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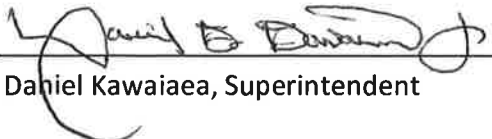
**Burned Area Emergency Response  
and  
Burned Area Rehabilitation Plan**

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**Kawaihae Fire  
Pu'ukohola Heiau  
National Historic Site**



Photo Credit: Andrew Richard Hara - ENA Media and Kohala Watershed Partnership, August 20, 2015

Submitted by:  Date: 08/28/15  
Daniel Kawaiaea, Superintendent August 28, 2015

 **August 2015** 



## Fire Summary Information

|                                       |                                     |
|---------------------------------------|-------------------------------------|
| <b>Fire Name</b>                      | Kawaihae                            |
| <b>Ignition Date/Cause</b>            | August 8, 2015                      |
| <b>Date Contained</b>                 | August 10, 2015                     |
| <b>Date Controlled</b>                | August 18, 2015                     |
| <b>Jurisdiction/Acres<sup>1</sup></b> | NPS= 66<br>State and private= 3,818 |
| <b>Total Acres<sup>1</sup></b>        | 3,884                               |

<sup>1</sup> Derived from NPS GIS

## Unit Summary Information

|                         |                                                                                |
|-------------------------|--------------------------------------------------------------------------------|
| <b>Unit Names</b>       | Pu'ukohola Heiau National Historic Site<br>Ala Kahakai National Historic Trail |
| <b>Unit Identifiers</b> | PUHE, ALKA                                                                     |
| <b>Fire Code</b>        | J04M                                                                           |
| <b>State</b>            | Hawaii                                                                         |
| <b>NPS Region</b>       | Pacific West                                                                   |

## Account Number, FY15

### Emergency Stabilization

|                        |                   |
|------------------------|-------------------|
| <b>Fund</b>            | 15XP112585        |
| <b>Cost Center</b>     | PPPWPUHE00        |
| <b>Functional Area</b> | PPJ04M            |
| <b>WBS</b>             | PF.FEJ04M015.00.1 |

## BAER Team Members

|                           |                               |
|---------------------------|-------------------------------|
| <b>Position</b>           | <b>Name &amp; Affiliation</b> |
| <b>Lead</b>               | Marti Witter, SAMO            |
| <b>Hydrology</b>          | Brian Rasmussen, WHIS         |
| <b>Hydrology</b>          | Jim Roche, YOSE               |
| <b>Cultural Resources</b> | Joe Svinarich, WHIS           |
| <b>Cultural Resources</b> | Amy Hoke, GOGA                |
| <b>Coordinator</b>        | Nelson Siefkin, PWR           |

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## **EXECUTIVE SUMMARY**

### **Introduction**

This Burned Area Emergency Response (BAER, also called Emergency Stabilization) Plan has been developed in accordance with Department of the Interior and National Park Service Policy, including *DM 620 Part 3: Burned Area Emergency Stabilization and Rehabilitation* and the *Interagency Burned Area Emergency Response Guidebook (Version 4.0)*. The primary objectives of the BAER program are to assess the need for and prescribe cost effective post-fire stabilization measures necessary to protect human life, property, and critical natural and cultural resources in accordance with approved land management plans and policies, and all relevant federal, state and local laws and regulations.

This plan also contains a request for Burned Area Rehabilitation (BAR) funds for the Kawaihae Fire. The BAR program is restricted to the Bureaus of the Department of the Interior, and provides funding to repair or improve lands damaged directly by wildland fire (see *DM 620 Part 3: Burned Area Emergency Stabilization and Rehabilitation* and the *Interagency Burned Area Rehabilitation Guidebook [Version 1.3]*). Allowable actions under BAR include eradication of invasive species through direct means or habitat alterations, and the replacement or repair of minor, non-safety related infrastructure impacted by wildland fire. BAR is financed from a non-emergency funding source, and the urgency of BAR treatments is less than that of BAER.

This plan provides emergency stabilization and rehabilitation recommendations for all lands in the Kawaihae Fire perimeter within Pu'ukohola Heiau National Historic Site (PUHE), those encompassing the Ala Kahakai National Historic Trail (ALKA) corridor, as well as private lands where post-fire effects may affect PUHE and ALKA.

Pertinent approved land management plans and resource assessments that guided the preparation of this document included:

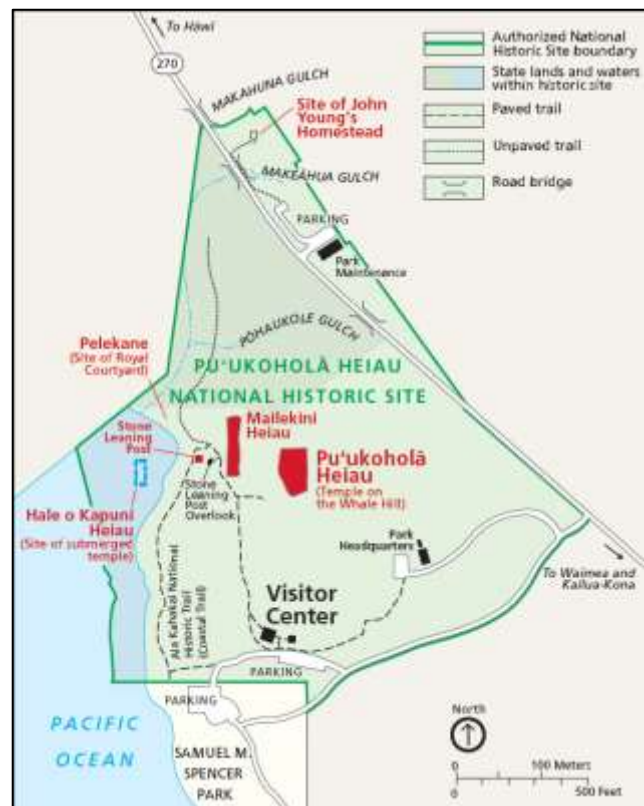
- Foundation Document, Pu'ukoholā Heiau National Historic Site (National Park Service, 2015)
- Pu'ukohola Heiau NHS Fire Management Plan (National Park Service, 2006)
- Ala Kahakai National Historic Trail Comprehensive Management Plan (National Park Service, May 2009)
- Update to the Pu'ukoholā Heiau National Historic Landmark Nomination, Pu'ukoholā Heiau National Historic Site, Island of Hawai'i. Pu'ukoholā Heiau National Historic Site, c/o P.O. Box 52 Hawaii National Park, HI 96718, Kona, Hawaii (Pacheco, R., M.J. Tomonari-Tuggle, M. Bell, 2015)

- Archaeological Overview and Assessment for the Three West Hawai'i Island Parks, National Park Service. National Park Service, Kona Hawaii (Tomonari-Tuggle, M. J., H.D. Tuggle, 2006.)
- National Park Service Cultural Landscapes Inventory Pu'ukohola Heiau National Historic Landmark Pu'ukohola Heiau National Historic Site (Duwall, T. 2003)
- Vegetation management strategies for three national historical parks on Hawai'i Island (Pratt, L. W. 1998).
- Assessment of Coastal Water Resources and Watershed Conditions at Pu'uhoiua O Honaunau National Historical Park, Hawai'i. Technical Report NPS/NRWRD/NRTR-2006/352. NPS Water Resources Division, Fort Collins, CO (Hoover, D., C. Gold. 2006.)
- Kohahla Watershed Partnership. 2011. Pelekane Bay Watershed Restoration Project August 2009 - February 2011. Final Project Report.

## The Kawaihae Fire

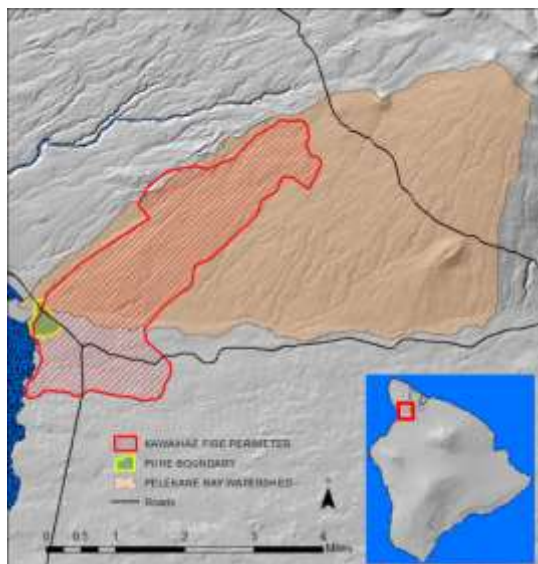
The Kawaihae Fire started on August 8, 2015 at approximately 1530. It started Southeast of Pu'ukohola Heiau National Historic Site (PUHE) along Highway 19 on private land. It was likely human caused. Hawaii County Fire Department responded to the incident soon after ignition.

August 8, 2015. The fire moved rapidly toward the Park. The Park was quickly evacuated for public and employee safety. The fire was reported to the Fire Management Officer, Ross Williams at approximately 1600. He responded to the incident, arriving at the park at 1900. He assumed command of the PUHE portion of the incident. At this time most of the PUHE had burned, approximately 75 acres. The County Fire Department had successfully protected all of the buildings at PUHE. One other fire qualified PUHE employee responded to the fire and was helping protect the buildings. Ross Williams met with the Hawaii County Fire Department Incident Commander and received a briefing on the current status of the incident. The buildings were quickly secured. Two PUHE employees worked the night shift to ensure the buildings would be protected.



Unit map, Pu'ukoholā Heiau National Historic Site.

August 9, 2015. The Park Service responded with a Type 3 Incident Commander, one Type 6 Engine and a Water Tender. During this shift the area around the buildings was secured. The northern flank was also secured by wet lining the fire edge. All actions were implemented using Minimal Impact Suppression Tactics (MIST), minimizing ground disturbance. No additional acres were burned at PUHE. Two people again worked the night shift to ensure the buildings were protected.



Overview map of Kawaihae Fire extent, Pelekane Bay Watershed, and Pu'ukohola Heiau National Historic Site with location on the Island of Hawai'i (inset).

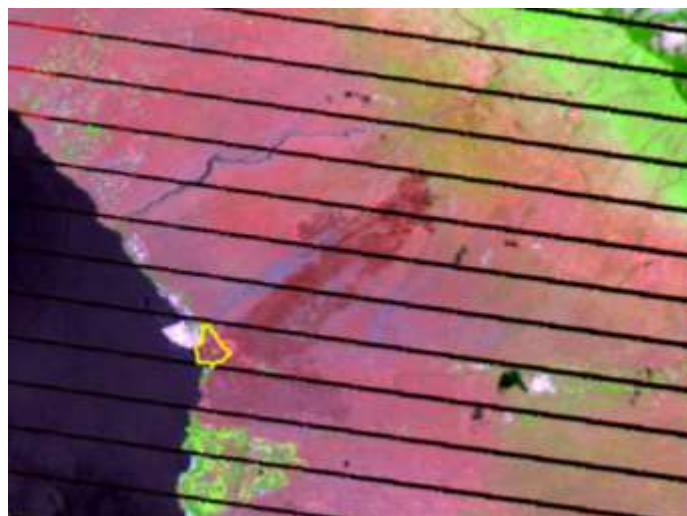
August 10, 2015. The Park Service responded with a Type 3 Incident Commander and one Type 6 Engine. During this shift, mop-up was completed around the PUHE buildings and along the northern flank. Mop-up using MIST was completed around the buildings and along the northern flank. The PUHE portion of the incident was called contained at 1900 and placed in patrol status.

August 11-18. The fire continued to be in patrol status. The incident received precipitation on August 17. The uplands received heavy precipitation causing flash flooding at PUHE. The fire was called controlled at 0730 on August 18, 2015.

August 17, 2015: An intense rainfall event on resulted in substantial flash flooding in Makeahua Creek, and deposition of a large delta of sediment and trees in Pelekane Bay. Peak flows on Pohaukole Creek overtopped the Highway 270 bridge, sending flow down the highway and spilling into Makeahua Creek and the

“Tank Road”. Flows on Makeahua Creek rose to soffit level on the Highway 270 bridge and transported boulders up to 1.5 meters in diameters. Many reaches along both creeks were scoured to bedrock. Rainfall intensities recorded by Kohala Watershed Partnership rain gauges ranged from 1.96 inches/hour near the coast to 2.78 inches/hour at higher elevations. Event totals ranged from 2-5 inches over the watershed. The return interval for events of this intensity are 25-500 years at PUHE and vary with elevation.

Impacts to infrastructure and natural cultural resources from the storm and amplified post-fire watershed response were documented at PUHE and ALKA.



Landsat 7 fire image (8/9/2015) with active fire in bright red. PUHE boundary in yellow (courtesy of Randy McKinley).

## Assessments and Specifications

Critical values at risk identified by the BAER team for the Kawaihae Fire included:

- Cultural Resources
- Watershed
- Vegetation
- Infrastructure

BAER and BAR requests are summarized in the tables below:

### KAWAIHAE FIRE EMERGENCY STABILIZATION: SUMMARY OF ACTIVITIES AND COSTS

| LINE ITEM NUMBER   | SPECIFICATION NUMBER | TITLE                                              | UNIT         | UNIT COST | NUMBER OF UNITS | WORK AGENT | FY15             | FY16             | FY17             | FY18             | COSTS               |
|--------------------|----------------------|----------------------------------------------------|--------------|-----------|-----------------|------------|------------------|------------------|------------------|------------------|---------------------|
| 1                  | CR-1                 | Cultural Resource Assessments                      | Sites        | \$ 293    | 336             | F          | \$49,195         | \$49,195         |                  |                  | \$98,390            |
| 2                  | CR-2                 | Cultural Resource Monitoring                       | Sites        | \$ 182    | 500             | F          |                  | \$91,100         |                  |                  | \$91,100            |
| 3                  | CR-3                 | Cultural Resource Stabilization                    | Sites        | \$ 552    | 150             | F          | \$25,100         | \$32,500         | \$25,100         |                  | \$82,700            |
| 4                  | CR-4                 | Cultural Resource Protection                       | Sites        | \$ 105    | 380             | F, C       | \$10,000         | \$29,580         |                  |                  | \$39,580            |
| 5                  | CR-5                 | Museum Collection                                  | Collections  | \$ 4,175  | 2               | F          |                  | \$8,350          |                  |                  | \$8,350             |
| 6                  | WS-1                 | Install and Repair Goat Exclusion Fencing          | Feet         | \$ 18     | 4,000           | C          |                  | \$64,000         | \$4,000          | \$4,000          | \$72,000            |
| 7                  | WS-2                 | Repair Dozer Line on Private Land                  | Miles        | \$ 3,000  | 10              | C          |                  | \$30,000         |                  |                  | \$30,000            |
| 8                  | WS-3                 | Clean Sediment Basins on Private Land              | Dams         | \$ 3,000  | 31              | C          |                  | \$93,000         | \$93,000         | \$93,000         | \$279,000           |
| 9                  | WS-4                 | Clean Sediment From Roads & Culverts               | Storms       | \$ 1,782  | 12              | F          | \$5,345          | \$7,124          | \$5,344          | \$3,563          | \$21,376            |
| 10                 | WS-5                 | Pelekane Bay Dredge Feasibility Study              | Study        | \$ 75,000 | 1               | C          |                  | \$75,000         |                  |                  | \$75,000            |
| 11                 | VEG-1                | Vegetation Risk Assessment                         | Acres        | \$ 76     | 80              | F          | \$6,070          |                  |                  |                  | \$6,070             |
| 12                 | VEG-2                | Native Vegetation Stabilization                    | Water System | \$ 23,760 | 1               | F          |                  | \$23,760         |                  |                  | \$23,760            |
| 13                 | PS-1                 | Monitor & Remove Trees for Public Safety           | Removals     | \$ 11,020 | 3               | F, C       | \$10,000         | \$23,060         |                  |                  | \$33,060            |
| 14                 | PS-2                 | Replace Safety Signs                               | Signs        | \$ 709    | 20              | F, C       |                  | \$14,168         |                  |                  | \$14,168            |
| 15                 | FD-1                 | Emergency Repairs to Infrastructure                | Repairs      | \$ 9,355  | 6               | F, C       | \$56,125         |                  |                  |                  | \$56,125            |
| 16                 | ADM-1                | BAER Implementation Coordinator and Administration | N/A          | N/A       | N/A             | F          | \$7,640          | \$93,248         | \$13,180         | \$3,820          | \$117,888           |
| 17                 | PL-1                 | Kawaihae Fire BAER Plan                            | Plan         | \$ 73,405 | 1               | F          | \$73,405         |                  |                  |                  | \$73,405            |
| <b>TOTAL COSTS</b> |                      |                                                    |              |           |                 |            | <b>\$242,880</b> | <b>\$634,085</b> | <b>\$140,624</b> | <b>\$104,383</b> | <b>\$ 1,121,972</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

### KAWAIHAE FIRE BURNED AREA REHABILITATION: SUMMARY OF ACTIVITIES AND COSTS

| LINE ITEM NUMBER   | SPECIFICATION NUMBER | TITLE                                                   | UNIT  | UNIT COST | NUMBER OF UNITS | WORK AGENT | FY16           | FY17       | FY18       | COSTS           |
|--------------------|----------------------|---------------------------------------------------------|-------|-----------|-----------------|------------|----------------|------------|------------|-----------------|
| 1                  | BAR-1                | Pili Grass Rehabilitation to Exclude Non-Native Species | Acres | TBD       | 90              | F          | TBD            | TBD        | TBD        | \$0             |
| 2                  | BAR-2                | Non-Emergency Repairs to Infrastructure                 | Each  | \$ 1,500  | 5               | F          | \$7,500        |            |            | \$7,500         |
| <b>TOTAL COSTS</b> |                      |                                                         |       |           |                 |            | <b>\$7,500</b> | <b>\$0</b> | <b>\$0</b> | <b>\$ 7,500</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

## Cultural Resources

Issues:

- Numerous nationally-significant cultural resources are found on burned lands under NPS jurisdiction, including a National Historic Landmark encompassed within a National Historic Site (PUHE) and National Historic Trail (ALKA) comprised of archaeological sites, historic structures, cultural landscapes, and traditional cultural properties. The Kawaihae Fire burned nearly all of the 39.78 acres of the Pu'ukoholā Heiau National Historic Landmark.
- Native Hawaiian Organizations maintain strong traditional ties to these cultural resources. The Kawaihae Fire and post-burn conditions impacted traditional uses by forcing the cancellation of annual ceremonies, and other values may have been impacted or are threatened.

- Loss of vegetative cover exposed numerous archaeological artifacts and cultural features. NPS lands affected by the Kawaihae Fire lie adjacent to private lands, a county park, and small communities, resulting in high visitation. Thus, the potential for unauthorized artifact collection and vandalism is significantly increased.
- The Kawaihae Fire burned watersheds that drain through the PUHE boundaries and across ALKA. The loss of vegetation and alteration of soils in these watersheds has significantly increased the surface water runoff during storm events. The resultant increase in erosion and sedimentation poses considerable threat to significant cultural resources.
- Many trees burned or scorched during the Kawaihae Fire within PUHE and along ALKA. These fire-killed trees can fall and directly impact cultural features such as stacked rock features and the historic trail, or uproot and expose cultural materials that were previously.
- Direct and indirect effects of the fire on cultural resources were observed during the BAER assessment (e.g., spalling on rock art sites, flood impacts to archeological features and deposits). These impacts need to be addressed, and other cultural resources remain to be inspected for damage and post-fire threats.

#### Recommendations:

- *CR-1 (Cultural Resource Assessments)*: Cultural resources assessments began in conjunction with the BAER planning and assessment process for the Kawaihae Fire needs to be completed. Known cultural resources within PUHE and ALKA are subject to post-fire threats. This includes resources located within the burned area and those subject to increased erosion and/or sedimentation resulting from amplified watershed response. A total of 336 recorded cultural resources falling into one or both of these categories remains to be assessed.
- *CR-2 (Cultural Resource Monitoring)*: Following the initial assessments, sensitive cultural resources will be periodically monitored to assess for looting activity, erosion/sedimentation issues (particularly following storm events), and treefall hazards. PUHE and ALKA cultural resource managers will consult with Native Hawaiian Organizations; funds will be allocated towards travel for elders to visit the parks, and field time for cultural resource managers. At least 100 cultural resources will be monitored.
- *CR-3 (Cultural Resource Stabilization)*: Fire-killed trees and other woody debris deposited during the recent storm events will be cleared. Strategic sandbag placement is also needed to redirect water flow during storm events, including stacked rock platforms located just below the access trail to Pu'ukohola Heiau. Exposed segments of traditional cobblestone trails/cartways will be covered, and burned irrigation lines removed. Multiple sites and/or cultural features assessed by the BAER Team require one or more of these stabilization treatments and it is anticipated that more will be identified following completion of the remaining site assessments.
- *CR-4 (Cultural Resource Protection)*: Although formal artifact collection was implemented by the BAER Team to alleviate the immediate potential of illegal artifact collecting, the potential still exists

as new artifacts and features are exposed by storm events and aeolian redistribution of soils. Proposed treatments include increasing security patrols and installing remote camera monitoring systems.

