*) fields. The eventual cessation of agriculture and grazing allowed the non-native grasses and scattered woody shrubs already present to spread and become dominant over the Peninsula. Inland portions of the Peninsula are now covered with dense stands of introduced species including lantana (*Lantana camara*) and Christmas berry (*Schinus terebinthifolius*), and koa haole (*Leucaena leucocephala*). Mango (*Mangifera indica*), coconut (*Cocos nucifera*), and other fruit trees are present in scattered locations, usually as remnant vegetation in the vicinity of old house sites.

While any fire-related disturbance or fire-fighting activity on the pali and high elevation rainforest would likely result in the incursion of non-native plant species, wildfire and related activities would most likely be restricted to the Kalaupapa Peninsula.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Wildfire and associated disturbances on the landscape are likely to result in increased occurrence of herbaceous weeds throughout the disturbed area. Herbaceous weeds would be suppressed by the regrowth of current non-native woody species resulting in a moderate long-term localized adverse effect.

Indirect Effects of Alternative A (No Action) – Competition by extant non-native vegetation continues to be a moderate long-term localized adverse effect.

Cumulative Effects of Alternative A (No Action) – Disturbances from small projects act synergistically to increase weeds across the landscape, a minor localized long-term adverse effect.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – The implementation of fuel-reduction will likely exacerbate the spread of weeds across the landscape. Nonetheless the effects of the wildfire would dominate the influence of alternative B on weeds across the landscape thus maintaining a moderate localized long-term adverse effect.

Indirect Effects of Alternative B (Increased Protection) – The dispersal of weeds across the landscape through fuel-reduction efforts would result in a minor localized long-term adverse effect.

Cumulative Effects of Alternative B (Increased Protection) - Disturbances from all projects act synergistically to increase weeds across the landscape, a minor localized long-term adverse effect.

Mitigation Measures of Alternative B (Increased Protection) –

- VEG-1** Areas subject to fire management treatments will be monitored for changes to the known distribution of non-native plant species following the treatment.
- VEG-2** All herbicide use will be administered through the park’s integrated pest management (IPM) coordinator. All herbicide use for fire management actions will be reported monthly to the IPM coordinator.
- VEG-3** Herbicide foliar spraying should be confined to the dry season to the greatest extent possible and be applied in conditions that meet the weather requirements and precipitation forecasts called for on the herbicide label.
- VEG-4** No herbicide foliar spraying or direct stump applications will be allowed in the riparian corridor of Waikolu Stream or within drifting distance of the Kauhakō Crater or in an area with potential to runoff to the ocean.
- VEG-5** A natural resource specialist or advisor will be present during fire management actions where recorded or suspected, but not yet recorded, rare native plant species would be at risk from project implementation. Wherever possible, any individual rare native plants should be salvaged when projects include ground-disturbing actions in areas largely populated by non-native invasive species.
- VEG-6** Network FMO will ensure that monitoring and research data are compiled, evaluated, and used to help refine natural resource compliance for future fire management actions and objectives.

Conclusion (Alternatives A and B) – Direct effects for both alternative A and B are closely related to the potential area influenced by wildfire and associated fire-fighting activities. The size of wildfire and consequent area of weed invasion is potentially reduced under alternative B. However, the spread of weeds is also favored by the fuel-reduction activities under alternative B. Direct effects of both alternatives are thus rated as moderate long-term localized adverse effects. Competition by existing non-native shrubs constitutes a moderate long-term localized adverse effect under alternative A. This competition by woody species is reduced under alternative B, though the introduction of new weeds remains a minor long-term localized adverse effect. Disturbances arising from other ongoing projects act synergistically to increase weeds across the landscape, resulting in a minor adverse localized long-term cumulative effect for both alternatives considered.

Wildlife and Fish

Waikolu valley contains the park's sole perennial stream. A survey conducted in 1986 found abundant native Hawaiian fish species in the stream include *Lentipes concolor* (o'opu alamo'o), which is under consideration by the U.S. Fish & Wildlife Service for listing as a threatened species under the Endangered Species Act. Also recorded in this survey were o'opu nopili, o'opu nakea, opae kalaole and wi. The native species are diadromous, requiring some portion of their life cycle spent in salt or brackish water (DLNR 1994). The Stream also contains native mollusks and the Federally listed endangered plant *Cyanea procera*. Threats to the stream and valley ecosystem are tied in with water rights and uses. If the Moloka'i Irrigation District or the Park draw too heavily on water resources, the connectivity of the Stream to salt water can be broken jeopardizing the viability of the diadromous species. To prevent overdrawing, each well has a three inch diameter pipe to discharge pumped water, when necessary, to provide supplementary flow to the Stream. In 1994, the DNLN concluded that if well pumping negatively impacted diadromous fish and aquatic microfauna, wells would only be operated in the rainy season.

The Pu'u Ali'i-Ohi'alele Plateau in the southeast corner of the park and supports one of the best examples of ohi'a rain forest in Hawai'i and is an essential habitat for rare and endangered native forest birds including the Moloka'i creeper (*Paroreomyza flammea*). Parts of the upper valleys and the Pu'u Ali'i Natural Area Reserve provide habitat for several species of native Hawaiian forest birds. Rare and endangered forest birds likely found within the reserve include the Federally listed Moloka'i thrush (*Myadestes lanaiensis rutha*) and the State-listed I'iwi, (*Vestiaria coccinea*).

The cliffs are likely to provide nesting sites for native and endangered birds including Newell's shearwater, dark-rumped petrel, and the dark-banded petrel. The cliffs along the entire northeast coast are a National Natural Landmark.

Sea birds, turtles and porpoises are common in the waters off shore, and humpback whales are seen between December and March.

With the exception of the Hawaiian Hoary bat (assessed under threatened and endangered species), all remaining mammals on the Kalaupapa Peninsula are all non-native. Axis deer (*Axis axis*) are medium sized (up to 200 pounds) with chestnut colored coats, white spots, and simple non-palmate antlers. Grasses making up the bulk of their diet, but they eat increased amounts of forbs during the dry season. Because axis deer rut is not seasonally restricted, herds year-round typically contain animals both in velvet and hard antler, pregnant and non-pregnant does, as well as fawns of different sizes. Axis does have been observed breeding as young as 4 months of age and typically give birth to single fawns (Graf and Nichols 1966; Gogan et al. 2001). Axis deer populations can double every 3 years (Elliott 1973). Axis deer are common throughout the Kalaupapa Peninsula. A study by Goltz et al. (2001) found that the radio-collared deer remained primarily within the Lowland Coastal Area of KALA. During the day, the deer were located in

thick forest of Christmasberry or guava at the base of the cliffs. At night, the ungulates traveled a short distance to nearby open grassy areas (Goltz et al. 2001). Axis deer can impact rare plant species directly through consumption and mechanical damage (antler thrashing and trampling). Destruction and grazing of vegetation in riparian, forest and grassland habitat from ground level to a height of 2 meters by non-native deer can adversely affect bird nesting habitat and remove food and nesting resources used by bird species.

Goats (*Capra hircus*) were introduced to the Hawaiian island in 1778 by Captain Cook. Adult females and males weigh up to 60 and 200 lb respectively. Herd sizes number between 3 and 16. Females produce 1-2 kids per year. Free-standing water is apparently not a requirement for goats and they feed on a wide variety of plants in drier habitats. Goat impacts at Kalaupapa are greatest on the pali (cliffs) where they threaten several of the cliff-dwelling Species of Concern.

The feral Pig (*Sus scrofa*), was first introduced to Hawai'i 1500 years ago by Polynesians, then again in the 18th century by the Europeans (Tep and Gaines 2003). Feral pigs can occupy in variety of habitats, but prefer moist forest areas near water sources. They are opportunistic breeders, capable of breeding year round if conditions are favorable. Sows are capable of producing two litters per year, averaging seven piglets per litter. Feral pigs can cause native plant extinctions through direct consumption, soil erosion and soil compaction. Uprooting of trees and underground plant masses are common and associated disturbance favors invasion by non-native plants. Feral pigs are also known to actively disperse non-native species by transporting seeds in their digestive tracts (Diong 1982.)

There are three species of rats which have been introduced to islands throughout the world: the Norway or Brown Rat (*Rattus norvegicus*), the ship or Black Rat (*R. rattus*), and the Pacific or Polynesian Rat (*R. exulans*). They have different dietary preferences, but all three species are omnivorous, have high reproductive rates, and can survive in a variety of habitats (Atkinson 1985). Introduced rats are responsible for an estimated 40 - 60% of all bird and reptile extinctions (ICEG Analysis of World Conservation Monitoring Centre Data, Atkinson 1985). Rats prey on seabird eggs, chicks, and adults, and are thought to be responsible for seabird extirpations and population declines, particularly on islands (Atkinson 1985).

The Indian Mongoose (*Herpestes auro-punctatus*) was introduced to Hawai'i in the 19th century for biological control of rats in agricultural (sugarcane) operations. Populations are well established on all islands but Kauai. They are weasel-like in appearance and up to 65 cm. long, including tail. They inhabit forest, scrub, coastal areas and cultivated lands (Baldwin et al 1952). Mongoose are active during the daytime and sleep in dens at night. Females can breed from the age of 10 months and produce two or three litters per year. Omnivorous, they feed on birds, small mammals, reptiles, insects, fruits and plants. The eggs and hatchlings of ground nesting birds and sea turtles are especially at risk.

The influence of the Fire Management Plan is restricted to the Kalaupapa Peninsula. where of wildlife described above, only the non-native mammals remain. Analysis in this section is thus restricted to non-native mammals.

Kalaupapa National Historical Park

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire would effect non-native birds and mammals on the Kalaupapa Peninsula, the most likely area of wildfire influence. A small portion of mammals would be expected to perish in the wildfire, but most would move aside. Few native species are present on the Peninsula. Wildfire is thus considered to have only a minor long-term adverse localized effect on wildlife and fish.

Indirect Effects of Alternative A (No Action) – Loss of food source (mature mango, false kamaani, kukui and other seed/fruit bearing trees) would result in a minor long-term localized adverse effect on wildlife and fish.

Cumulative Effects of Alternative A (No Action) – Other planned projects (restoration of native dryland forest) would reduce the effects of wildfire, a benefit to maintaining wildlife and fish.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Wildfire would effect non-native birds and mammals on the Kalaupapa Peninsula, the most likely area of wildfire influence. A small portion of mammals would be expected to perish in the wildfire, but most would move aside. Few native species are present on the Peninsula. Wildfire is thus considered to have only a minor long-term localized adverse effect on wildlife and fish.

Indirect Effects of Alternative B (Increased Protection) - Loss of food source (mature mango, false kamaani, kukui and other seed/fruit bearing trees) would result in a minor long-term localized adverse effect on wildlife.

Cumulative Effects of Alternative B (Increased Protection) - Other planned projects (restoration of native dryland forest) would reduce the effects of wildfire, a benefit to maintaining wildlife and fish.

Mitigation Measures of Alternative B (Increased Protection) –

WIL-1 Prescribed burns, mechanical treatments, and mowing of shrubs and grasses taller than 8 inches will not be conducted if there is potential to disturb native nesting birds in conformance with the Migratory Bird Treaty Act (MBTA). If there is potential for *native* bird-nesting in a project area, a qualified biologist must first conduct a pre-project survey for nesting native birds. In intensively managed landscapes where mowing is justified for fuel reduction, vegetation will be maintained at a height of less than 8 inches throughout the nesting season to discourage the use of the area for nesting by native birds.

Conclusion (Alternatives A and B) – Direct effects (mortality of mammals by wildfire) and indirect effects (loss of tree food sources) result in minor localized long-term adverse effect on wildlife and fish for both alternative A and B. Cumulative effects including dryland forest restoration are considered beneficial.

Insects and Invertebrates

The Waikolu stream and habitat valley provides habitat for two species of damsel flies that are candidates for listing under the Endangered Species Act. The pond at the bottom of the crater is habitat for a native shrimp.

A taxonomic list of invertebrate species occurring in the Lowland Coastal Area does not exist. However, Legrande (2002) noted the following arthropods during her survey: a non-native ant (*Leptogenys falcigera*), brine fly (*Ephydra millbrae*), and *Haematolocha rubescens* (Trematoda: Haematoloecidae). The Xerces Society for Invertebrate Conservation has petitioned the U.S. Department of the Interior to protect seven Hawaiian bee species under the Endangered Species Act. All seven species of these are “yellow-faced bees” — *Hylaeus anthracinus*, *H. longiceps*, *H. assimulans*, *H. facilis*, *H. hilaris*, *H. kuakea* and *H. mana*. A subset of the bees are known to exist at the northern tip of the Kalaupapa Peninsula.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire is unlikely to have a direct effect on known native insects and invertebrates within the area of interest because damselflies occur within fire-resistant riparian areas of Waikolu, while the native Hawaiian bee occurs in low-fuel areas at the northern extremity of the Peninsula. Wildfire would thus have negligible effects on insects and invertebrates.

Indirect Effects of Alternative A (No Action) – Wildfire (likely spotty) within the Hawaiian bee habitat would cause a short-term suppression of native flowers, resulting in a minor localized short-term adverse effect on insects and invertebrates.

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – Wildfire, fuel reduction, and wildfire suppression activities are unlikely to have a direct effect on native insects and invertebrates because damselflies occur within fire-resistant riparian areas of Waikolu, while the native Hawaiian bee occurs in low-fuel areas at the northern extremity of the Peninsula. Wildfire would thus have negligible effects on insects and invertebrates.

Indirect Effects of Alternative B (Increased Protection) - Wildfire (likely spotty) within the Hawaiian bee habitat would cause a short-term suppression of native flowers, resulting in a minor localized short-term adverse effect on insects and invertebrates.

Cumulative Effects of Alternative B (Increased Protection) - Negligible
Kalaupapa National Historical Park

Mitigation Measures of Alternative B (Increased Protection) – Mitigations defined under other resources are sufficient.

Conclusion (Alternatives A and B) – Negligible direct effects of wildfire would be expected for alternatives A or B. Indirect effects for both alternatives would be minor localized short-term adverse effects due to the short-term suppression of nectar/pollen sources.

Reptiles and Amphibians

Few surveys have been conducted to examine the distribution of reptiles and amphibians through Kalaupapa NHP. A collation of observations provides a list of reptiles and amphibians potentially inhabiting the area of interest. Kraus (2005) found only stump-toed gecko (*Gehyra mutilate*) in the crater. This non-native species is common on all the main Hawaiian Islands, typically found near warehouses, large buildings, and among debris, rocks, and fallen vegetation (McKeown 1996). During the survey of Huelo Islet, Duvall (2000) collected specimens of the moth skink (*Lipinia noctua*), which inhabits the leaf litter among the native loulu (*Pritchardia*) palms (Kraus 2005). The mourning gecko (*Lepidodactylus lugubris*) were also collected on the islet (Duvall 2000). Other reptiles and amphibians that were collected in the North Shore Cliff (NNL) include the stump-toed gecko, house gecko *Hemidactylus frenatus*, Indo-Pacific gecko (*Hemidactylus garnotii*), tree gecko (*Hemidactylus typus*), and rainbow skink (*Lampropholis delicata*). The moth skink was also collected in the NNL, but persists there only in small numbers (Kraus 2005). Cane toads (*Bufo marinus*) may also occur in the NNL (Kraus 2005). The common house gecko (*Hemidactylus frenatus*) and mourning gecko are also abundant in the Lowland Coastal Area (Kraus 2005).

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Lack of habitat and dearth of native reptiles and amphibians within the area of potential wildfire impact would result in negligible effect of wildfire to reptiles and amphibians.

Indirect Effects of Alternative A (No Action) - Lack of habitat and dearth of native reptiles and amphibians within the area of potential wildfire impact would result in negligible adverse effect of wildfire to reptiles and amphibians.

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Lack of habitat and dearth of native reptiles and amphibians within the area of potential wildfire impact would result in negligible adverse effect of wildfire and associated activities to reptiles and amphibians.

Indirect Effects of Alternative B (Increased Protection) - Lack of habitat and dearth of native reptiles and amphibians within the area of potential wildfire impact would result in negligible adverse effect of wildfire and associated activities to reptiles and amphibians.

Cumulative Effects of Alternative B (Increased Protection) - Negligible

Mitigation Measures of Alternative B (Increased Protection) - Mitigations defined under other resources are sufficient.

Conclusion (Alternatives A and B) – All effects (direct, indirect, and cumulative) of wildfire and associated activities would be a negligible short-term localized adverse effect for Alternatives A and B.

Unique or Important Wildlife Habitat

Two unique habitats are found within the Kalaupapa National Historical Park. Throughout the park, there are nearly 20 known lava tubes and caves. They are remnants of larger systems plugged by siltation, breakdown, or subsequent lava flow. Most of these caves are parts of three separate lava tube systems. The caves contain un-inventoried flora and fauna. The caves also may contain cultural resources from past human use. Other caves may exist because the pahoehoe lava characteristically forms roofed-over channels as it flows. There is also the possibility of caves in the cliffs above the Peninsula.

The second important habitat within the park is the anchialine lake within Kauhakō Crater. At less than one acre in surface area, the lake hides its remarkable depth of approximately 800 feet (248 meters). Such depth, especially for water so small in surface area, results in morphological and chemical features that qualify Kauhakō as one of the most unusual lakes in the world. The lake contains a species of shrimp which may be unique to this lake.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – The sub-surface nature of lava tubes and non-flammable aquatic habitat proffered by the lake make direct impacts by wildfire negligible.

Indirect Effects of Alternative A (No Action) – Mitigation measures adopted under Alternative B would preclude the use of fire-retardants over the lake within Kauhakō Crater and the soil covering would prevent retardant chemicals from entering lava-tubes and caves resulting in only minor adverse localized short-term effects.

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - The sub-surface nature of lava tubes and non-flammable aquatic habitat proffered by the lake make direct impacts by wildfire negligible.

Indirect Effects of Alternative B (Increased Protection) - Mitigation measures adopted under Alternative B would preclude the use of fire-retardants over the lake within Kauhakō Crater and the soil covering would prevent retardant chemicals from entering lava-tubes and caves resulting in only minor adverse localized short-term effects.

Cumulative Effects of Alternative B (Increased Protection) - Negligible

Mitigation Measures of Alternative B (Increased Protection) -

SW-7 Use of retardants on or near Kauhakō Crater or Waikolu Stream during suppression actions shall be avoided to the greatest extent possible, unless public and/or firefighter safety would be threatened by such avoidance.

SW-9 Monitor any chemical retardant drops in sensitive aquatic habitats for effects and, if necessary, taking necessary corrective action(s) using as a guide a recent USFS DEIS for chemical fire retardants on FS lands (see http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/71615_FSPLT2_050375.pdf).

Conclusion (Alternatives A and B) – Mitigation and natural protection of special habitats from fire would result in negligible direct effects from wildfire for alternative A and B. Fire-retardant use across the Peninsula would result in minor adverse localized short-term indirect effects for both alternatives. No cumulative effects are envisaged for either alternative.

Long-term management of resources or land/resource productivity

Productivity by the natural resources of the landscape that would be impacted by wildfire and associated activities are strongly associated with the current non-native shrub and forests covering the Peninsula. The products of photosynthesis in the form of extant vegetation and duff are in greater abundance than historic times. Healthy soils, shade, and the ability of organic matter to improve water storage are considered to increase the productivity of the landscape, albeit by non-native species.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire would result in the loss of extant non-native vegetation and duff, a minor adverse localized long-term effect.

Indirect Effects of Alternative A (No Action) – The loss of shade, increased soil temperatures and increased soil-evapotranspiration would result in a loss of productivity until the non-native vegetation recovered – a minor adverse localized long-term effect.

Cumulative Effects of Alternative A (No Action) – Other projects are minor in area compared to potential wildfire. Alternative A would thus result in negligible cumulative effects.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative A (No Action) – Wildfire would result in the loss of extant non-native vegetation and duff, a minor adverse localized long-term effect.

Indirect Effects of Alternative A (No Action) – The loss of shade, increased soil temperatures and increased soil-evapotranspiration would result in a loss of productivity until the non-native vegetation recovered – a minor adverse localized long-term effect.

Cumulative Effects of Alternative B (Increased Protection) - Other projects are minor in area compared to potential wildfire. Alternative A would thus result in negligible cumulative effects.

Mitigation Measures of Alternative B (Increased Protection) – Mitigations defined under other resources are sufficient.

Conclusion (Alternatives A and B) – The predominant effects of alternatives A and B are direct and would be minor adverse localized long-term effects. The envisaged rapid recovery of non-native vegetation would result in minor adverse localized short-term direct effect for both Alternatives considered. By virtue of the small area of other projects, cumulative effects of both

alternative A and B would be negligible. The accumulation of organic matter and biomass under current conditions (alternative A) might be seen as an improvement in long-term productivity.

Sensitive Species

Sensitive Species - Wildlife

The Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) is the only extant terrestrial mammal native to Hawai'i and is both Federal and State listed as endangered. Surveys have detected bats within the Park along the top of the pali (Fraser et al 2007). There is also an unconfirmed report of a bat-detection on the Peninsula between the pali and the crater (Hosten, pers. comm.).

Little is known about the population and distribution of the species. Hawaiians called the bat 'Ope'ape'a, or half-leaf, as its wings resembled the half-leaf remaining on a taro stalk after the top half has been removed. Population estimates run from the hundreds to the thousands but little is known about its life history and population trends (Fraser et al. 2007). Menard (2001) suggests that abundance and distribution patterns may fluctuate according to season and altitude on the island of Hawai'i. Bats may be more active or more numerous during certain periods of the year and move to lower elevation areas of the islands during their breeding period in spring and summer. They have been seen over the ocean feeding and as high as 4,115 m at the summit crater of Mauna Loa Volcano (Tomich 1974). Bats are most often observed foraging in open areas and the edges of forests though this may only be a reflection of the ease of detection in this areas. Hawaiian hoary bats roost solitarily in the foliage of trees. They may or may not use lava tubes for nesting or roosting, though bat remains have been found in lava tubes on Hawai'i and Maui (Tomich 1974).

Threats to Hawaiian hoary bat include habitat destruction (elimination of roosting sites), possibly direct and indirect effects of pesticides, introduced insects, and disease (USFWS 1998). The Hawaiian hoary bat, as a tree roosting species, is potentially threatened from predation and disturbance from cats and rats. In addition, the introduced common barn-owl (*Tyto alba*) and native short-eared owl (*Asio flammeus*), both nocturnal or crepuscular predators, may pose a threat to foraging bats.

The Federally endangered *Paroreomyza flammea* (Moloka'i creeper or kākāwahie) and *Myadestes lanaiensis rutha* (Moloka'i thrush or oloma'ō), which are both presumed extinct, have historically been documented at higher elevations in Pu'u Ali'i region. *Paroreomyza flammea* is small creeper endemic to the forests of eastern Moloka'i. This species was last recorded on the eastern boundary of the NAR in 1963 (DOFAW 1991, Mitchell et al. 2005). Until the early 1900s, the endangered *Myadestes lanaiensis* was abundant in eastern Moloka'i. This species was sighted three times in the adjacent Kamakou Preserve in 1980, but no confirmed sightings have been documented since (Marshall and Kozar 2008). The Moloka'i population of the *Vestiaria coccinea* (i'iwi) is considered endangered by the State of Hawai'i. This species is common on Maui, Kaua'i, and Hawai'i Island, however, only about 80 (±65) individuals are believed to occur on Moloka'i (Mitchell et al. 2005). A single *V. coccinea* was detected in the Upper Waikolu Valley during the 2004/2005 survey just mauka of the reserve boundary (Marshall and Kozar (2008). During the 1979 Hawaii Forest Bird Survey (HFBS), three *V. coccinea* were detected on the Pu'u Ali'i NAR transect. Marshall and Kozar (2008) concluded that the native forests of Pu'u Ali'i NAR (in addition to upper Waihānau and Hanalilolilo) Kalaupapa National Historical Park

possess the best possible remaining habitat for these forest birds. The Pu‘u Ali‘i NAR is also identified as recovery habitat for *Palmeria dolei* (‘ākohekohe and crested honeycreeper) and the *Pseudonestor xanthophrys* (kīkēkoa or Maui parrotbill) by the Revised Recovery Plan for Hawaiian Forest Birds (USFWS 2006). These endangered forest birds were historically present on Moloka‘i, but are currently found only on Maui (DOFAW 2007). During a 1989 survey, a single *Falco peregrinus* (peregrine falcon), which is an occasional migrant to the Hawaiian Islands, was detected (DOFAW 2007). This species is considered a Species of Concern by the USFWS and certain subspecies are listed as Federally endangered. Two endemic seabirds may occur in the Pu‘u Ali‘i area. The threatened *Puffinus auricularis newelli* and the endangered *Pterodroma sandwichensis* have historically been reported from the NAR area. It is not known whether nesting occurs in the NAR or if significant habitat exists for these species (DOFAW 1991, 2007). No threatened or endangered avifauna were observed in the North Shore Cliff NNL by Marshall and Aruch (2003) or Marshall and Kozar (2008). However, the coastal cliffs and the walls of Waikolu Valley may provide nesting sites for *Puffinus auricularis newelli* and *Pterodroma sandwichensis*. Results from the radar survey conducted for the seabird inventory in 2002 suggest that both *Pterodroma sandwichensis* and *Puffinus auricularis newelli* nest in the valleys of northeastern Moloka‘i, with the Pelekunu and Wailau Valleys having the greatest potential for nesting birds (Day and Cooper 2002). Thus, these endangered seabirds likely occupy the Lowland Coastal Area during the breeding season, returning to nesting colonies in March or April and leaving in June or July. The walls of the Kauhakō Crater are suitable nesting areas for the threatened *Puffinus auricularis newelli* (Newell’s shearwater or ‘a‘o) and the endangered *Pterodroma sandwichensis* (Hawaiian petrel or ua‘u). No reliable information on the occurrence of these species in the crater exists. It has been suggested that overgrowth of non-native vegetation in the Kauhakō Crater may have decreased habitat for these species (NPS 1990). The threatened *Puffinus auricularis newelli* and the endangered *Pterodroma sandwichensis* may fly over the Coastal Spray Zone. These species are believed to nest in the valleys of northeastern Moloka‘i (Day and Cooper 2002).

Threatened green sea turtles (*Chelonia mydas*) have been regularly seen foraging in the nearshore environment, but have not been observed to haul out in the intertidal to rest (Brown et al. 2008). Nesting activities have been recorded on the main black sand beach (Piko‘one) every year since 2005, but prior to 2009 most of these nests appeared to be false nests. In 2009, however, two successful nests hatched on August 20th and September 5th releasing 49 and 50 hatchlings respectively.