- *CR-5 (Museum Collection)*: As a protective measure against looting and other factors contributing to context loss, the NPS is collecting sensitive artifacts for inclusion into the museum collection. Collected artifacts will be processed, catalogued, accessioned, and curated following NPS standards.

## Watershed

### Issues:

- Post-fire threats to public and employee safety, facilities and infrastructure, and critical and natural and cultural resources on NPS lands from floods, mudflows, and debris flows within and downstream of the Kawaihae Fire.
  - There are no significant threats to public and employ safety from post-fire watershed conditions.
  - Roads and trails within PUHE and ALKA will be subject to potential sedimentation and erosion impacts until pre-fire watershed functionality returns. Major NPS facilities are not at risk from post-fire watershed conditions.
  - Erosion and sedimentation impacts to terrestrial NPS cultural resources were observed and temporarily stabilized. Long-term threats to these resources remain and should be mitigated.
  - Fire and flood impacts to perimeter fencing allow access to NPS lands by feral goats. Goats were observed in PUHE following the fire. Herbivory will slow the return of vegetation and delay watershed recovery.
  - Burned areas in the Makeahua and Pohaukole watersheds above NPS lands comprise a significant source of sediment that threatens marine natural and cultural resources within the administrative boundary of PUHE and greater Pelekane Bay. The major storm event following the Kawaihae Fire deposited an excessive amount of sediment in the bay. Erosion control devices installed by a non-profit watershed protection group are filled to capacity, and suppression impacts from the Kawaihae Fire have the potential to produce additional sediment. The State of Hawaii has designated the Makeahua watershed as top priority restoration site for improving water quality in Pelekane Bay, which would help protect one of the longest contiguous reef systems in the state (and associated Threatened and Endangered and culturally-important species) and significant offshore archeological resources.

### Recommendations:

- *WS-1 (Repair and install goat exclusion fence)*: Repair burned and flood-impacted goat exclusion fencing on private lands within the Pelekane Bay watershed, as well as installation of new fencing to prevent goat access on recovering NPS lands. A new exclusion fence is proposed to span approximately 800 feet between the existing exclusion fencing at the northeastern corner of the

John Young homestead and the existing Pelekane Bay watershed fencing on private land. Repair of approximately 3,000 feet of existing exclusion fencing, also on non-NPS lands, damaged by the Kawaihae Fire and/or post-fire flooding is also recommended.

- *WS-2 (Repair Dozer Line on Private Land)*: Approximately 10 miles of poorly-constructed dozer line on private lands need to be stabilized to reduce the risk of excess erosion and downstream impacts to the natural and cultural resources in PUHE and ALKA. Retention basins below these lines are already full and unable to accommodate additional sediment.
- *WS-3 (Clean Sediment Basins on Private Land)*: Thirty-one sediment retention basins located on burned private lands in the Pelekane Bay watershed should be cleaned out to restore functionality. These basins were filled by erosion resulting from the post-fire storm event, and are at increased risk of failure from future storms. Cleaning these basins will reduce the threat of sedimentation to marine natural and cultural resources within PUHE.
- *WS-4 (Clean Sediment from Roads and Culverts)*: Sediment yield is likely to be elevated for a period following the Kawaihae Fire, and culverts and roads within PUHE should be inspected and cleared as needed following major storms to prevent clogging and the risk of damage to facilities such as roads and trails surrounding natural and cultural resources.
- *WS-5 (Pelekane Bay Dredge Feasibility Study)*: A feasibility study is warranted to assess whether dredging substantially reduces the risk to marine natural and cultural resources within Pelekane Bay from post-fire sediment from the August 17, 2015, and subsequent storm event. Components of such an investigation should include (1) detailed sediment deposition mapping and in-situ volume estimates from immediate post-fire events within PUHE, (2) an estimate of event deposition residence time based on rates derived from previous research, and (3) the extent to which dredging reduces sediment residence time over a period of 5-10 years.

## Vegetation

### Issues:

- Fire-killed and damaged hazard trees that comprise a threat to public and employee safety.
- Direct fire mortality and the ability of sensitive species and/or species that contribute to the PUHE cultural landscape to recover from fire effects. These include, culturally-important (pili grass [*Heteropogon contortus*] and milo [*Thespesia populnea*], Threatened and Endangered Candidate, (pololei [*Ophioglossum concinnum*]), and sensitive (pā'ū o hi'iaka [*Jaquemontia ovalifolia* subsp. *Sandwicense*]) species.
- Expansion of non-native invasive species in the cultural landscape and displacement of native plant species. The invasives of greatest concern include buffleggrass (*Cenchrus ciliaris*) and kiawe (*Prosopis pallida*).
- Failure to re-establish post-fire vegetation cover due to herbivory by non-native feral goats. Fire and flood damage to nearby exclusion fences has allowed goats to enter PUHE.

- The influence of reduced vegetation cover on amplified watershed response, and observed and potential impacts to NPS infrastructure and critical natural and cultural resources in PUHE and ALKA.

#### Recommendations:

- *PS-1 (Monitor & Remove Trees for Public Safety)*: Fire-killed kiawe trees should be removed in high-use areas. Although kiawe trees are a detriment to ecosystem function by transpiring large amounts of groundwater, they do provide shade to visitors in a dry tropical environment. Where feasible and appropriate, when hazard trees are removed the site should be replanted with appropriate native tree species.
- *VEG-1 (Vegetation Risk Assessment)*: Provide an immediate assessment by experienced local botanists to identify the location of native species on the site relative to the vegetation map; identify how the fire affected them and if they are capable of re-establishment. This is a time-critical activity. Provide an assessment of the treatment options to promote re-establishment of native species and limit expansion of non-native species.
- *VEG-2 (Native Vegetation Stabilization)*: The irrigation system at PUHE needs to be repaired as an immediate postfire priority in order to provide pili grass planting materials during the critical, post-fire re-establishment phase.
- *BAR-1 (Pili Grass Rehabilitation to Exclude Non-Native Species)*: Without intervention, the Kawaihae Fire will provide the conditions for incremental expansion and further entrenchment of fire-adapted invasive species, particularly buffelgrass, at the expense of mostly non-fire adapted native flora. PUHE should continue with established techniques that have been used successfully to re-establish pili grass in select locations. Funding will be requested from the BAR program.

#### Infrastructure

##### Issues:

- The Kawaihae Fire damaged critical facilities at PUHE, including road and trail signs, electrical, water, communications (telephone, network, alarm system) systems, and various other features. Almost three weeks after the fire began, PUHE remains without fully functioning critical utilities.
- Five road and trail counters in PUHE and ALKA were destroyed by the Kawaihae Fire. These provide visitor use data necessary to fulfill the NPS mission.

##### Recommendations:

- *PS-1 (Replace Safety Signs)*: Approximately 20 safety signs along roads and trails in PUHE were damaged or destroyed as a result of the Kawaihae Fire. These should be replaced in-kind.
- *FD-1 (Emergency Repair to Infrastructure)*: Repairs to critical fire-damaged infrastructure are currently underway. These include replacing the water main, fiber optic cable, telephone and electrical lines, and a traffic sensor. In addition, NPS major facilities will be inspected for fire-damage (e.g., holes in roofs and siding).

- *BAR-2 (Non-Emergency Repair to Infrastructure)*: The Kawaihae Fire destroyed five road and trail counters at PUHE and ALKA. These should be replaced in-kind. Funding will be requested from the BAR program.

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## Burned Area Assessments



## **Cultural Resources Assessment**

### **Objectives**

- Determine if known or incidentally encountered cultural resources within, adjacent to or downstream of the Kawaihae Fire were impacted by the fire and/or are threatened by post-fire conditions. If applicable, prescribe emergency stabilization treatments or activities to minimize or mitigate those impacts.
- Determine if any proposed emergency stabilization or rehabilitation treatments for the Kawaihae Fire might adversely impact cultural resources and, if so, prescribe actions to minimize or mitigate adverse effects.
- Meet all Federal cultural resources legal mandates, including consultation with appropriate Native Hawaiian organizations.

### **Issues**

- Numerous cultural resources are found on burned lands under NPS jurisdiction, including a National Historic Landmark encompassed within a National Historic Site (PUHE) and National Historic Trail (ALKA) comprised of archaeological sites, historic structures, cultural landscapes, and traditional cultural properties. The Kawaihae Fire burned nearly all of the 39.78 acres of the Pu'ukoholā Heiau National Historic Landmark.
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- Many trees burned or scorched during the Kawaihae Fire within PUHE and along ALKA. These fire-killed trees can fall and directly impact cultural features such as stacked rock features and the historic trail, or uproot and expose cultural materials that were previously.
- Direct and indirect effects of the fire on cultural resources were observed during the BAER assessment (e.g., spalling on rock art sites, flood impacts to archeological features and deposits).

These impacts need to be addressed, and other cultural resources remain to be inspected for damage and post-fire threats.

- Other emergency stabilization treatments have been proposed for public safety, preservation of park infrastructure, or protection of natural resource values. These treatments may have the potential to impact significant cultural resources, especially if ground disturbing activities are required.

## Cultural Background

Many excellent volumes of historic research have been compiled that speak to the history and culture of PUHE and ALKA. The most comprehensive of these is Greene's (1983) *A Cultural History of Three Traditional Hawaiian Sites on the West Coast of Hawai'i Island*. More recently, an archaeological overview and assessment was completed for the three west Hawaii Island parks, including PUHE, (Tomonari-Tuggle and Tuggle 2006) that provides a good archaeological context and more current analysis of research needs and management recommendations. An overview of ALKA can be found in the historic trail comprehensive management plan (NPS 2009). Cultural landscape evaluations include a cultural landscape inventory (NPS 2003) and an environmental assessment evaluating the historic scene (Tetra Tech 2004). The following overview is excerpted from the *Pu'ukohola Heiau National Historic Landmark Cultural Landscape Inventory* (NPS 2003).

### Pre-contact

In the late 1780s, Kamehameha I began his quest to unify all the Hawaiian Islands under his rule as a king. A priest from the king's court received a prophecy. The guarantee was that Kamehameha I would conquer all of the Hawaiian Islands if he built a heiau (temple) in honor Ku ka 'ili moku (war god). Priests determined the site, orientation, dimensions and configuration of the heiau and performed ceremonies throughout its construction (Kuykendall 1938:37). Pu'ukohola (meaning "the hill of the whale") Heiau was constructed by thousands of Hawaiians including Kamehameha I himself.

In order to construct the heiau, a human chain spanned from Waipio Valley to the site. Stones for construction of Pu'ukohola Heiau were passed from hand to hand. During the construction of the temple, human sacrifices were offered to assure Ku ka 'ili moku of the king's devotion. The heiau and its associated structures were completed in the summer of 1791. A few months later, Kamehameha I fulfilled the prophecy and was successful in defeating the rival chief, Keoua. Kamehameha I then conquered the three neighboring islands, solidifying his power.

Pu'ukohola Heiau is situated on a prominence, at the top of the hill with expansive views of Kawaihae Bay and the shoreline, the Pacific Ocean, two other heiau below, and the northwestern foothills of Mauna Kea. The heiau is a multi-platformed structure with several internal components including a massive wall and three terraces. It is a mortarless stacked stone structure believed to be the last of the large heiau built in the Hawaiian Islands.

Mailekini (meaning “many maile [a native vine plant] vines”) Heiau is located just below Pu’ukohola on the Hill of the Whale. It is a smaller structure and appears to have been linked with Pu’ukohola Heiau with stone walls that formed a taboo kapu area around and between the heiau. Mailekini Heiau is believed to have been constructed by a district chief during the prehistoric period of warfare.



Pu’ukohola Heiau following the Kawaihae Fire.

Pelekane, a coconut tree-shaded beach area located just below and northwest of Pu’ukohola and Mailekini Heiaus, is the site where Kamehameha I established his primary residence while constructing Pu’ukohola Heiau. Pelekane was the location of the royal court of Kamehameha I and included houses for the royal family, priest, and other nobility. Pelekane was a taboo, or kapu, area, limited to those associated with royalty. It is the birthplace of Queen Kamamalu, the daughter of Kamehameha I and Kaheiheimalie, in approximately 1802. Later, Queen Emma, a granddaughter of John Young and Kamehameha I, who became the bride of Kamehameha IV, may also have been born or resided at Pelekane (Kelly 1974:16).

Historical accounts and illustrations provide much of the story of Pelekane. A drawing from L.I. Duperrey in 1819 depicts the landscape of Pelekane with thatch and pole structures and stone alignments delineating the associated space between each structure, and a rock wall surrounding the largest of the houses and a shaded lanai. Captain Louis de Freycinet described the royal house at Pelekane as:

"A grass dwelling 10 to 12 feet long and little less in width; the flooring was padded with mats, as is the custom in the Sandwich Islands....one could not compare this royal habitation to anything better than the shepherds' huts of certain provinces in France, built for the purpose of occasional shelter" (as stated by Freycinet 1918, editor Kelly 1978:17).

Not only is Pelekane important because it was the royal court, but it is also the site where Kamehameha I assumed the kingship of all the Hawaiian Islands when his rival Keoua was killed and offered to the sharks at the third heiau, Hale o Kapuni. Although the exact location of Hale o Kapuni Heiau is unknown, it lay somewhere just off-shore from Pelekane, and below Mailekini and Pu'ukohola Heiau. It was built of stones that projected above the water surface and, at the time of its dedication, it was situated near the shoreline.

Oral tradition indicates that Hale o Kapuni Heiau was dedicated to the shark gods (including Ukanipo and Kaaipai) in prehistoric times. In 1859, Theophilus Davies traveled over the submerged Heiau and recounts an informant's comments that "...a heap of stones in the ocean..." where "...bleeding victims were placed before the gods..." The sport of catching sharks was practiced by chiefs within Hale o Kapuni Heiau. Human flesh was sometimes used to attract them. Overlooking this bay was a tall rectangular stone known as the leaning post. Kamehameha I and his chief, Alapa'i, were known to use this leaning stone while viewing activities in the Hale o Kapuni and fishing activities within the bay (Greene 1993:261-2).

#### Post-contact (Historic)

The first documented Hawaiian contact with Europeans was from Captain James Cook in 1778. In 1790, John Young and Issac Davis arrived at Kawaihae and were taken into service by Kamehameha I. Young eventually became the king's closest advisor regarding politics, trade and commerce. In 1793, John Young was presented with property in Kawaihae, now called the homestead, from Kamehameha I following the ancient custom rewarding loyal service in victorious battle. John Young and his first wife, Namoku'elua, established a residence in the lower portion of the homestead, at the mouth of Makahuna Gulch. Oral tradition and archival research indicate that these structures were of traditional Hawaiian thatch and pole construction.

In 1798, John Young began building structures at the upper portion of the homestead, situated on a knoll above two gulches. Eventually the homestead contained several buildings, including a cook house, storage, animal pens and a whitewashed picket fence. Island stones were laid in mud and plastered on both interior and exterior surfaces. Thatch roofs with post structures were combined with the plastered walls.

Numerous accounts of John Young were recorded in ship's logs and journals by visiting sea captains. Guests at the homestead included some of the more prominent early missionaries to Hawai'i. Many meetings of trade, foreign affairs, and warfare took place here.

During one period of warfare, in 1810, under the direction of John Young, Mailekini Heiau was used as a fort to protect Kawaihae Bay and the kingdom's arsenal (Ladd, n.d.). Twenty-two cannons were placed within the heiau thereby changing the function of the structure from a religious site to a fortress (Greene 1993:249).

Kamehameha I died in 1819. His son, Liholiho (Kamehameha II) immediately denounced the kapu system. Many heiau were demolished and images were burned. The heiau at Pu'ukohola no longer held its prominence.

In 1835, upon the death of John Young, the upper portion of his homestead was abandoned. During the next 49 years the site was neglected and left for ruin. Historical notes from the *Addenda of The Thirty-Eighth Annual Report of the Hawaiian Historical Society for the Year 1929* (1930:60) mention John Young's house:

"There is a probability that John Young's house in Kawaihae, island of Hawai'i, where he lived during the earlier years of his residence in Hawai'i...will be preserved to posterity...because it was there that all ship captains and many others generally consulted with Young before having an audience with Kamehameha I, and it was there that much of the governmental foundation for the new Kingdom of Hawai'i was studied out. Governor Judd, it is reported, favors the plan for a 'John Young park.'"

Local residents utilized Mailekini Heiau as a burial site in the late 19th early 20th centuries. The burials have not been removed, so the heiau still serves as a cemetery.

In the 1920s, the Parker Ranch constructed a wagon road through Pelekane, past Mailekini Heiau, and continuing south along the coast. In the early 20th century (circa 1910), a section of a marine railway was constructed within the Pelekane area to service the small sugar operations in the region. By 1917, the railway was non-functional.

Pu'ukohola Heiau became overgrown with non-native vegetation. A 1922 report from the Smithsonian Institution stated that archaeological investigations of Pu'ukohola were greatly hampered by the overgrowth of the non-native tree, kiawe (*Prosopis pallida*). In 1928, poorly documented reconstruction of Pu'ukohola Heiau was conducted by a local group, "friends of Pu'ukohola" (Ladd 1986). The extent of the work completed is unknown. In 1975-76 two phases of stabilization effort for Pu'ukohola Heiau were conducted. Access to Spencer Beach Park from State Highway 270 was established in circa 1936 by the construction of a paved two-lane road passing between Pu'ukohola Heiau and Mailekini Heiau. The Pelekane area was used as a dry-dock in the 1940s and became a dumping ground for old cars, boats and trash (DCP 1989:15).

## **Cultural Resources and Wildland Fire**

Impacts to cultural resources as a result of fire, fire management actions, and post-fire conditions can be conveniently divided into three categories: direct, operational, and indirect. Direct impacts are those caused by the wildland fire itself or its byproducts (e.g., smoke); operational impacts are caused by fire management actions made in response to wildland fires (e.g., fire line construction, retardant drops); and

indirect impacts occur as a result of fire-induced changes to the context in which cultural resources are found (e.g., looting and erosion due to loss of vegetation cover).

Operational impacts to cultural resources are identified, assessed and mitigated as part of fire suppression activity damage repair and funded from the fire emergency suppression account. No significant suppression impacts were evident at cultural resources inspected during the initial post-fire fieldwork. However, since only a fraction of the known cultural resources within the Kawaihae Fire perimeter have been inspected to date, there is a possibility that operational impacts may still be discovered.

BAER funds are used to assess and, if necessary, mitigate the direct effect of fire and related indirect impacts such as erosion, as well as identify and mitigate resources that could be affected by emergency stabilization treatments (e.g., ground-disturbing activities). With regard to direct effects to material cultural resources, the level of threat is a function of the fuels and associated fire behavior, and the nature of cultural materials present. Fire effects vary with fire intensity and duration of heating that is dependent upon fuel type, fuel loading, and burning conditions. Within the Kawaihae Fire area, grasses and other ground surface vegetation are the predominant fuel types. These fuels suffered high mortality, although fire intensity was low to moderate with very short residence times. Mesquite (kiawe) trees occur in small stands (with other vegetation in drainages) or are isolated within the park area and can burn quite hot. The few areas exhibiting moderate to high burn severity occurred in these areas when the mesquite ignited. Generally speaking, these burning conditions will result in minor or negligible direct effects from fire, except in the areas with moderate to high burn severity where features and artifacts can suffer damage from heating or sooting.

Indirect impacts of the greatest concern within the Kawaihae Fire include erosion, fire-killed hazard trees, and looting or vandalism resulting from the post-fire exposure of artifacts. This includes incremental sediment loss and deposition, as well as catastrophic events such as debris flows. Onsite and upslope post-fire vegetation conditions influence erosion potential, and PUHE and ALKA lie at the bottom of burned watersheds. Fire-killed trees that fall can impact cultural resources if they strike cultural features or cause ground disturbance through contact and uprooting. Loss of vegetative cover due to fire can expose cultural features and surface artifacts that may be collected by uneducated park visitors or vandalized by unscrupulous looters.

## **Reconnaissance Methodology**

Assessments of known cultural resources within PUHE and ALKA were performed by the NPS BAER Team from 18 August to 21 August, 2015. This effort was led by NPS Klamath Network Fire Program Archeologist Joseph Svinarich and Golden Gate NRA Landscape Architect Amy Hoke. Cultural resource assessments for the fire included examination of fire and cultural resource data to identify resources most likely to be threatened by the fire, and completion of field assessments for significant sites that were easily accessible and in nonhazardous areas of the fire. However, given the large quantity of cultural resources under NPS jurisdiction within the fire area, and limited time allowed for developing the BAER plan, only a relatively few

cultural features and archaeological sites were assessed. Documentation methods including taking field notes and completing BAER cultural resources assessment forms, photo documentation with digital cameras and collecting location data with a Garmin GPS where appropriate.

PUHE and ALKA staff, recognizing the immediate post-burn concerns for artifact collecting and fire damage at archaeological sites, initiated field site assessments within areas of greatest concern immediately following completion of fire suppression activities. These activities were led by PUHE Cultural Resources Program Manager Elizabeth Gordon and Hawaii Volcanoes Integrated Resources Management Manager Adam Johnson. These efforts occurred 11 August through 19 August, 2015 with the most intense activity occurring early in that period. Readily accessible areas were inspected for fire-caused damage to cultural features and exposed artifacts that might otherwise be subject to unauthorized collection by park visitors. Resources were documented to NPS standards and then collected for inclusion into the park museum collections.

During the BAER Team inspections both Adam Johnson and Elizabeth Gordon accompanied BAER team members while conducting field assessments when time permitted. ALKA Archaeologist, Rick Gmirkin, accompanied team members on 20 August 2015 to assess fire-caused impacts and fire-related threats to the historic trail where the trail lies within PUHE, and also in other segments within the fire-affected area. Potential treatments related to direct impacts of fire on pictographs, and indirect impacts from fire-killed trees, erosion and sedimentation threats, and looting activities were discussed. Strategies and methods for completing cultural resource assessments and monitoring were also reviewed.

## Findings

Potential impacts included increased risk of looting or vandalism due to vegetative cover loss, damage to features or areas of artifact concentration due to soil disturbance resulting from falling fire-killed trees, degradation of rock art due to direct fire heating, or soil destabilization resulting in erosion of cultural features or artifact concentrations due to vegetation loss. In addition, PUHE and ALKA are of great significance to Native Hawaiian Organizations, and for continuation of their cultural traditions. Unfortunately the annual “Ku I Ka Mana” (Establishment Day) Festival had to be canceled this year because of the fire.

Field assessments were completed by both BAER Team cultural resource professionals and Pacific Islands Network parks archaeologists. Approximately 44 cultural sites and/or features were inspected for fire-related damage, and park data were examined determining that 336 additional cultural sites and/or features remain to be assessed within either the burned area or at the lower extremes of the burned watersheds where erosion and/or sedimentation pose a serious threat. Impacts resulting from the fire, or the storm that immediately followed the fire, were noted at many of the cultural sites and features during the initial assessments. Clearly, completing the remaining assessments is important. The following are discussions of the various classes of impacts noted.

## Slope and Erosion Potential

The hydrologic assessment of watersheds burned during the Kawaihae Fire indicate erosion from fast-flowing water and debris flows is a significant concern for cultural resources within PUHE and along the Historic Trail. This was evidenced by increased deposition of sediments from recent storms in the burned area. Cultural resources located on or below steep slopes may be subject to increased surface runoff that can erode archeological sites or historic features. Most of the cultural resources are located in areas that warrant field assessments to determine actual on-site erosion threats.

At least three newly-exposed platforms were revealed during the fire just below and west, or Makai (toward the sea), of the trail leading up to the Pu'ukoholā Heiau. Some or all of these could be burial features. The trail is located along a steep gradient, with evenly-spaced 4"x 4" timbers placed perpendicular to the path of travel to channel runoff (i.e., function as water bars). Extreme erosion on the stacked rock retaining wall that forms this trail's edge was observed at locations consistent with the timbers. Runoff from the eroded wall edge has led to impacts on the resources below; for example, some erosion of the stacked rock platforms was noted immediately below the timbers. Given urgency for stabilization in the face of impending storms, some timbers were removed and replaced with a series of strategically-placed sandbags. Timbers tacked with appropriately-sized landscape spikes should be installed, in consultation with the PUHE Archeologist, at the same locations and alignment of the sandbags. Periodic assessments following future rain events should be made to insure that erosion is mitigated and adjusting timber locations and alignments as needed.



Sandbag treatment along the Pu'ukohola Heiau access trail.

Erosion was also observed along the south edge of the asphalt Administrative Trail, which connects the PUHE Visitor Center and Headquarters facilities. The trail edge was severely undercut, and subsurface

paving material has migrated downhill. This erosion also threatens nearby buried archaeological features and corrective action is required. PUHE has attempted to stabilize this trail in the past by placing sandbags along the exposed edge; however, those sandbags have since disintegrated and bits of white plastic are now strewn throughout the site. Additional sandbag treatments will be necessary to stabilize the feature and avoid continued impacts to the Cultural Landscape viewshed in this area.

In the flood following the fire, historic paving materials (water smoothed cobblestones) were exposed along the historic road/traditional trail in both the Pelekane area and along the Waimea Kawaihae (aka Tank) Road. Some small sections of the traditional, hand-constructed cobblestone trail/cartway were noted; these were photo documented and mapped. A portion of this road/trail is an active road bed, used by the park for both events and maintenance activities on an infrequent, but regular, schedule. Covering the exposed historic/traditional material will both protect the resource in place and allow for the park to resume use of the road without damage to vehicles. A minimum of 6" of coral sand should be placed directly atop the cobbles and smoothed out to match adjacent grades. Periodic visual assessments should be made to ensure the cobblestones remain buried, especially if future floods or high surf events impact this area.

Other erosion impacts such as small-scale gullying or rill erosion in broader areas near cultural features or sites were noted. Emergency sandbag treatments were completed in some areas to mitigate the worst impacts following the first storm, but many other sites could suffer during future storm events if runoff is amplified due to the loss of vegetation. Of particular concern is undercutting of stacked rock features, which could result in partial or total collapse.

#### Fire-Damaged, Fire-Killed Trees and Woody Debris

Archaeological sites with fire-killed trees located on or near sensitive areas, such as stacked walls or within artifact concentrations, need to be assessed. These trees will eventually fail, further disrupting surface and subsurface cultural deposits. Completed site assessments have demonstrated that many areas have fire damaged trees; it is still uncertain if any of these will regenerate. Fire-killed trees were detected at the extreme northern edge of the NHL along Pōhaukauhole Gulch in close proximity to stacked stone features. There is a high likelihood of underground features nearby. Some of these trees were flush-cut prior to the last storm. Future treatments should include flush-cutting the remaining fire-killed trees that threaten cultural features, and cut woody debris should be removed from sites.

Multiple fire-damaged trees were also noted along the route of the Ala Kahakai National Historic Trail. In some cases, fire-killed trees have fallen and obstruct the trail. Unless removed, this will lead to the creation of social trails around the obstacles. There are also many associated cultural sites and features adjacent to the historic trail that will be impacted by the creation of new social trails. The fire-killed trees that have fallen across the historic trail should be removed as soon as possible. Some of this work is being completed by PUHE maintenance staff while this plan is being completed.



Fire-damaged trees across the Ala Kahakai Trail.

The flood event following the storm also delivered woody debris into the Pōhaukaukole Gulch and adjacent bay. Large trees, some with green leaves still visible, were observed up to 400 feet offshore, potentially in the reputed location of the Hale o Kapuni Heiau. The size and the quantity of material is a negative impact to the National Historic Landmark District, impacting the historic scene. Material should be removed from the bay and disposed of off-site. The same flood event also impacted an historic-period charcoal oven, located along the Waimea Kawaihae (Tank) Road. This rock and mortar feature had partially collapsed in recent years and all material not firmly attached to the feature foundation were washed away. Woody debris is lodged within the remnants and should be completely removed to help stabilize the feature. In addition thorough documentation should be completed to update the park baseline date for this site.

#### Potential Looting of Archaeological Sites

Field examination of archaeological sites and cultural features during the initial post-fire assessment revealed the potential for unauthorized artifact collecting and/or looting due to the loss of ground-obscuring vegetation throughout PUHE and along the Ala Kahakai Trail. This is most conspicuous at sites with dense white shell midden or clearly visible stacked rock features. Most of these sites were covered by dense stands of shrub vegetation and mesquite trees or grasses before the fire. Easy access resulting from close proximity to roads and park trails has elevated the probability of illegal artifact collecting or looting post-fire. There is a very clear need for increased law enforcement presence and archeological site monitoring to address these potential concerns.

To offset these concerns, PUHE should increase resource protection patrols and remote monitoring of high use areas containing sensitive cultural resources. This will entail placement of cameras at strategic locations that will be monitored from the PUHE Visitor Center. In addition, increased security patrols will be

implemented using a local security contractor and/or coordinating with the adjacent county park. Visitor education will also be used as a tool to discourage undesirable activities.

#### Direct Fire Impacts to Cultural Features

Although much of PUHE and segments of Ala Kahakai historic trail burned, direct fire impacts were variable and influenced by fuel type. Much of the fire burned through grasses or small shrubs; these fuels burned hot, but had a short residence time. Direct impacts in these fuels were negligible, consisting of sooting of rocks in stacked rock features. In areas where shrubs were dense, and occurred in conjunction with mesquite trees, the fire burned with higher intensity and for a longer duration.



Pictograph panel subject to sooting and spalling following the Kawaihae Fire.

The BAER Team assessed several sites and features in areas of heavier fuel accumulations. All but one—a pictograph site—were unburned. The pictograph site, however, exhibited sooting and spalling due to heat and smoke exposure, including direct impact to one painted element. Further, once rock surfaces are exposed to extreme heating, additional spalling may manifest as a result of heating/cooling and wetting/drying fluctuations. In these instances little can be done to prevent additional spalling with current technology, and the best course of action is to complete in-depth recording of the rock art features.

#### Ground-Disturbing Emergency Stabilization Treatments

Emergency stabilization treatments with the potential to affect significant cultural resources are subject to federal regulatory evaluation (36CFR800) in order to minimize those potential impacts. Proposed

treatments for the Kawaihae Fire in this category include culvert cleaning, removal of woody debris from archaeological sites, and removal of trees and other woody debris washed into the bay during recent storms near the reported location of the Hale o Kapuni Heiau. Archaeological monitoring for these treatments will ensure appropriate preventative measures to avoid impacts to cultural resources.

Other proposed treatments are designed specifically to reduce potential impacts to cultural resources; for example, the placement of sandbags for water diversion or the removal of fire-killed trees. These treatments should be conducted in consultation with cultural resource managers to ensure sensitive cultural features are not impacted.

Finally, because PUHE and ALKA are important to contemporary Native Hawaiian Organizations, all treatments should be accompanied by consultation with these groups to ensure traditional values are considered.

#### Visual Impacts to the National Historic Landmark and Cultural Landscape

Plastic irrigation lines placed to assist with the restoration of traditional native vegetation (pili grass) were burned during the Kawaihae Fire. The melted remains of these lines constitute a visual intrusion on the National Historic Landmark and cultural landscape. This was exacerbated by the further scattering of the remains due to the large storm that followed the fire. The burned remains should be removed from the site and properly disposed. In addition to mitigating the visual impact, removal will also lessen the chances plastic is blown or carried by runoff into the adjacent marine environment.



Melted plastic irrigation lines in the foreground with Pu'ukoholā Heiau in the background.

## Recommendations

Treatment recommendations include both emergency stabilization specifications that are eligible for funding under BAER and non-specification management recommendations intended to meet general agency cultural resource management standards.

### Emergency Stabilization Specifications

*CR-1 (Cultural Resource Assessments):* Cultural resources assessments begun in conjunction with the BAER planning and assessment process for the Kawaihae Fire needs to be completed. Known cultural resources within PUHE and ALKA are subject to post-fire threats. This includes resources located within the burned area and those subject to increased erosion and/or sedimentation resulting from amplified watershed response. A total of 336 recorded cultural resources falling into one or both of these categories remains to be assessed.

*CR-2 (Cultural Resource Monitoring):* Following the initial assessments, sensitive cultural resources will be periodically monitored to assess for looting activity, erosion/sedimentation issues (particularly following storm events), and treefall hazards. PUHE and ALKA cultural resource managers will consult with Native Hawaiian Organizations; funds will be allocated towards travel for elders to visit the parks, and field time for cultural resource managers. At least 100 cultural resources will be monitored.

*CR-3 (Cultural Resource Stabilization):* Indirect impacts from the Kawaihae Fire will, or have the potential to, further degrade important attributes of cultural resources within PUHE and ALKA. Fire-killed trees and other woody debris deposited during the recent storm events will be cleared. Strategic sandbag placement is also needed to redirect water flow during storm events, including stacked rock platforms located just below the access trail to Pu'ukohola Heiau. Exposed segments of traditional cobblestone trails/cartways will be covered, and burned irrigation lines removed. Multiple sites and/or cultural features assessed by the BAER Team require one or more of these stabilization treatments and it is anticipated that more will be identified following completion of the remaining site assessments (see CR-1).

*CR-4 (Cultural Resource Protection):* Although formal artifact collection was implemented by the BAER Team to alleviate the immediate potential of illegal artifact collecting, the potential still exists as new artifacts and features are exposed by storm events and aeolian redistribution of soils. Proposed treatments include increasing security patrols and installing remote camera monitoring systems.

*CR-5 (Museum Collection):* As a protective measure against looting and other factors contributing to context loss, the NPS is collecting sensitive artifacts for inclusion into the museum collection. Collected artifacts will be processed, catalogued, accessioned, and curated following NPS standards.

## Management Recommendations (Non-Specification Related)

Post-fire field assessments often identify management issues that are not eligible for suppression damage repair, BAER or BAR funding. The following recommendations are intended to assist PUHE and ALKA in meeting general NPS management goals related to cultural resources.



Example of an appropriate trail edge treatment below; blue gravel above.

1. **Trail Shoulder Material:** In many locations, the colored asphalt trail has been shouldered with blue colored gravel. The addition of this material negates the care that was taken to select a trail color that blends into the surrounding landscape, and instead calls attention to the extended edges of the trail corridor. The recent flood event scattered the shoulder material into the adjacent landscape, creating further visual impacts. A less impactful edge treatment is pictured. This could be achieved by emplacing stones on top of the existing shoulder material, in consultation with cultural resource managers. As an alternative, concrete stain could be sprayed onto the existing gravel to achieve a more cohesive color palette. Choosing another material or coloring material from the existing source prior to use on the cultural landscape should be given strong consideration in the future.
2. **Repair the rock stacked wall at Pu'ukoholā Heiau:** The retaining wall along the outboard edge of the trail up to the main temple has deteriorated and a few rocks have become dislodged. Given the importance of the Heiau, and the visual presence this wall occupies, it is recommended that the wall be repaired.
3. **Record cultural resources to professional standards:** Many archeological sites and cultural features assessed for emergency stabilization will require further documentation to meet professional

standards. Current documentation in some cases consists of only of GPS locations, digital photographs, and some general field notes.

4. Complete Archeological Sites Management Information System (ASMIS) assessments from BAER and READ data: NPS policy requires scheduled monitoring of site condition to be entered into the service-wide archeological sites database (ASMIS). This information can be gleaned from READ and BAER field site assessments.
5. Repair Administrative Trail: The asphalt paved Administrative Trail, which connects the PUHE Visitor Center to the park Headquarters facilities, is being severely undercut, especially along its south edge from increased runoff following the fire and flood. In addition to the increased instability of the trail, dislodged paving material is consistently washed downhill into the visitor parking lot which creates extra maintenance efforts to keep clear. The fire denuded landscape is prone to more runoff, which is exacerbating an already impacted facility built along a steep slope. Designing the new trail to accommodate water flow and reconstructing from concrete will mitigate the ongoing washout problem that is impacting the cultural landscape. Although considered under BAER and BAR this project does not meet the scope of work that qualifies under current emergency stabilization and burned area rehabilitation guidelines.

## Emergency Actions Completed

Given the series of storm events that immediately followed the Kawaihae Fire and are predicted to occur during this El Nino year, some emergency stabilization treatments had to be enacted during the BAER Team assessment to stabilize critical cultural resources impacted by the fire. These treatments were deemed essential and implemented following conversations with the regional BAER coordinator. Costs of the following activities were tracked and included in the emergency stabilization treatment specifications (CR-3).

1. Sandbags were emplaced along the Pu'ukoholā Heiau access trail edge as a check dam to prevent water from spilling over the trail edge and further eroding either the wall or the stacked rock platforms below. Sandbag water bars were placed and timbers removed to alter the location for water runoff specifically to avoid additional impacts to the stacked rock platforms. In addition the number of sandbag water bars was increased over the previous timber water bars to lessen the volume of runoff at any particular location. It is strongly emphasized that this is meant as a temporary measure in preparation for a wet weather event; following the storm the sandbags should be removed and 4" x 4" timbers replaced in more strategic locations.
2. Additional sandbag treatments were placed within PUHE to redirect water flow that would otherwise impact known cultural features. The primary concern is that during storm events concentrated water flow, if left unchecked, would erode and damage cultural features. In one location fire-killed trees were noted with potential to uproot and possibly expose subsurface cultural materials if they were to fall or be blown over during a storm. These were removed using chainsaws with the stumps flush cut.

3. The Ala Kahakai National Historic Trail was also impacted by fire-killed tree fall that obstructed passage along the trail. In several of these areas cultural features or sites were noted in the immediate vicinity, such that any social trails created to circumvent the obstruction would impact these cultural resources. To avoid impacts to these resources and to the trail, the fallen fire-killed trees were removed from the trail corridor.
4. The Kawaihae Fire also burned a large quantity of plastic irrigation line installed to promote native vegetation growth (pili grass). These burned during the fire and were scattered across the landscape by the subsequent storm. The burned irrigation line material is clearly visible with the loss of vegetation and contrasts the viewshed of the cultural landscape. These materials were gathered and removed to prevent further degradation of the viewshed, as well as spread into the adjacent marine environment.

## Consultations

Elizabeth Gordon, Cultural Resources Program Manager, Pu'ukohola Heiau National Historic Site  
Adam Johnson, Chief of Integrated Resources Management, Hawaii Volcanoes National Park  
Rick Gmirkin, Archaeologist, Ala Kahakai National Historic Trail

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## Preparers

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## **Watershed Assessment**

### **Objectives**

- Assess overall soil and watershed changes caused by the fire, particularly those that pose substantial threats to human life, property, and critical natural and cultural resources. This includes evaluating changes to soil conditions, hydrologic function, and watershed response to precipitation events.
- Identify potential flood and erosion source areas and sediment deposition areas.
- Identify potential threats to life, property, and critical natural and cultural resources in relation to flooding, debris flows, erosion, sediment deposition, and fire retardant applications.
- Develop treatment recommendations, if necessary.
- Identify future monitoring needs, if necessary.

### **Issues**

- Post-fire watershed risks to human life and property from floods, mudflows, and debris flows within and downstream of the fire.
- Post-fire risks to critical natural and cultural resources including historic and prehistoric cultural resources and aquatic resources including Threatened and Endangered species.
- Risks to park facilities.

### **Observations**

#### Background

The purpose of a burned area assessment is to determine potential values at risk resulting from post-fire emergency watershed conditions. Identification of values at risk occurs through consultation with individuals and non-governmental organizations, state and federal agencies, and through field investigation. Not all values initially identified are determined to be at risk. If emergency watershed conditions are found, and values at risk are identified and confirmed, then the magnitude and scope of the emergency is mapped and described, values at risk and resources to be protected are analyzed, and treatment prescriptions are developed to protect values at risk. The most significant factor leading to emergency watershed conditions is loss of ground cover, which leads to erosion and changes in hillslope hydrologic function in the form of decreased infiltration and increased runoff. Such conditions lead to increased flooding, sedimentation and deterioration of soil condition. Values at risk are human life, property, and critical natural and cultural

resources located within or downstream of the fire that may be subject to damage from flooding, ash, mud and debris deposition, and hillslope erosion.

### Physiography/Geology

The Kawaihae Fire burned 3,884 acres on NPS, state and private lands. On NPS lands, the fire burned 64 acres, or 74% of the total area of PUHE. The burned area is located on the northwestern coast of the Island of Hawaii, and at the base of the Pelekane Bay watershed that extends to the top of Kohala Mountain at approximately 5,300 feet above sea level. The fire burned 2,689 acres within this watershed, including critical erosion areas identified in the Pelekane Bay Watershed Restoration Project Final Report (2011). PUHE extends from the coastline to an elevation of about 160 feet at the top of a small hill (site of the Pu'ukohola Heiau) and, as a consequence, terrestrial areas of the park are generally isolated from the greater watershed. The northern area of the park contains the two main streams that drain the burned watershed: Makeahua and Pohaukole Gulches. PUHE extends seaward into Pelekane Bay 100 feet from shore near the southern park boundary, to 400 feet offshore at the mouth of Makeahua Creek. It is in these areas that post-fire watershed effects are, and will continue to be, most evident.