The beaches of Kalaupapa have become a premier birthing location for the Federally endangered *Monachus schauinslandi* (Hawaiian monk seal, Brown et al. 2008). As of 2008, a total of 40 Endangered *M. schauinslandi*, 22 males and 18 females, utilize the intertidal zone of Kalaupapa and up to seven pups are born annually on the Peninsula (Brown et al. 2008, NPS unpublished). A total of 46 pups have been born at Kalaupapa since 1997, Moloka‘i dispatch June 18, 2008. <http://www.themolokaidispatch.com/node/2160>). *M. schauinslandi* have a preference for the sandy habitat found on Papalaoa Beach and ‘Ilio Point where pupping takes place in spring and summer. Fewer sightings occur on the neighboring basaltic habitats. Monk seals are most often

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observed from the months of May through August and decrease in density from January to March as *M. schauinslandi* depart the Peninsula.

The Federally endangered humpback whale (*Megaptera novaeangliae*) is regularly seen offshore within the park boundary from December through May (Brown et al. 2008). The peak of whale activity is typically in February and March when mothers and calves frequent Awahua Bay in front of the settlement. The number of whales returning to Hawai'i has increased with a current estimate of 4,500 individuals during the 2000 season (Mobley et al. 2001).

Four species of achatinellid land snails have historically been documented near the Pu'u Ali'i area including *Partulina mighelsiana*, *P. tessellate*, *P. proxima*, and *P. redfieldii*. All four snails are considered Federal Species of Concern. These snails were found near the southern boundary of the NAR in the Kamakou Preserve (NPS 2004, 2007). Due to the similar habitats between these areas, the snails likely also occur within the Pu'u Ali'i NAR boundary. Approximately 400 ha (988 ac) of critical habitat for the endangered *Drosophila differens* (Hawaiian picture-wing fly) also exists immediately mauka of the Pu'u Ali'i NAR in TNC's Kamakou and Pelekunu Preserves (USFWS 2008a). To date there are no known fish species that are listed as endangered, threatened, candidate, or species of concern. However, in the 1980s, the USFWS listed an anadromous goby, *Lentipes concolor*, as a category 1 candidate endangered species based on limited distribution and abundance data (Dodd et al. 1985). Statewide reconnaissance surveys by DAR biologists greatly increased the number of streams in which *L. concolor* was found (Fitzsimons et al. 1990, Higashi and Yamamoto 1993, Devick et al. 1995) led to the subsequent delisting of *Lentipes concolor* in 1996. *Lentipes concolor* is considered a species of concern for the park, and it may be found in the upper reaches of Waikolu Stream.

A proposed rule was published by USFWS in July 2009 to list the native Pacific Hawaiian damselfly, *Megalagrion pacificum*, as endangered (USFWS 2009a). It has been a candidate endangered species since 1994. Historically, *M. pacificum* was the most common and most widespread of the native damselfly species and occurs on Maui, Moloka'i, and Hawai'i Island (Gagne and Howarth 1982). The species is restricted to seepage fed pools along overflow channels at low elevations in the terminal reaches of perennial streams (USFWS 2007). The orange black Hawaiian damselfly, *Megalagrion xanthomeles* is a candidate endangered species known to occur on 'Oahu, Maui, Moloka'i, and Hawai'i Island. The species was historically abundant throughout all the main Hawaiian Islands. A translocation program for *Megalagrion xanthomeles* was initiated on 'Oahu in July 2003 (USFWS 2007). Both *M. pacificum* and *M. xanthomeles* have been recorded from Waikolu Stream. *Megalagrion pacificum* has been recorded in Wai'ale'ia Stream and *M. xanthomeles* has been observed in Waihānau Stream. Several individuals of *M. xanthomeles* were observed flying along the margins of five slow, shallow stream pools in July 1995 (Polhemus 1996). *Megalagrion nigrohamatum nigrohamatum*, a USFWS Species of Concern, has only been documented in Waikolu Stream.

Sensitive Species - Plants

Most of the Threatened and Endangered plants with the potential to occur in Kalaupapa NHP occur in the Pu'u Ali'i area (Table 6). Many of the taxa known from adjacent areas were recorded prior to the 1920s, but may still occur in the area of interest (DOFAW 2007).

Phyllostegia hispida is a proposed endangered species only known from eastern Moloka'i. Currently, only one naturally occurring individual is located within the Pu'u Ali'i area and 23 additional naturally occurring individuals are known in the adjacent TNC's Kamakou Preserve (USFWS 2009b). An estimated 214 individuals have been outplanted in these areas. In 1997, a single *Phyllostegia* individual was discovered on the rim of Pelekunu Valley in the Pu'u Ali'i NAR; however, it was unclear whether this individual was *P. hispida* or *P. manni* (USFWS 2009b). Two plant species seen during the 1989 survey, *Cyanea solenocalyx* (haha) and *Cytrandrabiserrata* (ha'iwale), are considered Federal Species of Concern. *Cyanea solenocalyx* and *Cytrandra biserrata* were observed within the *Metrosideros/ Cheirodendron* Montane Wet Forest near Waikolu Stream. *Cyanea solenocalyx* was also observed along the NAR's eastern boundary on the rim of Pelekunu Valley (DOFAW 1991).

In the Moloka'i Forest Reserve, critical habitat has been designated for three endangered plant species known to have occurred in the area (Table 6). The North Shore Cliff area contains critical habitat for six Federally threatened and endangered species. Three are known to currently occur in the North Shore Cliff area. Federally endangered plant species located in Waikolu Valley include *Cyanea procera* (haha), *Panicum fauriei* var. *carteri* (Carter's panicgrass), and *Melicope reflexa* (alani). Other endangered and threatened plants known to grow on the coastal cliffs of KALA include *Canavalia molokaiensis* ('āwikiwiki), *Schiedea lydgatei*, and *Peucedanum sandwicense* (makou).

The endangered *Centaurium sebaeoides* ('āwiwi) is known to occur in the Lowland Coastal Area. *Centaurium sebaeoides* is the only native Hawaiian gentian. It is an annual with a total population of approximately 6,300 to 6,600 individuals. The population on KALA was comprised of approximately 4,020 plants in 1997 (Medeiros et al. 2000). During the study by Medeiros and Chimera (1997b), no individuals were found. The threatened *Tetramolopium rockii* var. *rockii* has been observed near Kalawao. The main concentration of this species in 1990 occurred along the coast from Kalawao to about 0.6 km (0.4 miles) to the north (Asherman et al. 1990). No *Tetramolopium rockii* var. *rockii* individuals were observed inside or outside of the enclosure transects during the study at Kūka'iwa'a by Medeiros and Chimera (1997b). A large patch of *Canavalia molokaiensis* ('āwikiwiki) has been found on the east side of the mouth of Wai'ale'ia Stream between 10 and 15 m (33 and 49 ft) elevation. At least six additional plants were seen along the coast between the mouth of Wai'ale'ia Stream and Waikolu at Keanakua (Asherman et al. 1990). Several of these plants are planned to be outplanted in the Lowland Coastal Area between Wai'ale'ia Stream and Kaaia, including the endangered *Canavalia molokaiensis*, endangered *Brighamia rockii*,

and threatened *Peucedanum sandwicense*. NPS has also outplanted *Brighamia rockii* individuals at Kūka‘iwa‘a (USFWS 2008b), as well as the endangered *Scaevola coriaceae* (dwarf naupaka). The only Federally listed plant species recorded in the Coastal Spray Zone is the threatened *Tetramolopium rockii* var. *rockii*. Although *Centaurium sebaeoides* (‘āwiwi) does not currently occur in the Coastal Spray area, critical habitat for this species has been designated there. Several threatened and endangered plant species occur on the two islets (Ōkala and Huelo) included within Kalaupapa NHP. Although no critical habitat has been designated on the Offshore Islets, the endangered *Brighamia rockii* (pua‘ala) and threatened *Peucedanum sandwicense* occur on Huelo Islet. Roughly 50 mature *B. rockii* individuals were recorded on the west side of the seastack in 1994, but this population has decreased over time. Only five *B. rockii* individuals were documented on the islet in 2003 (Wood 2008) and only one was noted in the most recent USFWS review (USFWS 2008a). Approximately 90% of the loss of *B. rockii* on Huelo is attributed to landslides, although lack of natural pollinators likely contributed to its small population size (Wood 2008). Eight mature *Scaevola coriacea* currently occur on Ōkala Islet (Wood 2008). This endangered plant is currently known from five locations in Hawai‘i, of which three are on offshore islets. In 2005, NPS fenced a small population of about five mature *P. sandwicense* individuals near the top of the Kalaupapa Cliff Trail between switchbacks 2 and 3. An additional population of 12 *P. sandwicense* individuals occurs off the trail just below switchback 3. Evidence of herbivory has been documented on these individuals (USFWS 2003). NPS outplanted four *Brighamia rockii* (pua‘ala) individuals along the Kalaupapa Trail switchbacks and one individual at the top of Kalaupapa Trail (USFWS 2008a). Other endangered species planned to be outplanted in the North Shore Cliff NNL include: *Canavalia molokaiensis*, *Peucedanum sandwicense*, and *Hibiscus arnottianus* ssp. *immaculatus* (koki‘o ke‘oke‘o). *Portulaca villosa* (ihi), a USFWS Species of Concern, occurs at the southwestern rim of the crater at roughly 155 m (508 ft) above sea level (a.s.l.). There were 6 *P. villosa* individuals in 1990 (Asherman et al. 1990). Fifteen individuals were counted in 2009 (Hosten pers comm.). Seven Federally threatened or endangered plant species currently occur in the Lowland Coastal Area. Four of these contain critical habitat within this area. *Hibiscus arnottianus* ssp. *immaculatus*, critical habitat in the Lowland Coastal Area. Numerous *Panicum fauriei* var. *carteri* individuals were documented at Kūka‘iwa‘a in 1992. The species was noted to grow at the edge of the cliffs likely because this area has minimal grazing and trampling pressure by non-native ungulates and competition from non-native plants (Jessel and Agliam 1994, NPS 2000a). In 2000, a total of 457 individuals were counted along the coast of the Peninsula at the previously established monitoring stations (LeGrande 2002).

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – With the exception of the Hawaiian Hoary bat, the lack of intersection of known sensitive species location and habitat with potential wildfire and creation of fire-break results in No Effect for all plant and wildlife species. The Hawaiian Hoary bat is the only wildlife species likely to be directly influenced by wildfire. Wildfire would engulf roosts and inhabitants in the daytime in a manner that may effect, but is not likely to adversely effect the metapopulation of bats.

Indirect Effects of Alternative A (No Action) - Marine mammals using the beaches (particularly the Hawaiian monk seal) may be affected by aircraft and drift of fire retardant. The loss of roosting habitat for Hawaiian Hoary bats would result in a moderate adverse localized long-term effect on bat populations. Both marine mammals and bats would be influenced in a manner that may effect, but is not likely to adversely effect populations in the long term.

Cumulative Effects of Alternative A (No Action) – The small area proffered by other projects and location beyond key habitat used by sensitive species would result in no effect under cumulative impacts for Alternative A.

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - With the exception of the Hawaiian Hoary bat, the lack of intersection of known sensitive species location and habitat with potential wildfire, creation of fire-break, and fuel reduction results in No Effect for all plant and wildlife species. The Hawaiian Hoary bat is the only wildlife species likely to be directly influenced by wildfire. Wildfire would engulf roosts and inhabitants in the daytime in a manner that may effect, but is not likely to adversely effect the metapopulation of bats.

Indirect Effects of Alternative B (Increased Protection) - Marine mammals using the beaches (particularly the Hawaiian monk seal) may be affected by aircraft and drift of fire retardant. The loss of roosting habitat for Hawaiian Hoary bats would result in a moderate adverse localized long-term effect on bat populations. Both marine mammals and bats would be influenced in a manner that may effect, but is not likely to adversely effect populations in the long term.

Cumulative Effects of Alternative B (Increased Protection) - The small area of influence by other projects and location beyond key habitat used by sensitive species would result in no effect under cumulative impacts for Alternative B.

Mitigation Measures of Alternative B (Increased Protection) -

SS-1 When emergency actions must be taken to prevent imminent loss of human life or property and these actions would result in a taking of listed species or adverse modification of critical habitat not covered under existing consultations, the NPS will respond to the situation in an expedient manner to protect human health and safety. After the incident is under control, the NPS will initiate emergency consultation procedures with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, as appropriate.

- SS-2** The project manager working with contractor or NPS crews on fire management projects in or near areas designated as habitat of listed species must be given specific instructions on the restrictions for the special status plant and animal species in each area to avoid harassment, take or habitat damage.
- SS-3** All outside workers and visitors, including firefighters and personnel working at a firefighting staging area, must be informed about the protections afforded Federal and State-listed endangered monk seals. Any person who encounters a monk seal whether on land or in the ocean must abide by the following:
1. Do not approach the seal even though they may approach you.
 2. Remain at least 100 feet away from all monk seals that have hauled out on the beach to avoid disturbing them.
 3. Never come between a female monk seal and a pup.
 4. Report sightings of injured or sick seals or of harassment by others to the National Marine Fisheries Service in Honolulu (808-955-8831).
- SS-4** In the event of a wildfire, the Resource Advisor will advise the Agency Representative of any monk seals hauled out on Park beaches. The Agency Representative will inform the Incident Commander of all haul-outs and the restrictions against harassment of monk seals including:
- Staging areas should be adequately set back from beaches where seals are known to haul out based on guidance from the Resource Advisor.
 - Non-emergency aircraft must stay 1000 feet from monk seals and humpback whales whether in the ocean or seals on shore.
 - Emergency aircraft should stay 1000 feet from monk seals and humpback whales to the extent feasible while fulfilling their emergency roles.
 - All personnel involved in the suppression effort must adhere to the restrictions in SS-3.
 - Boats and other watercraft must not approach beaches where monk seals are hauled out or approach closer than 100 yards to monk seals or humpback whales in the ocean.
- SS-5** In the event of a wildfire, the resource advisor should inform the NPS agency representative of any monk seals onshore or humpbacked whale sightings. The agency representative should inform the incident commander of the general location of these animals. All flights involved in emergency operations should maintain a distance of 1000 feet above monk seals and humpbacked whales, to the extent feasible in carrying out their

emergency mission. All non-emergency flights should be cautioned to keep out of air space above the Kalaupapa Peninsula.

- SS-5** Natural resource staff shall all NPS staff and private contractors working on fire management projects of the areas closed to vehicles and trampling to protect *Tetramolopium rockii* and staging areas for all projects will be sited to protect these populations.
- SS-6** Complete surveys for Hawaiian Hoary bat roosting areas before the implementation of fuel-reduction activities.

Conclusion (Alternatives A and B) - The direct influence of wildfire may effect, but is not likely to adversely effect the metapopulation of bats under alternatives A or B. Loss of roosting habitat as a consequence of fuel-reduction may effect, but is not likely to adversely effect the metapopulation of bats under alternatives A and B. Cumulative effects are considered negligible for both alternatives.

TABLE 6 - SPECIAL STATUS SPECIES (PLANTS, BIRDS, MAMMALS, AND INVERTEBRATES) THOUGHT TO OCCUR IN KALAUPAPA NATIONAL HISTORICAL PARK.

C = Candidate, E = Endangered, T = threatened, SOC = Species of Concern

Species Name	Common Name	Family	Date Listed	Status	organism	location
<i>Falco peregrinus</i>	peregrine falcon			SOC	avifauna	Pu'u Ali'i
<i>Falco peregrinus</i>	peregrine falcon		--	SOC	avifauna	Pu'u Ali'i
<i>Myadestes lanaiensis</i>	Moloka'i thrush or oloma'ō		10/13/1970	E	avifauna	Pu'u Ali'i
<i>Myadestes lanaiensis</i>	Moloka'i thrush or oloma'ō		10/13/1970	E	avifauna	Pu'u Ali'i
<i>Paroreomyza flammea</i>	Moloka'i creeper or kākāwahie		10/13/1970	E	avifauna	Pu'u Ali'i
<i>Pterodroma sandwichensis</i>	Hawaiian petrel		3/11/1967	E	avifauna	Pu'u Ali'i
<i>Puffinus auricularis newelli</i>	Newell's shearwater		10/28/1975	T	avifauna	Pu'u Ali'i
<i>Vestiaria coccinea</i>	i'iwi			SE	avifauna	Pu'u Ali'i
<i>Partulina mighelsiana</i>				SOC	invertebrate	Pu'u Ali'i
<i>Partulina proxima</i>				SOC	invertebrate	Pu'u Ali'i

<i>Partulina redfieldii</i>				SOC	invertebrate	Pu'u Ali'i
<i>Partulina tessellata</i>				SOC	invertebrate	Pu'u Ali'i
<i>Adenophorus periens</i>	pendant kihi fern	Grammitidaceae	11/10/1994	E	plant	Pu'u Ali'i
<i>Bidens wiebkei</i>	ko'oko'olau	Asteraceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Brighamia rockii</i>	pua'ala	Campanulaceae	10/8/1992	E	plant	FR, islets
<i>Canavalia molokaiensis</i>	'āwikiwiki	Fabaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Centaurium sebaeoides</i>		Asteraceae		E	plant	coastalsprayzone
<i>Clermontia oblongifolia</i> ssp. <i>brevipes</i>	'oha wai	Campanulaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Cyanea dunbarii</i>		Campanulaceae		E	plant	Forest Reserve
<i>Cyanea procera</i>	haha	Campanulaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Cyanea profuga</i>	-----	Campanulaceae	-----	SOC	plant	Pu'u Ali'i
<i>Cyanea solanaceae</i>	popolo	Campanulaceae	-----	SOC	plant	Pu'u Ali'i
<i>Cyanea solenocalyx</i>	haha	Campanulaceae	-----	SOC	plant	Pu'u Ali'i
<i>Cyrtandra halawensis</i>	ha'iwale	Gesneriaceae	-----	SOC	plant	Pu'u Ali'i
<i>Cyrtandra hematos</i>	ha'iwale	Gesneriaceae	-----	SOC	plant	Pu'u Ali'i
<i>Cyrtandra macrocalyx</i>	ha'iwale	Gesneriaceae	-----	SOC	plant	Pu'u Ali'i

<i>Cytrandra biserrata</i>	ha'iwale	Gesneriaceae	-----	SOC	plant	Pu'u Ali'i
<i>Diellia erecta</i>	-----	Aspleniaceae	11/10/1994	E	plant	Pu'u Ali'i
<i>Eurya sandwicensis</i>	-----	Theaceae	-----	SOC	plant	Pu'u Ali'i
<i>Exocarpos gaudichaudii</i>	-----	Santalaceae	-----	SOC	plant	Pu'u Ali'i
<i>Gardenia remyi</i>	nanu	Rubiaceae	-----	SOC	plant	Pu'u Ali'i
<i>Hedyotis mannii</i>	pilo	Rubiaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Hesperomannia arborescens</i>	-----	Asteraceae	3/28/1994	E	plant	Pu'u Ali'i
<i>Hibiscus arnottianus</i> ssp. <i>immaculatus</i>		Malvaceae		E	plant	Forest Reserve
<i>Hibiscus kokio</i> ssp. <i>kokio</i>	pualoalo	Malvaceae	-----	SOC	plant	Pu'u Ali'i
<i>Joinvillea ascendens</i> ssp. <i>ascendens</i>	'ohe	Joinvilleaceae	-----	C	plant	Pu'u Ali'i
<i>Lagenifera maviensis</i>	-----	Asteraceae	-----	SOC	plant	Pu'u Ali'i
<i>Lobelia dunbarii</i> ssp. <i>dunbarii</i>	-----	Campanulaceae	-----	SOC	plant	Pu'u Ali'i
<i>Lobelia dunbarii</i> ssp. <i>paniculata</i>	-----	Campanulaceae	-----	SOC	plant	Pu'u Ali'i
<i>Melicope reflexa</i>	alani	Rutaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Peucedanum sandwicense</i>	makou	Apiaceae	2/25/1994	T	plant	islets

<i>Phyllostegia hispida</i>	-----	Lamiaceae	-----	E	plant	Pu'u Ali'i
<i>Phyllostegia mannii</i>	-----	Lamiaceae	10/8/1992	E	plant	Pu'u Ali'i
<i>Phyllostegia mollis</i>	-----	Lamiaceae	10/29/1991	E	plant	Pu'u Ali'i
<i>Phyllostegia stachyoides</i>	-----	Lamiaceae	-----	SOC	plant	Pu'u Ali'i
<i>Plantago princeps</i> var. <i>laxiflora</i>	kuahiwi laukahi	Plantaginaceae	11/10/1994	E	plant	Pu'u Ali'i
<i>Platanthera holochila</i>	-----	Orchidaceae	10/10/1996	E	plant	Pu'u Ali'i
<i>Ranunculus mauianus</i>	makou	Ranunculaceae	-----	C	plant	Pu'u Ali'i
<i>Scaevola coriacea</i>	dwarf naupaka	Goodeniaceae	5/16/1986	E	plant	islets
<i>Schiedea diffusa</i>	-----	Caryophyllaceae	-----	SOC	plant	Pu'u Ali'i
<i>Schiedea pubescens</i> var. <i>pubescens</i>	ma'oli'oli	Caryophyllaceae	-----	C	plant	Pu'u Ali'i
<i>Sicyos cucumerinus</i>	'anunu	Cucurbitaceae	-----	SOC	plant	Pu'u Ali'i
<i>Stenogyne bifida</i>	-----	Lamiaceae	10/9/1992	E	plant	Pu'u Ali'i
<i>Tetramolopium rockii</i> var. <i>rockii</i>		Asteraceae		T	plant	coastalsprayzone
<i>Zanthoxylum hawaiiense</i>	a'e	Rutaceae	3/4/1994	E	plant	Pu'u Ali'i

CULTURAL RESOURCES

The Kalaupapa Peninsula has a unique human history and rich natural history. Protruding from the base of some of the world's tallest sea cliffs, the low-lying Peninsula was designated by King Kamehameha V (advised by Western doctors) as a location to isolate residents of Hawai'i who were diagnosed with leprosy. The "Act to Prevent the Spread of Leprosy" went into effect January 3, 1865 and the first exiles disembarked on January 6, 1866. In the early days of the settlement, the exiles were expected to fend for themselves. As more exiles arrived and the news spread of the poor living conditions at the settlement, Kalaupapa began receiving more attention from religious missions, the Hawai'i Territorial Government, and eventually the U.S. Federal Government.

The 1873 arrival of Saint Damien, both a dedicated priest and a skilled carpenter, marked the beginning of major social and physical improvements in the settlement. By the turn of the century the gradual migration of the community from the Kalawao (windward) to the Kalaupapa (leeward) side of the Peninsula was complete, with the exception of the Baldwin Home for Boys, two churches, and the short-lived U.S. Leprosarium (1909-1913). After the 1902 arrival of John McVeigh as Superintendent and Dr. William Goodhue as resident physician, the Kalaupapa settlement underwent massive improvements and earned the reputation as the best leprosy treatment facility in the world.

By 1924, Hawai'i's leprosy epidemic was subsiding and the advent of sulphone drugs in 1943 produced remarkable improvements in the treatment of Hansen's Disease patients, causing their symptoms to subside and permitting a more normal and comfortable lifestyle for the patients. It was not until the early 1960s that health workers determined that regular use of the sulphone drugs made the patients non-contagious. As a result, the mandatory isolation laws, effective in Hawai'i for over a century, were abolished in 1969 and patients were allowed to leave the Peninsula. Nevertheless, many members of the patient community did not leave and continue to live there today.

Due to the history of the settlement and treatment of the patients, Public Law 96-565 outlines the rights of the Hansen's disease patients living at Kalaupapa today. These rights include the right to limit public visitation to the settlement to no more than 100 persons per day. Patients also have the right to take and utilize fish and wildlife resources without regard to Federal fish and game laws and regulations and the right to take and utilize plant and other natural resources for traditional purposes in accordance with applicable State and Federal laws.

The stories that are not as often voiced are those of the *kama`āina* who flourished on the Peninsula for centuries before the Hansen's Disease settlement was established. More and more light is being shed on the Kalaupapa *kama`āina* and our knowledge of their lives and the transitional period of how they interacted with the Hansen's Disease patients continues to grow. Because of the factual history of displaced *kama`āina*, there has been more than one account

noting the lack of pre-contact information regarding Kalaupapa and its people. Perhaps it would be more accurate to say that the written information on pre-contact Kalaupapa is lacking, however, it is highly likely that a wealth of historical information lies in *mo`olelo* [unwritten stories].

In a bit more detail, and to take the opportunity to give voice to the ‘transitional’ part of Kalaupapa’s history, the historical accounts tell us that the *kama`āina* took in the Hansen’s disease patients into their homes all over the Peninsula and also Waikolu Valley. Where there were no more houses available for the sick, some resided in caves throughout the Peninsula (Hutchison 1932). Frustrated with the situation, the *kama`āina* took off to see King Lot [Kamehameha V]. Though the King too was distressed, his advisors reminded him that they were only carrying out the Act to protect the Hawaiian race (Hutchison 1932). With unfortunate news upon the *kama`āina*’s return to Kalaupapa, they began to pack up their lives from their home place and relocated, most of them to Waialua, east Moloka’i by 1895 (Hutchison 1932, Damon 1948, Greene 1985). Following this period of history, the community on the Peninsula began to consist of patients and their *kōkua* with two primary settlements, Kalaupapa and Kalawao. By 1932 the settlement moved completely to the Kalaupapa side of the Peninsula and exists and thrives there until this day (Stein 2009:6).

National Historic Landmark and National Register of Historic Places Status

The “Kalaupapa Leprosy Settlement” National Historic Landmark (NHL) was designated on January 7, 1976, and subsequently listed in the National Register of Historic Places (NR #76002415). The Kalaupapa Leprosy Settlement NHL was originally listed under National Register evaluation criteria A and B as per Section 106 of the National Historic Preservation Act (NHPA) 36 CFR Part 800. Further assessment in 2005 for a Cultural Landscape Inventory found the NHL to be eligible under all applicable criteria (A, B, C, and D). The State Historic Preservation Officer (SHPO) concurred on the revised Determination of Eligibility.

Criterion A. The Kalaupapa and Kalawao settlements on Moloka'i are nationally significant as the national social attitudes, health policies, and treatment paradigms for victims of leprosy were revolutionized during the period of significance, in part as a direct result of the Moloka'i example. On the State level, Criterion A also applies as the isolated historic district is emblematic of broader patterns of social and physical transformations occurring elsewhere in the Hawaiian Islands following Western contact - most importantly the introduction of foreign diseases to which the Hawaiian people were particularly vulnerable. In the aftermath of Western contact, the impacts of leprosy and other foreign epidemics to the communities, demographics, culture, and physical history of the Hawaiian Islands were extensive.

Criterion B. Kalaupapa is significant on both the National and State levels for its association with Father Damien (Joseph De Veuster), Mother Marianne Cope, and Brother Joseph Dutton and others for their heroic humanitarian efforts in serving the afflicted and restoring dignity to the community of exiles. Their example, propelled by the global renown of Father Damien and the "Moloka'i leper colony", significantly influenced social and health perspectives on Hansen's Disease throughout the U.S. and the around the globe.

Criterion C. The largely intact Kalaupapa Settlement, including its layout, spatial organization, circulation patterns, architecture and other features is significant at the State level. Spatial characteristics of the historic district are indicative of its historical use as a leprosy settlement and include: the clustered arrangement of the various treatment facilities and residential sections (e.g. the Bishop Home for girls, the Baldwin Home for boys), the grid- pattern circulation system of roads and walkways within the settlement, and the absence of formal routes leading out of the settlement. In addition, scores of original Hawai'i

Plantation Style houses, churches, dormitories, and other landscape features remain, as well as utilitarian and aesthetic planted vegetation within the neighborhoods, all of which collectively create a unity in the fabric in terms of scale, density, shape, style, and form. This Plantation Style is rapidly disappearing in Hawai'i and the extended and cohesive

group found at Kalaupapa is one of the last remaining collections. Further, the historic district contains scores of unique small-scale features (e.g. shrines, grave markers, tombs) which add a unique and personal dimension to the physical history of the place.

Criterion D. The historic district is highly likely to yield information important to the prehistory and history of the landscape. The Kalaupapa Peninsula is dense in historic and prehistoric archaeological sites uncompromised by contemporary development. Dense invasive vegetation has made it difficult to conduct archaeological surveys; as a result, only about ten percent of Kalaupapa National Historical Park has been surveyed. Large portions of the intensively developed landscape at Kalawao and along Father Damien Road are rich in historic-period archaeological sites that may contain crucial information relevant to understanding the cultural historic district's development over the last 103 years. The prehistoric archaeology on the Peninsula, presumed to be one of the largest unaltered archeological sites in the State, is significant in its own right and may warrant a separate period of significance at a future date.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildland fire and suppression activities by use of fire retardants could evoke a direct moderate localized long term adverse effect by causing deterioration or staining to historic properties. Additionally, rapid temperature changes caused by application of retardant to hot rocks may cause spalling of stone and degradation of mortar, thereby potentially affecting historic properties.

Indirect Effects of Alternative A (No Action) –As long as mitigation measures are followed there will be no additional impacts (negligible) on the contributing resources to the National Historic Landmark.

Cumulative Effects of Alternative A (No Action) – Negligible

Mitigation Measures of Alternative A (No Action) – Mitigation measures under each individual contributing cultural resource must be followed in order to retain historic integrity of the National Historic Landmark. See CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – Wildland fire and suppression activities by use of fire retardants could evoke a direct moderate localized long term adverse effect by causing deterioration or staining to historic properties. Additionally, rapid temperature changes caused by application of retardant to hot rocks may cause spalling of stone and degradation of mortar, thereby potentially affecting historic properties. The widening of the fuel-break and manipulation of vegetation may reduce the above impacts, but further disturb rock alignments.

Indirect Effects of Alternative B (Increased Protection) – As long as mitigation measures are followed there will be no additional impacts (negligible) on the contributing resources to the National Historic Landmark.

Cumulative Effects of Alternative B (Increased Protection) – Negligible

Mitigation Measures of Alternative B (Increased Protection) - Mitigation measures under each individual contributing cultural resource must be followed in order to retain historic integrity of the National Historic Landmark. See CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Conclusion (Alternatives A and B) – In both alternatives there is potential to cause moderate localized long term adverse direct effects. However, both Alternative A and Alternative B provide management actions for enhancing the integrity of the historic landmark, creating overall beneficial effects. The no-action alternative (Alternative A) would result in the continued decline in condition of the NHL as a consequence of plant growth and damage by feral animals.

Ethnographic Resources

Ethnographic resources are those cultural resources to which traditional and park-associated communities associate significance, meaning and value. The range of ethnographic resources can vary from one locale to another based on whether traditional people perceive particular resources as meaningful to their identity and cultural lifeways. Thus, a natural object, such as a rock where food offerings are left, are also an ethnographic resource because the rock has religious meaning and associated rituals linked to it. Ethnographic resources may include archeological sites, historic structures, landscape features, spiritual and sacred areas, subsistence resources, ocean resources, including submerged resources, and trails. Resources can also be intangible, such as a particular rain or wind to which particular descriptive characteristics are ascribed and have significance to an associated group of people. Such resources continue to play a role in a community's identity and way of life.

Overview of Cultural Resources Use by the Patient Community

When the patients were younger, many learned to fish and gather resources from the mountain valleys and streams (Waihānau, Wai`ale`ia, Waikolu). The streams were accessed for *hīhīwai*, *o`opu* and watercress (Waikolu). From Waikolu Valley, they also gathered yellow ginger and *maile* for lei to wear to dances at Paschoal Social Hall, *lū`au* and other festive events. From the ocean, all kinds of fish – along with crab, lobster *he`e* and *opihi* – were caught. Other seafood delicacies collected were edible *limu*, *wana*, *hā`uke`uke* and shellfish. There is also a tradition of collecting salt from the shallow pools and rock depressions along the northern coast of the Peninsula. Many patients believe that Kalaupapa salt should never be sold or the salt supply will dry up. It can only be given away. The patients have a tradition of giving salt away to their callers (visitors, guests) who visit Kalaupapa. In the absence of stores at Kalaupapa, salt is the one gift they have access to and they can offer from the land. Another tradition associated with the patient community is the *kīkānia*, a thorny non-native plant that grows wild, especially out in the open spaces at Kalawao where it used to be more abundant in times past. Its orange fruit, gathered and strung into lei, has become symbolic as the “official” lei representing Kalaupapa. Some patients planted *kīkānia* in their yards because it became harder to find. Certain other plants were used for food preparation and/or eating such as *lau kī*, *hō`i`o* and watercress. Patients also used particular plants for *lā`au lapa`au*, for medicine and healing.

Hunting for animal resources with guns was a later tradition. It was illegal for patients to own guns until the early 1950s and *kōkua* were not allowed to hunt until about 1995. In earlier years, patients hunted pigs and goats with dogs or by catching the young animals. In one story, a patient killed a pig by hitting it on the head with a rock. The pig was dressed, cooked in the *imu* and shared with the rest of the boys at Old Baldwin Home. (Cambra in ASL) Deer entered the park in 1984 and are hunted by *kōkua* today. There are no longer patients who hunt but the *kōkua* do share their excess deer meat with those patients who request it. The tradition of giving fish, salt

and other resources away to widows, elderly and those in need is rooted in Hawaiian culture. This tradition has carried over to the patient culture. Both patients and *kōkua* speak of giving fish to other patients who can no longer fish or who no longer have access to fish (i.e., a spouse who fished has since died). Now that most of the patients are unable to fish because of their age or health reasons, patients depend on *kōkua* to supply them with these kinds of food resources they love and that represent their cultural values.

The rich cultural heritage of these traditions continue to be expressed by cultural practitioners such as *Pohaku a Kane*, (dry stack stone masons), visiting and resident *hula halau*, (oracular tradition and dance) and the propagation of native and traditional plants at the NPS Native Plant Nursery.

Kalaupapa NHP is an “historical” park. As such, it is important to understand that ethnographic resources cannot only be looked at as an independent unit of cultural resources. Ethnographic resources are deeply imbedded throughout Kalaupapa culture and history – in traditional Hawaiian legends and history of the place itself, in the stories patients tell, in historic buildings, in the scenic and cultural landscape, in the cemeteries and churches. The most important ethnographic resource this park has is the patients themselves – their stories, their knowledge and personal experiences of the cultural and historic landscape. Recognizing this, the NHP started a formal ethnography program in 2009 to actively engage the patient community to participate in documenting their history. Their stories will be a valuable resource for education, interpretation, and research and will help to direct the long-term future of Kalaupapa.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Wildland fire and suppression activities including the use of fire retardants would result in a moderate long term widespread adverse effect by causing alteration to resources associated with subsistence, religious values and the cultural landscape.

Indirect Effects of Alternative A (No Action) - Negligible

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - See CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – Wildland fire and suppression activities including the use of fire retardants would result in a minor long term widespread adverse effect by causing alteration to resources associated with subsistence and religious values. Alternative B would also provide a beneficial effect by reducing invasive brush and maintaining the historic views and cultural landscape for communities to participate in culturally important activities.

Indirect Effects of Alternative B (Increased Protection) - Negligible

Cumulative Effects of Alternative B (Increased Protection) -Negligible

Mitigation Measures of Alternative B (Increased Protection) - Retain all heritage trees in the extended fuel reductions under Alternative A, see CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Conclusion (Alternatives A and B) – The direct effects of fire and control methods would be reduced from moderate long-term widespread adverse under alternative A to minor long-term widespread adverse under alternative B. This reduction in effect under alternative B is due to the expanded fuel reduction within and outside the settlement aimed at reducing landscape fire-hazard and fire intensity adjacent historically significant buildings. Both alternative A or B would show negligible indirect or cumulative effects on historic structures.

Historic Buildings and Structures

Presently there are approximately 1500 historic structures at Kalaupapa National Historic Park, including some 270 historic buildings, 4 outdoor sculptures, 2 main roads, 30 ruins, 1199 grave markers, 1 special feature (Waikolu water line) and 1 marine/waterway feature (Kalaupapa Landing). These historic structures are the physical evidence and remnants that tell what happened here on the Kalaupapa Peninsula in the past into the present. Preserving these historic structures is paramount in telling this story.

The Kalaupapa Peninsula was declared a National Historical Landmark (NHL) in 1976 prior to the site becoming a national park in 1980. At that time over 400 buildings existed and NPS soon took over and completed an inventory of the historic buildings, prioritizing about 200 buildings, according to their significance for preservation, but recognizing the impossibility of preserving all existing structures in this tropical, remote site. Of these initial 200 prioritized buildings identified about 80 % still exist presently. The other extant historic buildings not identified on the NPS 1980 priority list, but contributing to the character and setting of the Peninsula, have been added to an updated Building Priority List in 2006.

The types and patterns of buildings constructed on the Kalaupapa Peninsula were based on the needs and requirements of the patients and the operation of the facility. There are four major building types represented: residential, administration/industrial, religious and patient-built structures. The form, materials and stylistic features are similar despite their historical uses. With few exceptions the architectural cohesiveness of the historic buildings throughout the community is a result of a consistent handling of form, material and style. Similarly within each of the twelve cemeteries are relatively consistent uses of materials and construction styles and techniques.

Most of the existing historic structures remain from the period of significance. They continue to reflect the needs of the settlement throughout its history and how the population adapted to those needs and to the environment on the isolated Kalaupapa Peninsula. Smaller structures and features such as stone walls and entry pillars, statuary, monuments and memorials provide critical detail to the physical history and demonstrate the utilitarian, decorative, and spiritual needs of the population.

Patterns

Historically buildings at Kalaupapa were sited either individually along streets or were part of complexes organized around central spaces or main buildings. In the early settlement of Kalaupapa there was primarily a linear arrangement of small buildings along an approximate orthogonal grid. Many structures were sited on individually expressed lots and generally oriented towards the street. Clusters of buildings associated with group homes, such as McVeigh

Home or Bayview Home, also fit into the orthogonal layout. However Bishop Home has a forty five degree orientation to the grid and Baldwin Home at Kalaupapa was detached from the grid to the south of the settlement. Generally the single residences were used by healthier patients. The group homes were for those patients who required daily assistance. The hospital, community store, pier, community hall, visitor quarters and most of the churches are all centrally located within the settlement.

Material and Stylistic Features

The earliest remaining structures are typically small residential buildings, often less than 400 square feet floor plan with single wall, wood frame construction of board and batten details. A simple gable roof runs the length of the structure and the interior layout has two or three spaces with laundry functions housed separately.

The mid-period structures were very similar to the standardized plans produced by the Hawai'i Sugar Planters Association (HSPA) from 1919 to 1930, now known as the Hawaiian Plantation Style. The Department of Health drew the site plans for new construction at Kalaupapa in the 1930's, where featured new buildings have an exterior frame of vertical boards of tongue & groove or board & batten with lateral stability achieved with exterior horizontal girts. Gable or hip roofs have overhanging eaves. Window and door openings are organized in singles or pairs and sashes were multi-pane double hung or sliding. Doors were plank or stile and rail with built-in screens. Decorative features such as columns, cornices, and decorative moldings were often added to the basic design.

Building Types: Residential

Today residential buildings exist only at the Kalaupapa Settlement and consist of two basic types: individual homes/cottages and group living homes. Housing and institutional structures here are typically single story, wood frame buildings in a simple massing of rectilinear spaces often accessed from open porches. The buildings are raised one to two and a half feet above grade on a foundation of posts sitting on rock or concrete footings. There were distinct sub-communities built during the several construction phases, which have standardized plans and building components.

While several groups of patient cottages were built within individual complex areas, there were also periods of residential construction activity on the east side of the settlement. The earliest houses pre-dating the historic period were simple structures with double-pitched, gable roofs and single wall, board & batten walls. The eaves extended to cover the porch which spanned across the entire front of the structure. Many of the materials for these earliest cottages at Kalaupapa were brought from Kalawao at the turn of the twentieth century and recycled. These houses and associated buildings, such as wash houses, workshops and outhouses, were located along the alignment of Kamehameha Road. While these houses do not remain as a distinct grouping

today, their form is very distinctive and can be seen within later residential areas as remnants of what was once much more prominent in the settlement.

There were a substantial number of patient cottages built in 1931 by Moloka'i homestead carpenters. These houses were simple rectangles in plan with a simple hip roof and inset covered porch. The single-wall constructed exteriors were tongue and groove with concrete stoops and stone side walls. Housing built after World War II are typical Hicks Homes (a standardized, pre-fabricated housing type popular in Hawai'i at the time). Many of these buildings remain in the residential areas throughout the settlement and contribute to the significance of the site.

The group homes and dormitories are generally surrounded by their own set of auxiliary & functional buildings such as wash houses, laundries, utility buildings and storage sheds. Although many of the outbuildings for Bishop Home no longer exist, the overall layout with concrete foundations remaining is still evident. McVeigh Home and Bayview areas are still quite intact with most historic structures still remaining. The main structures of the group homes are similar in construction to the cottages, but a much larger scale. They are primarily single wall construction with hip roofs extending over large front porches running the full extent of the main façade. They rest on pier foundations with have board & batten siding and double-hung windows.

Building Types: Administrative/Industrial

Community buildings built for the enrichment of patient life were typically large and centrally located. Paschoal Hall, the most important community building is prominently located in the center in the settlement, distinguished by its large size and orientation within a large open space surrounded by tall palm trees. The landmark structure built in 1916 is an example of Hawaiian Plantation Style architecture and retains basic elements, such as tongue and groove vertical wood plank siding, slider windows, stile & rail doors, truncated hip roof and concrete footings. The historic structure has been used for dances, to view movies, provide a venue for live entertainment, host other community events and meetings, and is a key historical feature illustrating Kalaupapa's administrative philosophy of improving the life experience of the patients. No longer present, the unique interior features included balconies & railings which separated the uninfected from the tiers where the patients were allowed, adding to the building's architectural significance. McVeigh Social Hall is today the main venue for most of the community activities at Kalaupapa. It sits at the center of McVeigh Home located at the northeast corner of the settlement and has been recently repaired with a new roof and repainted on the exterior.

In addition to the community social halls, there were several ethnic social halls built during the historic period, including the Americans of Japanese Ancestry (AJA) Benevolent Society Hall, the Chinese Clubhouse, the Filipino Meeting House and the Women's Social Club. The Women's Social Club was converted to the bakery in the mid 1930's and is now known as the

Craft Shop. AJA Hall is the only remaining ethnic social hall and serves as the museum and book store for park visitors operated by the Kalaupapa Historical Society with the assistance of Arizona Memorial Museum Association.

Other remaining civic buildings such as the US Post Office and the Kalaupapa Store, Mother Marianne Library, Gas Station, and Department of Health Administrative Office are residential in scale and distinguished only by their location within the community's core near the pier. The character of the nearby industrial area is quite different than the rest of the settlement during the historic period since the majority of the buildings were not built in the plantation style. These structures are large and rectilinear with flat or simple gable roofs. Most structures were built on concrete slabs with concrete or unit masonry walls with few distinguishing features. The exception is the main warehouse built next to the pier which had modern plaster decorative elements in the Art Deco style. After World War II the Navy provided several large Quonset huts to Kalaupapa, which were placed in the industrial area for use as storage and temporary housing. One of these Quonset huts also remains in the Bayview area and is still used as a dormitory.

Building Types: Religious

Places of worship played an important historical role at both Kalawao and Kalaupapa Settlements and continue to be important to the remaining patients and community. The primary religious congregations are Catholic, Protestant and Mormon. These respective congregations have each had several religious structures, as original buildings fell in to disrepair or were enlarged to accommodate growing parishes.

Kalawao

On December 23, 1866, thirty five people gathered to organize the congregation of Siloama and established the first church at Kalawao. Siloama means "Church of the Healing Spring". The Protestant church structure was dedicated in 1871 and has gone through a number of successive alterations including being rebuilt in 1880 and was completely reconstructed in 1966. This austere structure was the first protestant church erected for the Hansen's disease patients forced to live here. The white wood frame structure rests on concrete pilings and is one-story with a gabled portico. It has six double-hung windows, a small steeple, a corrugated metal gabled roof, horizontal channel siding and cornerboards. Despite a complicated history, Siloama remains highly significant to the community for its historical and symbolic associations with the early trials of the first exiles and the importance of spirituality to the earliest residents of Kalawao.

St. Philomena, the first Catholic Church on the Peninsula, was built in a simple gothic style in 1972 at Kalawao near Siloam Church. Built in successive stages using both stone and wood, the church has a bell tower and gabled roofs. Double hung windows are located on the original wood portion of the structure to the west and triple hung windows in the gothic arch recesses line both sides of the later primary building volume. The building is associated with Father Damien

who preached there and led much of the construction of the church, though it was completed after his death.

Kalaupapa

The oldest remaining historic church structure in Kalaupapa is the Old Stone Church that dates back to the pre-settlement period. It was built in 1853 in the form of a typical Protestant missionary meeting house of simple rectangular volume, gable roof and thick rubble masonry walls, made of lava rock with coral lime mortar and deeply set double-hung windows. Although the configuration and openings have changed significantly due to varied uses such as jail, repair shop, warehouse and fire vehicle storage, its original exterior walls remain. It is now being used as the National Park Service Ranger Station.

The Kana`ana Hou Church was built by the United Church of Christ in 1915 in a modified Arts and Crafts Stick Style. Constructed in the shape of a Greek cross, the wood framed structure rests on wood post, stone and concrete foundations. It has a large bell tower, gabled portico, numerous double-hung windows, tongue & groove siding and a cross-gable wooden shingle roof. Architectural details include gothic arched louvers and large dentils in the bell tower plus many chamfered buttresses. The Church recently underwent restoration work in 2004.

The contemporary Catholic congregation worships at St. Francis Church, an Italian Gothic-style building of reinforced concrete, noteworthy as an early example of this type of construction is such a remote location. It has a corner bell tower with gothic arches and double hung windows, colored-glass quatrefoil windows, side buttresses and a large corrugated metal roof.

The Mormon Church at Kalaupapa was built in 1940 in a modified Hawaiian Plantation Style structure with low gable roof of composition shingles, plywood and batten siding and sliding windows. All of the previous associated church buildings with the Mormon Church at Kalawao and Kalaupapa have been removed.

Building Types: Patient-Built Structures

The majority of the historic buildings at Kalaupapa were built by the State of Hawai'i Department of Health throughout the site's history. But there is also evidence of patients taking initiative in their own lives on the Peninsula by building their own garages to store their own vehicles, constructing pig sties and chicken coops for raising farm animals (only ruins remain of these structures) and adding several beach houses built for recreation and weekend relaxation, most of which were located to the north of the settlement, facing west off the road to the airport. Preserving and maintaining these small, but significant patient-built structures are important in telling the story of how these courageous patients adapted and created their own way of life on the Kalaupapa Peninsula.

Building Types: Cemeteries

There are twenty (20) cemeteries scattered about the entire Peninsula located at Kalawao, Kalaupapa and at Makanalua near the Kauhakō Crater. The cemeteries reflect both the religious and cultural affiliations of Kalaupapa's residents. All of the cemeteries in the settlement of Kalaupapa are located north of the settlement, west of Kamehameha Street and immediately adjacent to the shoreline and beaches.

In 1966 the State of Hawai'i surveyed the cemeteries and documented the graves and other features, such as walls and trees. In addition a 1991 directory of grave markers in all the cemeteries on the Peninsula was compiled. The current list of 1199 grave-markers identified was compiled and entered into the List of Classified Structures (LCS) database in 2007. The LCS is an inventory of all historic and prehistoric structures, in which the NPS has, or plans to acquire, any legal interest. These structures must have historical, architectural or engineering significance. Structures listed on the LCS must meet one of the following criteria: either the structure is listed individually or is eligible for the National Register or the structure is a contributing element of an historic site or district that is listed or is eligible for the National Register.

Each cemetery along Kamehameha Street is identified with white wooden signs at both the eastern edge along the road and at the western edge next to the shoreline. Grave markers vary by size and style and include: upright, raised, cross, flat or flush with the ground, mausoleum, tomb vault, obelisk, post, pillow, slab covering entire grave, hakkaurn house and temporary signs. Materials used to construct the grave markers include: wood, rough lava stone, concrete, iron pipes, bronze plaques, granite, marble and sand. The condition of the markers runs the gamut from excellent to collapsed and broken beyond repair. The more recent graves have draped leis, plastic flowers and other mementoes on the markers. The cemeteries are being maintained now and are clear of vegetation and open for visitation by residents.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – The potential loss of irreplaceable historic buildings and smoke damage arising from Intense fire within the settlement within the unique milieu of the Kalaupapa and Kalawao settlements poses a severe long-term widespread adverse effect.

Indirect Effects of Alternative A (No Action) – Negligible

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) – None

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – The reduced probability of high intensity fire due to fuel-reduction within the settlements of Kalaupapa and Kalawao and the installation

of fire suppression systems in all historic buildings results in a minor long-term widespread adverse effect.

Indirect Effects of Alternative B (Increased Protection) - Negligible

Cumulative Effects of Alternative B (Increased Protection) -Negligible

Mitigation Measures of Alternative B (Increased Protection) – Additional prevention of installation of sprinkler systems must comply with Secretary Standards Guidelines for Preserving, Rehabilitating Restoring and Reconstruction Historic Buildings (see Health and Safety Considerations)

Conclusion (Alternatives A and B) – The direct effects of fire and control methods would be reduced from severe long-term widespread adverse under alternative A to minor long-term widespread adverse under alternative B. This reduction in effect under alternative B is due to the expanded fuel reduction within and outside the settlement aimed at reducing landscape fire-hazard and fire intensity adjacent historically significant buildings. Both alternative A or B would show negligible indirect or cumulative effects on historic structures.

Precontact, Protohistoric and Historic Archaeological Resources

The Kalaupapa region consisting of the entire Peninsula of Kalaupapa (or Makanalua), the western land shelf of Nihoa and east to Waikolu Valley, can be considered a complex of archeological sites and features that layer each other and form archeological landscapes of considerable variety. Because of the isolation enforced from topography and the lack of large-scale industry such as ranching, sugar plantations and pineapple farming, the archeology in Kalaupapa National Historical Park is one of the most well-preserved and archeologically varied landscapes in all of Hawai'i. It also is a landscape of rich and layered history that sheds light on many human stories that will educate for generations to come.

Time periods are represented in archeology through a variety of dating techniques. A time period scale was originally outlined by Kirch (1985) for the chronology of human occupation and development in the Hawaiian Islands. The model was adapted by Weisler (1989) to apply to the island of Moloka'i. In developing this adaptation of chronology, Weisler interpreted radiocarbon dates from Kaupikiawa Cave excavations at Kalaupapa. Subsequent excavations at the same site paired with radiocarbon data from other sites in the area resulted in different dates that both challenged Weisler's interpretation of chronology for the island of Moloka'i as well as challenged the earliest date for the Kalaupapa region (Kirch 2002). Further study by McCoy (2007) has revised the culture history timeline based on new information and data synthesis for the entire island of Moloka'i.

In the revised chronology, the Colonization Period (AD 300-600) and the Development Period (AD 600-1100) combine into a single Foundation Period (AD 800-1200); followed by Early Expansion Period (AD 1200-1400); Late Expansion Period (AD 1400-1650); Proto-Historic Period (AD 1650-1795); and Historic Period (AD 1795-1900) (McCoy 2007). For regional archeology purposes within Kalaupapa National Historical Park, the chronology can be further defined by sub-categories of the Historic Period including the Early Historic Era (AD 1795-1866); the Transitional Era (AD 1866-1895); Kalawao Settlement (AD 1866-1900s); Kalaupapa Settlement (AD 1888-1960); and the Present 'Period of Significance' (AD 1960-present).

Only four dateable samples exist on the whole Island of Moloka'i that corresponds to the **Foundation Period** (AD 800-1200), one of which came from Kalawao. The reliability of these early dates is contested. While the dates can be rejected under 'strict chronometric hygiene standards' (Spriggs and Anderson 1993), other evidence from the paleo-environmental record in the Kalaupapa region support human occupation in this time frame (see McCoy 2007 for further discussion).

Two distinct agricultural features of the Kalaupapa region exhibit dates that relate to the **Early Expansion Period** (AD 1200-1400). An exposed stratigraphic sequence of a terraced *loi* in Waikolu Valley revealed a charcoal sample beneath the pondfield deposits. Kirch (2002)

suggests that the charcoal represents possible clearing of the land before cultivation in the *loi*. During the same field season, Kirch's 2000 survey in dryland fields, or *kula* fields of the Peninsula suggest the first small-scale cultivation of sweet potato, which also dates to this period.

In the **Late Expansion Period** (AD 1400-1650), a sizeable dataset gives strong evidence that there was an intensification of the *kula* fields, which are known collectively as the Kalaupapa Field System. The Kalaupapa Field System is characterized by the easily visible low-lying, single course, roughly stacked parallel field walls that are oriented roughly north/south, adjacent to prevailing tradewinds. It is estimated that the Kalaupapa Field System encompasses approximately nine square kilometers. Dating implies the intensification of this system between AD 1450-1550. Also dating to this time period, McCoy (2006) has identified an 'establishing' phase of ritual sites, consisting of *heiau*, on the Peninsula that date between AD 1440 and 1650.

A well known battle recorded through *moo'elo* is thought to have occurred in the 17th century, which would place it in the **Proto-Historic Period** (AD 1650-1795). The battle erupted between the chiefs of Kona and Koolau districts, or *moku*. The Koolau district, which the Kalaupapa region was a part of, sought access to fishing grounds on the Kona side during winter months when the north shore swells are treacherous. The ensuing battle occurred on the Kalaupapa Peninsula (Summers 1971). Archeological investigations suggest a site, Makapulapai, to be a burial monument, rare in the Hawaiian Islands, but also exhibited at Keahou on Hawai'i Island. The burial complex is interpreted as being the resting place for the Koolau warriors of this battle, based on its style and form (Manning and Neller n.d. and McCoy 2005).