The burned area is underlain chiefly by Pleistocene basaltic lava, airborne tephra, and associated weathering material from Mauna Kea and Kohala Volcanoes. The land surface of the older Kohala Volcano (700 – 120 ka) is more deeply fissured than the younger (250 – 65 ka) surface derived from Mauna Kea lava flows. Beach sediments are derived from a mixture of terrigenous and coral sources (Richmond et al., 2008). Soils in the area are described as very rocky fine sandy loam on 6-12% slopes (National Park Service, 2012). They are highly erodible when denuded of vegetation by fire or non-native goats (pers. comm. Purrell, 2015).

Makeahua Creek drains approximately 85% of the watershed and was diverted into Pelekane Bay when the U.S. Army Corps of Engineers constructed the Kawaihae Harbor, located to the north of PUHE, in 1949. Both Makeahua and Pohaukole gulches contain large transported boulders as evidence of occasional large flow events, such as that observed on August 17, 2015 immediately following the Kawaihae Fire. The combined sediment input from these two drainages creates an ephemeral delta where they enter Pelekane Bay. Wave action transports this sediment to deeper waters and along the beach, though the littoral along-shore current is substantially reduced by Kawaihae Harbor. Land-use changes starting in the early 1800's have left much of the watershed without adequate vegetation, resulting in short flow concentration times during rain events and subsequent incision of the primary drainages. The watershed is classified as a Category I watershed by the state of Hawaii, indicating that it is a top priority for restoration to improve water quality in the bay (Mauna Kea Soil and Water Conservation District, 2005). Moreover, the reef system is one of two top priority restoration sites in the state of Hawaii due to factors such as uniqueness (one of the longest contiguous reef system in the state), species richness, coral cover, resilience, degree of threat, and conservation viability (The State of Hawaii, 2010). Figure W-1 depicts the extent of coral reef in Pelekane Bay

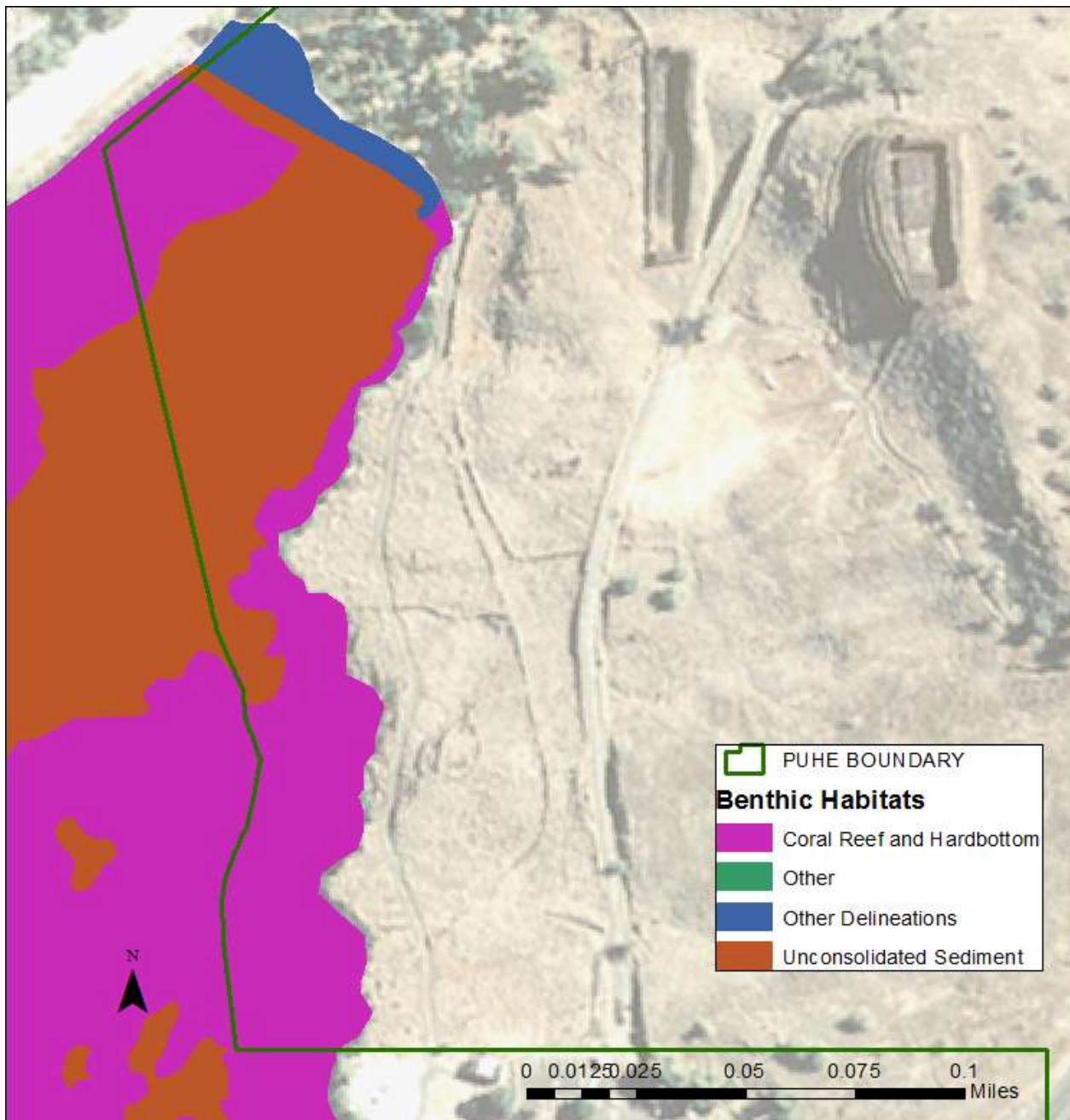


Figure W-1. Benthic habitats in Pelekane Bay adjacent to and within PUHE boundary (Cochran et al., 2006).

within NPS waters. Restoration activities are on-going and organized under the Kohala Watershed Partnership.

### Climate

A warm sub-tropical climate is common for PUHE, with periodic rains and long periods of drought (NPS 2006). The region is the driest in the state, because it occurs in the rain shadow of Mauna Kea and the

Kohala Mountains (NPS 2004). Annually, more than 90% of the days are sunny and clear; clouds that do form inland over the Kohala Mountains and the Waimea Plateau usually disperse before they reach PUHE. The area lies within the tradewind belt, but the large mountains provide shelter or deflect these winds. Convective sea breezes are typically more common and influential than northeast winds at this site. Gusts from 20-40 knots can occur, with both upslope and downslope winds contributing to soil aridity and difficulty in vegetation establishment. Mean annual temperatures average about 80°F; summer temperatures average slightly higher than the mean. Annual precipitation at Kawaihae (located 1.6 km north of PUHE) averages 7 to 9 inches, occurring mainly in the winter months when trade winds lessen and allow for westerly “Kona” storms from the leeward direction. Areas higher in the Pelekane Bay watershed receive substantially more annual rainfall, averaging 20-30 inches near the upper elevations of the burned area and up to 80 inches at the top of the watershed (Mauna Kea Soil and Water Conservation District, 2005). The average daily minimum and maximum relative humidity ranges from 44% in November to 87% in July (NPS 2006; NPS 2004).

### Soil Burn Severity

Post-fire soil burn severity is often mapped with the intention of identifying the degree to which the fire has affected soil characteristics that impact soil health and hydrologic function, and hence erosion rate and runoff potential. It is emphasized that soil burn severity is not simply an assessment of vegetation consumption, but rather an integration of vegetation loss, changes in soil infiltration capacity, remaining vegetation, duff, or ash, and soil color, all of which may indicate relative degrees of soil heating.

While soil burn severity is not based primarily on fire effects to vegetation, the BAER Team used post-fire vegetative condition as one of the visual indicators in assessing soil burn severity. In some cases there may be complete consumption of vegetation by fire, with little effect on soil properties, such as in a shrub ecosystem. Conversely, dense vegetation, with a deeper litter and duff layer, results in longer heat residence time, and more severe effects on soil properties. For example, deep ash after a fire usually indicates a deeper litter and duff layer prior to the fire. This promotes loss of soil organic cover and organic matter, which are important for erosion resistance and the formation or exacerbation of water repellent layers at or near the soil surface. The results are increased potential for runoff and soil particle detachment, and transport by water, wind, and gravity. This would be mapped as high soil burn severity.

By contrast, sparse or light pre-fire vegetation such as grasses or sparse shrubs usually have negligible litter layers and surface fuels and experience extremely rapid consumption and spread rates, with very little heat residence time at the soil surface. The result is very little alteration of soil organic matter and little or no change in soil structural stability. Water repellency, usually present under shrubs before the fire, may or may not be exacerbated by the fire. Areas between shrubs or grass crowns usually had very little fuel to burn, thus only experienced brief radiant heat as the flashy grasses and sparse shrubs burned. In these cases, soil burn severity would be low.

In between these extremes, the moderate class of soil burn severity is far more diverse in observed soil conditions and can include various vegetation types, ranging from forests to shrub communities. In the case of a forest, the litter layer may be largely consumed, but scorched needles and leaves remain in the canopy and will rapidly become mulch. This is important in re-establishing protective ground cover and soil organic matter. This factor can result in the classification of the area as moderate, rather than high. Generally, however, there will also be less destruction of soil organic matter, roots, and structure in an area mapped as moderate. In a shrub ecosystem, even where pre-fire canopy density was high, the litter layer is generally thin, and while the shrub canopy may have been completely consumed by the fire, the soil structure, roots, and litter layer may remain intact beneath a thin ash layer.

Above ground indicators, such as size of unconsumed twigs, were used to help the BAER Team determine how long the heat may have persisted on the site. If only root stubs and large diameter twigs remained, it was likely a more intense fire with longer heat residence time; combined with other observations of soil conditions, this might be classified as high soil burn severity. More common in shrub fuels is the retention of small diameter twigs, indicating a flashy fire with short residence time. Combined with other observations of soil conditions, this usually led to a classification of moderate soil burn severity, even though the canopy was partially consumed.

#### Soil Erosion/Debris Flow

Soil erosion potential generally increases post-fire. This is largely due to the loss of soil cover (forbs, grasses, and leaf and needle litter), the surface horizon soil organic matter responsible for structural stability, and, in some cases, increased water repellency at or near the soil surface. The amount of increase over pre-fire condition is related to the degree of soil changes. The degree of soil alteration influences the potential of post-fire soil erosion and debris flow process.

The factors most affected by fire are: (1) the amount of effective soil cover, (2) the inherent susceptibility to soil particle detachment by wind, water, or gravity (which are a function of soil texture and structural stability), and (3) the surface infiltration rate. Areas of high soil burn severity can be expected to show a greater increase in sediment production than an area of low soil burn severity due the concomitant decrease in soil cover, increased susceptibility of soil particle detachment, and a decrease in the infiltration capacity of the soil. It is important to understand pre-fire erosion behavior when assessing post-fire erosion, since some areas have inherently water-repellant surfaces and high erosion potential even in the absence of fire.

#### Watershed Response

Overland flow occurs when rainfall exceeds soil infiltration capacity and the storage capacity of depressions. On the unburned forest floor, overland flow is often absent, or when it does occur, is forced to follow myriad complex interlinking paths comprised of organic (litter and duff layers) and inorganic (rock) materials. Consumption of organic materials by fire alters the path of overland flow by concentrating it into a shorter

flow path, which, in turn, increases the hydraulic energy of the flow; this can result in rill erosion. At the watershed scale, the reduction of hillslope flow path lengths, combined with the formation of rills that have a high water conveyance capacity, reduces the time of concentration, or the amount of time for overland flow to reach a defined point within the watershed.

Overland flow is also amplified if there is an increase in soil water repellency (hydrophobicity) due to fire. This can reduce infiltration and increase runoff. Infiltration curves for water-repellent soils reflect increasing wettability over time once the soil is placed in contact with water. Water repellency decreases—and infiltration increases—with time as the substances responsible for hydrophobicity begin to break down and wettability is restored. In general, fire-induced hydrophobicity is broken up, or is sufficiently washed away, within one to two years after a fire. The thicker and deeper the water repellent layer, the longer it will take to dissipate. However, once soil cover and vegetative canopy begin to recover, this persistent water repellency becomes less significant to the runoff response because the litter and canopy quickly restore protection of soil and obstruction of overland flow, thus enhancing infiltration and reducing energy for runoff and erosion.

Raindrops striking exposed mineral soil with sufficient force can dislodge soil particles. This is known as splash erosion. These dislodged particles can fill in and seal pores in the soil, thereby reducing infiltration. Further, once soil particles are detached by splash erosion they are more easily transported in overland flow. Surface erosion is defined as the movement of individual soil particles by a force (wind, water or gravity). It is initiated by the planar removal of material from the soil surface (sheet erosion) or by concentrated removal of material in a downslope direction (rill erosion). Surface erosion is a function of four factors: (1) susceptibility of the soil to detachment, (2) magnitude of external forces (raindrop impact or overland flow), (3) the amount of protection provided by material that reduces the magnitude of the external force (soil cover), and (4) management practices that reduce erosion.

On-the-ground field observations within and downstream of the Kawaihae Fire burned area were conducted to determine potential watershed response. Channel morphologies and crossings and stream outlets were examined to gain an understanding of transport and deposition processes. Observations included condition of riparian vegetation, and the volume of sediment and wood stored in channels and on slopes that could potentially be mobilized.

## Findings

The following sections present the findings for soil burn severity, erosion and debris flow potential, and watershed response associated with the Kawaihae Fire. These are analyzed in reference to values at risk at PUHE and ALKA.

### Soil Burn Severity

Soil burn severity mapping was not conducted for this assessment due to a combination of poor satellite imagery and the assumption that the predominant fuels carrying the Kawaihae Fire—sparse grasses—likely burned with low intensity. The latter was confirmed by the BAER Team; intact grass root crowns were present over approximately 90% of the burn area. This suggested short burn residence times and low soil burn severity over the vast majority of the burned area. The balance of the Kawaihae Fire likely experienced moderate soil burn severity. Though naturally hydrophobic soils can exist throughout the watershed, there was no evidence of hydrophobicity in burned or unburned soils; infiltration was mostly instantaneous at all sites tested in the field. Ash was not evident on soil surfaces, though this was likely the result of a large rainstorm just prior to the initiation of the watershed assessment.

### Erosion Potential

The potential for erosion has increased in the Kawaihae Fire due primarily to vegetation loss and generally highly erosive soils. Importantly, the fire burned an area previously identified as a critical erosion area for watershed restoration (Kohala Watershed Partnership, 2011). This was evidenced by flooding and sediment transport observed during storms immediately post-fire, and overall erosion potential in the burned area is considered high.

During suppression, two dozer lines were constructed on non-NPS lands along the east flank of the fire. As observed from PUHE headquarters and on the ground, these lines follow the approximate fall-line of the topography, and elevated berms remain on both sides of the lines. The BAER Team was not able to observe the total extent of the lines, but it is assumed that they extend to the farthest uphill extent of the fire perimeter (approximately 10 miles). Additionally, there were no observable water bars or other erosion control measures in place on these lines. As such, the dozer lines present a clear and immediate erosion source because (1) bare soil is exposed, (2) the slope along the lines is maximized, and (3) the berms will tend to channelize flows quickly to nearby gulches. Without intervention, the effect will likely be rapid erosion and delivery of sediment into Pelekane Bay.

On non-NPS lands across Highway 270 from PUHE, restoration fencing installed to protect the Pelekane Bay watershed from goat grazing was damaged by the fire and subsequent flooding. Goats were observed entering park lands post-fire, threatening vegetation recovery and cultural resources. With respect to the latter, goats can climb onto historic dry stack rock fences, dislodging stones as they go.

Existing sediment dams on Pelekane Bay watershed restoration lands (non-NPS) above PUHE were all observed to be full of sediment, rendering them ineffective in future storms. Expedient cleaning of these basins is needed to mitigate post-fire sediment flux from the burned area to Pelekane Bay.

Sediment deposition in Pelekane Bay as a result of the Kawaihae Fire and subsequent erosion represents a substantial impact to marine resources within the authorized boundary of PUHE and offshore areas. While sediment deposition in the bay is an on-going problem, the scale of the recent event indicates that additional effort should be undertaken to ensure that the extent and magnitude of impacts does not exceed those previously observed.

Approximately 10 culverts within PUHE have the potential to plug. These need to be cleaned following post-fire storms to prevent impacts to park infrastructure and cultural resources.

#### Debris Flow Potential

Field evidence of debris flows is lacking. This is unsurprising given the relatively low gradient of slopes within the burned area (~12%). Post-fire debris flow potential is classified as low.

#### Watershed Response

The influence of wildfires on storm runoff is well documented. Wildfires typically cause an increase in watershed responsiveness to precipitation events. Burned watersheds can quickly yield runoff due to the removal of protective tree and shrub canopies, and litter and duff layers. As a result, burned areas often respond to typical storm events in a much flashier way. The amount of water yield increase is variable, though it is often orders of magnitude greater than the same events under pre-fire conditions. Extreme amplified responses typically occur in watersheds that have experienced significant vegetation consumption and moderate to high soil burn severity. Fires may also increase the number of runoff events because even small storms can trigger runoff until vegetation begins to recover. Finally, peak flow increases post-fire may also be augmented by floatable and transportable material within the active channels.

Vegetation recovery in burned areas is largely dependent on climatic cycles. If sufficient precipitation occurs, vegetation recovery can occur rapidly. By the second season, grasses often provide sufficient cover to reduce any increase in watershed response to near pre-fire levels. Once sprouting grasses produce brushy crowns, watershed response will be further reduced. However, if drought persists, vegetation recovery will be slow, the establishment of ground cover will be slow, and watershed response will remain slightly elevated over pre-fire conditions.

Another consequence of increased runoff, erosion, and sediment and debris delivery is short-term degradation of water quality, as ash, sediment, and burned organic debris are delivered to streams within and downstream of burned areas. The impacts of this effect depend largely on the vegetative recovery period, in combination with storm characteristics during the same interval.

An intense rainfall event on August 17, 2015 resulted in substantial flash flooding in Makeahua Creek, and deposition of a large delta of sediment and trees in Pelekane Bay. Peak flows on Pohaukole Creek overtopped the Highway 270 bridge, sending flow down the highway and spilling into Makeahua Creek and

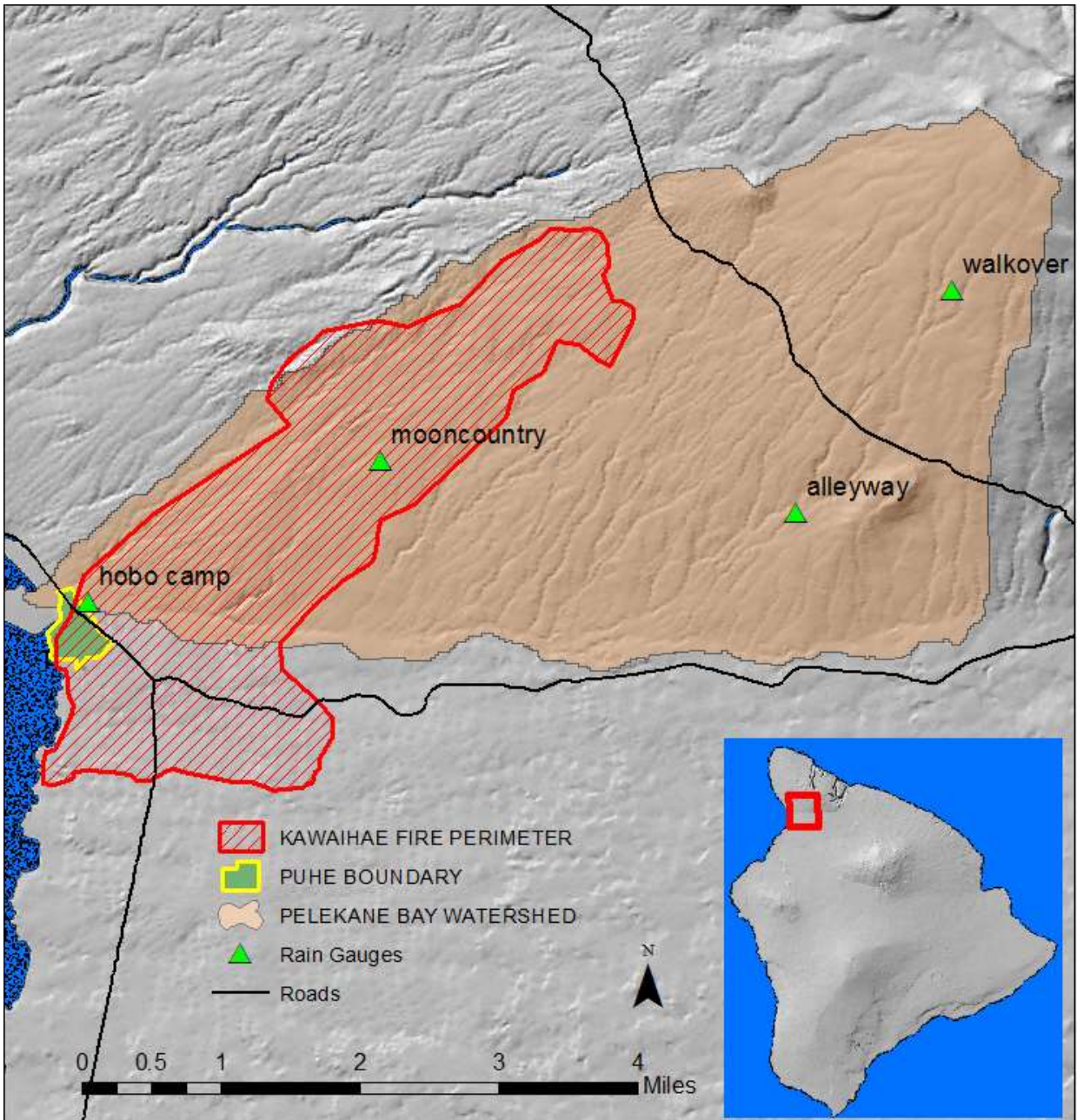


Figure W-2. Pelekane Bay watershed rain gauge locations.

the “Tank Road”. Flows on Makeahua Creek rose to soffit level on the Highway 270 bridge and transported boulders up to 1.5 meters in diameters. Many reaches along both creeks were scoured to bedrock.