In addition, thirty-nine of eighty-nine dateable samples on Moloka'i come from the Kalaupapa region and relate to this time period. Through research undertaken primarily by McCoy (2006), the scientific data agrees with general interpretations that the island societies were dynamic and great with political flux. The Kalaupapa region further displays social and political implications in this era that suggest chiefly authority over daily life of *makaainana*. Such interpretations have been made by examining the northern end of the Peninsula and its density of small shelters in contrast to the blend of site sizes and types found in the majority of the Peninsula suggesting it was "a zone clearly used for agriculture but never permanently occupied" (McCoy 2007:1286). In addition, McCoy has demonstrated a lithic source was used throughout the Peninsula, suggesting access ahupua`a boundaries were not entirely static. This interpretation indicates that ahupua`a were not rigid land divisions with limited interaction with neighbors.

The **Early Historic Era** in the Kalaupapa region is defined more or less beginning at Post-(European) Contact and the unification of the Hawaiian Islands under Kamehameha I, through the establishment of the 'leper settlement' by the Monarchial government in 1866. Written records by missionaries in the 1830s and explorers such as Jules Remy in the 1850s describe the Kalaupapa landscape and various activities of the kama`aina. Another source of information for this time period comes from records of the Great Mahele, which from 1846-1853 made vast changes in the land tenure system of Hawai'i, but also provides a multifaceted written record that sheds light on Hawaiian society and the lives of the kama`aina. One archeological survey was

conducted by Neller inside an L.C.A (Land Claim Award) resultant from the Great Mahele. Synthesis of this study is not known to have been previously undertaken but is planned to be forthcoming.

Historical accounts and archeological investigations by Ladefoged (1993), and Goodwin (1994) describe a re-intensification period of the Kalaupapa Field System, which apparently fell into decline during the Proto-Historic Era. The re-intensification of the field system relates to the Gold Rush era, where Kalaupapa was known to export potatoes and other cultigens to California gold miners. Following this, port towns in the islands began to emerge at Honolulu and Lahaina harbors, which attracted some people of Moloka'i, resulting in an island-wide population decline. This era in history is certainly rich, with a lot of room for further exploration.

From 1866, when people afflicted with Hansen's disease began to come to the Peninsula of Kalaupapa to 1895, when the very last kama`āina of the region were forced to leave, is another important era of the region's history, known here as the **Transitional Era**. A handful of historical sources provide evidence that the first people sent to the Peninsula with the disease were taken in by the kama`āina of the region until the kama`āina homes were full and their resources scant. Though some kama`āina left at the establishment of the 'leper settlement' in 1866, certainly not all did until 1895 when the government made its final land exchange offer. Historical research thus far shows that the kama`āina of the Kalaupapa region were given exchange lands in Kainalu and Waialua, topside Moloka'i. Archeological investigations thus far have not targeted this period, and a visible archeological record may be fairly elusive given the approximate thirty-year time span. However, preliminary research by Viernes-Stein (in prep.) is showing some evidence of this transitional time that brings to light at least two interpretive themes; 1) that the kama`āina were tied to their lands and were not going to leave just because of government mandate and 2) that the 'leper' stigma may not have been quite as severe in Hawai'i as it was elsewhere. Though this time period is a short one comparatively, it is one that can bring life back to this significant and transitional time.

We know that the first patients to arrive to the Kalaupapa region were sent to Kalawao in 1866, forming the **Kalawao Settlement**, whose last occupation at the Baldwin Home for Boys lasted until 1932. Historical records provide a lot of information to help us understand this time era and regional area. Dedication of missionaries like Father Damien and Brother Dutton helped to transform the living conditions for the community of Kalawao Settlement holistically.

Archeological investigations by James Flexner (forthcoming) are exposing what life was like in the community of the Kalawao Settlement by focusing on household sites. Flexner's research has provided some very interesting preliminary results including worked bottle glass into a 'blade' tool. Ongoing investigations by Kalaupapa National Historical Park archeologists are showing a noteworthy density of such worked bottle glass. Further archeological investigations are planned in this area.

In 1888, the Bishop Home for Girls was established on the Kalaupapa side. Shortly thereafter, patients and kōkua began to move over to the Kalaupapa side of the settlement to be closer to the

landing area and in a drier climate. **Kalaupapa Settlement** was established notably by utilizing building materials of the failed Leprosy Investigation Station as well as materials from other structures at Kalawao. This era in history should not be thought of as something static since the Kalaupapa Settlement is existent still today. What marks this era differently is the ending date of 1960, which caps this era as historic from fifty years ago—a marker used by both the State and Federal governments. Certainly, as time moves forward, this historic time era will also expand.

Still, although this time era spans into the very recent past, archeological investigations still occur and help to tell the story of this time period. A portion of Somers archeological survey (1985) takes place here and reveals house sites that are no longer occupied. Additionally, archeological mitigation measures have revealed subsurface archeological sites some of which can be attributed to still-standing and utilized buildings. This time period challenges views of many that archeology is something that is very distant, when archeological resources truly exist at the feet of living patients and kōkua today.

Avoiding theoretical discussions of what archeology *is* and isn't, the Kalaupapa Settlement is in the **Present: Period of Significance**, which means that regardless of how futile a resident's action may seem to be, it is a contributor to the period of significance that will be preserved and protected under historic preservation laws. Archeology of the present isn't something that occurs all too often, but has been done to study behavior in contemporary societies, such as Rathje's 'Garbage Project' (1978). The fact that the settlement is still in its period of significance is a unique one and challenges archeological priorities and provides a rare opportunity to engage in true anthropological archeology. Archeology of the present has not been engaged in any concentrated effort thus far at Kalaupapa. Furthermore, it is important to note that this period, like the preceding Kalaupapa Settlement period, is dynamic and both will eventually condense into a single Kalaupapa Settlement period.

The archeology within the boundaries of Kalaupapa National Historical Park has been regarded as one of the most well-preserved archeological complexes in Hawai'i. It has also been recognized for its great variability of site types and recommended to be researched, interpreted, and preserved. In 1976, the archeological sites within Kalawao County were established as a contributing member of the National Historic Landmark as well as listed as a contributing feature to the National Register of Historic Places. The archeological sites have also been recognized in the enabling legislation for Kalaupapa National Historical Park. As further investigations inform the archeology program at the park, our knowledge of various eras of this regions' very rich history continues to grow.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Wildland fire and suppression activities and the use of fire retardants could result in the deterioration/staining of archaeological resources. Long-term retardants contain fertilizer salts (ammonium phosphate or ammonium sulfate) that can leave a

residue when dry. These salts can attract water and can cause the surface that they are in contact with, to swell and contract. Soluble salts crystallize as water evaporates, causing a great increase in volume. When crystallization occurs within a porous material like wood, bone, shell or some ceramics, it can cause physical damage, such as the spalling of the object's surface, losing any detail present (Society for Historic Archaeology n.d.). Rapid temperature changes caused by application of retardant to hot rocks may also cause spalling of stone and degradation of mortar. Retardants containing iron oxide have a high potential for staining raw wood, stone, bone, ceramics, shell and vegetation. Any applied decoration, pigment or other applications (scoring, etching) will be similarly affected. Retardant applications may have very different effects on painted surfaces. In some cases it easily washes off and in others it does not. Short and long term effects may also be caused by inadvertently disturbed previously unrecorded or recorded archaeological sites and features within defensible space areas. The combination of activities are considered to have a moderate localized long term adverse effect on archeological resources.

Indirect Effects of Alternative A (No Action) –Suppression activities and continued invasive vegetation growth could damage archaeological sites and features. Archaeological sites and features directly adjacent to the fuel break may also be threatened by the mechanical fuel reduction. The combination of management activities would cause a moderate localized long term adverse effect.

Cumulative Effects of Alternative A (No Action) – Other projects, most notably the Memorial Construction may impart a minor localized long-term adverse effect.

Mitigation Measures of Alternative A (No Action) – Continue archaeological inventory under Section 110 of the NHPA (National Historic Preservation Act). Record damage to archaeological sites and features after a fire; update existing site records in ASMIS (Archaeological Site Management Information System); document previously unrecorded archaeological sites and features. Regularly monitor defensible space activities and record any archaeological sites or features that are previously unrecorded. See also CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Wildland fire and suppression activities and the use of fire retardants could result in the deterioration/staining of archaeological resources. Long-term retardants contain fertilizer salts (ammonium phosphate or ammonium sulfate) that can leave a residue when dry. These salts can attract water and can cause the surface that they are in contact with, to swell and contract. Soluble salts crystallize as water evaporates, causing a great increase in volume. When crystallization occurs within a porous material like wood, bone, shell or some ceramics, it can cause physical damage, such as the spalling of the object's surface, losing any detail present (Society for Historic Archaeology n.d.). Rapid temperature changes caused by application of retardant to hot rocks may also cause spalling of

stone and degradation of mortar. Retardants containing iron oxide have a high potential for staining raw wood, stone, bone, ceramics, shell and vegetation. Any applied decoration, pigment or other applications (scoring, etching) will be similarly affected. Retardant applications may have very different effects on painted surfaces. In some cases it easily washes off and in others it does not. Short and long term effects may also be caused by inadvertently disturbed previously unrecorded or recorded archaeological sites and features within defensible space areas. The combination of activities are considered to have a moderate localized long term adverse effect on archaeological resources. The addition of prescribed burning in Alternative B would facilitate access and consequent looting of previously unrecorded archaeological sites. The combination of activities are considered to have a moderate localized long term adverse effect on archaeological resources.

Indirect Effects of Alternative B (Increased Protection) – Suppression activities and fuel reduction would damage archaeological sites and features, though continued growth of invasive vegetation would be reduced in fuel-reduction areas. Long term moderate localized adverse effects would occur on archaeological sites and features through increasing exposure to such sites and features by expanding the fuel break, increasing defensible space, and increasing open grassland.

Cumulative Effects of Alternative B (Increased Protection) - Other projects, most notably the Memorial Construction may impart a minor localized long-term adverse effect.

Mitigation Measures of Alternative B (Increased Protection) - Continue archaeological inventory under Section 110 of the NHPA (National Historic Preservation Act). Record damage to archaeological sites and features after a fire; update existing site records in ASMIS (Archaeological Site Management Information System); document previously unrecorded archaeological sites and features. Regularly monitor defensible space activities and record any archaeological sites or features that are previously unrecorded. Conduct archaeological inventory survey before expansion of fuel break or increased defensible space vegetation clearing work occurs. Conduct archaeological inventory survey before using prescribed fire activities; monitor prescribed fire activities. When increasing the fuel break, defensible space, and grassland, always expand in such a way where archaeological sites and features should not be removed, damaged, or threatened. See also CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Conclusion (Alternatives A and B) – Both Alternatives A and B would result in moderate localized long term adverse direct and indirect effects. Cumulative effects arising from the construction of the Kalaupapa Memorial would result in cause short and long term direct, indirect, and cumulative moderate effects. The no-action alternative (Alternative A) would result in the continued decline in archaeological resources as a consequence of plant growth and damage by feral animals.

Cultural Landscape Resources

Kalaupapa National Historical Park contains three primary cultural landscapes with distinct periods of significance, physical characteristics, and features. They include: 1) the Native Hawaiian settlements, 2) the Kalaupapa and Kalawao Settlements and related sites for which the park was established, and 3) the cultural landscape related to the Moloka'i Light Station. Of the three cultural landscapes, the Kalaupapa and Kalawao Settlements have received the most documentation, analysis and are the core resources of the National Historic Landmark designation.

The following information is adapted from the “Kalaupapa and Kalawao Settlement Cultural Landscape Inventory, 2005.” Other sources of information include “Kalaupapa Landscape: An Ethnographic Study” by Sonia P. Juvik, 2007; the U.S. Coast Guard Moloka'i Light National Register of Historic Places Nomination Form, 1982; Wyban, 1991.

Early Native Hawaiian Settlements

For over 800 years before the establishment of the Hansen's disease settlement, the Kalaupapa Peninsula and the valleys of Waihānau, Wai'ale'ia, and Waikolu were home to Native Hawaiians. These areas were organized into four ahupua`a (Hawaiian land divisions usually extending from the uplands to the sea) including: Kalaupapa, Makanalua, Kalawao, and Waikolu. A diversity of subsistence, habitation, ceremonial, and protective areas and features continue to exist within each ahupua`a. The identified sites and features include: roughly 50 *heiau* or religious temples (fifteen confirmed and issued State site numbers); eight ko`a or fishing shrines; a multitude of burial sites; two *hōlua* sled runs; several caves with human artifacts; and numerous agricultural terraces, habitation sites, and other features. While the totality of these sites and features once constituted complex and ancient cultural landscapes, today, these remains are more accurately categorized as archeological features. These resources are described in the archeological resources section in this chapter.

It must also be noted that later residents associated with the Hansen's disease settlement peopled these same areas and adaptively used many of the early Native Hawaiian sites. In some cases, particularly at Kalawao, it is often difficult or potentially impossible to dissect which features are associated with early Native Hawaiians and which are associated with the Hansen's disease settlement.

Hansen's Disease Settlement

The Kalaupapa Leprosy Settlement landscape includes the Kalaupapa Peninsula, associated valleys and cliffs, and adjacent marine areas. The most intensively developed areas consist of Kalawao settlement, Kalaupapa settlement, the Saint Damien Road corridor, the landing strip at the north end of the Peninsula, the two *pali* trails, and the water system from Waikolu Valley to Kalawao and Kalaupapa settlements. Kalawao and Kalaupapa settlements and related sites and features are evaluated as a single landscape associated with the Hansen's disease settlement.

This landscape is located in the distinct land division of the County of Kalawao whose boundary is identical to the legal settlement boundary and the existing National Historic Landmark district.

The historic vernacular landscape is strongly associated with Saint Damien, who devoted himself to personally assisting the patients and improving the settlement's living conditions by garnering political and financial support. The efforts of Saint Damien and Mother Marianne Cope helped Kalaupapa develop into what has been called the best leprosy facility of its time. After much work invested by these individuals, patients themselves, and others, Kalaupapa afforded most of the amenities of normal society, in addition to the lush surroundings and beautiful island scenery. The settlement contained and still contains boat landings, a road network (for cars), several neighborhoods, single-family patient housing, dormitories and hospitals for those requiring more assistance, churches, monasteries, community recreational facilities, cemeteries, slaughterhouses, and a light industrial area. Kalaupapa's revolutionary administrative philosophy encouraged patient participation in the operation and maintenance of the settlement to foster feelings of self-worth and community cohesion, and contributes to the significance and uniqueness of Kalaupapa's cultural landscape.

The Kalaupapa and Kalawao Settlements landscape retains integrity according to the seven aspects as defined by the National Register of Historic Places: location, setting, design, materials, workmanship, feeling, and association. The location and remarkable physiographic setting on the still-isolated Kalaupapa Peninsula remain as imposing as during the initial settlement period and the boundaries that define this isolation are exactly the same as when the settlement was founded. The layout of the settlements is still evident in their spatial organization generally defined by a grid pattern of streets and the clustered arrangement of treatment and residential facilities. Further, hundreds of historic structures and associated grounds, such as the bungalows, churches, tombs, gardens, ornamental plantings remain, representing the architectural designs deemed appropriate for specific uses at the time of construction. The buildings and small scale features that remain clearly display the workmanship and materials (dry laid stone work and balloon-frame construction methods) that were used throughout the history of the settlement, in addition to the remaining introduced vegetation which continues to represent original stock and planting patterns. The aspect of feeling is retained through the cumulative effect of setting, materials, workmanship, and design which creates a sense of past time and place. Lastly, the aspect of association, or a direct link between the property and the events or persons who shaped it, is retained through the lives of those patients that continue to live at Kalaupapa.

The period of significance begins in 1866 when the first group of patients established themselves at Kalawao and continues through 1969 when patients were allowed to leave their enforced isolation due to the development of sulphone drugs that halted the advancement and communicability of Hansen's disease.

The landscape is determined to be in poor condition, though it continues to display most of the historic characteristics that evoke the way of life found on the Peninsula during the period of significance. The management category for the landscape is “Must be preserved and maintained.”

Existing Landscape Characteristics

Today the cultural landscape of Kalawao and Kalaupapa reflects the Hawaiian origins of both communities, the 145-year effort to care for thousands of people torn from their homes and families, and the dignity and pride of the remaining Hansen’s disease patients who call Kalaupapa their home. The Kalaupapa and Kalawao Settlements continues to demonstrate those characteristics that made the Peninsula an ideal choice in the eyes of its founders, as well as those characteristics that demonstrate its unique development patterns from 1866 to 1969. Though not a tangible or physical resource of the cultural landscape, many people, especially those with direct familial connections to Kalaupapa, feel that the entire Peninsula is a spiritual and sacred place.

Portions of the cultural landscape have been well-maintained, particularly at Kalaupapa which has been in continuous use from the late nineteenth century until the present. However, at Kalawao, usage and maintenance came to an end in the early 1900s and the condition of the historic landscape has since diminished. Invasive species have quickly transformed much open-space areas into forests, and hidden large tracts of archaeological resources from view. These relict portions of the landscape are nonetheless highly significant and vital to interpreting the early days of the settlement and the landscape's dynamism through the period of significance.

This section is organized by landscape characteristics which contribute to the significance and integrity of the landscape.

Natural Systems and Features

The broad physiographic attributes that heavily influenced establishment, relocation, and development of the Hansen’s disease settlement are still prevalent today. These natural systems and features of the landscape, particularly the unique setting of the Peninsula, over 2,000 feet below the looming cliffs of Moloka’i’s northern coast, were instrumental in its nomination as a Hansen’s disease settlement. These cliffs continue to invoke feelings of both awe and isolation today. In addition, those climatic characteristics which historically prompted the migration of the settlement from windward Kalawao (colder and wetter) to leeward Kalaupapa (warmer and drier) are still evident. Other natural features that played a role in the lives of Hansen’s disease patients at Kalaupapa continue to exist today. These features include, but are not limited to: the Kauhakō Crater, associated lava tubes and caves, marine areas for fishing and salt collection, the navigable shoreline, Waikolu Stream as a source of water for the settlements, the upper valleys that provided raw materials and natural resources for building and sustaining a settlement, and the open plains that were used for agricultural production.

Spatial Organization

Spatial organization within the landscape is still evident in the overall development on relatively flat land at the base of the cliffs. Within the intensively developed settlement areas on the Peninsula, the distinction between the earlier Kalawao settlement site remains to the east and distinct from the later Kalaupapa settlement on the western shore. However, much of the formerly open/agricultural space between the two settlements has been completely inundated with invasive vegetation that significantly distorts the spatial relationship between the two areas.

Within the Kalaupapa settlement, the overall pattern of streets laid out on a modified grid, with centralized clusters within it, continue to define the overall spatial patterns of development within the landscape despite several changes. Perhaps the greatest change is the loss of vegetation and many of the rock walls that defined the physical and visual boundaries individual properties and home sites. The loss of these materials has been incremental, but the overall effect has been the loss of a compartmentalized layout, and the creation of more open space within the intensively developed areas. In spite of these changes, the majority of elements defining the spatial organization of the settlement remain.

The physical land forms which define and isolate the Peninsula are still extant, and many of the early roads and formal walkways within the settlement remain and continue to provide a circulatory framework for the landscape. Individual cottages remain along the narrow roads surrounding community services (store/gas/post office/library) and State facilities.

Existing cluster arrangements within the spatial organization are found only within Kalaupapa where specific medical/residential groupings were developed to house and care for: personnel, relatively healthy patients who desired to have single-family homes, individuals whose health was rapidly deteriorating, and invalid patients. Four of the five primary housing clusters also remain: the McVeigh Home, the Bishop Home, Staff Row and the Bay View Home – although altered to varying degrees (the Baldwin home was removed in 1951). The McVeigh Home complex retains virtually all of its original spatial organization, including the locations of structures, circulation systems, and even land use patterns. The Bishop Home, although missing many of the original structures, retains the spatial organization of the grounds including the original circulation system, the interior focus on the chapel and convent, the fence, and portions of the outer wall surrounding the entire lot.

Circulation

Circulation patterns within the landscape continue to demonstrate the routes of travel off of the Peninsula (boat landing, airport, and *pali* trail), between the two settlements (along Damien Road and the Peninsula's perimeter jeep road), and within Kalaupapa proper (the modified grid street pattern). Their routes, configurations, and materials have not been significantly altered and continue to perform their historic functions. Although some significant changes have been made to the circulation systems throughout the history of the settlements such as the loss of the loop

road around the leprosarium site and smaller-scale alterations with Kalaupapa proper, the settlements continue to show the vast majority of circulation infrastructure from all periods of the history. Major extant circulation systems and features include: the Kalaupapa *pali* trail, Puahi Street connecting the trail to the settlement, the Kalaupapa airstrip, Damien Road, Kamehameha Street connecting the airport and lighthouse to the settlement, eastern coastal road, and the network of roads, driveways, and sidewalks within the Kalaupapa settlement. Discreet circulation systems related to clustered areas still exist, including: Bay View Home, Bishop Home, McVeigh, and Staff Row.

Cemeteries

Cemeteries are considered as built structures in the landscape. Within the boundaries of Kalaupapa National Historical Park, these places are the burial grounds of thousands of individuals who were banished to the Peninsula and their kōkua.

There are twenty cemetery locations on the Kalaupapa Peninsula, located at Kalawao, Kalaupapa, and at Makanalua near the Kauhakō Crater. The cemeteries reflect the religious and cultural affiliations of Kalaupapa's residents. All of the cemeteries in the settlement of Kalaupapa are located in the north end of the settlement, *makai* (or ocean-side) of Kamehameha Street, and immediately adjacent to the shoreline and beaches. Eight cemeteries are along Kamehameha Street within Kalaupapa and four cemeteries are located outside the settlement along Kamehameha Street (at the junction with the unimproved road to beach houses) approximately 1/3 of a mile north of the cattle guard.

According to the 1991 inventory, there are also cemeteries (areas noted with grave markers) located in the following locations: the Bishop Home grounds, two sites near the summit of Kauhakō Crater, Kahaloko Cemetery along Damien Road, Siloama Church, and three distinct adjacent fields to the east of St. Philomena Church at Kalawao. A traditional burial practice was the location of people with similar backgrounds; thus there are cemeteries for Catholics, Protestants, Mormons, Americans of Japanese Ancestry, Native Hawaiians, Caucasian, and Chinese. In the Kalaupapa cemeteries, a total of 1,089 graves have been identified. In the four cemeteries north of the cattle guard, a total of 238 graves were inventoried.

Small Scale Features

Numerous small scale features, of various functions, are found throughout the landscape. These smaller structures such as the numerous walls, statuary, cisterns, monuments, and memorials provide critical detail to the physical site history, and demonstrate the utilitarian, decorative, and spiritual necessities of the population. Notable features include: Mother Marianne's Grave, Saint Damien Monument, Mother Clinton Monument, Statue of the Sacred Heart of Jesus in front of the St. Francis Catholic Church, Baldwin Home Grotto, Grotto at St. Francis Catholic Church, church bells, Kamehameha Street stone culverts, the system of dry stack rock walls, and features within the Bishop Home, including the cistern, bake oven, and flag staff.

Vegetation

Although the broad vegetative patterns across the Peninsula have changed drastically since the peak of the settlements due to invasive species colonization, the culturally established vegetation patterns (and species) within Kalaupapa are highly significant. Throughout the settlement edible-fruit trees are very common including: mango, avocado, breadfruit, tamarind, banana, papaya, citrus, cherry, guava, litchi, coffee, and coconut. Ornamental trees and shrubs are also widespread throughout Kalaupapa settlement including African tulip, crown flower, hibiscus, ironwood, and kamani. Within the settlement there is a high occurrence of hedgerows of shrubs or trees such as wiliwili, panax and croton, which are excellent species for making live fences.

The types and patterns of planted vegetation are significant for their associations with the following: the need for the patient community to provide a portion of its own food and raw materials, the desire for privacy and "independence" by patients that were healthy enough to live in a single-family residence, the need for windbreaks to shelter homes from seasonal winds, and the notion that aesthetics could promote health and well-being. This attention to aesthetics is a key component of Kalaupapa's revolutionary status compared with other facilities during the historic period, underlining that exile does not necessarily entail a prison-like setting and that emotional well-being and physical health are interconnected. In addition, a few remnants of cultural vegetation also remain at Kalawao, including coconut trees and a few other ornamental or utilitarian trees. As a result, vegetation contributes as a landscape characteristic to the significance of the proposed Kalaupapa and Kalawao Settlements.

Buildings and Structures and Archeological Sites

The buildings and structures and archeological sites at Kalaupapa are historically significant and contributing resources to the cultural landscape. These resources are discussed in more detail in separate sections in this chapter.

Moloka'i Light Station

The U.S. Coast Guard Moloka'i Light Station maintains a separate listing on the National Register of Historic Places, apart from the Kalaupapa Leprosy Settlement National Historic Landmark District. It was originally listed in 1976, and then received its own entry on the National Register of Historic Places in 1982.

The Moloka'i Light Station was established in 1909 on the northern tip of Kalaupapa Peninsula. It was an ideal location because the Peninsula juts out to sea for a considerable distance from the otherwise incurving and very steep north coast of Moloka'i. This majestic, 138 foot classic lighthouse structure served to lead mariners coming from west coast United States and the Panama Canal through the narrow and tricky Kaiwi Channel between the islands of Moloka'i and Oahu. Its light can be seen up to 28 miles at sea.

This isolated station was operated by lighthouse keepers and resident Coast Guardsmen for 57 years. Automation came to Moloka'i in 1966 thus ending the long and colorful history of the live-in keeper.

Within the 23 acre complex associated with the lighthouse are four other historic buildings, a concrete water storage tank, and an unbroken lava rock wall constructed in 1916 for the purpose of defining the property and controlling cattle movement. The cultural landscape is in the process of being evaluated for its historic significance, National Register of Historic Places eligibility, and condition.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Alternative A provides a negligible effect to the currently certified cultural landscape through maintaining the fuel break around Kalaupapa Settlement in an effort to decrease the chance of wildfire spreading.

Indirect Effects of Alternative A (No Action) - Negligible

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - None

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Alternative B provides a beneficial effect to the currently certified cultural landscape by maintaining and increasing the fuel break around Kalaupapa Settlement in an effort to decrease the chance of wildfire spreading, as well as maintaining defensible space around structures. Alternative B also increases areas of low open vegetation, restoring aspects of the historic cultural landscape.

Indirect Effects of Alternative B (Increased Protection) - Negligible

Cumulative Effects of Alternative B (Increased Protection) - Negligible

Mitigation Measures of Alternative B (Increased Protection) - See CUL-1 through CUL-4 of the collated mitigation measures for Cultural Resources.

Conclusion (Alternatives A and B) – Direct effects of Alternative A on the Cultural Landscape are negligible. The extended areas of fuel reduction under Alternative B restore aspects of the cultural landscape resulting in a benefit. The indirect and cumulative effects of both alternatives A and B on the Cultural Landscape are negligible.

Museum Collections

Kalaupapa National Historical Park maintains its museum collection to illustrate and document the compelling story of separation forced by a devastating disease and the nationally significant natural and cultural resources found within its boundaries. The museum collection, first managed in 1987, contains over 270,000 objects including 70 LF of archival documents, primarily representing the late twentieth century experiences of patient-residents' within the Kalaupapa Settlement. The museum program has developed and completed management documents that include: Museum Management Plan (2006), Scope of Collections (Updated – 2009) and the Museum Preservation Maintenance Plan to guide the museum program through the next developmental stage. A growing portion of the collection is made up of archeological assemblages and representative natural specimens as the NPS continues to inventory resources associated with the park.

Cultural & Historical Collection

The cultural collections at the park currently comprise approximately 200,000 objects and 35 linear feet of cataloged archival materials and 27 linear feet of un-cataloged archival materials. Collections are subdivided into three major disciplines: history (including archives/manuscripts), archeology, and ethnology.

The Cultural & Historical Collection primarily focuses on Archeological, historical materials, including archives and manuscripts. The current representation of object types and future collection goals for this discipline are best viewed within four distinct time periods.

1) Pre-1866 Period:

Hawai'i's "historic" period pre-dates the establishment of the leprosy settlement on the Kalaupapa Peninsula. Existing historical records document commerce, land use patterns and daily life of the Kama`āina of Kalaupapa. Pre-contact Material (pre-European arrival in 1778) -- The collection contains Native Hawaiian items from this period including animal bone, lithic material, shell fragments and other organics. Please refer to the Archeological A/E Section for further refinement of dates.

2) Kalawao (Early) Period (1866 – ca. 1932):

This period focuses on the windward side of the Peninsula; the experiences and living conditions of those exiled during this period; the work of Saint Damien, Mother Marianne, Brother Dutton, and other kōkua; and early medical treatments. The history of the U.S. Leprosy Investigation Station (1909-1913) is included in this Kalawao Period due to the station's location at Kalawao and its existence during this gradual shift of population.

The collection includes building fragments and architectural features, such as the original cross from the steeple of St. Philomena Church and a railing baluster from the Investigation Station. Under storage loans, the NPS preserves and stores the remains of the fourteen Stations of the Cross that potentially date from Saint Damien's time, and the remains of two organs from St. Philomena, one of which was likely given to the church by Princess Liliuokalani. The original fencing surrounding Saint Damien's grave is also found in the collection. The collection contains material from sites that can be dated after European arrival in Hawai'i (1778 – 1866). This collection consists of cataloged artifacts, including charcoal, basalt, shell as well as more modern materials such as beads, buttons, and glass and iron fragments.

3) Kalaupapa (Primary) Period (ca. 1888 to 1980):

This period is defined by the establishment of activities and the settlement at Kalaupapa until the designation as a unit of the National Park System in 1980. Archival materials in the collection represent the changing lives of patient-residents' as the community grows, amenities are added, treatments become more effective, and finally, restrictions are lifted. The collection includes oral histories, photographs, medical technology and equipment, artwork created by patients, personal effects such as clothing, jewelry, modified tools (eating utensils, household objects).

4) Kalaupapa (Late) Park Period, (1980 to present):

This period includes the administration of a historic site while the history is still playing out. The national historical park was established in 1980, while over 90 patient-residents still lived in the settlement along with State Department of Health employees and clergy caring for them. This collection includes photographs, mementos, created from the Saint Damien Day in 1989, the Beatification in 1995 and the Canonization Celebration in 2009. Organization of this time period is different in relationship to the Archeological Time Period because, the creation of the park marks the beginning of the Museum Collection.

Archive/Manuscript Collection

The museum collection currently includes about 40 linear feet of cataloged papers and records. Two map cases of plans, drawings and maps, and a collection of 5,000 individually cataloged photographs.

The archival collection currently contains the associated field records for archeological projects, natural resource activities, and historic preservation efforts at the park. NPS operational records form another portion of the collection. Records of various community organizations and the personal papers of patient-residents, workers and visitors to Kalaupapa comprise the remainder of the collection.

A small number of library materials (e.g., rare books and manuscripts) are included in the museum collection due to their close association with park projects, eminent figures or their use

within the settlement historically. Rare books and original manuscripts, having direct association with the park are included in the museum collection.

The park library contains other rare books that either duplicate museum copies, or have tangential association with the park. The library includes books that are out of print, technical references, and administrative documents.

Pre-1866 Period:

The park's reference library has photocopies of some of the *mahele* or land claim proceedings that describe (or at least hint at) life on the Kalaupapa Peninsula for several generations prior to the 1850s.

Kalaupapa (Primary) Period (1900 – 1980):

Organizations represented in the archive collection from this period include the Kana`ana Hou Church, Kalaupapa Fishing Club, Police Department, Kalaupapa Stamp Club, Kalaupapa Choral Group, Lion's Club, Americans of Japanese Ancestry Benevolent Society, and the local Civil Air Patrol.

Personal papers and documentary materials of patients, former State employees, and clergy from this time period are held in the park collections.

Oral histories are also a part of the collection from this time period.

Kalaupapa (Late) Park Period (1980 to present):

Park staff and current residents collect and contribute documentary materials related to current events and activities within the Kalaupapa community. Recent examples of documentary acquisitions include memorabilia from the 50th wedding anniversary of Paul and Winifred Harada, the filming of the movie "Moloka'i," the exhumation of Mother Marianne, the centennial commemoration of Father Damien's death, and the Canonization of Father Damien in Rome in October 2009.

Ethnology Collection

One group of patient-resident associated objects are classified as "Ethnology" for their unique place in the story of Kalaupapa – those items created by the patients. From the artworks painted by Ed Kato and Henry Nalaielua or the can-openers devised by Kenso Seki, to the doilies crocheted by Sarah Benjamin, these items hold great potential as sources for exhibits and research.

Natural History: Biology Collection

The biological collections include a partial inventory of plants, herpetology specimens, insects and arachnids, marine invertebrates and shells.

Associated Field Records

All records associated with specimens collected in conjunction with biological research are retained as part of the museum collection, regardless of the disposition of the specimens.

Public Access

All serious research regardless of educational level – is encouraged. The park Museum Collection Access Policy states Web Catalog – Research Proposals – The park has completed a Digital Imaging Project through Harpers Ferry Center creating 300 high resolution digital images of the park museum collection objects. A selection of images will be available for online viewing through the park website and the NPS Web Catalog <http://www.museum.nps.gov/> . Accessibility to information regarding the cemeteries should be directed in writing to the Hawai'i Department of Health to obtain patient birth-death records: State of Hawai'i - Department of Health Status Monitoring, Attn: Dr. Pat Barrett, 1250 Punchbowl Street, Honolulu, HI 96813

Restrictions

Of particular concern at Kalaupapa National Historical Park, archival collections may contain patient-specific medical information that is privacy-protected under the Health Insurance Portability and Accountability Act (HIPAA) of 1996. Oral history interviews at the park may have specific restrictions issued by the interviewee that must be honored.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) - Alternative A provides an overall beneficial effect to the currently certified cultural landscape through maintaining the fuel break around Kalaupapa Settlement in an effort to decrease the chance of wildfire spreading.

Indirect Effects of Alternative A (No Action) – Implementation of the firebreak and defensible space fuel reduction would provide a benefit to the preservation of the Museum Collections, Storage facility, museum property, and all historic structures that house museum resources.

Cumulative Effects of Alternative A (No Action) - Negligible

Mitigation Measures of Alternative A (No Action) - None

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) - Alternative B provides an overall beneficial effect to the currently certified cultural landscape through maintaining the fuel break around Kalaupapa Settlement in an effort to decrease the chance of wildfire spreading as well as maintaining defensible space around structures.

Indirect Effects of Alternative B (Increased Protection) – Implementation of the firebreak and defensible space fuel reduction would provide a benefit to the preservation of the Museum Collections, Storage facility, museum property, and all historic structures that house museum resources.

Cumulative Effects of Alternative B (Increased Protection) – Negligible.

Mitigation Measures of Alternative B (Increased Protection) - None

Conclusion (Alternatives A and B) – Direct effects of fire-fighting under alternatives A and B are beneficial to Museum Collections by virtue of enhancing the safety of existing collections. Construction of the firebreak (alternative A) and its expansion coupled with additional fuel reduction under alternative B provide beneficial safety, an indirect effect on Museum Collections. Cumulative effects are considered negligible under alternatives A and B.

Mitigation Measures for all Cultural resources

CUL-1 Project Preparation Phase. To assure that cultural resources are considered early in the fire management planning process and afforded the utmost protection, the following preparatory actions will be undertaken:

- Computer and other databases containing cultural resources data will be maintained by cultural resource staff in coordination with the needs of fire management activities.
- Appropriate cultural resources monitoring protocols will be established by cultural resources staff and applied to fire management practices as warranted.
- Potential research opportunities to study the effects of fire management actions on cultural resources will be identified by cultural resources staff.
- Cultural resources specialists from adjacent land management agencies will be consulted by NPS staff, as appropriate, in order to coordinate mitigation efforts prior to fire management actions.
- Archeological sites, spiritual sites, plant communities or other resources important to Native Hawaiians or Settlement residents will be identified and appropriately managed for preservation, maintenance, and/or enhancement by park cultural resources staff. Consultation with local Native Hawaiian organizations will continue to occur as fire management actions proposed for these areas are developed.

CUL-2 Project Planning Phase. All areas slated for fire management activities will be considered for pre-action field surveys, based on the recommendations of cultural resource specialists and the need to identify cultural resources in proposed project areas. This includes areas likely to be disturbed during future wildfire suppression activity, such as helispots, staging areas, and spike camps. Site-specific information gathering may include the following:

1. In cultural landscape areas, vegetation removal or retention will be incorporated into project planning.
2. Evaluation of the relative hazards of fuel loads in proposed project areas will address the protection of cultural resource values, including:
 - Maintenance of light fuel loads on and in close proximity to cultural resources that might be impacted by fire,
 - Benefits gained from reduced fuel loads in relation to the need to avoid or minimize adverse effects on cultural resources,
 - Opportunities to restore or enhance the historic character of cultural landscapes,

- In developing burn plans, assessment of the potential effects of heat intensity and duration above, at, and below the surface in relation to cultural resources, and
 - For projects with the potential for accelerating the rates of erosion, potential effects of erosion on cultural resources.
5. For historic structures (cited from the Secretary of the Interior's Standards for the Treatment of Historic Properties)
- Installing sensitively designed fire suppression systems, such as sprinkler systems that result in retention of historic features and finishes
 - Applying fire-retardant coatings, such as intumescent paints, which expand during fire to add thermal protection to steel

CUL-3 Project Implementation. Adverse effects on known and unknown cultural resources will be avoided or minimized during the implementation of fire management projects. A variety of treatments and techniques, as detailed in the project planning and preparation phase for individual projects, will be used for the protection of cultural landscape features during implementation of both prescribed fire and mechanical treatment activities, as follows:

1. A cultural resource specialist or resource advisor will:
 - Be present during fire management actions, as stipulated, where recorded and suspected but not-yet-recorded historic or prehistoric resources are considered at risk,
 - Deliver a pre-project briefing to fire management staff as necessary, and
 - Share data with fire management personnel as needed to avoid or minimize adverse effects.
2. Vegetation will be flagged, or otherwise identified, to properly carry out project planning stipulations for:
 - Retention, based upon age determination or diameter thresholds as previously agreed upon,
 - Limbing up landmark trees and other tree pruning within the Settlement,
 - Flush-cutting trees removed from cultural resource areas unless otherwise stipulated, and

- Brush removal within agreed-upon boundaries.
3. Fences and fields may be character-defining features of historic properties. In such cases:
 - Avoid displacing or damaging fences with equipment and vehicles,
 - Remove brush only by hand or with hand-tools in a 10-foot-wide buffer zone along fence lines,
 - Provide temporary gates where necessary.
 - Use prescribed burn to restore field patterns in consultation with cultural resources staff.
 4. Structures and small-scale features may contribute, or be themselves, historic properties. In such cases:
 - Remove brush approximately 30 feet from burnable structures, depending on slope, with hand tools being the default method, and
 - If there are foundation plantings, create defensible space outside ornamental edge plantings wherever possible.
 5. Some areas may be sensitive for archeological resources on or near the surface. In such cases:
 - Do not drag cut vegetation,
 - Do not use rakes,
 - Use no burning when surface or subsurface resources are sensitive to heat, and
 - Avoid using surface scarification to retard runoff in archeological sites.
 6. Erosion will be minimized to the extent possible, by methods such as:
 - Constructing control lines perpendicular to the slope,
 - Using the existing road network,
 - Keeping vehicles and equipment off undisturbed soils, and

- rehabilitate any lines within and upslope of cultural resources as soon as practicable at the conclusion of the incident or treatment.

CUL-4 Post-Project Phase. Adverse effects on known and suspected cultural resources will continue to be avoided or minimized through careful consideration of actions during the post-action phase of mechanical treatment, prescribed fire, and fire suppression activities.

1. The post-action condition of all recorded cultural resources will be assessed, as necessary.
- Post-action surveys may be conducted both in previously surveyed areas and in unsurveyed areas.
 - Previously unrecorded cultural resources will be assessed for condition, and stabilization and other protection needs.
2. Stabilization and other treatment needs of cultural resources will be addressed in the development and implementation of Burned Area Emergency Response Plans and Burned Area Restoration Plans, and in the development of funding requests for these and other post-fire programs as needed.
 3. Network FMO will ensure that monitoring and research data are compiled, evaluated, and used to help refine cultural resource compliance for future fire management actions and objectives.
 4. Park staff will work with the Network FMO to accomplish these tasks.

Park Operations

Visitor Experience and aesthetic resources

Visitors to Kalaupapa may be classified into four general categories, including:

1. *Guests of Kalaupapa Settlement Residents.* The residents at Kalaupapa may invite family and friends to visit them at the Settlement. The guests may stay overnight in visitor quarters or in private homes. They can swim and snorkel, fish, picnic, and walk through Kalaupapa Settlement unescorted and may travel beyond the Settlement if accompanied.
2. *Natural resource enthusiasts* come to the Park to view wildlife, especially the unique Hawaiian avian faunal, and the unusual native plants. These visitors access backcountry portions of the Park by hiking or guided mule.
3. *Sightseeing Visitors.* About 85 percent of Kalaupapa visitors stop at the overlook in Pala`au State Park to view the surrounding scenery, natural landscapes, geologic formations, and cultural and historical sites. Visitors can hike through the ironwood, koa, and eucalyptus forests or view Kalaupapa Peninsula and the cliff on the north coast of Moloka'i from Kalaupapa Lookout. The NPS maintains information wayside exhibits on the Kalaupapa Peninsula's people, history, and archeology. Some choose to ride mules or hike the steep two mile (3.2 km) Pali Trail to Kalaupapa Settlement and take the guided bus tour.
4. *Cultural practitioners* come to Kalaupapa to gather natural materials used in ceremonies and worship, or to visit sacred sites that hold spiritual significance. Hawaiians still visit the Peninsula for traditional activities.

Since 1996, visitation to Kalaupapa has ranged between 58,000 and 87,000 people per year. On average approximately 68,000 people visit Kalaupapa each year with visitation fairly steady throughout the year. About 58,000 people visit the Kalaupapa Peninsula overlook in Pala`au State Park, while 10,000 people come to the Settlement via mule rides, hiking, or by aircraft. The highest recorded visitation of 86,989 was in 2000. The overall trend indicates a relatively stable yearly visitation rate. The number of visitors arriving by aircraft has doubled since 1999, while hiking visitors has remained about constant, averaging 2,100 visitors per year. The enabling legislation for Kalaupapa NHP calls for a limit of no more than 100 visitors per day.

Because an important purpose of Kalaupapa NHP is to protect the lifestyle and individual privacy of the Hansen's Disease patients, there are several restrictions for visitors at Kalaupapa. These include requirements that visitors obtain a permit from the Hawai'i State Department of Health to enter Kalaupapa Settlement (a commercial tour company arranges permits for customers, and guests of residents have their permits arranged by their sponsor), not be under the age of 16, not take photographs of patients without their written permission, and not camp

overnight. Guests of Settlement residents may tour Kalaupapa and Kalawao Settlement as well as other areas of the Peninsula while escorted by a resident and stay overnight in visitor's quarters. Other visitors may only tour Kalaupapa and Kalawao Settlements on a commercial tour, currently provided by Damien Tours (which is owned and operated by a Kalaupapa resident). The NPS does not offer any regularly scheduled interpretive programs or activities because of the restricted nature of visitation to the park and because tours are offered through a commercial service.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire would result in the immediate restriction of visitors to Kalaupapa. However, since wildfire has not been recorded at Kalaupapa such an event would be considered unlikely and of short duration, resulting in a minor short-term localized adverse impact on visitor experience.

Indirect Effects of Alternative A (No Action) - negligible

Cumulative Effects of Alternative A (No Action) - negligible

Mitigation Measures of Alternative A (No Action) – There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – Wildfire would result in the immediate restriction of visitors to Kalaupapa. However, since wildfire has not been recorded at Kalaupapa such an event would be considered unlikely and of short duration, resulting in a minor short-term localized adverse impact on visitor experience.

Indirect Effects of Alternative B (Increased Protection) – Fuel reduction would restore historic views resulting in a benefit to visitor experience and aesthetic resources.

Cumulative Effects of Alternative B (Increased Protection) - negligible

Mitigation Measures of Alternative B (Increased Protection) –

PUB-1 Project work hours will normally be limited to normal work hours (8 A.M. to 5 P.M.) to minimize potential noise impacts on nearby residents and staff. Exceptions may occur outside of normal work hours where warranted, for example to take advantage of windows of favorable weather.

PUB-2 The fire management office will develop and implement an education and communication plan for all site-specific fire management implementation projects for the benefit of Settlement residents, park visitors and the public at large via the Park website.

Conclusion (Alternatives A and B) – Wildfire would result in a minor short-term localized adverse direct impact on visitor experience for both alternative A and B. Fuel-reduction activities would be considered a beneficial indirect benefit under Alternative B. The indirect effects under alternative A and B, and cumulative effects under Alternative A are all considered negligible.

Soundscapes

Natural soundscapes have not yet been identified for the park. Park soundscapes can be divided into two general areas, coastal and inland.

Natural sounds at the coastal areas of the park are dominated by the ocean and by wind. Surf can almost always be heard at the coast, and brisk trade winds blow the majority of the year. During the day birds can also be heard in the coastal and forested areas of the park. Vegetation is scattered scrub near the coast and heavily wooded inland throughout the park. Natural sounds are primarily bird and wind sounds through open and closed vegetation canopy.

Sounds associated with a small town are prevalent on the western portion of the Peninsula in Kalaupapa Settlement and near the airport. Air traffic associated with the Kalaupapa Airport can be heard throughout the park.

Existing intrusions to the park's soundscapes include the administrative use of power tools and vehicles for other park purposes. Visitor services and facilities also experience associated impacts to soundscapes such as tour buses and passenger vehicles in town and along the road to Kalawao to Judd Park. These are not expected to change.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire fighting including the sound of aircraft, heavy machinery, and other vehicles would result in substantial noise in addition to either oceanside or terrestrial soundscapes. Such an event would be rare considering there are no recorded historical wildfire events for the Kalaupapa Peninsula, resulting in a minor short-term localized adverse effect.

Indirect Effects of Alternative A (No Action) - Negligible

Cumulative Effects of Alternative A (No Action) - There are cumulative minor short-term localized adverse impacts to soundscapes with wildfire suppression because of existing impacts of other sound sources such as the administrative use of power tools and vehicles for other park purposes and air traffic. Visitor services and facilities such as tour buses and passenger vehicles also impart impacts to soundscapes. These are not expected to change, resulting in a minor long-term localized adverse effect.

Mitigation Measures of Alternative A (No Action) - None

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – In addition to the effects described under Alternative A, the maintenance of fuel-reduction areas would contribute to an annual intrusion of noise by motorized equipment (chainsaw, mower, line-trimmer, etc), resulting in a minor long-term localized adverse effect.

Indirect Effects of Alternative B (Increased Protection) - Negligible

Cumulative Effects of Alternative B (Increased Protection) - There are cumulative minor short-term localized adverse impacts to soundscapes with wildfire suppression because of existing impacts of other sound sources such as the administrative use of power tools and vehicles for other park purposes and air traffic. Visitor services and facilities such as tour buses and passenger vehicles also impart impacts to soundscapes. These are not expected to change, resulting in a minor long-term localized adverse effect.

Mitigation Measures of Alternative B (Increased Protection) - none

Conclusion (Alternatives A and B) – Noise arising from aircraft and other motorized vehicles and equipment associated with fire-fighting would result in a minor short-term localized adverse direct effects on soundscapes under alternative A. Maintenance of fuel-reduction areas under alternative B would result in minor long-term localized adverse direct effects. Alternatives A and B result in negligible indirect effects. Alternatives A and B would both experience cumulative minor long-term localized adverse impacts to soundscapes from noise associated with building maintenance, aircraft, and other perennial sources of noise. While the maintenance of fuel-breaks and low-fuel areas is expected to increase machinery noise under Alternative B, the Kalaupapa soundscape is not expected to be adversely affected because of ambient noise levels due to current mowing practices.

Maintenance

The effect of alternatives on maintenance of grounds and structures within Kalaupapa National Historical Park is expressed through time commitment and the requirement for equipment.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Wildfire would aid the management of grounds by reducing fuels and woody structure across the Kalaupapa Peninsula, a benefit.

Indirect Effects of Alternative A (No Action) - negligible

Cumulative Effects of Alternative A (No Action) - The transition from State to Federal management has resulted in the need for additional staff and equipment to complete maintenance of grounds and existing structures, a minor long-term localized adverse cumulative impact.

Mitigation Measures of Alternative A (No Action) – none

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – While wildfire would provide a benefit to the maintenance of grounds, additional staff and equipment able to mow on rocky terrain would be required for the implementation and maintenance of fuel-reduction areas within the Kalaupapa NHP, a minor long-term localized adverse impact.

Indirect Effects of Alternative B (Increased Protection) - negligible

Cumulative Effects of Alternative B (Increased Protection) - The transition from State to Federal management has resulted in the need for additional staff and equipment to complete maintenance of grounds and existing structures, a minor long-term localized adverse cumulative impact.

Mitigation Measures of Alternative B (Increased Protection) – none

Conclusion (Alternatives A and B) – Wildfire would provide a direct benefit to maintenance of grounds under both alternative A and B. However, the need for additional staff and equipment to maintain fuel-reduction areas would result in a minor long-term localized adverse direct impact to maintenance under alternative B. Indirect effects are negligible under alternatives A and B. The transition of grounds and structure management from State to National Park Service would result in a minor long-term localized adverse cumulative impact on maintenance under alternatives A and B.

Infrastructure

Infrastructure considered by this analysis includes roads, electric lines, and structures associated with the water system.

Roads within the settlement and to the airport are covered with asphalt. The road between Kalaupapa and Kalawao is improved by being graveled. Other roads are roughly leveled unimproved native dirt.

Electric delivery lines within Kalaupapa National Historical Park originate from Meyer family managed land at the top of the pali directly south of the settlement of Kalaupapa. The lines are suspended by a few wooden posts down the pali. More closely spaced wooden posts support the wire to an electrical substation within the Settlement. Delivery lines suspended from wooden poles supply power to individual homes and the airport. The power line to the airport runs alongside immediately south of the road to the airport, lighthouse, and lighthouse keeper homes.

The well, pump, and storage tank that comprise part of the Kalaupapa water system are located 500 feet south of the mouth where Waihānau stream debauches onto the Kalaupapa Peninsula. The pipe system for delivering water to Kalaupapa and other portions of the settlement are located below-ground.

The phone and fax lines to Kalaupapa descend the pali in the vicinity of the pali trail crossing the empty field north of the landfill into Kalaupapa settlement. While the phone lines down the pali remain in use, a newly installed dish sends signals directly overhead to a receiving station on Meyer managed property at the top of the pali.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – Power lines running down the pali and above-ground portions of the water system are susceptible to wildfire. Damage by fire would result in a moderate long-term localized adverse impact to the power and water supply infrastructure

Indirect Effects of Alternative A (No Action) - negligible

Cumulative Effects of Alternative A (No Action) - negligible

Mitigation Measures of Alternative A (No Action) - There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – The fuel-reduction efforts would reduce the impact of wildfire to above-ground portions of the power and water supply infrastructure, resulting in a minor long-term localized adverse impact.

Indirect Effects of Alternative B (Increased Protection) - negligible

Cumulative Effects of Alternative B (Increased Protection) -negligible

Mitigation Measures of Alternative B (Increased Protection) –

Maint 1 Maintain low-fuel corridors along power, water, and phone lines

Conclusion (Alternatives A and B) – The influence of fuel-reduction would reduce the moderate long-term localized direct adverse impact to the power and water supply infrastructure under alternative A to a minor long-term localized adverse impact under alternative B. Indirect and cumulative impacts to infrastructure are considered negligible under both alternatives A and B.

Safety/security

Strong tradewinds blow across the Peninsula towards the settlement. Dry vegetation on the Kalaupapa Peninsula would push the fire towards the settlement. State and Federal workers, Kalaupapa residents, visitors, and volunteers would be in the path of spreading fire. Smoke from the fires would also be blown into the settlement. The existing safety plan under alternatives A and B calls for evacuating employees and others in Kalaupapa at the time of fire to safety areas free of smoke allowing evacuation by rotary or fixed-wing aircraft. Allowing for the location of the fire and prevailing direction of wind, safety evacuation points could include the open area north of the landfills, the wharf/care home facility, or the airport.

Impacts of Alternative A (No Action)

Direct Effects of Alternative A (No Action) – The effects of intense fire (flames, heat, and smoke) due to fuel accumulation across the Peninsula and associated spotting by fire-brands onto pockets of dense vegetation and historic wooden buildings within the Settlement of Kalaupapa would pose considerable risk to all. Wildfire would pose a severe short-term localized adverse impact to the safety and security of all Kalaupapa Settlement inhabitants.

Indirect Effects of Alternative A (No Action) - negligible

Cumulative Effects of Alternative A (No Action) – negligible

Mitigation Measures of Alternative A (No Action) – There is no provision for a Fire Management Plan to formalize and implement such measures. However, mitigations developed under Alternative B could be adopted in the event of a wildfire.

Impacts of Alternative B (Increased Protection)

Direct Effects of Alternative B (Increased Protection) – The effects of intense fire (flames, heat, and smoke) due to fuel accumulation across the Peninsula and associated spotting by fire-brands onto pockets of dense vegetation and historic wooden buildings within the Settlement of Kalaupapa would pose considerable risk to all. Fuel reduction would reduce fire-hazard in key areas to facilitate containment of the fire, provide safety areas, and reduce the probability of fire spreading into the Kalaupapa settlement. The installation of fire suppression systems in all historic buildings would provide additional safety to visitors. Under the more favorable conditions of alternative B, wildfire would pose a minor short-term localized adverse impact to the safety and security of all Kalaupapa Settlement inhabitants.

Indirect Effects of Alternative B (Increased Protection) - negligible

Cumulative Effects of Alternative B (Increased Protection) - negligible

Mitigation Measures of Alternative B (Increased Protection) –

PUB-3 Training plans will be established for appropriate Park staff to ensure that they have the necessary training for specific tasks, such as tree removal or limbing.