Rainfall intensities recorded by Kohala Watershed Partnership rain gauges ranged from 1.96 inches/hour near the coast to 2.78 inches/hour at higher elevations (Figure W-2; Table W-1). Event totals ranged from 2-5 inches over the watershed. The return interval for events of this intensity are 25-500 years at PUHE and vary with elevation (Table W-1). Given the upslope extent of the rain event, the overall return interval for

the resulting flow in Makeahua Creek is likely to be at the upper end of return intervals in Table W-1. Further, the event was very likely increased in magnitude by sediment bulking from recently burned slopes.

Table W-1. August 17, 2015 storm rainfall intensities (in inches) and estimated return intervals in years as estimated from NOAA Atlas 14 ([http://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_hi.html](http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_hi.html))).

| Gauge Name   | Degrees Latitude | Degrees Longitude | Elevation (feet) | 15 minute intensity (return interval/years) | 30 minute intensity (return interval/years) | 1 hour intensity (return interval/years) | storm total (inches) |
|--------------|------------------|-------------------|------------------|---------------------------------------------|---------------------------------------------|------------------------------------------|----------------------|
| Hobo Camp    | 20.031           | -155.820          | 79               | 0.88 (25-100)                               | 1.38 (50-200)                               | 1.96 (50-500)                            | 2.08                 |
| Moon Country | 20.045           | -155.789          | 1542             | 0.85 (10)                                   | 1.32 (10-25)                                | 2.18 (25-200)                            | 2.51                 |
| Alleyway     | 20.040           | -155.746          | 2484             | 0.97 (5-10)                                 | 1.73 (10-25)                                | 2.78 (25-200)                            | 5.25                 |
| Walkover     | 20.063           | -155.730          | 4216             | 0.37 (<1)                                   | 0.71 (<1)                                   | 1.22 (<1)                                | 2.88                 |

As vegetation regrows following this and subsequent events, watershed response should be reduced rapidly to pre-fire conditions.

#### Values at Risk

All areas within and downstream of the Kawaihae Fire were evaluated for values at risk from post-fire watershed conditions. This assessment covers PUHE and ALKA.

With respect to post-fire flooding, standard operating procedures (SOPs) for BAER evaluations and treatments only address up to 25-year storm events. The ability for BAER to prescribe treatments that can withstand storm events greater than a 25-year magnitude is problematic. The purpose of BAER is to provide rapid assessment and implementation of treatments to protect human lives, property, and critical natural and cultural resources from impending weather events. Designing and implementing treatments capable of withstanding large magnitude events (>25-year) usually requires complex and time-consuming engineering and construction stages. Further, because amplified watershed response is ephemeral, BAER treatments are not considered long-term or permanent fixes against pre-existing or extreme threats, and are intended only to protect values at risk from the time of the fire to the return of pre-fire watershed functionality. In the case of the Kawaihae Fire, neither NPS infrastructure nor terrestrial cultural resources were substantially damaged by the exceptional storm event of August 17, 2015. Therefore, it is anticipated that a 25-year event would pose minimal threat.

NPS staff from PUHE and ALKA and their local cooperators provided the BAER Team with a preliminary list of values at risk from post-fire watershed response:

- Cultural Resources—archeological and historic sites for which PUHE and ALKA were designated.

- Natural Resources—vegetation recovery on NPS and adjacent lands; sedimentation impacts to NPS terrestrial and marine ecosystems.
- Roads and Trails—fire and flood impacts, culverts and drainage
- NPS Facilities—flooding of the maintenance facility adjacent to Makeahua Creek.

Values at risk were evaluated through site field visits, professional judgment of BAER Team members, and consultation with local technical specialists.

*Cultural Resources:* Given the low soil burn severity within PUHE and ALKA, and moderate slopes, risks to cultural resources from increased post-fire watershed response and erosion is low to moderate.

*Natural Resources:* As noted, the burned watersheds that drain through PUHE and ALKA have been identified as critical erosion areas affecting water quality in Pelekane Bay. Aquatic resources in the bay may be substantially affected by post-fire watershed response, as evidenced following the August 17, 2015 storm event. Additionally, dozer lines constructed on private lands will likely contribute increased sediment input into the bay.

However, most of the burned area on NPS land is of low soil burn severity resulting in an estimated negligible to low impact from post-fire watershed response and erosion potential on natural resources.

*Roads and Trails:* Roads and trails were impacted by post-fire runoff following the August 17, 2015 storm, especially the administrative trail between PUHE Headquarters and the Visitor Center, and ALKA. Visitor trails may be impacted where waterbars have burned or were overwhelmed by sediment.

*Park Facilities:* The PUHE maintenance yard adjacent to Makeahua Creek flooded during the August 17, 2015 storm event. Remarkably, this occurred not from overflow of the creek, but by storm water captured by the road from a drainage south (upslope) from the yard. Given the magnitude of the August 17 event, it is unlikely that flooding would occur in a 25-year event, precluding any treatments.

### Critical Natural Resources

Critical natural resources were identified as aquatic resources in Pelekane Bay downstream of burned areas of the Kawaihae Fire within the NPS boundary. The reef is regarded as one of the longest in the Hawaiian Islands and contains federally threatened green sea turtle habitat as specifically mentioned in the species recovery plan (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 1998). Threats to marine resources include feral goats, dozer lines, and sediment dams on private property.

Vegetation recovery is key to reducing sediment input into Pelekane Bay and fencing prevents grazing by goats that inhibits this recovery.

## Critical Cultural Resources

The unit is a historic site and as such the entire area is significant. The site is a national historic landmark, is listed on national historic register, and is a cultural landscape.

## **Recommendations**

### Emergency Stabilization Specifications

*WS-1 (Repair and install goat exclusion fence):* Repair of burned and flood-impacted goat exclusion fencing on private lands within the Pelekane Bay watershed, as well as installation of new fencing to prevent goat access on recovering NPS lands (Figure W-3). PUHE staff has observed goats within the park post-fire, impacting cultural resources (knocking rocks off historic stone walls) and consuming vegetation. As such, a new exclusion fence is proposed to span approximately 800 feet between the existing exclusion fencing at

the northeastern corner of the John Young homestead and the existing Pelekane Bay watershed fencing on private land. Repair of approximately 3,000 feet of existing exclusion fencing, also on non-NPS lands, damaged by the Kawaihae Fire and/or post-fire flooding is also recommended.

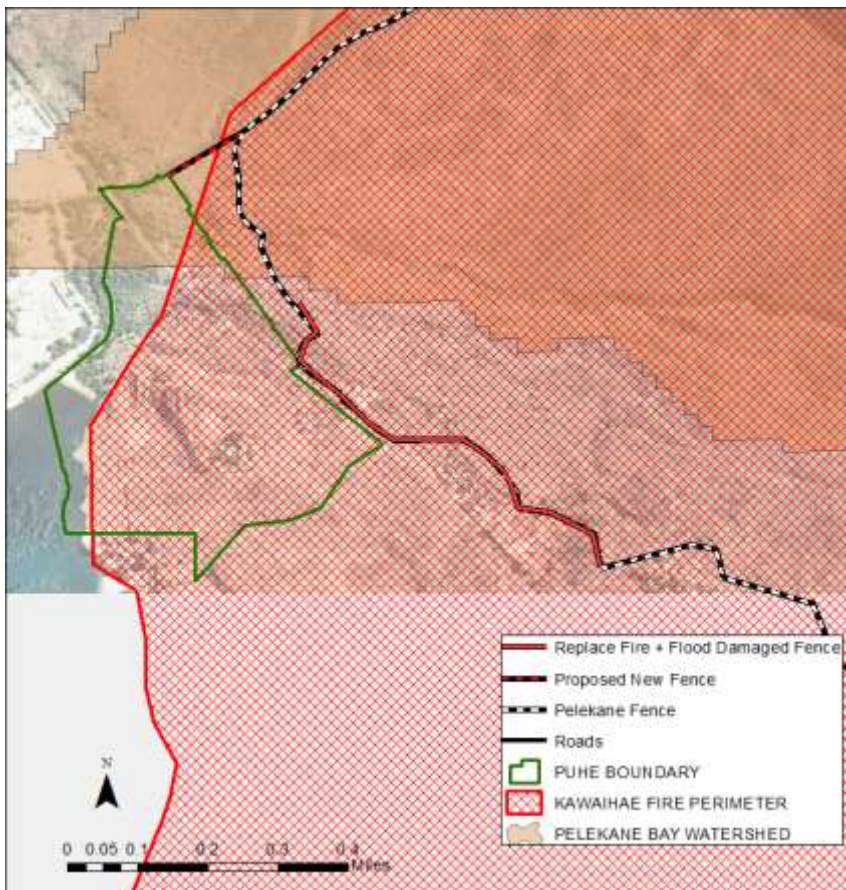


Figure W-3. Locations of damaged and proposed goat exclusion fences.

*WS-2 (Repair Dozer Line on Private Land):* Approximately 10 miles of poorly-constructed dozer line on private lands need to be stabilized to reduce the risk of excess erosion and downstream impacts to the marine natural and cultural resources in PUHE. Retention basins below these lines are already full and unable to accommodate additional sediment. Berms should be pulled and distributed in a hummocky fashion over the disturbed ground using an excavator with thumb (not a dozer) working from the highest elevation down the slope. No additional soil should be disturbed.

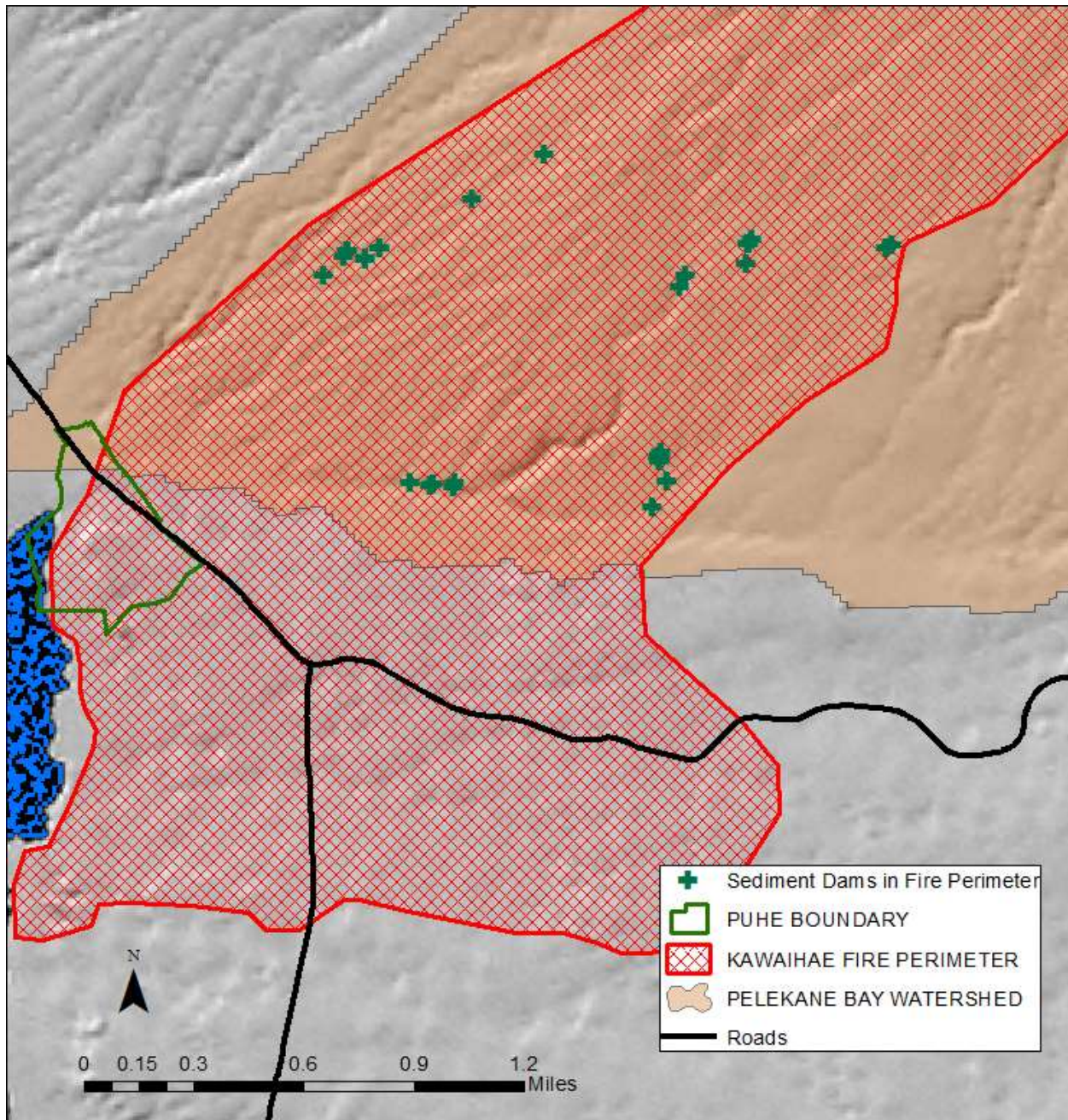


Figure W-4. Locations of sediment basins on private lands within the Kawaihae Fire.

*WS-3 (Clean Sediment Basins on Private Land):* Thirty-one sediment retention basins located on burned private lands in the Pelekane Bay watershed should be cleaned out to restore functionality (Figures W-4, W-5). The extracted sediment should be disposed outside of the watershed. These basins were filled by erosion resulting from the August 17, 2015 storm event, and are at increased risk of failure from future storms. Cleaning these basins will reduce the threat of sedimentation to marine natural and cultural resources within PUHE.



Figure W-5. Example of filled sediment dam on private lands.

*WS-4 (Clean Sediment from Roads and Culverts):* Sediment yield is likely to be elevated for a period following the Kawaihae Fire, and culverts and roads within PUHE should be inspected and cleared as needed following major storms to prevent clogging and the risk of damage to facilities such as roads and trails surrounding natural and cultural resources.

*WS-5 (Pelekane Bay Dredge Feasibility Study):* The exceptional rain event following the Kawaihae Fire transported a large amount of sediment into Pelekane Bay. While a sediment yield study was completed in 2007 (USACOE, 2007), the exceptional magnitude of the August 17, 2015 event probably far exceeded those sediment transport estimates. Dredging has been deliberated in the Pelekane Bay Watershed Management Plan as a means to protect marine cultural resources within PUHE (Mauna Kea Soil and Water Conservation District, 2005). An NPS water resources assessment also suggested sediment removal as mitigation for circulation problems caused by Kawaihae Harbor, admitting, however, a limited knowledge baseline for evaluating success (National Park Service, 2006). A dredging feasibility study is warranted to assess whether dredging substantially reduces the risk to marine natural and cultural resources within Pelekane Bay from post-fire sediment from the August 17, 2015 and subsequent events. Components of such an investigation should include (1) detailed sediment deposition mapping and in-situ volume estimates from immediate post-fire events within PUHE, (2) an estimate of event deposition residence time based on rates derived from

previous research, and (3) the extent to which dredging reduces sediment residence time over a period of 5-10 years.

### Management Recommendations (Non-Specification Related)

*Dozer Line Rehabilitation:* If pili grass is available from Kohala Watershed Partnership for out planting and irrigation options exist, pili grass should be planted in the repaired dozer line to further increase restoration potential.

## **Consultations**

In addition to NPS personnel, the following area specialists were consulted via phone, email, or in person during the course of this investigation:

Melora Purell, Coordinator, Kohala Watershed Partnership

Cody Dwight, Crew Leader, Kohala Watershed Partnership

Dr. Paul Jokiel, Research Professor, Hawaii Institute of Marine Biology, University of Hawaii

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## **Preparers**

Jim Roche, Hydrologist, Yosemite National Park

Brian Rasmussen, Geologist, Whiskeytown National Recreation Area

## Vegetation Assessment

### Objectives

- Assess effects of fire on vegetation, particularly the direct and indirect effects that could impact native plant communities and sensitive plant species, exacerbate the spread of invasive non-native species, alter the cultural landscape, or reduce watershed functions that protect significant offshore marine resources.
- Survey for the presence or absence of any recorded sensitive species including pololei (*Ophioglossum concinnum*) and pā'ū o hi'iaka (*Jaquemontia ovalifolia* subsp. *sandwicense*).
- Evaluate the effects of the fire on each of the major vegetation types identified in the PUHE vegetation assessment.
- Identify potential threats to sensitive species, the major elements of the cultural landscape, and watershed function.
- Develop treatment recommendations, if necessary.
- Identify future monitoring needs, if necessary.

### Issues

- Direct fire mortality and the ability of sensitive species and/or species that contribute to the cultural landscape to recover from fire effects.
- Expansion of non-native invasive species in the cultural landscape; displacement of native plant species.
- Failure to re-establish post fire vegetation cover due to herbivory by non-native feral goats.
- The effects of reduced vegetation cover on post-fire watershed risks to human life and property from floods, mudflows, and debris flows within and downstream of the fire.
- Secondary post-fire risks to critical vegetation resources sensitive species and/or species that contribute to the cultural landscape.

### Observations

#### Background

The purpose of a burned area vegetation assessment is to determine the effect of the fire and the post-fire conditions and the risk to important vegetation resources. Identification of values at risk occurs through consultation with individuals and non-governmental organizations, state and federal agencies, and field

investigation. If emergency conditions are found, and values at risk are identified and confirmed, then the magnitude and scope of the emergency is described, values at risk and resources to be protected are analyzed, and treatment prescriptions are developed to protect values at risk. Risk to vegetation often means related risks to other values; for example, watershed values, wildlife and cultural landscapes.

### Vegetation

The following description of the baseline vegetation resources is excerpted from the *Vegetation Inventory Project, Pu'ukoholā Heiau National Historic Site* (NPS, 2011. Natural Resource Report NPS/PUHE/NRR—2011/459), the Fire Management Plan (NPS, 2006) and the park's Foundation Document (NPS, 2015).

PUHE encompasses approximately 32 ha (80 ac), and was established to preserve and protect three important ancient Hawaiian heiau or temples and other historical and cultural features. PUHE is situated on a vast lava field supporting 104 vascular plant species including examples of coastal strand and wetland native plants that are actively managed. Most of the remaining vegetation has been extremely altered over the years and consists primarily of non-native buffelgrass (*Cenchrus ciliaris* = *Pennisetum ciliare*) and kiawe (*Prosopis pallida*) trees/shrubs (Figure V-1). It is estimated that 78% of plant species now present were probably introduced since 1830 (NPS, 2006). The indigenous species that remain in the park are a minor component of species composition and total plant cover, and are mostly localized in small patches.

Fire in exotic Hawaiian grasslands is well known to have a detrimental impact on native species and to promote the further spread of fire-resilient exotic grasses (NPS, 2006; D'Antonio et al, 2000). One exception to this is the native pili grass (*Heteropogon contortus*), which is tolerant of fire and can expand under postfire conditions (D'Antonio et al, 2000). Pili grass was once a dominant component of the vegetation at many dry, leeward coastal sites in the Hawaiian Islands. It was a primary source of thatch for Hawaiian homes, and therefore a central component of the cultural landscape. Today, most pili grasslands have been replaced by near-monocultures of introduced African grasses, which at PUHE is buffelgrass. Experimental pili plots established and monitored at PUHE over a 6 year period in the mid 1990's showed that once established, pili competed well against the alien buffelgrass (Daehler 1998-2004; Daehler, 1998).

The park has successfully re-established large stands of pili grass in the park, most notably in the ceremonial area between the two large heiau (Figure V-1).

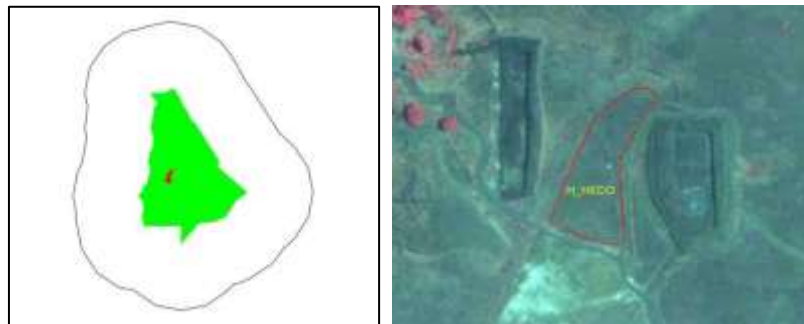
### Rare Species

A native fern, pololei (*Ophioglossum concinnum*), which is a candidate for the federal list of Threatened and Endangered Species, has been noted growing in a small area east of the heiau. Another native species in PUHE probably present before Western contact, as inferred from early historic accounts, is pā'ū o hi'iaka (*Jaquemontia ovalifolia* subsp. *sandwicense*) (Pacheco, R., M.J. Tomonari-Tuggle, M. Bell. 2015).





**Buffelgrass** (*Cenchrus ciliaris*) dominates vegetation at PUHE where it was found to occur on over 50% of the landscape. Buffelgrass formed large almost monotypic stands that varied in density based on moisture levels, soil type and topographic positions. On more developed soils and in drainage bottoms, buffelgrass was dense and grew up to 67cm (2 ft.) tall. On broken lava buffelgrass tended to be sparse and stunted.



**Pili grass** (*Heteropogon contortus*) was likely the dominant grass species at PUHE in historic times before the arrival of Europeans and the introduction of buffelgrass. Today, pili is actively being restored to some areas of PUHE and this map class represents one known area of reintroduction. In addition to this polygon, pili grass was also found in some of the newly landscaped areas around the new visitor center and parking lot. This type was mapped primarily from ground observations. More ground-truthing and updating of this type should occur in the future to better inventory it and monitor its spread.

**Milo** (*Thespesia populnea*) Milo trees were found throughout the study area with concentrations occurring in the Pelekane area and in the Samuel M. Spencer Park. Milo was fairly common along the coast where it tended to intermingle with coconut and kiawe. Some areas of this type likely include planted or restored areas that are actively being managed.

Figure V-2.  
Vegetation  
descriptions of  
buffelgrass, pili  
grasslands and native  
milo woodlands.



## Invasive Species and the Cultural Landscape

PUHE has been actively working to restore native pili grass (*Heteropogon contortus*) near the heiaus to counter threats to the cultural landscape from fire and invasive species, predominately buffelgrass (Pacheco, R., M.J. Tomonari-Tuggle, M. Bell. 2015; NPS, 2011; NPS, 2015).

## **Findings**

### Fire Effects

The fire generally burned with apparent low intensity. Fully intact grass root crowns were visible over approximately 90% of the burn area, and both buffelgrass and pili were observed resprouting. Scattered burned shrubs did not show any signs of resprouting. Kiawe ranged from completely consumed plants to mildly scorched. Scattered burned shrubs showed no evidence of resprouting and most native species are poor postfire resprouters. Local botanists need to confirm species identification and the expected postfire response of individual species to predict recovery in the coming year.

### Erosion Potential

The potential for erosion has increased in the burned areas of the Kawaihae Fire due primarily to the loss of vegetation cover on the highly erosive soils at PUHE. Runoff events will be more frequent and severe until vegetation begins to recover. Rapid re-establishment of vegetation cover is critically important to protection of marine, terrestrial and cultural resources. Despite being a highly invasive non-native species, buffelgrass will provide important vegetation cover to reduce postfire soil erosion. Pili restoration should focus plantings where soils are exposed. To provide for both the control of buffelgrass and reduced erosion, timing and methods of control are important. Buffelgrass can be allowed to resprout vegetatively but be sprayed prior to seed set, leaving dead plants in place to provide soil cover while pili grass out plantings become established.

### Threats to Vegetation Recovery

Goats have been observed entering park lands post-fire, threatening vegetation recovery and cultural resources (see WS-1). Herbivory of resprouting vegetation depletes stored carbon and leads to mortality of plants that would normally recover from fire.

The native flora is generally poorly adapted to fire, pili grass being a notable exception (Tunison et al, 2000; Daehler, 1998).

Drought can slow vegetation recovery but several major rainfall events and predicted wetter than normal El Nino conditions make the potential for drought less likely.

## Threats to Rare Species

The status of previously reported populations of rare species at PUHE prior to the fire is unknown. An intense rainfall event on August 17, 2015 resulted in substantial flash flooding in the Makeahua Creek and deposition of a large delta of sediment in Pelekane Bay could have impacted suitable *Jaquemontia* habitat.

## Invasive Species

Invasive species dominate the landscape at PUHE and have largely replaced native vegetation types (Figure V-1). Invasive species combined with fire are recognized as the single largest threat to both the natural and cultural resources of the park (Tomonari-Tuggle, M. J. and H.D. Tuggle, 2006; Pacheco, R. et al, 2015; Pratt, 1998; Greene, L. W. 1993; Duwall, T. 2003; Kohahla Watershed Partnership, 2011; NPS, 2006; NPS, 2011; NPS, 2015).

## Values at Risk

*Natural and Cultural Resources:* All native plant species that contribute to the cultural landscape, particularly pili grass. Two threatened species have been reported for the site: pololei (*Ophioglossum concinnum*), and pā'ū o hi'iaka (*Jaquemontia ovalifolia* subsp. *sandwicense*). Conversely, further expansion of non-native plant species, particularly buffelgrass and kiawe, at the expense of small remnants of remaining native vegetation (Greene, L. W., 1993; Pacheco, R., M.J. Tomonari-Tuggle, M. Bell. 2015; Pratt, L. W., 1998; NPS, 2004; NPS, 2006; NPS, 2015). Threats to native species include goats, expansion and competition from exotic species. Fire sensitive native species may have declined. Sedimentation of coastal habitat may have altered potential habitat for pā'ū o hi'iaka.

## **Recommendations**

### Emergency Stabilization

*WS-1 (Repair and install goat exclusion fence):* Vegetation recovery is key to reducing sediment input into Pelekane Bay and preserving the cultural landscape. Fencing prevents grazing by goats that inhibits this recovery, and may differentially impact native species more than island species that evolved in the absence of large herbivore grazing (Rock, 1974; Carlquist, 1970).

*PS-1 (Monitor & Remove Trees for Public Safety):* Fire-killed kiawe trees pose a hazard to visitors and employees, and should be removed in high-use areas. Although kiawe trees are a detriment to ecosystem function by transpiring large amounts of groundwater, they do provide shade to visitors in a dry tropical environment. Where feasible and appropriate, when hazard trees are removed the site should be replanted with appropriate native tree species.

*VEG-1 (Vegetation Risk Assessment):* Provide an immediate assessment by experienced local botanists to identify the location of native species on the site relative to the vegetation map; identify how the fire affected them and if they are capable of re-establishment. This is a time-critical activity. Provide an assessment of the treatment options to promote re-establishment of native species and limit expansion of non-native species.

*VEG-2 (Native Vegetation Stabilization):* The irrigation system used to stimulate growth of pili grass for out planting material for restoration of the cultural landscape was destroyed in the fire. Pili grass is the desired condition for the cultural landscape. The irrigation system needs to be repaired as an immediate postfire priority in order to provide planting materials during the critical, post-fire re-establishment phase. At PUHE, this may be a very narrow window of time on the order of months. Funding for more extensive vegetation plantings and invasive species control are requested in BAR-1.

### Burned Area Rehabilitation

*BAR-1 (Pili Grass Rehabilitation to Exclude Non-Native Species):* PUHE, like much of the lowlands of the Big Island of Hawaii, is a vastly transformed landscape dominated by non-native tropical grasses and exotic kiawe woodlands (Figure V-1), the result of several hundred years of land-use practices that degraded the indigenous flora. Fire is just the latest disturbance that threatens the remnants of the native landscape. Without intervention, the Kawaihae Fire will provide the conditions for incremental expansion and further entrenchment of fire-adapted invasive species, particularly buffelgrass, at the expense of mostly non-fire adapted native flora. PUHE should continue with established techniques that have been used successfully to re-establish pili in the park. Select locations and modify methods as proposed in the vegetation assessment (VEG-1).

### Management Recommendations (Non-Specification Related)

*Restoration Collaboration:* Restoration at PUHE should be integrated with efforts in the upper watershed by the Kohahla Watershed Partnership, other NPS units on the island, and in collaboration with the local native Hawaiian community.

## **Consultation**

In addition to NPS personnel, the following area specialists were consulted via phone, email, or in person during the course of this investigation:

Carla D'Antonio, Ecologist, University of California, Santa Barbara

## References

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Tunison, J., C. D'Antonio, and R. Loh. 2000. Fire and invasive plants in Hawai'i Volcanoes National Park. Pages 122-131 *in* Proceedings, Invasive Plant Workshop: The Role of Fire in the Control and Spread of Invasive Species. Fire Conference.

### **Preparer**

Marti Witter, Fire Ecologist, Santa Monica Mountains National Recreation Area

## **Infrastructure Assessment**

### **Objectives**

- Determine the extent of damage to PUHE and ALKA infrastructure resulting from the Kawaihae Fire and post-fire conditions.
- Prescribe and implement emergency and non-emergency treatments as needed to protect public and employee safety, NPS facilities and critical natural and cultural resources.

### **Issues**

- The Kawaihae Fire damaged critical facilities at PUHE, including road and trail signs, electrical, water, communications (telephone, network, alarm system) systems, and various other features. Almost three weeks after the fire began, PUHE remains without fully functioning critical utilities.
- Five road and trail counters in PUHE and ALKA were destroyed by the Kawaihae Fire. These provide visitor use data necessary to fulfill the NPS mission.

### **Findings**

The Kawaihae Fire damaged critical facilities at PUHE, including road and trail signs, electrical, water, and communications (telephone, network, alarm) systems. This has forced closure of the park to protect public and employee safety. Further, valuable museum objects are threatened by lack of climate control and non-functioning alarm systems, and archeological resources are vulnerable due to loss of traffic sensors.

In addition to critical infrastructure, the Kawaihae Fire also damaged road and trail counters, which gather visitor use data necessary to fulfill the NPS mission. This is especially true at ALKA, which lacks visitor contact facilities and relies on trail counters for public use data.

### **Recommendations**

#### Emergency Stabilization

*PS-1 (Replace Safety Signs):* Approximately 20 safety signs along roads and trails in PUHE were damaged or destroyed as a result of the Kawaihae Fire. These should be replaced in-kind.

*FD-1 (Emergency Repair to Infrastructure):* Repairs to critical fire-damaged infrastructure are currently underway. These include replacing the water main, fiber optic cable, telephone and electrical lines, and a

traffic sensor. In addition, NPS major facilities will be inspected for fire-damage (e.g., holes in roofs and siding).

#### Burned Area Rehabilitation

*BAR-2 (Non-Emergency Repair to Infrastructure):* The Kawaihae Fire destroyed five road and trail counters at PUHE and ALKA. These should be replaced in-kind.

# BAER & BAR Specifications



**KAWAIHAE FIRE EMERGENCY STABILIZATION: SUMMARY OF ACTIVITIES AND COSTS**

| LINE<br>ITEM<br>NUMBER | SPECIFICATION<br>NUMBER | TITLE                                              | UNIT         | UNIT COST | NUMBER<br>OF<br>UNITS | WORK<br>AGENT | FY15             | FY16             | FY17             | FY18             | COSTS               |
|------------------------|-------------------------|----------------------------------------------------|--------------|-----------|-----------------------|---------------|------------------|------------------|------------------|------------------|---------------------|
| 1                      | CR-1                    | Cultural Resource Assessments                      | Sites        | \$ 293    | 336                   | F             | \$49,195         | \$49,195         |                  |                  | \$98,390            |
| 2                      | CR-2                    | Cultural Resource Monitoring                       | Sites        | \$ 182    | 500                   | F             |                  | \$91,100         |                  |                  | \$91,100            |
| 3                      | CR-3                    | Cultural Resource Stabilization                    | Sites        | \$ 552    | 150                   | F             | \$25,100         | \$32,500         | \$25,100         |                  | \$82,700            |
| 4                      | CR-4                    | Cultural Resource Protection                       | Sites        | \$ 105    | 380                   | F, C          | \$10,000         | \$29,580         |                  |                  | \$39,580            |
| 5                      | CR-5                    | Museum Collection                                  | Collections  | \$ 4,175  | 2                     | F             |                  | \$8,350          |                  |                  | \$8,350             |
| 6                      | WS-1                    | Install and Repair Goat Exclusion Fencing          | Feet         | \$ 18     | 4,000                 | C             |                  | \$64,000         | \$4,000          | \$4,000          | \$72,000            |
| 7                      | WS-2                    | Repair Dozer Line on Private Land                  | Miles        | \$ 3,000  | 10                    | C             |                  | \$30,000         |                  |                  | \$30,000            |
| 8                      | WS-3                    | Clean Sediment Basins on Private Land              | Dams         | \$ 3,000  | 31                    | C             |                  | \$93,000         | \$93,000         | \$93,000         | \$279,000           |
| 9                      | WS-4                    | Clean Sediment From Roads & Culverts               | Storms       | \$ 1,782  | 12                    | F             | \$5,345          | \$7,124          | \$5,344          | \$3,563          | \$21,376            |
| 10                     | WS-5                    | Pelekane Bay Dredge Feasibility Study              | Study        | \$ 75,000 | 1                     | C             |                  | \$75,000         |                  |                  | \$75,000            |
| 11                     | VEG-1                   | Vegetation Risk Assessment                         | Acres        | \$ 76     | 80                    | F             | \$6,070          |                  |                  |                  | \$6,070             |
| 12                     | VEG-2                   | Native Vegetation Stabilization                    | Water System | \$ 23,760 | 1                     | F             |                  | \$23,760         |                  |                  | \$23,760            |
| 13                     | PS-1                    | Monitor & Remove Trees for Public Safety           | Removals     | \$ 11,020 | 3                     | F, C          | \$10,000         | \$23,060         |                  |                  | \$33,060            |
| 14                     | PS-2                    | Replace Safety Signs                               | Signs        | \$ 709    | 20                    | F, C          |                  | \$14,168         |                  |                  | \$14,168            |
| 15                     | FD-1                    | Emergency Repairs to Infrastructure                | Repairs      | \$ 9,355  | 6                     | F, C          | \$56,125         |                  |                  |                  | \$56,125            |
| 16                     | ADM-1                   | BAER Implementation Coordinator and Administration | N/A          | N/A       | N/A                   | F             | \$7,640          | \$93,248         | \$13,180         | \$3,820          | \$117,888           |
| 17                     | PL-1                    | Kawaihae Fire BAER Plan                            | Plan         | \$ 73,405 | 1                     | F             | \$73,405         |                  |                  |                  | \$73,405            |
| <b>TOTAL COSTS</b>     |                         |                                                    |              |           |                       |               | <b>\$242,880</b> | <b>\$634,085</b> | <b>\$140,624</b> | <b>\$104,383</b> | <b>\$ 1,121,972</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

## INDIVIDUAL SPECIFICATION

|                              |                               |                                  |                                           |
|------------------------------|-------------------------------|----------------------------------|-------------------------------------------|
| TREATMENT/ACTIVITY NAME      | Cultural Resource Assessments | PART E SPECIFICATION #           | CR-1                                      |
| NFPORS TREATMENT CATEGORY*   | Assessment                    | FISCAL YEAR(S) (list each year): | 2015, 2016                                |
| NFPORS TREATMENT TYPE *      | Risk Assessment               | WUI? Y / N                       | Yes                                       |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                      | IMPACTED T&E SPECIES             | pololei ( <i>Ophioglossum concinnum</i> ) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Continuation of the cultural resources assessment begun in conjunction with the BAER planning and assessment process for the Kawaihae Fire. The large number of potentially vulnerable cultural resources dictated that not all assessments could be completed prior to completion of the BAER plan. Immediate post-fire work focused on cultural resources most vulnerable to storm flooding damage or looting, and left many others in need of inspection.

**B. Location/(Suitable Sites):** Cultural resources within the administrative boundaries of PUHE and ALKA that are subject to post-fire threats. This includes those resources located within the burned area those subject to increased threat of erosion and/or sedimentation resulting from the fire. At least 336 cultural resources will be assessed.

**C. Design/Construction Specifications:** The assessment will follow the protocol established for the BAER planning and assessment phase, including: (1) documenting post-burn observations and photographic recordation of resource condition and threats; (2) compiling, processing, and archiving field data to include GPS data, digital photographs, and field inspection notes; (3) preparing an accomplishments report, including an analysis of field methods and results, and summarizing the treatment specification success. These activities will be performed by NPS employees and cooperating partners.

**D. Purpose of Treatment Specifications:** A large number of potentially vulnerable cultural resources are found within PUHE and ALKA. These need to be assessed for susceptibility to looting, erosion/sedimentation, and other fire-related impacts, to determine if emergency stabilization treatment are necessary.

**E. Treatment Effectiveness Monitoring Proposed:** Complete all proposed post-burn cultural resource assessments, and determine if additional emergency stabilization treatment specifications are necessary. Prepared and submit supplemental BAER requests if warranted. Present final results in accomplishment reports.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                             | COST / ITEM |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Archeologist GS-11 @ \$52/hr x 280 hrs (8 hrs/day x 35 days) x 2 FY                                                                                                                                          | \$29,120    |
| Archeology Technician GS-09 @ \$42/hr x 280 hrs (8 hrs/day x 35 days) x 2 FY                                                                                                                                 | \$23,520    |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | \$ 52,640   |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM |
|                                                                                                                                                                                                              | \$ -        |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | \$ -        |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM |
| Miscellaneous Supplies @ \$1000 x 1 x 2 FY                                                                                                                                                                   | \$ 2,000    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | \$ 2,000    |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM |
| Travel for cultural resource specialist @ \$1500 (per week) x 14 x 2 FY                                                                                                                                      | \$42,000    |
| GSA vehicle @ \$250 (per week) x 3.5 x 2 FY                                                                                                                                                                  | \$1,750     |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | \$ 43,750   |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM |
|                                                                                                                                                                                                              |             |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | \$ -        |

TOTAL ALL COSTS \$ 98,390

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST     |
|--------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|------------------|
| 2015         | 08/31/15                                 | 09/30/15                                    | F          | Sites | \$ 293    | 168                            | \$ 49,195        |
| 2016         | 10/01/15                                 | 11/31/15                                    | F          | Sites | \$ 293    | 168                            | \$ 49,195        |
|              |                                          |                                             |            |       |           |                                |                  |
| <b>TOTAL</b> |                                          |                                             |            |       |           |                                | <b>\$ 98,390</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. |         |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         | P, M, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

|  |
|--|
|  |
|--|

**TOTAL COST BY JURISDICTION**

| JURISDICTION          | UNITS TREATED     | COST             |
|-----------------------|-------------------|------------------|
| National Park Service | 336               | \$ 98,390        |
|                       |                   |                  |
|                       |                   |                  |
|                       |                   |                  |
|                       |                   |                  |
|                       | <b>TOTAL COST</b> | <b>\$ 98,390</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                              |                                  |                                  |
|------------------------------|------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Cultural Resource Monitoring | PART E SPECIFICATION #           | CR-2                             |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources           | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Protect Heritage Sites       | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                     | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

### Number and Describe Each Task:

**A. General Description:** Field examination of archaeological sites and cultural features during the initial post-fire assessment revealed the potential for unauthorized artifact collecting and/or looting due to the loss of ground-obscuring vegetation throughout PUHE and along the Ala Kahakai Trail. Additionally, many of these same resources are also vulnerable to increased erosion/sedimentation and treefall impacts. Periodic monitoring is needed to identify indirect fire-related impacts, determine whether additional emergency stabilization treatments are necessary, and evaluating the effectiveness and condition of implemented treatments.

**B. Location/(Suitable Sites):** All vulnerable cultural resources within the administrative boundaries of PUHE and ALKA. Emphasis will be given to sites containing especially significant cultural materials (by PUHE/ALKA cultural resources managers), in areas vulnerable to erosion/sedimentation, and containing or near fire-killed trees. At least 100 cultural resources will be monitored.