PUB-4 A safety plan will be established that covers all fire management actions, whether prescribed burning or mechanical fuel reduction.

Conclusion (Alternatives A and B) –Direct impacts are reduced from severe short-term localized adverse impact under alternative A to minor short-term localized adverse impact on the safety and security of all Kalaupapa Settlement inhabitants under alternative B. Indirect and cumulative impacts are negligible under alternatives A and B.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The presumed restriction of wildfire and associated activities (fire-fighting) to the Kalaupapa Peninsula combined with lack of natural resources in the same area results in the negligible effects of either alternative to many of the natural resources examined (Table 7). Where adverse effects do occur, these are frequently negligible or minor and shorter localized adverse effects (Air Quality, Soil Resources, Water Quality, Floodplains, Wetlands, Wildlife and Fish, Insects and Invertebrates, Reptiles and Amphibians, Unique Habitat and Long-term Productivity). Resources that do show moderate or Major adverse effects (Native Vegetation, Non-native Plant/Animal) show equitable adverse effects by either alternatives because fuel-reduction is mostly designed to protect the settlement and outlying structures from wildfire. While Alternatives A and B have direct and indirect effects on marine animals and the Hawaiian hoary bat that may effect, but are not likely to adversely effect, mitigation measures ensure that direct and indirect effects on special species are naught.

For Cultural Resources, two criteria analyzed (Archaeological Resources; Museum Collections) show the same pattern of type, intensity, and scale of effect under both alternatives considered. Several criteria (Ethnographic Resources; Historic Structures, Cultural Landscape) show an amelioration of adverse effects under the preferred alternative (Alternative B). The remaining criteria (NHL) shows an intensification of adverse indirect effect from negligible to moderate consequent to the enlargement of the fuel-break.

For the criteria considered under Park Operations, only Soundscapes show the same effects for either alternative. Infrastructure and visitor safety show a reduced intensity of Direct Impacts for Alternative B versus A. Maintenance of fuel-reduction areas shows an increase in intensity of direct effect reflecting the labor required to maintain fuel-reduction areas. These same fuel reduction areas are considered a benefit under indirect effects for Alternative B Visitor Experience by virtue of the restoration of historic views.

TABLE 7 – ENVIRONMENTAL CONSEQUENCES COMPARISON

Impact Topic		Direct, Indirect, Cumulative Impacts	Alternative 1 – No Action	Alternative 2 – Increased Protection
Natural Resources	Air Quality	Direct Impacts	Negligible short-term localized adverse	Negligible short-term localized adverse
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Negligible	Negligible
	Soil Resources	Direct Impacts	Negligible short-term localized adverse	Negligible short-term localized adverse
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Minor long-term localized adverse	Minor long-term localized adverse
	Water Quality	Direct Impacts	Negligible	Negligible
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Negligible	Negligible
Floodplains	Direct Impacts	Negligible	Negligible	
	Indirect Impacts	Negligible	Negligible	
	Cumulative Impacts	Negligible	Negligible	
Wetlands	Direct Impacts	Negligible	Negligible	
	Indirect Impacts	Negligible	Negligible	
	Cumulative Impacts	Negligible	Negligible	
Native Vegetation	Direct Impacts	Major long-term localized adverse	Moderate long-term localized adverse	
	Indirect Impacts	Major long-term localized adverse	Moderate long-term localized adverse	
	Cumulative Impacts	Beneficial	Beneficial	
Non-native Plant/Animal	Direct Impacts	Moderate long-term localized adverse	Moderate long-term localized adverse	
	Indirect Impacts	Moderate long-term localized adverse	Minor long-term localized adverse	
	Cumulative Impacts	Minor long-term localized adverse	Minor long-term localized adverse	
Wildlife and Fish	Direct Impacts	Minor long-term localized adverse	Minor long-term localized adverse	
	Indirect Impacts	Minor long-term localized adverse	Minor long-term localized adverse	
	Cumulative Impacts	Beneficial	Beneficial	
Insects and Invertebrates	Direct Impacts	Negligible	Negligible	
	Indirect Impacts	Minor localized short-term adverse	Minor localized short-term adverse	
	Cumulative Impacts	Negligible	Negligible	

	Reptiles and amphibians	Direct Impacts	Negligible	Negligible
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Negligible	Negligible
	Unique Habitat	Direct Impacts	Negligible	Negligible
		Indirect Impacts	Minor localized short-term adverse	Minor localized short-term adverse
		Cumulative Impacts	Negligible	Negligible
	Long-term productivity	Direct Impacts	Minor localized long-term adverse	Minor localized long-term adverse
		Indirect Impacts	Minor localized long-term adverse	Minor localized long-term adverse
		Cumulative Impacts	Negligible	Negligible
	Species of Special Concern	Direct Impacts	May effect, not likely to adverse effect	May effect, not likely to adverse effect
		Indirect Impacts	May effect, not likely to adverse effect	May effect, not likely to adverse effect
		Cumulative Impacts	No effect	No effect
Cultural Resources	NHL	Direct Impacts	Moderate localized long term adverse	Moderate localized long term adverse
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Negligible	Negligible
	Ethnographic Resources	Direct Impacts	Moderate long-term widespread adverse	Minor long-term widespread adverse
		Indirect Impacts	Negligible	Negligible
		Cumulative Impacts	Negligible	Negligible
Historic Structures	Direct Impacts	Severe long-term widespread adverse	Minor long-term widespread adverse	
	Indirect Impacts	Negligible	Negligible	
	Cumulative Impacts	Negligible	Negligible	
Archaeological Resources	Direct Impacts	Moderate localized long term adverse	Moderate localized long term adverse	
	Indirect Impacts	Moderate localized long term adverse	Moderate localized long term adverse	
	Cumulative Impacts	Minor localized long-term adverse	Minor localized long-term adverse	
Cultural Landscape	Direct Impacts	Negligible	Beneficial	
	Indirect Impacts	Negligible	Negligible	
	Cumulative Impacts	Negligible	Negligible	

	Museum Collections	Direct Impacts Indirect Impacts Cumulative Impacts	Beneficial Beneficial Negligible	Beneficial Beneficial Negligible
Park Operations	Visitor Experience	Direct Impacts Indirect Impacts Cumulative Impacts	Minor short-term localized adverse Negligible Negligible	Minor short-term localized adverse Beneficial Negligible
	Soundscapes	Direct Impacts Indirect Impacts Cumulative Impacts	Minor short-term localized adverse Negligible Minor long-term localized adverse	Minor long-term localized adverse Negligible Minor long-term localized adverse
	Maintenance	Direct Impacts Indirect Impacts Cumulative Impacts	Beneficial Negligible Minor long-term localized adverse cumulative impact	Minor long-term localized adverse Negligible Minor long-term localized adverse
	Infrastruct.	Direct Impacts Indirect Impacts Cumulative Impacts	Moderate long-term localized adverse Negligible Negligible	Minor long-term localized adverse Negligible Negligible
	Visitor Safety	Direct Impacts Indirect Impacts Cumulative Impacts	Severe short-term localized adverse Negligible Negligible	Minor short-term localized adverse Negligible Negligible

CHAPTER 6. COORDINATION AND CONSULTATION

Public scoping fulfilling the requirements for both the NEPA and NHPA Section 106 consultation process were conducted simultaneously (see Appendix C for the scoping notice). A public notice of the scoping period for the FMP was sent to the Park's general mailing list, regulatory agencies and local government on August 13, 2008 requesting input from the public. Further detail is provided under the following NHPA and Environmental consultation sub-headings.

Compliance with Section 106 of the National Historic Preservation Act (NHPA)

Section 106 regulations to the NHPA 36 CFR Part 800—Protection of Historic Properties (incorporating amendments effective August 5, 2004) §800.8(3)(c)(1) Coordination With the National Environmental Policy Act. Use of the NEPA process for section 106 purposes.

(i) Identify consulting parties either pursuant to §800.3(f) or through the NEPA scoping process with results consistent with §800.3(f)

Twenty-nine individuals and organizations were identified in 2008 as consulting parties. Some consulting parties originally identified in 2008 have either changed positions or have passed away. A revised list for follow-up Section 106 consultation and notification that the EA is released and has been sent to consulting parties. Another notification letter has been sent to the larger FMP mailing list to solicit comments and review of the FMP on its release (December 1, 2011). See appendix D for list of consulting parties.

(ii) Identify historic properties and assess the effects of the undertaking on such properties in a manner consistent with the standards and criteria of §§800.4 through 800.5, provided that the scope and timing of these steps may be phased to reflect the agency official's consideration of project alternatives in the NEPA process and the effort is commensurate with the assessment of other environmental factors;

The Area of Potential Effect is the entire Kalaupapa National Historic Park boundary (see Figure 1) and all the historic properties located within that boundary. This includes the Kalaupapa Leprosy Settlement National Historic Landmark (NHL), which spans the entire peninsula, at least 1100 historic grave markers, at least 500 archaeological sites, and at least 200 historic structures. Environmental consequences on cultural resources have been assessed; these findings can be located in the Cultural Resources section of Chapter 5. The mitigations outlined in that same section must be followed. As long as all mitigations are followed, no historic properties will be adversely affected

(iii) Consult regarding the effects of the undertaking on historic properties with the SHPO/THPO, Indian tribes and Native Hawaiian organizations that might attach religious and cultural significance to affected historic properties, other consulting parties, and the Council, where appropriate, during NEPA scoping, environmental analysis, and the preparation of NEPA documents;

Of the consulting parties identified in 2008, twenty-nine letters serving as NEPA Scoping Notices and initiation of Section 106 were sent; twenty-seven letters were received by the consulting parties. Recipients of the consultation letter and notice include the SHPO (at the time Nancy McMahon, Deputy SHPO as well as DLNR Administrator, Laura Thielen); The Office of Native Hawaiian Affairs (Moloka'i Branch and O'ahu); Native Hawaiian Organizations including: Hûi Mâlama I Na Kûpuna o Hawai'i Nei; as well as residents of the patient community including the President of the Kalaupapa Patient Advisory Council.

Comment letters were received by the SHPO (August 29, 2008), the ACHP (September 2, 2008) and Historic Hawai'i Foundation (August 19, 2008). Copies of these letters can be found in Appendix E. Of note, the Historic Hawai'i Foundation "encourages the development of a wildfire management and suppression plan for the Kalaupapa National Historical Park, as this will aid in the protection of the park's historic resources."

On July 26, 2011, the Kalaupapa National Historical Park Advisory Commission had a meeting at the McVeigh Social Hall in Kalaupapa. On the agenda was an update on the Fire Management Plan, which was given by Kalaupapa NHP Superintendent Steve Prokop. One comment from Commissioner Henry Tancayo suggested reopening historic community pastures as a means to keep down dry vegetation / hazardous fuels.

A revised list for follow-up Section 106 consultation and notification that the EA will soon be released has been sent (November 4, 2011). An additional notification letter has been sent to the larger FMP mailing list concurrent with the release of the Environmental Assessment (December 1, 2011). The NPS will be taking comments from all consulting parties including the Kalaupapa community and the public through the NPS's PEPC website, written letter, phone, email and community meeting.

(iv) Involve the public in accordance with the agency's published NEPA procedures; and

The Park conducted a scoping meeting for the FMP open to both park staff and community members on August 20, 2008 at McVeigh Hall at Kalaupapa. Attendees included the President of the Kalaupapa Patient Advisory Council.

In concurrence with the release with of the Environmental Assessment, the agency will be taking comments from all consulting parties including the Kalaupapa community and the public through the NPS's PEPC website, written letter, phone, email and community meeting.

A follow-up consultation meeting will also be held in the Kalaupapa community to solicit comments on the EA. This meeting is tentatively scheduled to coincide with the regular Kalaupapa Community meeting in December 13, 2011.

(v) Develop in consultation with identified consulting parties alternatives and proposed measures that might avoid, minimize or mitigate any adverse effects of the undertaking on historic properties and describe them in the EA or DEIS.

Compliance with Natural Resource Protection Laws (NEPA/ESA)

Public involvement during the National Environmental Policy Act (NEPA) process included public scoping, public review of the EA (1st – 30th November, 2011), and responses to comments submitted by the public. In accordance with CEQ's regulations for implementing NEPA (40 CFR 1506.6), the NPS has involved the interested and affected public during the preparation of this EA.

The community/staff scoping meeting for the FMP on August 20, 2008 at McVeigh Hall at Kalaupapa yielded the following input, comments and questions grouped in the following lists by general issue area.

Firefighting Protocol, Equipment, Safety

What is the response time of the Maui County Fire Department helicopter? What is the response time on foot? Is there additional fuel for the helicopter in the Park or topside?

Where are the Park's fire hydrants?

What are the Park's responsibilities for initial response for wildfire?

If responsible, what are the current resources available for firefighting including number of trained firefighters, tools, personal protective equipment, tankers, trailers, pumps, hoses? Is this an adequate first response for fire?

What should be the training needs and schedule? If the Park conducts fire training, a doctor should also come and conduct physicals.

What is the emergency protocol in case of fire for Park staff, especially red-carded staff?

What is the protocol for community notification?

Range of Alternative Strategies to be Included in the EA

Will prescribed burning be part of the scope of FMP actions?

Will pile burning be part of the FMP actions?

If a wildfire should occur on the Peninsula in the non-native shrublands or forest, the FMP should consider using prescribed burning to maintain the landscape in this area and prevent dense regrowth of non-native invasive plants.

How many Fire Management Units (FMUs) are reasonable for the Park? The developed areas of the Settlement and the churches in Kalawao could be grouped as one FMU.

Recommend that roadside fuel reduction be included in the FMP strategy with a list of roads to be treated. Consider including Makanalua Boundary Road and the Dump Road for treatment.

Fuel Break/Sprinkler System

Is it adequate or should it be lengthened, widened or relocated?

What was the original intent including type of fire, supporting resources, strategy used by firefighters in conjunction with the operating fuel break?

What should be routine maintenance for the fuel break itself including frequency of vegetation clearing and methods?

Should the sprinkler system be separated from the fence to allow for separate fence maintenance without dismantling the sprinklers?

How does operation of the sprinkler system affect the pressure on using one hydrant in the Park and vice versa? On using two hydrants in the Park?

Environmental Issues and Input

Disciplines that should take part in planning fuel reduction projects include maintenance, cultural resources/archaeology, natural resources, landscape architect, fire management.

Fuel reduction projects should be based on modeling fuel and fire behavior using 90th percentile weather and include a review by a fuels specialist and a hazard assessment posed by the current and potential fuel levels.

Primary values at risk include the community residents, State and Federal staff, community visitors, contributing structures to the National Historic Landmark including residents' and staff homes and beach houses, the historic churches, the lighthouse, park infrastructure and airport facilities.

What is the effect of fire on the Park's most invasive weed species such as lantana and Christmas berry?

Can a fuel hazard model be run from the existing vegetation map that has classifications by physiognomy (grass, tree, shrub) that could be cross-walked into fuel types for modeling?

A copy of this EA was sent to all persons who requested a copy, as well as to other pertinent agencies and individuals potentially affected by the Preferred Alternative. This EA would be

available for public review for 30 days. During this public review period, comments on the EA are invited from the public and interested agencies.

The NPS Water Resources Division indicated that because the project would not raise flood levels or build permanent structures in the floodplain, a Statement of Findings for floodplains was not necessary.

The NPS has informed the U.S. Fish & Wildlife Service of the development of a Fire Management Plan within Kalaupapa NHP. Concurrence on the effects of the implementation of the preferred alternative on threatened and endangered species is necessary [in compliance with section 7 of the Endangered Species Act of 1973 (ESA), as amended]. This will be addressed in preparing the “Finding of No Significant Impact” FONSI.

Appendix G provides a final distribution list for the completed Environmental Assessment.

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REFERENCES

- Advisory Council on Historic Preservation. 2008. Programmatic Agreement Among the National Park Service, the Advisory Council on Historic Preservation and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act. November 14, 2008.
- Ainsworth, Alison; Tetteh, Michel; Kaufmann, and J. Boone. 2005. Relationships of an alien plant, fuel dynamics, fire weather, and unprecedented wildfires in Hawaiian rain forests: implications for fire management at Hawai'i Volcanoes National Park. Unpublished report. On file at: Hawai'i Volcanoes National Park. Hawai'i National Park, HI. 12 p.
- Atkinson, I.A.E. 1985. The spread of commensal species of *Rattus* to oceanic islands and their effects on island avifaunas. In *Conservation of island birds: Case studies for the management of threatened island species*, edited by P. J. Moors, 35-81. Cambridge, UK: International Council for Bird Preservation.
- Asherman K. E., J. M. Crumme, and J. Q. C. Lau. 1990. A botanical reconnaissance of Kalaupapa National Historical Park, November 27-December 5 1989.
- Baldwin, P., Schwartz, C.W. and E.R. Reader. 1952. Life History and Economic Status of the Mongoose in Hawai'i. *Journal of Mammalogy*, 33: 3, 335-356.
- Brown, E., K. Kageyama, and R. Watanuki. 2008. Biological Assessment of Marine Resources in Kalaupapa Harbor, Moloka'i, Hawai'i. Natural Resource Report NPS/MWR/HTLN/NRR—2008/001. National Park Service, Omaha, Nebraska.
- Clague, David A, Chen Dao-Gong, Richard Murnane, Melvin H. Beeson Marvin A. Lanphere, G. Brent Dalrymple, Walter Friesen and Robin T. Holcomb. 1982. Age and Petrology of the Kalaupapa Basalt, Molokai, Hawaii. *Pacific Science*, Vol. 36, No. 4. University of Hawai'i Press.
- Daehler, Curtis C. 1998. Using Fire to Restore and Manage Pili Grasslands at Pu'ukohola NHS, November, Department of Botany, University of Hawai'i Manoa, Honolulu, HI.)
- Damon, Ethel. 1948. Siloama. The Church of the Healing Spring. Honolulu: The Hawaiian Board of Missions.
- Day, R.H. and B.A. Cooper. 2002. Petrel and Shearwater surveys near Kalaupapa, Molokai Island, June 2002. Final Report, prepared by ABR, Inc.—Environmental Research & Services. Fairbanks, AK. 17pp.
- Department of the Interior (DOI). 2006a. Interagency Burned Area Rehabilitation Guidebook Interpretation of Department of the Interior 620 DM 3 For the Burned Area Rehabilitation of Federal and Tribal Trust Lands Version 1.3. October 2006.

- _____. 2006b. Interagency Burned Area Emergency Response Guidebook, Interpretation of Department of the Interior 620 DM 3 and USDA Forest Service Manual 2523, for the Emergency Stabilization of Federal and Tribal Trust Lands. Version 4.0. February 2006.
- Devick, W.S., J.M. Fitzsimons and R.T. Nishimoto. 1995. Threatened fishes of the world: *Lentipes concolor* Gill 1860 (Gobiidae). *Environmental Biology of Fishes* **44**: 325-326.
- Diong, C.H. 1982. Population biology and management of the feral pig (*Sus scrofa* L.) in Kipahulu Valley, Maui. PhD dissertation. University of Hawai'i, Honolulu, Hawai'i. 408 pp.
- Dodd, C.K., Jr., G.E. Drewry, R.M. Nowak, J.M. Sheppard, and J.D. Williams. 1985. Endangered and threatened wildlife and plants; review of vertebrate wildlife. *Federal Register* 50:37957-37967.
- DOFAW (Division of Forestry and Wildlife), Hawaii DLNR. 1991. Puu Alii Natural Area Reserve Management Plan. Natural Area Reserves System Program.
- DOFAW, Hawaii DLNR. 2007. Final Environmental Assessment Pu'u Ali'i Conservation Fencing Project, Upper Pu'u Ali'i Plateau Pu'u Ali'i Natural Area Reserve, Molokai.
- DOI. 2001a. United States Department of the Interior, National Park Service. 08 January 2001. Conservation Planning, Environmental Impact Analysis, and Decision Making. Director's Order#12 and Handbook.
- Duvall, F. 2000. Report on 2-day biological survey Huelo Islet: Vertebrates. Draft report, Department of Land and Natural Resources, Kahului, Maui.
- Elliott, H.W. 1973. A field survey of the exotic axis deer at Point Reyes National Seashore. M.S. thesis, University of California, Davis. 40 pp.
- Fire Executive Council (FEC). 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. February 13, 2009. pp. 20.
- Fitzsimons, J.M. 1990. Letter to Mr. Ernest Kosaka, Field Supervisor, Fish and Wildlife Enhancement, US Fish and Wildlife Service, Pacific Islands Office, Honolulu, HI.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lana'i, State of Hawai'i. U. S. Department of Agriculture, Soil Conservation Service.
- Fraser, Heather R., Vanessa Parker-Geisman and George R. Parish. 2007. Hawaiian Hoary Bat Inventory in National Parks on the islands of Hawai'i, Maui and Moloka'i. Technical Report 140. Pacific Cooperative Studies Unit, University Of Hawai'i, Mānoa. April 2007.
- Frasher, H.R., V. Parker-Geisman, and G.R. Parish. 2007. Hawaiian Hoary Bat Inventory in National Parks on the Islands of Hawai'i, Maui, and Moloka'i. Pacific Cooperative Studies Unit Technical Report 140. University of Hawaii at Manoa, Honolulu, Hawaii.

- Gagne, W.C. and F.G. Howarth. 1982. Assessment of endangered and threatened status of Hawaiian arthropods. Report to the U.S. Fish and Wildlife Service, Honolulu.
- Gogan, P.J., R.H. Barrett, W. Shook and T.E. Kucera 2001. Control of ungulate numbers in a protected area. *Wildlife Society Bulletin* 29(4):1075-1088.
- Goltz, D. M., A. M. Agness and P. C. Banko. 2001. Axis deer home range, movements, and survival at Kalaupapa, Molokai. Unpublished Report. USGS-BRD. Hawaii Volcanoes National Park.
- Goodwin, Conrad. A Kalaupapa Sweet Potato Farm: Report on Archaeological Data Recovery Operations, Kalaupapa Airport Improvement Project, Kalaupapa, Molokai, Hawai'i. Volume 1. Honolulu: International Archaeological Research Institute, Inc. for Edward K. Noda & Associates, 1994.
- Graf, W. and L. Nichols. 1966. The axis deer in Hawai'i. *Journal of the Bombay Natural History Society* 63(3):629-734.
- Greene, L.W. 1985. Historic Resource Study, Exile in Paradise: The Isolation of Hawai'i's Leprosy Victims and Development of Kalaupapa Settlement, 1986 to Present.
- Guidance for implementation of Federal Wildland Fire Management Policy. 2009. Updated Guidance for Implementation of Federal Wildland Fire Management Policy. Memo from the United States Forest Service, Washington Office.
http://www.google.com/search?q=Guidance+for+implementation+of+Federal+Wildland+Fire+Management+Policy+&sourceid=ie7&rls=com.microsoft:en-US&ie=utf8&oe=utf8&rlz=1I7ADSA_en
- Hawai'i Department of Land and Natural Resources (DNLR). 2008. Report to the Twenty-Fifth Legislature Regular Session of 2009 on Budgetary and Other Issues Regarding Invasive Species. Prepared by Hawaiian Division of Forestry And Wildlife. In response to Section 194-2, Hawai'i Revised Statutes and Section 28 of Act 158, Session Laws of Hawai'i, October 2008.
- _____. 1994. Draft Environmental Assessment and Negative Declaration. Job No. 3-9W-J1, Waikolu Valley Wells Development (0855-05 & 06), Pump Controls and Connecting Pipeline, Moloka'i Irrigation System, Kalawao, Moloka'i, Hawai'i. Prepared for the State of Hawai'i, Department of Agriculture, Agriculture Resource Management Division. Prepared by the Department of Land and Natural Resources, Division of Water and Land Development. November 1994.
- Hawai'i, Office of the Governor. 2008. Lenny Klompus, Senior Advisor, Communications. Press Release of April 17, 2008. Governor Lingle Releases \$1,025,000 for Kalaupapa Harbor Facilities Improvements. <http://www7.hawaii.gov/gov/news/releases/2008/governor-lingle-releases-1-025-000-for-kalaupapa/?searchterm=kalaupapa>

- Higashi, G.R. and M.N. Yamamoto. 1993. Rediscovery of "Extinct" *Lentipes concolor* (Pisces: Gobiidae) on the Island of Oahu, Hawaii.
- Hutchison, Ambrose T. 1932. In Memory of Reverend Father Damien J. DeVeuster and Other Priests Who Have Labored in the Leper Settlement of Kalawao, Moloka'i. Father Paul Macken transcribed handwritten. Unpublished manuscript.
- Island Conservation and Ecology Group (ICEG). 2000. Anacapa Island Restoration Project (AIRP), Fall 1999 Field Report. Island Conservation and Ecology Group, Davenport, California, Unpublished Report.
- Jessel, S. and R. Agliam. 1994. Kukaiwaa, North Shore Molokai, Carter's Panic Grass (*Panicum fauriei* var. *carteri*), August 22-25, 1994. Unpublished report.
- Juvik, Sonia P., 2007, "Kalaupapa Landscape: An Ethnographic Study. United States Department of the Interior National Park Service, Pacific West Region Social Science Series, Publication Number 2007-03. Frederick F. York, Ph.D., Managing Editor.
- Karl, Thomas R., Jerry M. Melillo, and Thomas C. Peterson. 2009. Global Climate Change Impacts in the United States, (eds.). Cambridge University Press.
- Kirch, P.V. 1985. Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory. Honolulu: University of Hawaii Press.
- Kirch, P.V. 2002. From the "Cliffs of Keolewa" to the "Sea of Papaloa": An archaeological reconnaissance of portions of the Kalaupapa National Historical Park, Moloka'i, Hawaiian Islands. Berkeley, CA: Archaeological Research Facility, University of California, Berkeley.
- Kirch, P.V., S. O'Day, J. Coil, M. Morgenstein, K. Kawelu, and M. Millerstrom. 2003. The Kaupikiawa Rockshelter, Kalaupapa Peninsula, Moloka'i: New investigations and reinterpretation of its significance for Hawaiian prehistory. *People and Culture in Oceania*, 19, 1-27.
- Kraus, F. 2005. Inventory of Reptiles and Amphibians in Hawaii Volcanoes, Haleakala, and Kalaupapa National Parks. Contribution No. 2005-013 to the Hawaii Biological Survey. Prepared for Pacific Cooperative Studies Unit. University of Hawai'i at Manoa, Honolulu, Hawaii.
- Ladefoged, Thegn N. 1993. Hawaiian dryland agricultural intensification and the Pacific economy. *Pacific Studies* 16(2):119-131.
- LaRosa, Anne Marie, J. Timothy Tunison, Alison Ainsworth, J. Boone Kauffman, R. Flint Hughes. 2008. Chapter 11, Fire and Non-native Invasive Plants in the Hawaiian Islands Bioregion, *in* Wildland Fire in Ecosystems, Fire and Non-native Invasive Plants, USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 6.