**C. Design/Construction Specifications:** Monitoring will be completed quarterly and/or following significant rain events. Cultural resources will be inspected for exposed artifacts, assessed for new impacts or threats resulting from erosion or sedimentation following storm events, and to evaluate fire-impacted trees for subsequent die-off. Monitoring will include documentation of indirect fire-related impacts with photographs and changes in baseline condition document during assessments. These activities will be performed by NPS employees and cooperating partners, including Native Hawaiian monitors.

**D. Purpose of Treatment Specifications:** Prevent or minimize the adverse effects of post-fire conditions to nationally significant cultural resources.

**E. Treatment Effectiveness Monitoring Proposed:** Complete scheduled post-burn cultural resource monitoring and inspections, and determine if additional emergency stabilization treatment specifications are needed, or if implemented treatments are effective. Prepared and submit supplemental BAER requests if warranted. Present final results in accomplishment reports.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Archeologist GS-11 @ \$52/hr x 400 hrs x 1 FY (8 hrs/day x 50 days)                                                                                                                                          | \$20,800         |
| Archeologist GS-09 @ \$42/hr x 400 hrs x 1 FY (8 hrs/day x 50 days)                                                                                                                                          | \$16,800         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 37,600</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
|                                                                                                                                                                                                              | \$ -             |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ -</b>      |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| Miscellaneous Supplies @ \$1000 x 1 x 1 FY                                                                                                                                                                   | \$ 1,000         |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 1,000</b>  |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| Travel for cultural resource specialist @ \$1500 (per week) x 20 x 1 FY                                                                                                                                      | \$30,000         |
| GSA vehicle @ \$250 (per week) x 10 x 1 FY                                                                                                                                                                   | \$2,500          |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 32,500</b> |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
| Native Hawaiian Monitor @ \$50/hr x 400 hrs x 1 FY                                                                                                                                                           | \$ 20,000        |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ 20,000</b> |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 91,100</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST |
|-------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|--------------|
| 2016        | 10/01/15                                 | 09/30/16                                    | F, S       | Sites | \$ 182    | 500                            | \$ 91,100    |
|             |                                          |                                             |            |       |           |                                |              |
|             |                                          |                                             |            |       |           |                                |              |
| TOTAL       |                                          |                                             |            |       |           |                                | \$ 91,100    |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C       |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         | P, M, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION | UNITS TREATED | COST      |
|--------------|---------------|-----------|
| NPS          | 500           | \$ 91,100 |
|              |               |           |
|              |               |           |
|              |               |           |
|              |               |           |
| TOTAL COST   |               | \$ 91,100 |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                 |                                  |                                  |
|------------------------------|---------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Cultural Resource Stabilization | PART E SPECIFICATION #           | CR-3                             |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources              | FISCAL YEAR(S) (list each year): | 2015, 2016, 2017                 |
| NFPORS TREATMENT TYPE *      | Site Stabilization              | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                        | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Indirect impacts from the Kawaihae Fire could degrade important attributes of archaeological sites and cultural features within PUHE and ALKA. This specification consists of five components: (1) clear trees and woody debris from cultural resources; (2) install sandbag check dams and other treatments to minimize ; (3) Cover exposed cobblestones along historic trail; (4) Remove melted plastic irrigation lines.

**B. Location/(Suitable Sites):** Select threatened archeological sites and cultural features within PUHE and ALKA, including: (1) fire-killed trees were detected at the extreme north edge of PUHE, along Pōhaukukole Gulch. Multiple fire-damaged trees were noted obstructing the route of the Ala Kahakai Trail. Remnants of a collapsed charcoal oven created a collection point for woody debris. Large woody debris is visible within the bay, adjacent the assumed location of the Hale o Kapuni Heiau; (2) Various locations throughout the 39.78 acre National Historic Landmark (located within PUHE), and especially those areas west (or makai) of the Pu'ukoholā Heiau; (3) newly exposed cobblestones were observed in the Pelekane area, as well as along the Waimea Kawaihae (aka Tank) Road; (4) various locations throughout the PUHE, especially near pili test plots.

**C. Design/Construction Specifications:** (1) Trees within the National Historic Landmark will be flush cut and chipped off site. Trees blocking the historic trail will be bucked up and left on site to discourage formation of social trails. Debris will be removed from the charcoal oven and Pelekane Bay within the PUHE administrative boundary; (2) Sandbags were emplaced along the Pu'ukoholā Heiau access trail edge as a check dam to prevent water from spilling over the trail edge and further eroding either the wall or the stacked rock platforms below. Sandbag water bars were placed and timbers removed to alter the location for water runoff specifically to avoid additional impacts to the stacked rock platforms. In addition the number of sandbag water bars was increased over the previous timber water bars to lessen the volume of runoff at any particular location. It is strongly emphasized that this is meant as a temporary measure in preparation for a wet weather event; following the storm the sandbags should be removed and 4" x 4" timbers replaced in more strategic locations. In addition sandbag treatments should be installed in vulnerable areas, such as along the paved administrative trail that is being undercut by erosion; (3) Cover exposed cobblestones with at least 6" of coral sand and smooth to match adjacent grades. (4) To the degree possible, remove all burned remnants of irrigation lines.

**D. Purpose of Treatment Specifications:** (1) Removal of standing fire-killed trees will prevent trees from falling and impacting archaeological sites. Relocation of fallen trees off of trail corridor will protect adjacent archaeological sites from disturbance created by social trails. Removal of debris will prevent further degradation of the charcoal oven. Removal of large woody debris from the bay will restore the important views and vistas from both landside heiaus, the Stone Leaning Post overlook, and across the site; (2) Protect exposed and vulnerable resources from a major weather event. Once the system has passed, sandbags will be removed and timbers emplaced at the trail to the Pu'ukoholā Heiau; (3) Provide stability and protection to the historic paving materials on the historic trail; (4) Remove the adverse visual intrusion from the National Historic Landmark, as well as remove the threat of adding undesirable material into Pelekane Bay.

**E. Treatment Effectiveness Monitoring Proposed:** (1) complete removal of fire-killed trees and woody debris near sensitive resources, blocking Ala Kahakai Trail, the historic charcoal oven, and within Pelekane Bay; (2) complete post-storm evaluations of resources protected by check dams to evaluate effectiveness of the treatment. If erosion was prevented, install timbers at trail to the Pu'ukoholā Heiau to match sandbag locations. Adjust locations as needed; (3) periodic visual assessments should be made to ensure the cobblestones remain buried, especially if future floods or high surf events impact this area; (4) visual assessment of the site following clean up to indicate if all the material was recovered.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Archeologist GS-11 @ \$52/hr x 40 hrs (8 hrs/day x 5 days) x 3 FY                                                                                                                                            | \$6,240          |
| Maintenance Worker WG-07 @ \$45/hr x 120 hrs (8 hrs/day x 15 days) x 3 FY                                                                                                                                    | \$16,200         |
| Maintenance Worker WG-05 @ \$38/hr x 240 hrs (8 hrs/day x 30 days) x 3 FY                                                                                                                                    | \$27,360         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 49,800</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
| Utility Boat @ \$250/day x 10 days x 1 FY                                                                                                                                                                    | \$2,500          |
| Construction Size Disposal Bin @ \$1000/month x 1 month x 1 FY                                                                                                                                               | \$1,000          |
| Backhoe @ \$250/day x 10 days x 1 FY                                                                                                                                                                         | \$2,500          |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$6,000</b>   |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| Miscellaneous Supplies @ \$1000 x 1 x 3 FY                                                                                                                                                                   | \$3,000          |
| Sandbags @ \$5.00 ea. x 1000 x 3 FY                                                                                                                                                                          | \$15,000         |
| 4x4 Timbers @ \$20 ea. X 20 x 1 FY                                                                                                                                                                           | \$400            |
| PPE @ \$1000 ea. X 1 x 1 FY                                                                                                                                                                                  | \$1,000          |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 19,400</b> |

| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item): | COST / ITEM     |
|----------------------------------------------------------------------------------------|-----------------|
| Travel for archaeologist @ \$300 (per day) x 5 x 3 FY                                  | \$4,500         |
| GSA vehicle @ \$250 (per week) x 4 x 3 FY                                              | \$3,000         |
| <b>TOTAL TRAVEL COST</b>                                                               | <b>\$ 7,500</b> |

| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item): | COST / ITEM      |
|--------------------------------------------------------------------------------------|------------------|
|                                                                                      |                  |
|                                                                                      |                  |
|                                                                                      |                  |
| <b>TOTAL CONTRACT COST</b>                                                           | <b>\$ -</b>      |
| <b>TOTAL ALL COSTS</b>                                                               | <b>\$ 82,700</b> |

#### SPECIFICATION COST SUMMARY

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED ACCOMPLISHMENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|-------|-----------|-------------------------|------------------|
| 2015         | 08/11/15                           | 09/30/15                           | F          | Sites | \$ 502    | 50                      | \$ 25,100        |
| 2016         | 10/01/15                           | 09/30/16                           | F          | Sites | \$ 650    | 50                      | \$ 32,500        |
| 2017         | 10/01/16                           | 09/30/17                           | F          | Sites | \$ 502    | 50                      | \$ 25,100        |
| <b>TOTAL</b> |                                    |                                    |            |       |           |                         | <b>\$ 82,700</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

#### SOURCE OF COST ESTIMATE

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. | E, M |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | P, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

#### RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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#### TOTAL COST BY JURISDICTION

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 150           | \$ 82,700        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 82,700</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                              |                                  |                                  |
|------------------------------|------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Cultural Resource Protection | PART E SPECIFICATION #           | CR-4                             |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources           | FISCAL YEAR(S) (list each year): | 2015, 2016                       |
| NFPORS TREATMENT TYPE *      | Protect Heritage Sites       | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                     | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Loss of vegetative cover due to the Kawaihae Fire has left a large number of potentially vulnerable cultural resources subject to unauthorized artifact collecting or looting. This specification includes three components: (1) install surveillance cameras; (2) increase law enforcement presence; (3) collect exposed artifacts.

**B. Location/(Suitable Sites):** Vulnerable cultural resources in the administrative boundaries of PUHE and ALKA; (1) camera locations will be determined based on viewshed. Installations will be made at strategic high points (e.g., trees, temporary pole, PUHE Visitor Center). Signs warning of surveillance cameras will be posted; (2) increased patrol frequency in areas of known sensitive cultural resources; (3) sensitive cultural resources located in visitor corridors or other heavy use areas.

**C. Design/Construction Specifications:** (1) In consultation with the PUHE Cultural Resource Manager, determine most the effective camera locations; (2) coordinate increased law enforcement presence with adjacent Samuel M. Spencer Park. Make contacts with public as appropriate, and take action against violators; (3) remove any sensitive surface artifacts that are potential targets for looters.

**D. Purpose of Treatment Specifications:** All three components seek to protect newly exposed surface artifacts and features from looting and vandalism.

**E. Treatment Effectiveness Monitoring Proposed:** This treatment will be successful if no reports or evidence of looting of fire or flood-exposed artifacts occur, or such incidents result in a successful law enforcement documentation and investigation.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| NPS Ranger GS-09 @ \$42/hr x 240 hrs x 1 FY                                                                                                                                                                  | \$ 10,080        |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 10,080</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
|                                                                                                                                                                                                              | \$ -             |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ -</b>      |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| Roof mounted cameras and monitors @ \$750 x 6 x 1 FY                                                                                                                                                         | \$4,500          |
| Miscellaneous supplies @ \$1000 x 1 x 1 FY                                                                                                                                                                   | \$1,000          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 5,500</b>  |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| GSA vehicle @ \$250 (per week) x 10 x 1 FY                                                                                                                                                                   | \$ 2,500         |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 2,500</b>  |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
| Security company contract @ \$20,000 ea. X 1 x 1 FY                                                                                                                                                          | \$20,000         |
| Install roof mounted cameras @ \$250 ea. x 6 x 1 FY                                                                                                                                                          | \$1,500          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ 21,500</b> |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 39,580</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST |
|-------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|--------------|
| 2015        | 09/01/15                                 | 09/30/15                                    | F, S       | Sites | \$ 26     | 380                            | \$ 10,000    |
| 2016        | 10/01/15                                 | 09/30/16                                    | F, S       | Sites | \$ 78     | 380                            | \$ 29,580    |
|             |                                          |                                             |            |       |           |                                |              |
| TOTAL       |                                          |                                             |            |       |           |                                | \$ 39,580    |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C       |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         | P, M, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION | UNITS TREATED | COST      |
|--------------|---------------|-----------|
| NPS          | 380           | \$ 39,580 |
|              |               |           |
|              |               |           |
|              |               |           |
|              |               |           |
| TOTAL COST   |               | \$ 39,580 |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                        |                                  |                                  |
|------------------------------|------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Museum Collection      | PART E SPECIFICATION #           | CR-5                             |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources     | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Protect Heritage Sites | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae               | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Loss of vegetative cover on archeological sites and has exposed many artifacts that are subject to unauthorized collection by looters and uneducated park visitors. As a protective strategy, the NPS is collecting these items following NPS documentation standards for inclusion into NPS collections.

**B. Location/(Suitable Sites):** At-risk cultural resources within the administrative boundaries of PUHE and ALKA.

**C. Design/Construction Specifications:** Collected artifacts will be catalogued, accessioned, and curated for inclusion into NPS collections. This includes assigning catalog and accession numbers, entering the information into the NPS service-wide museum collections database, and preparing objects for curation.

**D. Purpose of Treatment Specifications:** PUHE and ALKA are cultural resources of national significance. Collecting exposed artifacts, while observing NPS standards, preserves these materials for use in interpretive displays, provides data useful for scientific investigation, and ensures the park meets its responsibility to preserve these artifacts and associated information for the enjoyment of future generations.

**E. Treatment Effectiveness Monitoring Proposed:** Complete all cataloging and curation activities and present results in a BAER accomplishment report.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Park Curator GS-11 @ \$45/hr x 24 hrs (8 hrs/day x 3 days) x 1 FY                                                                                                                                            | \$1,080     |
| Museum Technician GS-7 @ \$27/hr x 160 hrs (8 hrs/day x 20 days) x 1 FY                                                                                                                                      | \$4,320     |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | \$ 5,400    |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM |
|                                                                                                                                                                                                              | \$ -        |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | \$ -        |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM |
| Miscellaneous Supplies @ \$250 ea. x 1 x 1 FY                                                                                                                                                                | \$250       |
| Curation and archiving supplies @ \$1250 ea. x 1 x 1 FY                                                                                                                                                      | \$1,250     |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | \$ 1,500    |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM |
| Travel for cultural resource specialist @ \$300 (per day) x 4 x 1 FY                                                                                                                                         | \$1,200     |
| GSA vehicle @ \$250 (per week) x 1 x 1 FY                                                                                                                                                                    | \$250       |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | \$ 1,450    |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM |
|                                                                                                                                                                                                              |             |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | \$ -        |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | \$ 8,350    |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS       | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST |
|-------------|------------------------------------------|---------------------------------------------|------------|-------------|-----------|--------------------------------|--------------|
| 2016        | 10/01/15                                 | 09/30/16                                    | F          | Collections | \$ 4,175  | 2                              | \$ 8,350     |
|             |                                          |                                             |            |             |           |                                |              |
|             |                                          |                                             |            |             |           |                                |              |
| TOTAL       |                                          |                                             |            |             |           |                                | \$ 8,350     |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. |         |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         | P, M, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION | UNITS TREATED | COST     |
|--------------|---------------|----------|
| NPS          | 2             | \$ 8,350 |
|              |               |          |
|              |               |          |
|              |               |          |
|              |               |          |
| TOTAL COST   |               | \$ 8,350 |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                         |                                  |                                  |
|------------------------------|-----------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Install & Repair Goat Exclusion Fencing | PART E SPECIFICATION #           | WS-1                             |
| NFPORS TREATMENT CATEGORY*   | Erosion/Sedimentation                   | FISCAL YEAR(S) (list each year): | 2016, 2017, 2018                 |
| NFPORS TREATMENT TYPE *      | Hillslope Protection                    | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                                | IMPACTED T&E SPECIES             | pololei (Ophioglossun concinnum) |

\* See NEPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

| Number and Describe Each Task:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>A. General Description:</b> Replace flood-damaged fencing and install new fencing on private lands to protect vegetation and cultural resources on burned federal lands. Feral goats on private lands can access PUHE and ALKA, causing damage to existing and recovering vegetation. Vegetation is critical to burned slope recovery, which in turn protects natural and cultural resources from erosion. Fencing will also protect cultural resources at PUHE and ALKA from direct impacts by goats (e.g., climbing on heiaus and dislodging rocks). It is well documented that postfire consumption of recovering native vegetation by non-native herbivores can promote the expansion of non-native invasive species, and is especially problematic in vulnerable island habitats. Restored native pili grass, an important part of the cultural landscape is at risk. Finally, this specification reduces erosion risk and adverse sedimentation to state and federally listed green sea turtle habitat.</p> |
| <p><b>B. Location/(Suitable Sites):</b> On private lands adjacent to PUHE owned by the Queen Emma land group and leased by the Parker Ranch. Fencing would be replaced by the Kohala Watershed Partnership, PO Box 437462, Kamuela, HI 96743. Local contact is Melora Purell, (808) 333-0976.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p><b>C. Design/Construction Specifications:</b> Replace 3,000 feet of existing fence impacted by the Kawaihae Fire and post-fire flooding. Additionally, construct 1,000 feet of new fence. Fencing must be designed for goat exclusion, and requires special design and installation requirements. Consult with Kohala Watershed Partnership for design specifications for in-kind replacement and new construction. The new fencing will be installed in 2016, and maintenance and monitoring will occur in 2017 and 2018 if needed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p><b>D. Purpose of Treatment Specifications:</b> The repair and installation of existing and new fencing will exclude goats from PUHE and ALKA. This will allow for vegetation recovery, promote faster watershed stabilization, and protect critical cultural and natural resources from the direct impacts of goats.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p><b>E. Treatment Effectiveness Monitoring Proposed:</b> Surveillance cameras (CR-3 Specification) and employee observations will determine if goats are entering NPS lands after installation. Modifications and repairs will be made as necessary.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**LABOR, MATERIALS AND OTHER COST:**

|                                                                                                           |  |                    |
|-----------------------------------------------------------------------------------------------------------|--|--------------------|
| <b>PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):</b>                    |  | <b>COST / ITEM</b> |
| Do not include contract personnel costs here (see contractor services below).                             |  |                    |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                       |  | \$ -               |
| <b>EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):</b> |  | <b>COST / ITEM</b> |
| Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.    |  |                    |
|                                                                                                           |  | \$ -               |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                     |  | \$ -               |
| <b>MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):</b>                  |  | <b>COST / ITEM</b> |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                    |  | \$ -               |
| <b>TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):</b>             |  | <b>COST / ITEM</b> |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
|                                                                                                           |  |                    |
| <b>TOTAL TRAVEL COST</b>                                                                                  |  | \$ -               |
| <b>CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):</b>               |  | <b>COST / ITEM</b> |
| Fence Construction 4,000 feet x \$16/foot x 1 FY                                                          |  | \$64,000           |
| Fence Repair 4,000 feet x \$1/foot x 2 FY                                                                 |  | \$8,000            |
|                                                                                                           |  |                    |
| <b>TOTAL CONTRACT COST</b>                                                                                |  | \$ 72,000          |
| <b>TOTAL ALL COSTS</b>                                                                                    |  | \$ 72,000          |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST     |
|--------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|------------------|
| 2016         | 10/01/15                                 | 09/30/16                                    | C          | Feet  | \$ 16     | 4,000                          | \$ 64,000        |
| 2017         | 10/01/16                                 | 09/30/17                                    | C          | Feet  | \$ 1      | 4,000                          | \$ 4,000         |
| 2018         | 10/01/17                                 | 08/10/18                                    | C          | Feet  | \$ 1      | 4,000                          | \$ 4,000         |
| <b>TOTAL</b> |                                          |                                             |            |       |           |                                | <b>\$ 72,000</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         |   |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |   |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| Private           | 4000          | \$ 72,000        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 72,000</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                   |                                  |                                  |
|------------------------------|-----------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Repair Dozer Line on Private Land | PART E SPECIFICATION #           | WS-2                             |
| NFPORS TREATMENT CATEGORY*   | Suppression Damage                | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Fireline Treatment                | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                          | IMPACTED T&E SPECIES             | pololei (Ophioglossun concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