- LeGrande, M. 2002. Survey of Kukaiwaa Peninsula, Kalaupapa National Historical Park, Molokai, Hawaii, Special Report Prepared for Kalaupapa National Historical Park.
- Marshall, S. and S.N.R. Aruch 2003. Kalaupapa Shoreline Seabird Survey, 1 December 2003. Unpublished report.
- Marshall, S. and K. Kozar. 2008. Forest Bird Inventory Kalaupapa National Historical Park. Pacific Cooperative Studies Unit Technical Report 154. University of Hawaii at Manoa, Honolulu, Hawaii.
- McCoy, M.D. 2002. Report on Kalaupapa Peninsula Archaeological Project 2002. Unpublished manuscript.
- McCoy, M.D. 2003. Report on Kalaupapa Peninsula Archaeological Project 2003. Unpublished manuscript.
- McCoy, M.D. 2004. Report on Kalaupapa Peninsula Archaeological Project 2004. Unpublished manuscript.
- McCoy, M.D. 2005. The development of the Kalaupapa field system, Moloka'i Island, Hawai'i. *Journal of the Polynesian Society*, 116, 339–358.
- McCoy, M.D. (2008). Hawaiian Limpet Harvesting in Historical Perspective: A Review of Modern and Archaeological Data on *Cellana* spp. from the Kalaupapa Peninsula, Moloka'i Island. *Pacific Science* 62(1):21-38.
- McCoy, Mark D. and Anthony S. Hartshorn. 2007. Wind Erosion and Intensive Prehistoric Agriculture: A Case Study from the Kalaupapa Field System, Moloka'i Island, Hawai'i. *Geoarchaeology: An International Journal*, Vol. 22, No. 5, 511–532.
- McKeown, S. 1996. *A Field Guide to Reptiles and Amphibians in the Hawaiian Islands*. Diamond Head Publishing, Inc., Los Osos, California.
- Maui County. 2006. 2005 Socio-Economic Forecast, Maui County Department of Planning.
- Medeiros, A.C., C.G. Chimera and L.L. Loope. 1996. Ka'uhako Crater Botanical Resource and Threat Monitoring, Kalaupapa National Historical Park, Technical Report 110. Prepared by the Cooperative National Park Resources Studies Unit, University of Hawai'i at Manoa. Cooperative Agreement, NPS CA 8023-2-9001
- Medeiros, A.C. and C.G. Chimera. 1997b. Monitoring Methods for *Centaurium sebaeoides* Exclosure, Kalaupapa NHP, Moloka'i April 9-10, 1997.
- Medeiros, A.C., C.G. Chimera, and L.L. Loope, S.M. Joe, and P.D. Krushelnycky. 2000. Notes on Status and Ecology of the Endangered Hawaiian Annual 'Āwiwi, *Centaurium sebaeoides* (Gentianaceae). *Pacific Science* 54(4):417-422.

- Menard, T. 2001. Activity patterns of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in relation to reproductive time periods. M. S. Thesis, University of Hawai'i, Honolulu
- Mitchell, C., C. Ogura, D.W. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. Hawai'i's comprehensive wildlife conservation strategy. Hawai'i Department of Land and Natural Resources. Honolulu, Hawai'i. October 1, 2005. 722 pp.
- Mobley, Jr., J. R. 2001. Results of 2001 aerial surveys of humpback whales north of Kauai. Annual report submitted to the North Pacific Acoustic Laboratory (NPAL), Scripps Oceanographic Institution, 7 pp.
- Mueller-Dombois, D. 1981a. Fire in tropical ecosystems. Pages 137–176 in H.A. Mooney, T.M. Bonnicksen, N.L. Christensen, J.E. Lotan, and W.A. Reiners (technical coordinators). Fire regimes and ecosystem properties. General Technical Report WO-26, U.S. Department of Agriculture, Forest Service, Washington, D.C.
- Museum Management Plan. 2006. Museum Management Plan, Kalaupapa National Historical Park.
- Neill, Christie, Russ Gripp, Janice Rea, Glenn Shishido, and Lance DeSilva. 2004. Maui Fire Assessment, State of Hawai'i, Division of Forestry and Wildlife, Maui County, Wailuku, Hawai'i. December 17, 2004.
- NIFC. 2001. Review and Update of the 1995 Federal Wildland Fire Management Policy January 2001. http://www.nwcg.gov/branches/ppm/fpc/archives/fire_policy/history/index.htm
- National Park Service (NPS). 2009. Kalaupapa National Historical Park web page on plants updated January 16, 2007. <http://www.nps.gov/kala/naturescience/plants.htm>
- _____. 2009b. Kalaupapa National Historical Park Draft Foundation Statement. April 2009. Prepared by Kalaupapa National Historical Park and the Pacific West Region and Denver Service Center of the National Park Service.
- _____. 2009c. Memorandum to NPS Regional Directors and Park Superintendents from NPS Associate Director, Visitor and Resource Protection, Subject: Guidance for Implementation of Federal Wildland Fire Management Policy. Dated April 9, 2009.
- _____. 2008. Director's Order #18: Wildland Fire Management. National Park Service, Washington, D.C. January 16, 2008. 7 pp.
- _____. 2008b. Reference Manual #18: Wildland Fire Management. National Park Service, Washington, D.C. January 1, 2008.
- NPS. 2007. Draft Foundation Statement Kalaupapa National Historical Park, Molokai, Hawaii. U.S. National Park Service, Kalaupapa, Molokai.
- _____. 2006. Kalaupapa National Historical Park Solid Waste Management Environmental Assessment, December 2006. National Park Service, Pacific West Region, Oakland, CA.

- _____. 2005. Kalaupapa and Kalawao Settlement, Cultural Landscape Inventory, Kalaupapa National Historical Park. Signed by Superintendent, Kalaupapa National Historical Park on September 8, 2005.
- NPS. 2004. Final Environmental Assessment Construction of Ungulate-Proof Fencing, Upper Pu'u Ali'i Plateau. Pu'u Ali'i Natural Areas Reserve, Moloka'i.
- _____. 2001. Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making. National Park Service, Washington, D.C. January 8, 2001.
- _____. 1990. Resource Management Plan, Kalaupapa National Historical Park, Kalaupapa, Hawaii.
- _____. undated. Reference Manual #12. Handbook for Environmental Impact Analysis. National Park Service, Washington, D.C.
- National Oceanic and Atmospheric Administration (NOAA). 2009. National Climatic Data Center. Storm Events, Maui County, 1993 – 2009. <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>
- NWCG (National Wildfire Coordinating Group). 2009. Memorandum from NWCG Chair to NWCG Executive Board, Subject: Update of the Modifications to the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy. January 7, 2009. Boise, ID. 2 pp.
- _____. 2008. Glossary of Fire-fighting Terminology. <http://www.nwcg.gov/pms/pubs/glossary/index.htm>. November 2008 edition.
- Pogue, Pamela and Robert J. Collum, Jr. 2006. The Maui County Hazard Mitigation Plan. Prepared for the Maui County Civil Defense Agency. January 19, 2006.
- Polhemus, D.A. 1996. The Orangeblack Hawaiian Damselfly, *Megalagrion xanthomelas* (Odonata: Coenagrionidae): Clarifying the Current Range of a Threatened Species. Bishop Museum Occasional Papers: No. 45:30-53.
- Pratt, Linda. 1998. Vegetation Management Strategies for Three National Historical Parks on Hawai'i Island. Technical Report 121, Cooperative Parks Resources Study Unit, University of Hawai'i, Honolulu.
- Randall, Rod. 2007. Global Compendium of Weeds database dated 24 January 2007. A collaborative online venture between AgWest (data & weed expertise) and the Hawaiian Ecosystems at Risk project (HEAR).
- Reeser, Jordan. 2009. Fuel Specialist, Wildland Fire Management, Bay Area Network Parks, Point Reyes National Seashore. September 3, 2009.
- Register of Historic Places Nomination Form, 1982

- Smith, Clifford W; Tunison, J. Timothy. 1992. Fire and alien plants in Hawai'i: research and management implications for native ecosystems. In: Stone, Charles P.; Smith, Clifford W.; Tunison, Timothy, eds. Symposium on alien plant invasions in native ecosystems of Hawai'i: management and research. Honolulu, HI: University of Hawai'i, Cooperative Parks Resources Studies Unit: 394-408.
- Summers, Catherine. 1971 Molokai: a site survey. Pacific Anthropological Records No. 14. Honolulu: Bernice Pauahi Bishop Museum Press.
- Spriggs, M. and Anderson, A. (1993). Late colonization of East Polynesia. *Antiquity*, 67:200-217.
- Tep P. and K.Gaines. 2003. Reversing the impacts of feral pig on the Hawaiian tropical rainforest ecosystem. *Restoration and Reclamation Review*, Univ. of MN. www.hort.agri.umn.edu/h5015/rrr.htm
- Thornberry-Ehrlich, T. 2010. Kalaupapa National Historical Park: geologic resources inventory report. Natural Resources Report NPS/NRPC/DRD/NRR---2010/243. National Park Service, Ft. Collins, Colorado.
- TNC (The Nature Conservanc. 2002. Long-Range Management Plan, Fiscal Years 2004–2009, Pelekunu Preserve, Moloka'i, Hawai'i, 2nd Revision. Submitted to the Department of Land & Natural Resources Natural Area Partnership Program by The Nature Conservancy of Hawai'i, January 2003.
- Tomich, P. Q. 1974. The Hawaiian hoary bat, daredevil of the volcanoes. *National Parks and Conservation Magazine* 48: 10-13.
- Tunison, J. Timothy, Julie A.K. Leialoha, Rhonda K. Loh, Linda W. Pratt, and Paul K. Higashino. 1994. Fire effects in the coastal lowlands, Hawai'i Volcanoes National Park. Technical Report 88. Honolulu, HI: University of Hawai'i, Cooperative Parks Resources Studies Unit. 42 p.
- USFWS (U.S. Fish and Wildlife Service). 2009a. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Flying Earwig Hawaiian Damselfly (*Megalagrion nesiotus*) and Pacific Hawaiian Damselfly (*M. pacificum*) Throughout Their Ranges. Federal Register **74**(129):32490-32510.
- _____. 2009b. Endangered and Threatened Wildlife and Plants; Listing *Phyllostegia hispida* (No Common Name) as Endangered Throughout Its Range. Federal Register **74**(50):11319-11327.
- _____. 2008a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for 12 Species of Picture-Wing Flies From the Hawaiian Islands. Federal Register **73**(234): 73794-73843.

- _____. 2008b. *Brighamia rockii* (Pua‘ala) 5- Year Review: Summary and Evaluation. Pacific Islands Fish and Wildlife Office. Honolulu, Hawaii.
- _____. 2007. *Megalagrion pacificum*, Species Assessment and Listing Priority Assignment Form. 17 pp.
- _____. 2006. Revised Recovery Plan for Hawaiian Forest Birds. Region 1, Portland, OR. 622 pp.
- _____. 2003. Endangered and Threatened Wildlife and Plants; Final Designations and Nondesignations of Critical Habitat for 42 Plant Species From the Island of Moloka'i, HI. Federal Register, Vol. 68, No. 52, Tuesday, March 18, 2003. pp. 12982 – 13030.
- _____. 1998. Recovery Plan for the Hawaiian Hoary Bat. U.S. Fish and Wildlife Service, Portland, OR. pp. 50.
- Weisler, M. 1989. Towards documenting exchange in a complex chiefdom: An essay in method. Paper presented at the 54th Annual Meeting of the Society for American Archaeology, Atlanta, Georgia.
- Williams, J. 1990. The coastal woodland of Hawai'i Volcanoes National Park: vegetation recovery in a stressed ecosystem. Technical Report 72. Honolulu, HI: University of Hawai'i, Cooperative National Park Studies Unit. 78 p.
- Wood, K.R. 2008. Vegetation Descriptions of the Offshore Islets, Kalaupapa, Moloka‘i, Hawai‘i and Kukaiwa‘a Peninsula. Special Report Prepared for Kalaupapa National Historic Historical Park.
- WRCC (Western Regional Climate Center). 2006. Historical climate information, online edition, [<http://www.wrcc.dri.edu/narratives/HAWAII.htm>].
- Wyban, C. A., 1993. *Report on the Kalaupapa Fishpond*. On file with the National Park Service U.S. Department of the Interior.

APPENDIX A: Acronyms and Glossary

Affected environment: The existing biological, physical, cultural, social, and economic conditions of an area that are subjected to both direct and indirect changes, as a result of actions described within alternatives under consideration.

Agency Administrator and Employee Roles: Agency administrators will ensure that their employees are trained, certified and made available to participate in the wildland fire program locally, regionally, and nationally as the situation demands. Employees with operational, administrative, or other skills will support the wildland fire program as necessary. Agency administrators are responsible and will be held accountable for making employees available.

Air quality: A measure of health and visibility-related characteristics of air often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

Alternatives: A reasonable range of options that can accomplish an agency's objectives.

Ambient air: The surrounding air.

Aquatic species: A group of closely related and interbreeding living things, living or growing in, on, or near the water.

Archeological resource: Any material remains or physical evidence of past human life or activities, which are of archeological interest, including the record of the effects of human activities on the environment. An archeological resource is capable of revealing scientific or humanistic information through archeological research.

Communication and Education: Agencies will enhance knowledge and understanding of wildland fire management policies and practices through internal and external communication and education programs. These programs will be continuously improved through the timely and effective exchange of information among all affected agencies and organizations.

Consultation: A discussion, conference, or forum, in which advice or information is sought or given, or information or ideas are exchanged. Consultation can take place on an informal or formal basis. Consultation is the process used with the US Fish and Wildlife Service and National Marine Fisheries Service for Endangered Species Act compliance and for National Historic Preservation Act compliance for discussions with the State Historic Preservation Officer.

Council on Environmental Quality: The President's Council on Environmental Quality was established by the National Environmental Policy Act NEPA and is the agency responsible for the oversight and development of national environmental policy.

Critical habitat: Specific areas within a geographical area occupied by a threatened or endangered species which contain those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time of its listing, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species.

Cultural resource: An aspect of a cultural system that is valued by or significantly representative of a culture, or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places, and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management purposes. By their nature, cultural resources are nonrenewable.

Cumulative effects (impacts): Effects on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

EA: Environmental Assessment.

EIS: Environmental Impact Statement.

Ecological Risk Assessment: Evaluation of the likelihood that a pesticide will harm wildlife or the environment.

Environmental Assessment: A brief NEPA document that is prepared (a) to help determine whether the impact of an proposed action or its alternatives could be significant; (b) to aid the NPS in compliance with NEPA by evaluating a proposal that would have no significant impacts, but may have measurable adverse impacts; or (c) as an evaluation of a proposal that is either not described on the list of categorically excluded actions, or is on the list, but exceptional circumstances apply.

Endangered species: Any species which is in danger of extinction throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service.

Endangered Species Act (1973): The Endangered Species Act ensures that no federal action would jeopardize the continued existence of federally listed or proposed threatened or endangered species of plant or animal.

Ethnographic landscape: An area containing a variety of natural and cultural resources that traditionally associated people define as heritage resources. The area may include plant and animal communities, structures, and geographic features, each with their own special local names.

Ethnographic resources: Objects and places, including sites, structures, landscapes and natural resources, with traditional cultural meaning and value to associated peoples. Research and consultation with associated people identifies and explains the places and things they find culturally meaningful. Ethnographic resources eligible for the National Register of Historic Places are called traditional cultural properties.

Exotic: Plant or animal species introduced into an area where they do not occur naturally; non-native species.

Facilities: Refers to buildings, houses, campgrounds, picnic areas, visitor-use areas, operational areas, and associated supporting infrastructure such as roads, trails, and utilities.

Floodplain: Land on either side of a stream or river that is submerged during floods; typically discussed in terms of 50, 100, or 500-year events.

100-year floodplain: The land adjacent to a river corridor that would be covered by water during a 100-year flood event. A 100-year flood event has a 1% probability of occurring during any given year.

FMP: Fire Management Plan.

FONSI: Finding of No Significant Impact.

General Management Plan: A plan which clearly defines direction for resource preservation and visitor use in a park, and serves as the basic foundation for decision making. GMPs are developed with broad public involvement.

GMP: General Management Plan

Historic property: A district, site, building, structure, or object significant in the history of American archeology, architecture, culture, engineering, or politics at the national, state, or local level.

Impact: The likely effects of an action or proposed action upon specific natural, cultural, or socioeconomic resources. Impacts may be direct, indirect, cumulative, beneficial, or adverse. Direct impacts are those occurring at the same time and place as the action itself. Indirect impacts occur later in time or are farther removed in distance from the action, yet are reasonably foreseeable. Severe impacts that harm the integrity of park resources or values are known as “impairments.”

Impairment: An impact so severe that, in the professional judgment of a responsible NPS manager, it would harm the integrity of park resources or values and violate the 1916 NPS Organic Act.

Interagency Cooperation: Fire management planning, preparedness, prevention, suppression, fire use, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of all partners.

Invasive non-native and exotic plants: A species which takes over a new habitat where it was not previously found, often to the detriment of species which were there before.

Mitigation Measure: An restriction or standard designed to avoid, minimize, rectify, reduce or compensate the severity of, or eliminate impacts from the proposed project. A mitigation measure should be a solution to an identified environmental problem.

Monitoring: To keep track of systematically with a view to collecting information.

National Environmental Policy Act (1969): A law enacted on January 1, 1970 that established a national policy to maintain conditions under which humans and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations of Americans.

National Historic Preservation Act (1966): This act required federal agencies to give consideration to historic properties determined significant (properties listed on or determined to be eligible for the National Register of Historic Places) prior to expending funding for, authorizing, or licensing a federal project or permit.

National Park Service: An agency in the Department of the Interior responsible for protection and preservation of 384 natural and cultural units throughout the United States.

National Register of Historic Places: The comprehensive list of districts, sites, buildings, structures, and objects of national, regional, state, and local significance in American history, architecture, archeology, engineering, and culture kept by the National Park Service under authority of the National Historic Preservation Act of 1966.

Natural resources: Features and values that include plants and animals, water, air, soils, topographic features, geologic features, paleontological resources, natural quiet and clear night skies.

NEPA: National Environmental Protection Act.

NEPA process: The objective analysis of a proposed action to determine the degree of its environmental impact on the natural and physical environment; alternatives and mitigation that reduce that impact; and the full and candid presentation of the analysis to, and involvement of, the interested and affected public. Required of federal agencies by the National Environmental Policy Act of 1969.

NHPA: National Historic Preservation Act.

No action alternative: An alternative in an environmental assessment that continues current management direction. A no action alternative is a benchmark against which action alternatives are compared.

Non-native species: Species of plants or animals that do not naturally occur in a particular area and often interfere with natural biological systems. Also known as alien, introduced, or exotic species.

Non-target: Animals or plants other than the ones which the pesticide is intended to kill.

NPS: National Park Service.

Organic Act (NPS): The 1916 law (and subsequent amendments) that created the National Park Service and assigned it responsibility to manage the national parks.

Planning: Every area with burnable vegetation must have an approved FMP. FMPs are strategic plans that define a program to manage wildfire and prescribed fires based on the area's approved land management plan. FMPs must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.

Preparedness: Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight.

Prevention: Agencies will work together with their partners and other affected groups and individuals to prevent unauthorized ignition of wildfires.

Protection Priorities: The protection of human life is the single, overriding suppression priority. Setting priorities to protect human communities and community infrastructure, other property and improvements, and natural and cultural resources will be done based on human health and safety, the values to be protected, and the costs of protection.

Restoration: Work conducted to remove impacts to natural resources and restore natural processes, and to return a site to natural conditions.

Riparian areas: Areas that are on or adjacent to rivers and streams; these areas are typically rich in biological diversity.

ROD: Record of Decision.

Safety: Firefighter and public safety is the first priority. All FMPs and actions must reflect this commitment.

Science: FMPs and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results must be made available to managers in a timely manner and must be used in the development of land management plans, Fire Management Plans, and implementation plans.

Section 7 Consultation: Section 7 of the Endangered Species Act requires consultation with the U.S. Fish and Wildlife Service if the habitat of a threatened or endangered plant or animal may be affected by a federally authorized action.

Standardization: Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values to be protected, methodologies, and public education programs for all fire management activities.

Suppression: Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and all values to be protected, consistent with resource objectives.

Threatened species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. These species are listed by the U.S. Fish and Wildlife Service.

Visitor experience: The perceptions, feelings, and interaction a park visitor has in relationship with the environment.

Watershed: The region draining into a river, river system, or body of water.

Wetland: Areas that are inundated by surface or groundwater with a frequency sufficient to support, under normal circumstances, vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wildland Urban Interface: The operational roles of the federal agencies as partners in the wildland urban interface are wildland firefighting, hazard reduction, cooperative prevention and education, and technical assistance. Structural fire suppression is the responsibility of tribal, state or local governments. Federal agencies may assist with exterior structural fire protection activities under formal fire protection agreements that specify the mutual responsibilities of the partners, including funding.

APPENDIX B: Executive/NPS Director's Orders, Acts and Regulations

EXECUTIVE ORDERS

Executive Order 11988 (*Floodplain Management*)
 Executive Order 11990 (*Protection of Wetlands*)
 Executive Order 12898 (*Environmental Justice*)
 Executive Order 13186 (*Migratory Birds*)

NPS DIRECTOR'S ORDERS

DO-2 (*Planning Process Guidelines*)
 DO-12 (*Conservation Planning, Environmental Impact Analysis, & Decision-making*)
 DO-28 (*Cultural Resource Management*)
 DO-77 (*Natural Resources Management*)

US FEDERAL GOVERNMENT

- 1916 National Park Service Organic Act, as amended 16 U.S.C. National Park Service General Authorities Act
- 1947 Federal Insecticide, Fungicide and Rodenticide Act, as amended
- 1958 Fish and Wildlife Coordination Act, as amended
- 1963 Clean Air Act, as amended
- 1966 National Historic Preservation Act, as amended 1969
- National Environmental Policy Act (NEPA)
- 1972 Noise Control Act, as amended 1973 Endangered Species Act, as amended
- 1974 Archeological and Historic Preservation Act (88 Stat. 174)
- 1976 General Authorities Act (90 Stat 1939)
- 1977 Clean Water Act, as amended
- 1979 Archeological Resources Protection Act
- 1984 Farmland Protection Policy Act
- 1990 Native American Graves Protection and Repatriation Act
- 1993 Government Performance and Results Act (GPRA)
- 1995 Programmatic Agreement among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers
- 2001 *Pinnacles National Monument Strategic Plan* Dept. of the Interior,
- Departmental Manual, *DM 516-NEPA Policies*

- 36 Code of Federal Regulations, Chapter 1 – *National Park Service*
- 36 Code of Federal Regulations, Part 800 - *National Historic Preservation Act*
- 40 Code of Federal Regulations, Parts 1500-1508 - *NEPA Regulations*
- 40 Code of Federal Regulations, Part 162 -40 CFR 162.10 (h) (1), July 3, 1975)
- 43 Code of Federal Regulations, Part 7 – *Archeological Resources Protection*
- 43 Code of Federal Regulations, Part 10 – *Native American Graves Protection and Repatriation*
- 50 Code of Federal Regulations, Part 17 – *Endangered and Threatened Wildlife and Plants*

APPENDIX C: Scoping Notice



United States Department of the Interior

NATIONAL PARK SERVICE

Kalaupapa National Historical Park

P.O. 2222

Kalaupapa, HI 96742

Tel: 808-567-6802

Fax: 808-567-6729



A3815 (KALA)

April 4, 2007

Subject: Scoping Notice: Kalaupapa Wildland Fire Management Plan

Dear Interested Party,

Kalaupapa National Historic Park (KALA), National Park Service, U.S. Department of the Interior, is seeking input, comments, and public review of the Kalaupapa Wildland Fire Management Plan.

The 1996 Federal Wildland Fire Management Policy and Program Review initiated the need for all federally owned lands with vegetation capable of supporting a fire to have an overall

strategic Fire Management Plan (FMP). This plan will serve as (1) programmatic direction for all fire management activities, and (2) the basis for future funding.

The FMP for each National Park Service (NPS) unit will follow federal and NPS Policy, but equally important, it will reflect specific characteristics, legislative obligations, as well as environmental and social considerations of the area. All aspects of the Fire Management Program for Kalaupapa National Historical Park (NHP), from fire prevention to the use of fire as a management tool, are outlined in this document. Strategies and activities suggested in this document are intended to help achieve desired future conditions, goals & objectives of the Park.

The primary management response for wildland fire is suppression. The park intends to utilize the Appropriate Management Response concept outlined in this plan that calls for prudent selection of tactics to achieve a suppression response with no or minimal resource damage from the suppression actions.

In accordance with the Advisory Council on Historic Preservation regulations, 36 CFR Part 800: *Protection of Historic Properties*, the National Park Service is required to comply with section 106 of the National Historic Preservation Act of 1966 (as amended). This scoping notice serves to officially initiate section 106 consultation process with you as well as the Advisory Council on Historic Preservation, the Hawai'i State Historic Preservation Office and multiple other agencies, Native Hawaiian organizations, and individuals.

We would appreciate any preliminary feedback you may have by September 10, 2008. Please feel free to contact Jennifer Cerny, Kalaupapa NHP Cultural Resources Division Chief at 808-567-6802x42 (Jennifer_Cerny@nps.gov), Guy Hughes, Kalaupapa NHP Natural Resources Division Chief at 808-567-6802x41 (guy_hughes@nps.gov) if you have any questions or would like to discuss the proposed project further. Thank you in advance for your cooperation!

Sincerely,

Stephen Prokop

Superintendent

Mailing Address:

Kalaupapa National Historical Park

P.O. Box 2222

Kalaupapa, HI 96742

APPENDIX D: Initial request for Section 106 Consultation

Example letter follows, letters to different interested parties may vary slightly.



United States Department of the Interior

NATIONAL PARK SERVICE
Kalaupapa National Historical Park
P.O. 2222
Kalaupapa, HI 96742

Tel: 808-567-6802
Fax: 808-567-6729



A3815 (KALA)

August 8, 2008

Kelly Yasaitis
Historic Preservation Specialist
Advisory Council on Historic Preservation
1100 Pennsylvania Avenue NW Suite 809
Washington, D.C. 20004

Subject: Scoping Notice: Kalaupapa Wildland Fire Management Plan

Dear Ms. Yasaitis,

Kalaupapa National Historic Park (KALA), National Park Service, U.S. Department of the Interior, is seeking input, comments, and public review of the Kalaupapa Wildland Fire Management Plan.

The 1996 Federal Wildland Fire Management Policy and Program Review initiated the need for all federally owned lands with vegetation capable of supporting a fire to have an overall strategic Fire Management Plan (FMP). This plan will serve as (1) programmatic direction for all fire management activities, and (2) the basis for future funding.

The FMP for each National Park Service (NPS) unit will follow federal and NPS Policy, but equally important, it will reflect specific characteristics, legislative obligations, as well as environmental and social considerations of the area. All aspects of the Fire Management Program for Kalaupapa National Historical Park (NHP), from fire prevention to the use of fire as a management tool, are outlined in this document. Strategies and activities suggested in this document are intended to help achieve desired future conditions, goals & objectives of the Park.

The primary management response for wildland fire is suppression. The park intends to utilize the Appropriate Management Response concept outlined in this plan that calls for prudent selection of tactics to achieve a suppression response with no or minimal resource damage from the suppression actions.

In accordance with the Advisory Council on Historic Preservation regulations, 36 CFR Part 800: *Protection of Historic Properties*, the National Park Service is required to comply with section 106 of the National Historic Preservation Act of 1966 (as amended). This scoping notice serves to officially initiate section 106 consultation with your office. Formal section 106 consultation has also been initiated with the Hawai'i State Historic Preservation Office as well as multiple other agencies, Native Hawaiian organizations, and individuals.

In addition, in accordance with 36 CFR Part 800.8(c): *Use of the NEPA process for section 106 purposes*, this letter also serves to notify your office of our intention to use the NEPA process for all subsequent section 106 consultation on this project. We have already identified consulting parties both for NEPA and section 106 purposes and are now working to identify all applicable historic properties and areas of potential effect (APE).

We would appreciate any preliminary feedback you may have by September 8, 2008. Please feel free to contact Jennifer Cerny, Kalaupapa NHP Cultural Resources Division Chief at 808-567-6802x42 (Jennifer_Cerny@nps.gov), Guy Hughes, Kalaupapa NHP Natural Resources Division Chief at 808-567-6802x41

(guy_hughes@nps.gov) if you have any questions or would like to discuss the proposed project further. Thank you in advance for your cooperation!

Sincerely,

Stephen Prokop
Superintendent

Mailing Address:
Kalaupapa National Historical Park
P.O. Box 2222
Kalaupapa, HI 96742

APPENDIX E: Section 106 Consultation Response

Advisory Council on Historic preservation, State Historic Preservation Office, Development Services Administration, and the Historic Hawaii Foundation



Preserving America's Heritage

September 2, 2008

Stephen Prokop
 Superintendent
 Kalaupapa National Historical Park
 P.O. 2222
 Kalaupapa, HI 96742

REF: ***Preparation of Environmental Assessment (EA) to Comply with Section 106, Proposed Development of Wildland Fire Management Plan, Kalaupapa National Historical Park, Hawaii***

Dear Mr. Prokop:

On August 18, 2008, the Advisory Council on Historic Preservation (ACHP) received Kalaupapa National Historical Park's notification for the referenced undertaking pursuant to 36 CFR § 800.8(c) of the ACHP's regulations, *Protection of Historic Properties* (36 CFR Part 800). We appreciate receiving your notification, which establishes that Kalaupapa National Historical Park will use the process and documentation required for the preparation of an EA to comply with Section 106 of the National Historic Preservation Act in lieu of the procedures set forth in 36 CFR §§ 800.3 through 800.6.

In addition to notification to the ACHP, Kalaupapa National Historical Park must notify the Hawaii State Historic Preservation Officer (SHPO) and meet the standards in 36 CFR § 800.8(c)(1)(i) through (v) for the following:

- identifying consulting parties;
- involving the public;
- identifying historic properties and assessing the undertaking's effects on historic properties; and
- consulting regarding the effects of the undertaking on historic properties with the SHPO and Native Hawaiian organizations that might attach religious and cultural significance to affected historic properties, other consulting parties, and the ACHP, where appropriate, during National Environmental Policy Act (NEPA) scoping, environmental analysis, and the preparation of NEPA documents.

ADVISORY COUNCIL ON HISTORIC PRESERVATION
 1100 Pennsylvania Avenue NW, Suite 809 • Washington, DC 20004
 Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

The regulations do not specifically require that an agency submit an EA to the ACHP. However, keep in mind that, in the case of an objection from the ACHP or another consulting party, 36 CFR § 800.8(c)(2)(ii) and (c)(3) provide for ACHP review of the EA to determine whether preparation of the EA has met the standards set forth in 36 CFR § 800.8(c)(1) and/or to evaluate whether the substantive resolution of the effects on historic properties proposed in the EA is adequate.

Should Kalaupapa National Historical Park determine, in consultation with the SHPO, Native Hawaiian organizations, and other consulting parties, that its proposed undertaking may have an adverse effect on properties listed or eligible for listing on the National Register of Historic Places that will be documented in the EA, we request that you notify us of the adverse effect and provide adequate documentation for our review. Please indicate in your cover letter the schedule for Section 106 consultation and a date by which you require a response by the ACHP. The ACHP's decision to review the EA will be based on the applicability of the criteria in Appendix A of the ACHP's regulations.

Thank you for your notification pursuant to 36 CFR § 800.8(c). If you have any questions, or if we may be of further assistance, please contact me at 202-606-8583 or via e-mail at kfanizzo@achp.gov.

Sincerely,



Kelly Yasaitis Fanizzo
Program Analyst
Office of Federal Agency Programs

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSLIJ
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BIODIVERSITY AND OCEAN RESOURCES
BUREAU OF CONSERVATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESTORATION ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAPAHUAHUA LAND RESERVE COMMISSION
LAND
STATE PARKS

August 29, 2008

Stephen Prokop, Superintendent
Kalaupapa National Historical Park
P.O. Box 2222
Kalaupapa, Hawaii 96742

LOG NO: 2008.3632
DOC NO: 0808NM30
Archaeology

Dear Mr. Prokop:

**SUBJECT: National Historic Preservation Act (NHPA) Section 106 Consultation –
Development of Kalaupapa National Historical Park’s Wildland Fire Management
Plan and Notification of Intent to Use the NEPA Process for Section 106 Purposes
Kalaupapa, Island of Moloka’i**

Thank you for the opportunity to comment on the Kalaupapa National Historical Park’s Wildland Fire Management Plan and initiating the 106 process. At this point in time we have no comments. If you have any questions please call me at 808-652-1510.

Aloha,

Nancy A. McMahon
Deputy State Historic Preservation Officer
State Historic Preservation Division



August 19, 2008

Stephen Prokop
Superintendent
Kalaupapa National Historical Park
P.O. Box 2222
Kalaupapa, HI 96741

RE: Section 106 and NEPA Consultation on the Development of Kalaupapa National Historical Park's Wildfire Management and Suppression Plan

Dear Mr. Prokop:

Thank you for referring the above mentioned project to Historic Hawaii Foundation for consultation under Section 106 of National Historic Preservation Act.

Since 1973, Historic Hawaii Foundation (HHF) has been a statewide leader for historic preservation. HHF's mission is to preserve and encourage the preservation of Hawaii's historic buildings, places, objects and communities.

Historic Hawaii Foundation encourages the development of a wildfire management and suppression plan for the Kalaupapa National Historical Park, as this will aid in the protection of the park's historic resources. Your letter indicates that you are currently in the early stages of the planning process. We look forward to commenting on your plan when a draft Environmental Assessment is available later this fall.

Very truly yours,

A handwritten signature in cursive script that reads "Kirsten Faulkner".

Kirsten Faulkner, AIA
Executive Director



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Historic Preservation Department, 1000 Ala Moana Blvd., Suite 1000, Honolulu, HI 96813
Website: <http://www.hawaii-historical.org>

APPENDIX F: Continuing section 106 consultation
Original in color



United States Department of the Interior

NATIONAL PARK SERVICE
 Kalaupapa National Historical Park
 P.O. 2222
 Kalaupapa, HI 96742

Tel: 808-567-6802
 Fax: 808-567-6729



December 1, 2011

Katry Harris
 Historic Preservation Specialist
 Advisory Council on Historic Preservation
 1100 Pennsylvania Avenue NW Suite 809
 Washington, D.C. 20004

Subject: Section 106 and NEPA Consultation on the Kalaupapa National Historical Park's Wildland Fire Management Plan (FMP) Environmental Assessment and Request for Review and Concurrence on the Assessment of Effect

Dear Ms. Harris,

On a letter dated August 13, 2008, The National Park Service notified the Advisory Council for Historic Preservation on the initiation of Section 106 (36 CFR 800.3) and NEPA consultation as well as the intent to use the NEPA process for Section 106 purposes (36 CFR 800.8c) on the development of Kalaupapa National Historical Park's Wildland Fire Management Plan. The ACHP replied in a letter dated September 2, 2008, which explained that Kalaupapa National Historical Park must notify the SHPO and meet the standards in 36 CFR § 800. (c)(1)(i) through (v). A letter dated November 4, 2011, was sent to you in an effort to reestablish consultation on the plan, as well as inform you that the Environmental Assessment was being prepared.

The SHPO was initially notified in a letter dated August 13, 2008. Kalaupapa National Historical Park received a response from SHPO Nancy McMahon on August 29, 2008 expressing that at that point the State Historic Preservation Division had no comments.

The Draft Environmental Assessment (EA) for the proposed Fire Management Plan (FMP) to reduce fire-hazard and improve the safety of Kalaupapa residents and visitors is now available for review and comment at the National Park Service website *Planning, Environment, and Public Comment* (<http://parkplanning.nps.gov/>). In addition to release on the planning website, review is also solicited by mailing the EA to federal/state/county agencies on the park's mailing list, publishing press releases, and placing copies of the document at the Moloka'i Public Library, Molokai Museum & Cultural Center, and office of Historic Hawaii Foundation.

The FMP for Kalaupapa National Historical Park describes a proposed fire management program that responds to the Park's natural and cultural resource objectives and addresses the health and safety of Park residents, staff and visitors. Alternative A defines the current "No Action" alternative Fire management Strategy required in all National Environmental Policy Act assessments, while Alternative B is the proposed "Increased Protection" Strategy. Alternative B assesses the effect of reducing flammable vegetation within 100 feet of all buildings in Kalaupapa and Kalawao, large

areas of dense vegetation within the Kalaupapa Settlement, enhancing the fire-break around the settlement of Kalaupapa, and utilizing strategically arranged areas of fuel-reduction to reduce fire-hazard within the settlement and across the Peninsula as a whole.

The National Park Service has determined that the Area of Potential Effect is the entire Kalaupapa National Historic Park boundary (see Figure 1) and all the historic properties located within that boundary. This includes the Kalaupapa Leprosy Settlement National Historic Landmark (NHL), which spans the entire peninsula, at least 1100 historic grave markers, at least 500 archaeological sites, and at least 200 historic structures. The National Park Service has also found that the actions proposed in the Fire Management Plan will have No Adverse Effect as long as the mitigations outlined are followed. Find descriptions of the historic properties in the EA in Chapter 5: Environmental Consequences, Cultural Resources. Mitigations for all Cultural Resources can also be found in Chapter 5 after the descriptions of historic property types. The National Park Service seeks your review and comment on these findings.

Below you will find the standards for developing environmental documents to comply with Section 106 (36 CFR § 800.8(c)(1)(i) through (v)). You can also find these standards in the EA, Chapter 6. Coordination and Consultation.

Compliance with Section 106 of the National Historic Preservation Act (NHPA)

Section 106 regulations to the NHPA 36 CFR Part 800—Protection of Historic Properties (incorporating amendments effective August 5, 2004) §800.8(3)(c)(1) Coordination With the National Environmental Policy Act. Use of the NEPA process for section 106 purposes.

(i) Identify consulting parties either pursuant to §800.3(f) or through the NEPA scoping process with results consistent with §800.3(f)

Twenty-nine individuals and organizations were identified in 2008 as consulting parties. Some consulting parties originally identified in 2008 have either changed positions or have passed away. A revised list for follow-up Section 106 consultation and notification that the EA is released and has been sent to consulting parties. Another notification letter has been sent to the larger FMP mailing list to solicit comments and review of the FMP on its release (December 1, 2011). See appendix D for list of consulting parties.

(ii) Identify historic properties and assess the effects of the undertaking on such properties in a manner consistent with the standards and criteria of §§800.4 through 800.5, provided that the scope and timing of these steps may be phased to reflect the agency official's consideration of project alternatives in the NEPA process and the effort is commensurate with the assessment of other environmental factors;

The Area of Potential Effect is the entire Kalaupapa National Historic Park boundary (see Figure 1) and all the historic properties located within that boundary. This includes the Kalaupapa Leprosy Settlement National Historic Landmark (NHL), which spans the entire peninsula, at least 1100 historic grave markers, at least 500 archaeological sites, and at least 200 historic structures. Environmental consequences on cultural resources have been assessed; these findings can be located in the Cultural Resources section of Chapter 5. The mitigations outlined in that same section must be followed. As long as all mitigations are followed, no historic properties will be adversely affected. See descriptions of these historic properties in the EA in Chapter 5: Environmental Consequences, Cultural Resources.

(iii) Consult regarding the effects of the undertaking on historic properties with the SHPO/THPO, Indian tribes and Native Hawaiian organizations that might attach religious and cultural significance

to affected historic properties, other consulting parties, and the Council, where appropriate, during NEPA scoping, environmental analysis, and the preparation of NEPA documents;

Of the consulting parties identified in 2008, twenty-nine letters serving as NEPA Scoping Notices and initiation of Section 106 were sent; twenty-seven letters were received by the consulting parties. Recipients of the consultation letter and notice include the SHPO (at the time Nancy McMahon, Deputy SHPO as well as DLNR Administrator, Laura Thielen); The Office of Native Hawaiian Affairs (Moloka'i Branch and O'ahu); Native Hawaiian Organizations including: Hūi Mālama I Na Kūpuna o Hawai'i Nei; as well as residents of the patient community including the President of the Kalaupapa Patient Advisory Council.

Comment letters were received by the SHPO (August 29, 2008), the ACHP (September 2, 2008) and Historic Hawai'i Foundation (August 19, 2008). Copies of these letters can be found in Appendix E. Of note, the Historic Hawai'i Foundation "encourages the development of a wildfire management and suppression plan for the Kalaupapa National Historical Park, as this will aid in the protection of the park's historic resources."

On July 26, 2011, the Kalaupapa National Historical Park Advisory Commission had a meeting at the McVeigh Social Hall in Kalaupapa. On the agenda was an update on the Fire Management Plan, which was given by Kalaupapa NHP Superintendent Steve Prokop. One comment from Commissioner Henry Tancayo suggested reopening historic community pastures as a means to keep down dry vegetation / hazardous fuels.

A revised list for follow-up Section 106 consultation and notification that the Draft EA will soon be released has been sent (November 4, 2011). An additional notification letter has been sent to the larger FMP mailing list concurrent with the release of the draft Environmental Assessment (December 1, 2011). The NPS will be taking comments from all consulting parties including the Kalaupapa community and the public through the NPS's PEPC website, written letter, phone, email and community meeting.

(iv) Involve the public in accordance with the agency's published NEPA procedures; and

The Park conducted a scoping meeting for the FMP open to both park staff and community members on August 20, 2008 at McVeigh Hall at Kalaupapa. Attendees included the President of the Kalaupapa Patient Advisory Council.

In concurrence with the release with of the Environmental Assessment, the agency will be taking comments from all consulting parties including the Kalaupapa community and the public through the NPS's PEPC website, written letter, phone, email and community meeting.

A follow-up consultation meeting will also be held in the Kalaupapa community to solicit comments on the Draft EA. This meeting is tentatively scheduled to coincide with the regular Kalaupapa Community meeting in December 13, 2011.

(v) Develop in consultation with identified consulting parties alternatives and proposed measures that might avoid, minimize or mitigate any adverse effects of the undertaking on historic properties and describe them in the EA or DEIS.

Adverse effects are minimized through mitigation, and projects are designed to result in no impairment of resources. Find descriptions of the historic properties in the EA in Chapter 5: Environmental Consequences, Cultural Resources. Mitigations for all Cultural Resources can also be found in Chapter 5 after the descriptions of historic property types. Refer to Chapter 4: Affected Environment, Table 3 –

Descriptive Terms Defining Impacts to Cultural Resources and Table 4 – Resource Impairment Assessment.

In the existing 'Programmatic Agreement among the national Park Service (U.S. Department of the Interior), The Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for compliance with Section 106 of the National Historic Preservation Act', from here forward known as the 106 PA, hazardous fuel and fire management activities are eligible for streamline review if the park has an approved FMP in place.

Please know that the FMP does not approve all park undertakings under hazardous fuel and other fire management activities. Each activity will still be reviewed by the park's interdisciplinary management team to determine if it is an activity that meets streamline criteria under the 106 PA. If the project undertaking includes ground disturbance, archeological monitoring may be appropriate throughout the ground disturbing activities, in accordance with any recommendation of the CRM (Kalaupapa Cultural Resource Management Section 106) Team. Following completion of activities under this streamline criterion, post-burn inspection and monitoring should be conducted by a qualified archeologist to ensure no archeological sites were impacted or previously unknown site revealed.

One action outlined and assessed in the FMP that your agency may take particular note of is the installation of a fire sprinkler system in historic structures. It was found that "Installing sensitively designed fire suppression systems, such as sprinkler systems that result in retention of historic features and finishes" and "Applying fire-retardant coatings, such as intumescent paints, which expand during fire to add thermal protection to steel" are recommended actions in the Secretary of the Interior's Standards for Rehabilitating Historic Buildings, under Health and Safety Considerations.

In addition, as with any activity, Hawaii Administrative rules (HAR) 13-300, Rules of Practice and Procedure relating to burial sites and human remains will be followed should a project encounter such a situation.

There will be a 30 day comment period starting on December 1, 2011. We encourage you to review the FMP Environmental Assessment and send us your comments by December 31, 2011. You may submit comments online at <http://parkplanning.nps.gov/> or you may mail or hand-deliver comments to the letterhead address above.

If you would like to discuss the progress of the FMP or any of its details as they relate to Section 106 of the NHPA or historic properties, please feel free to contact Erika Viernes Stein, Kalaupapa NHP Cultural Resource Program Manager at 808-567-6802 x 1702 (Erika_Stein@nps.gov).

Sincerely,



Stephen Prokop
Superintendent

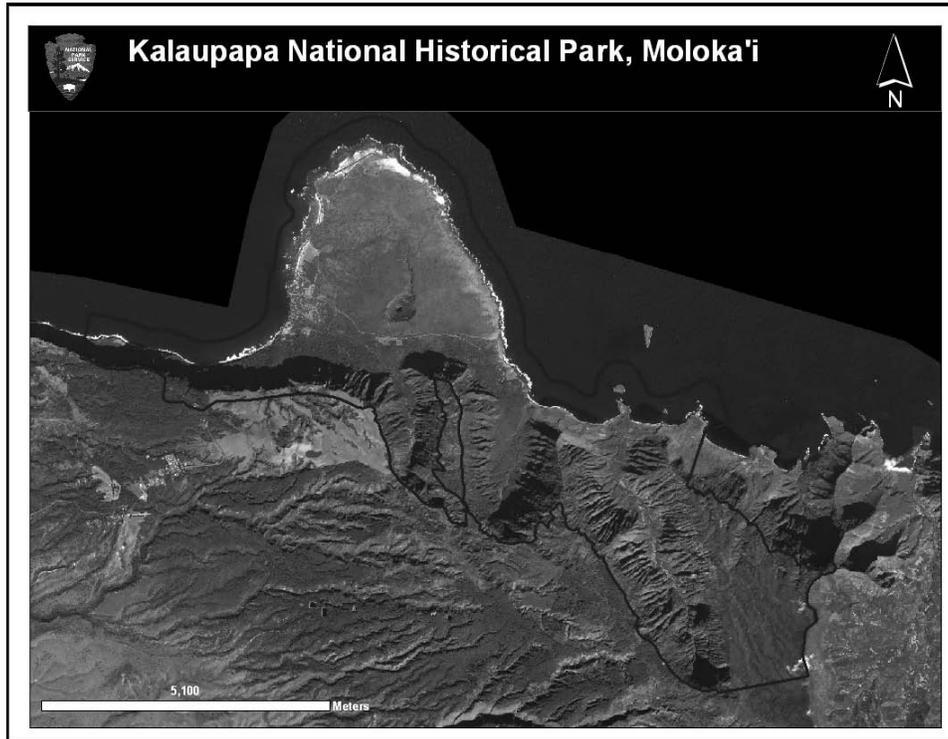


Figure 1. Purple showing Kalaupapa National Historic Park boundary

APPENDIX G: Request for Section 7 Consultation



United States Department of the Interior

NATIONAL PARK SERVICE
 Kalaupapa National Historical Park
 P.O. 2222
 Kalaupapa, HI 96742



Tel: 808-567-6802
 Fax: 808-567-6729

December 1, 2011

Loyal Mehrhoff, Field Supervisor
 US Fish and Wildlife Service
 Pacific Islands Fish and Wildlife Office
 300 Ala Moana Boulevard, Room 3-122
 PO Box 50088
 Honolulu, HI 96850

Section 7 consultation on Kalaupapa Fire Management Plan Environmental Assessment

Dear Mr. Mehrhoff,

The Environmental Assessment (EA) for implementing a Fire Management Plan has been posted on the Planning Environment and Public Comment (PEPC) web site (<http://parkplanning.nps.gov/>) and is now available for consultation under Section 7 of the Endangered Species Act. For your convenience we have also included a "PDF" version of the EA on a compact disk included with this letter.

The Fire Management Plan (FMP) EA for Kalaupapa National Historical Park describes a proposed fire management program that responds to the park's natural and cultural resource objectives and addresses the health and safety of park residents, staff and visitors. Alternative A defines the current "No Action" alternative fire management strategy required in all National Environmental Policy Act assessments, while Alternative B is the proposed "Increased Protection" Strategy. Alternative B assesses the effect of reducing flammable vegetation within 100 feet of all buildings in Kalaupapa and Kalawao, large areas of dense vegetation within the Kalaupapa settlement, enhancing the fire-break around the settlement of Kalaupapa, and utilizing strategically arranged areas of fuel-reduction to reduce fire-hazard within the settlement and across the peninsula as a whole.

None of the remaining natural resources on the Kalaupapa peninsula are endangered by either of the FMP alternatives by virtue of the fact that remaining natural resources are concentrated along the coast, cliffs, or at higher elevations beyond the reach of wildfire or planned fuel reduction activities.

Seven federally threatened or endangered plant species have habitat adjacent with the project area. The White Moloka'i Hibiscus (*Hibiscus arnottianus ssp. immaculatus*), which is not currently present outside of plantings, has critical habitat in the lowland coastal area.

Pua'ala (*Brighamia rockii*) occurred historically along the pali, but have been decimated by the introduction of domestic goats. Pua'ala have recently been reintroduced in protected areas at the top of the Kalaupapa Trail and at Mokia adjacent to Kalawao.

Carter's panicgrass (*Panicum fauriei var. carteri*) individuals were documented within the coastal spray area at Kūka'iwa'a in 1992. The species was noted to grow at the edge of the cliffs likely because this area has minimal grazing and trampling pressure by non-native ungulates and competition from non-native plants. In 2000, a total of 457 individuals were counted along the coast of the peninsula at the previously established monitoring stations. This grass is not known to occur on the Kalaupapa peninsula, and if it was it would be restricted to low fire-hazard coastal communities.

The endangered 'āwiwi (*Centaurium sebaeoides*) is also known to occur in the lowland coastal area. It is the only native Hawaiian gentian, and an annual with a total population of approximately 6,300 to 6,600 individuals. The population at Kalaupapa National Historical Park was comprised of approximately 4,020 plants in 1997. No individuals were found on transects inside an enclosure during a more recent study. Although 'āwiwi does not currently occur in the project area, critical habitat for this species has been designated in the coastal spray area, a naturally low fire-hazard area outside of proposed project areas.

The threatened Dune Tetramolopium (*Tetramolopium rockii var. rockii*) has been observed near Kalawao. The main concentration of this species in 1990 occurred along the coast about 0.6 km (0.4 miles) to the north of Kalawao within naturally low fire-hazard coastal vegetation.

A large patch of 'āwikiwiki (*Canavalia molokaiensis*) has been found on the east side of the mouth of Wai'ale'ia Stream between 10 and 15 m (33 and 49 ft) elevation. At least six additional plants were seen along the coast between the mouth of Wai'ale'ia Stream and Waikolu at Keanakua. All occurrences are off the Kalaupapa peninsula, beyond defined project areas.

Ihi (*Portulaca villosa*) (a federal Species of Concern) occurs naturally in the crater and is planted out in the coastal spray zone between Kalawao and Kahi Point on the northern tip of the peninsula.

None of these plants currently occur within the project areas, and several are restricted to naturally low-fuel/fire hazard salt affected habitat immediately adjacent the ocean.

The threatened Newell's Townsend's shearwater (*Puffinus auricularis newelli*) and the endangered Hawaiian petrel or 'Ua'u (*Pterodroma sandwichensis*) may fly over the coastal spray zone. These species are believed to nest in the valleys of northeastern Moloka'i.

The federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only extant native terrestrial mammal from the Hawaiian archipelago (USFWS 1998), and likely flies through project areas.

I assure you that all possible steps will be taken to prevent any negative effects to rare species resulting from the construction process. If you have any questions, please contact me directly (808) 567-6802 x1501.

Mahalo

A handwritten signature in black ink, appearing to read "PHosten". The signature is fluid and cursive, with a large initial "P" and "H".

Paul Hosten
Terrestrial Ecologist
Kalaupapa National Historical Park
(paul_hosten@nps.gov)

APPENDIX H: Environmental Assessment distribution list

In addition to interested individuals; the following list of State and Federal Agencies, Non-Governmental Organizations, and public libraries were either notified or sent a copy of the Environmental Assessment.

Chair-Ke Aupuni Lokahi
 County of Maui, Department of Water Supply
 County of Maui, Hoolehua Fire Station
 County of Maui, Kaunakakai Fire Station
 County of Maui, Public Works
 County of Maui, Puko'o Fire Station
 Department of Agriculture
 Department of Hawaiian Home Lands, Chairman
 Department of Land and Natural Resources - State Parks
 Department of Land and Natural Resources -Div. of Forestry & Wildlife
 Department of Land and Natural Resources-Historic Preserv. Div.
 Department of Land and Natural Resources-Office of Conservation & Coastal Lands
 Division of Forestry & Wildlife
 Environmental Protection Agency
 Hawaii Audubon Society
 Hawaiian Botanical Society c/o Botany Dept., UH
 House of Rep., US Congressional District 01
 House of Rep., US Congressional District 02
 Hui Malama O Mo'omomi
 Kamehameha Schools
 Moanalua Gardens Foundation
 Molokai Community Svc. Council
 Molokai Ranch
 Molokai Visitor's Association
 Native Hawaiian Plant Society
 Natural Area Reserve Commission
 Natural Resources Conserv. Svc.
 Office of Environmental Quality Control
 Pu'u O Hoku Ranch
 RW Meyer Ltd.
 Sierra Club Legal Defense Fund
 State of Hawaii - Hawaii State Library
 State of Hawaii - Kahului Public Library
 State of Hawaii - Lanai Public Library
 State of Hawaii - Molokai Public Library
 State of Hawaii - Wailuku Public Library
 U.S. Fish & Wildlife Service

US Geological Survey, BRD Pacific Island Ecosystems Research Center