| Number and Describe Each Task:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>A. General Description:</b> Two large dozer lines (approximately 10 miles in total length) were constructed on private lands owned by the Queen Emma land group and leased to the Parker Ranch. The dozer lines were installed by the Parker Ranch during suppression of the Kawaihae Fire. These have high potential for erosion, which could adversely NPS lands and water through sedimentation. Additionally, this specification will reduce erosion potential and adverse sedimentation to state and federally listed green sea turtle habitat.</p>                                                                                                                                                            |
| <p><b>B. Location/(Suitable Sites):</b> Private lands adjacent to and upslope of PUHE and ALKA.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p><b>C. Design/Construction Specifications:</b> Dozer line must be rehabbed with the use of an excavator (CAT 315 with thumb or equivalent) operated by an experienced equipment operator familiar with dozer line rehab. No dozers should be used in the process. The final product shall have the side berms laid down and a rough surface (hummocky) across the entire dozer line profile. Work will be performed from the top of the dozer line downhill. The footprint of restoration should not exceed the original area of disturbance. The work will be completed in cooperation with the Kohala Watershed Partnership, PO Box 437462, Kamuela, HI 96743. Primary contact is Melora Purell at (808) 333-0976</p> |
| <p><b>D. Purpose of Treatment Specifications:</b> Installation of dozer line to prevent the spread of the fire disrupted highly erosive soils and created large berms on each side of the dozer lines. Without restoration, water will be channeled downhill along the dozer lines causing excessive erosion. The sediments from the dozer lines will ultimately be deposited upon NPS lands and waters, with the potential to affect critical natural and cultural resources. Dozer line rehab will help to mitigate those impacts. Additionally, the federal and state listed Pacific green turtle is known to inhabit the waters of Pelekane Bay, and is documented to by sensitive to erosion and sedimentation.</p>  |
| <p><b>E. Treatment Effectiveness Monitoring Proposed:</b> Monitor dozer line after rehab for excessive erosion after the first rains and modify treatment as needed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**LABOR, MATERIALS AND OTHER COST:**

|                                                                                                                                                                                                                            |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):</b><br><b>Do not include contract personnel costs here (see contractor services below).</b>                                            | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                                        | <b>\$ -</b>        |
| <b>EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):</b><br><b>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.</b> | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            | <b>\$ -</b>        |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                                      | <b>\$ -</b>        |
| <b>MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):</b>                                                                                                                                   | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                                     | <b>\$ -</b>        |
| <b>TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):</b>                                                                                                                              | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                                   | <b>\$ -</b>        |
| <b>CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):</b>                                                                                                                                | <b>COST / ITEM</b> |
| Excavator, operator, transport, and supplies @ \$250/hr x 120 hours x 1 FY                                                                                                                                                 | \$30,000           |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                                 | <b>\$ 30,000</b>   |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                                     | <b>\$ 30,000</b>   |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED ACCOMPLISH MENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|-------|-----------|--------------------------|------------------|
| 2016         | 10/01/16                           | 08/11/16                           | S          | Miles | \$ 3,000  | 10                       | \$ 30,000        |
|              |                                    |                                    |            |       |           |                          |                  |
|              |                                    |                                    |            |       |           |                          |                  |
| <b>TOTAL</b> |                                    |                                    |            |       |           |                          | <b>\$ 30,000</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. |   |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         |   |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 | F |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| Private           | 10            | \$ 30,000        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 30,000</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                       |                                  |                                  |
|------------------------------|---------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Clean Sediment Basins on Private Land | PART E SPECIFICATION #           | WS-3                             |
| NFPORS TREATMENT CATEGORY*   | Erosion/Sedimentation                 | FISCAL YEAR(S) (list each year): | 2016, 2017, 2018                 |
| NFPORS TREATMENT TYPE *      | Catchment Basin Cleanout              | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                              | IMPACTED T&E SPECIES             | pololei (Ophioglossun concinnum) |

\* See NEPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

**Number and Describe Each Task:**

**A. General Description:** Sediment dams on private lands owned by Queen Emma land group, and leased by the Parker Ranch, were filled to capacity during a very large storm immediately after the Kawaihae Fire. These dams no longer have capacity to hold sediment, and are at risk to failure should another large storm occur. Cultural and natural resources at PUHE and ALKA would be at risk to adverse sedimentation should the dams fail. The sediment dams are operated by the Kohala Watershed Partnership, a non-profit with limited financial resources. Additionally, this specification will reduce erosion potential and adverse sedimentation to state and federally listed green sea turtle habitat.

**B. Location/(Suitable Sites):** Private lands adjacent to and upslope of PUHE and ALKA.

**C. Design/Construction Specifications:** Remove sediment from existing sediment dams that are within or downstream of the burned area. Use of a rubber tracked mini-excavator to perform the work is preferred. Hand work may be required to empty some dams. Sediment removed from the basins should be removed from the watersheds using appropriate low-impact equipment. There is an estimated 1,250 cubic yards captured in 31 sediment dams. Dams should be cleaned when full; work may not occur in 2017, but should be performed in 2018 whether full or not. The work will be performed through the Kohala Watershed Partnership, PO Box 437402, Kamuela, HI 96743. Local contact is Melora Purell, (808) 333-0976.

**D. Purpose of Treatment Specifications:** A large storm after the Kawaihae Fire eroded and transported large volumes of sediment in the watersheds above PUHE and ALKA. The Kohala Watershed Partnership, a non-profit watershed restoration group, installed sediment dams in order to reduce delivery to PUHE and nearshore coral reefs in Pelekane Bay. The storm filled the sediment dams to capacity and the Kohala Watershed Partnership does not have the financial resources to remove the sediment.

**E. Treatment Effectiveness Monitoring Proposed:** After removal of sediment from dams, monitor capacity after storm events and clean as needed.

**LABOR, MATERIALS AND OTHER COST:**

|                                                                                                                                                                                                                     |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):</b><br>Do not include contract personnel costs here (see contractor services below).                                             | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                                 | <b>\$ -</b>        |
| <b>EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):</b><br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                     | \$ -               |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                               | <b>\$ -</b>        |
| <b>MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):</b>                                                                                                                            | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                              | <b>\$ -</b>        |
| <b>TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):</b>                                                                                                                       | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                            | <b>\$ -</b>        |
| <b>CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):</b>                                                                                                                         | <b>COST / ITEM</b> |
| Remove fill from 31 sediment dams @ \$3,000/dam x 3 FY                                                                                                                                                              | \$279,000          |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                          | <b>\$ 279,000</b>  |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                              | <b>\$ 279,000</b>  |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS        | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST      |
|-------------|------------------------------------------|---------------------------------------------|------------|--------------|-----------|--------------------------------|-------------------|
| 2016        | 10/01/15                                 | 09/30/16                                    | C          | Dams         | \$ 3,000  | 31                             | \$ 93,000         |
| 2017        | 10/01/16                                 | 09/30/17                                    | C          | Dams         | \$ 3,000  | 31                             | \$ 93,000         |
| 2018        | 10/01/17                                 | 08/11/18                                    | C          | Dams         | \$ 3,000  | 31                             | \$ 93,000         |
|             |                                          |                                             |            | <b>TOTAL</b> |           |                                | <b>\$ 279,000</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         |   |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |   |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST              |
|-------------------|---------------|-------------------|
| Private           | 93            | \$ 279,000        |
|                   |               |                   |
|                   |               |                   |
|                   |               |                   |
|                   |               |                   |
| <b>TOTAL COST</b> |               | <b>\$ 279,000</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                      |                                  |                                  |
|------------------------------|--------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Clean Sediment From Roads & Culverts | PART E SPECIFICATION #           | WS-4                             |
| NFPORS TREATMENT CATEGORY*   | Roads                                | FISCAL YEAR(S) (list each year): | 2015, 2016, 2017, 2018           |
| NFPORS TREATMENT TYPE *      | Culverts                             | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                             | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Clear sediment from roads, trails, and culverts using equipment and hand crews. This specification will reduce erosion delivery and sedimentation to state and federally listed green sea turtle habitat.

**B. Location/(Suitable Sites):** Within the administrative boundary of PUHE.

**C. Design/Construction Specifications:** Use equipment and hand crews to remove sediment deposited on roads and trails and in culverts in or downstream of burned areas. Monitor culverts prior to storm events and clean as necessary. This specification provides for 3 storm events in 2015, 4 storm events in 2016, 3 storm events in 2017, and 2 storm events in 2018. Each storm clean-up event is calculated to be 4 hours long. An archeologist should be present during road, trail, and culvert cleaning to examine sediments for cultural resources.

**D. Purpose of Treatment Specifications:** Post-fire watershed conditions increase sediment delivery in and below burned areas. The sediment on roads and trails can transport to culverts, causing plugging and potential failure. Removal of sediment reduces the potential for plugging, and protects visitor and employee safety and cultural and natural resources.

**E. Treatment Effectiveness Monitoring Proposed:** Monitor culverts for plugging prior to storm events and clean as necessary to prevent loss of culvert structures. If culverts losses occur, the treatment frequency is ineffective.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1 WG x @ \$ 61/hr x 12 hours x 4 FY                                                                                                                                                                          | \$2,928          |
| 2 WG x @ \$ 45/hr x 12 hours x 4 FY                                                                                                                                                                          | \$4,320          |
| 1 GS 11 @ \$ 63/hr x 24 hours x 4 FY                                                                                                                                                                         | \$6,048          |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 13,296</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
| Rent skid steer with brush @ \$60/hour including transport and delivery x 12 hours x 4 FY                                                                                                                    | \$2,880          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ 2,880</b>  |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| Miscellaneous supplies @ \$200/each x 1 x 4 FY                                                                                                                                                               | \$800            |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 800</b>    |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| 2015 Archeologist @ \$400 x 2 RT x 1 FY                                                                                                                                                                      | \$800            |
| 2016 Archeologist @ \$400 x 4 RT x 1 FY                                                                                                                                                                      | \$1,600          |
| 2017 Archeologist @ \$400 x 3 RT x 1 FY                                                                                                                                                                      | \$1,200          |
| 2018 Archeologist @ \$400 x 2 RT x 1 FY                                                                                                                                                                      | \$800            |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 4,400</b>  |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ -</b>      |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 21,376</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS  | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST     |
|--------------|------------------------------------------|---------------------------------------------|------------|--------|-----------|--------------------------------|------------------|
| 2015         | 08/15/15                                 | 09/30/15                                    | F          | Storms | \$ 1,781  | 3                              | \$5,345          |
| 2016         | 10/01/15                                 | 09/30/16                                    | F          | Storms | \$ 1,781  | 4                              | \$7,124          |
| 2017         | 10/01/18                                 | 09/30/17                                    | F          | Storms | \$ 1,781  | 3                              | \$5,344          |
| 2018         | 10/01/17                                 | 08/11/18                                    | F          | Storms | \$ 1,781  | 2                              | \$3,563          |
| <b>TOTAL</b> |                                          |                                             |            |        |           |                                | <b>\$ 21,376</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. | M, E |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | P, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 12            | \$ 21,376        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 21,376</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                       |                                  |                                  |
|------------------------------|---------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Pelekane Bay Dredge Feasibility Study | PART E SPECIFICATION #           | WS-5                             |
| NFPORS TREATMENT CATEGORY*   | Assessment                            | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Risk Assessment                       | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                              | IMPACTED T&E SPECIES             | pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Large quantities of sediment have been delivered to Pelekane Bay as a result of post-fire watershed conditions and an exceptionally large storm that occurred directly after the Kawaihae Fire. These sediments may effect coral reef ecosystems, archeological resources, and habitat for State and federally listed Green Sea Turtle (*Chelonia mydas*).

**B. Location/(Suitable Sites):** Pelekane Bay within the administrative boundary of PUHE.

**C. Design/Construction Specifications:** Implement a study to remove sediment from Pelekane Bay that achieves the following objectives:

- 1) Detailed sediment deposition mapping and in-situ volume estimates from immediate post-fire events within PUHE waters.
- 2) An estimate of event deposition residence time based on rates derived from previous research.
- 3) The extent to which dredging following a large event, such as was observed in the August 17, 2015, substantially reduces sediment residence time over a period of 5-10 years.

It is recommended to utilize University of Hawaii (UH) to conduct study as the UH has assets already working on sedimentation issues in conjunction with the Kohala Watershed Partnership (KWP). The primary contact for the KWP is Melora Purell at (808) 333-0976.

**D. Purpose of Treatment Specifications:** Deposition of large volumes of sediment to Pelekane Bay as a result of post-fire watershed conditions may have adversely affected critical natural and cultural resources, including state and federally listed green sea turtle habitat.

**E. Treatment Effectiveness Monitoring Proposed:** This study will reduce potentially adverse sediment deposition in Pelekane Bay. Monitor for improved conditions within the bay.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | \$ -        |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | \$ -        |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | \$ -        |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | \$ -        |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM |
| Study @ \$75,000 x 1 FY                                                                                                                                                                                      | \$75,000    |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | \$ 75,000   |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | \$ 75,000   |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED ACCOMPLISHMENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|-------|-----------|-------------------------|------------------|
| 2015         | 10/01/15                           | 08/11/16                           | C          | Study | \$ 75,000 | 1                       | \$75,000         |
|              |                                    |                                    |            |       |           |                         |                  |
|              |                                    |                                    |            |       |           |                         |                  |
| <b>TOTAL</b> |                                    |                                    |            |       |           |                         | <b>\$ 75,000</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |  |
|------------------------------------------------------------------------------------------|--|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |  |
| 2. Documented cost figures from similar project work obtained from local agency sources. |  |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |  |
| 4. Estimates based upon government wage rates and material cost.                         |  |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |  |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 1             | \$ 75,000        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 75,000</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                            |                                  |                                  |
|------------------------------|----------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Vegetation Risk Assessment | PART E SPECIFICATION #           | VEG-1                            |
| NFPORS TREATMENT CATEGORY*   | Assessment                 | FISCAL YEAR(S) (list each year): | 2015                             |
| NFPORS TREATMENT TYPE *      | Risk Assessment            | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                   | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

| Number and Describe Each Task:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>A. General Description:</b> Provide experienced botanical assessment of the direct effects of fire and expected recovery of the native flora at PUHE including a survey for rare or endangered species known or suspected to occur at the park. Prepare management recommendations to rehabilitate impacted native species and native plant habitat. Special effort should be made to locate additional stands of native pili grass; how to facilitate pili expansion; and control further encroachment of buffelgrass or other non-native dominants. Include recommendations of appropriate native tree or shrub species to replace fire-killed non-native kiawe trees, to meet the objectives of restoring the native cultural landscape.</p>                       |
| <p><b>B. Location/(Suitable Sites):</b> PUHE and any immediately adjacent property that may provide a source of invasive species that could affect vegetation recovery on NPS lands.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p><b>C. Design/Construction Specifications:</b> The assessment will follow the protocol established for the BAER planning and assessment phase, including documenting post-burn observations and photographic recordation of resource condition and threats. Compile, process, and archive field data to include GPS data, digital photographs, and field inspection notes to prepare an accomplishments report including an analysis of field methods and results and summarize the treatment specification success. These activities will be performed by NPS employees and cooperating partners.</p>                                                                                                                                                                    |
| <p><b>D. Purpose of Treatment Specifications:</b> The next 2-3 months following the Kawaihae Fire will be crucial to establishment of the postfire vegetation patterns in this significant cultural landscape. More detailed assessment by experienced local botanists is necessary to identify what native species are present on the site, where they are located relative to the vegetation map, how the fire affected them, and if they are capable of re-establishment. Further spread of exotic species, particularly the non-native perennial tropical grasses, is expected following fire in a disturbed landscape such as this. An assessment of the options to promote re-establishment of native species and limit non-native species expansion is critical.</p> |
| <p><b>E. Treatment Effectiveness Monitoring Proposed:</b> Complete field survey of vegetation condition and focused searches for sensitive species and determine if additional emergency stabilization or longer term rehabilitation treatment specifications are needed. Present results in an accomplishments report and supplemental BAER plan request if needed.</p>                                                                                                                                                                                                                                                                                                                                                                                                    |

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Botanist GS-11 @ \$63/hr x 50 hrs x 1 FY                                                                                                                                                                     | \$3,150     |
| Botany Technician GS-07 @ \$44/hr x30 hrs x 1 FY                                                                                                                                                             | \$1,320     |
|                                                                                                                                                                                                              |             |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | \$ 4,470    |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | \$ -        |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | \$ -        |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM |
| Travel @ \$400 x 4 x 1 FY                                                                                                                                                                                    | \$1,600     |
|                                                                                                                                                                                                              |             |
|                                                                                                                                                                                                              |             |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | \$ 1,600    |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM |
|                                                                                                                                                                                                              |             |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | \$ -        |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | \$ 6,070    |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST    |
|--------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|-----------------|
| 2015         | 10/01/15                                 | 08/11/16                                    | F          | Acres | \$ 76     | 80                             | \$6,070         |
|              |                                          |                                             |            |       |           |                                |                 |
|              |                                          |                                             |            |       |           |                                |                 |
| <b>TOTAL</b> |                                          |                                             |            |       |           |                                | <b>\$ 6,070</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. |      |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | P, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST            |
|-------------------|---------------|-----------------|
| NPS               | 80            | \$ 6,070        |
|                   |               |                 |
|                   |               |                 |
|                   |               |                 |
| <b>TOTAL COST</b> |               | <b>\$ 6,070</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                 |                                  |                                  |
|------------------------------|---------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Native Vegetation Stabilization | PART E SPECIFICATION #           | VEG-2                            |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources              | FISCAL YEAR(S) (list each year): | 2015                             |
| NFPORS TREATMENT TYPE *      | Site Stabilization              | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                        | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Immediately restore damaged watering system to established pili grass plantings (see map V-1) to provide more rapid growth in this extremely dry landscape for pili out plantings to the burn area. Pili grass is a strong competitor with non-native buffleggrass following fire and there is a narrow window of opportunity to revegetate burned areas with native plants to exclude buffleggrass. The park has successfully used the irrigation technique to establish new pili plantings. Although pili seed is available, establishment from seed is low and ineffective compared to out plantings. Seed growth is too slow and plants too small to effectively compete with large established resprouting buffleggrass.

**B. Location/(Suitable Sites):** PUHE pili stands (see V-1 and results of vegetation reconnaissance (VEG-1).

**C. Design/Construction Specifications:** Replacement of pre-existing system and recommendations from reconnaissance (VEG-1).

**D. Purpose of Treatment Specifications:** The irrigation system used to stimulate growth of pili grass for out planting material for restoration of the cultural landscape was destroyed in the fire. Pili grass (vs non-native buffleggrass) is the desired condition for the cultural landscape and an important thatch material for the significant historic period. The irrigation system needs to be repaired as an immediate postfire priority in order to provide planting materials during the critical, postfire re-establishment phase. At PUHE, this may be a very narrow window of time on the order of months, not years. Funding for more extensive vegetation plantings and invasive species control are requested in BAR-1.

**E. Treatment Effectiveness Monitoring Proposed:** Number of pili grass individuals harvested and out planted in the burn area following irrigation.

### LABOR, MATERIALS AND OTHER COST:

|                                                                                                                                                                                                                            |                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):</b><br><b>Do not include contract personnel costs here (see contractor services below).</b>                                            | <b>COST / ITEM</b> |
| WG-7 @ \$45/hr x 80 hrs x 1 FY                                                                                                                                                                                             | \$3,600            |
| WG-5 4 @ \$38/hr x 80 hrs x 1 FY                                                                                                                                                                                           | \$12,160           |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                                        | \$ 15,760          |
| <b>EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):</b><br><b>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.</b> | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                                      | \$ -               |
| <b>MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):</b>                                                                                                                                   | <b>COST / ITEM</b> |
| Irrigation System Supplies \$8,000 x 1 x 1 FY                                                                                                                                                                              | \$8,000            |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                                     | \$ 8,000           |
| <b>TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):</b>                                                                                                                              | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                                   | \$ -               |
| <b>CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):</b>                                                                                                                                | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                            |                    |
|                                                                                                                                                                                                                            |                    |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                                 | \$ -               |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                                     | \$ 23,760          |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS        | UNIT COST | PLANNED ACCOMPLISHMENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|--------------|-----------|-------------------------|------------------|
| 2015         | 10/01/15                           | 08/11/16                           | F          | Water System | \$ 23,760 | 1                       | \$23,760         |
|              |                                    |                                    |            |              |           |                         |                  |
|              |                                    |                                    |            |              |           |                         |                  |
| <b>TOTAL</b> |                                    |                                    |            |              |           |                         | <b>\$ 23,760</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. | M |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         | P |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |   |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 1             | \$ 23,760        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 23,760</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                          |                                  |                                  |
|------------------------------|------------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Monitor & Remove Trees for Public Safety | PART E SPECIFICATION #           | PS-1                             |
| NFPORS TREATMENT CATEGORY*   | Trails                                   | FISCAL YEAR(S) (list each year): | 2015, 2016                       |
| NFPORS TREATMENT TYPE *      | Hazard Removal                           | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                                 | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** Inspect and remove burned trees on or along the Ala Kahakai National Historic Trail and other roads and trails within PUHE that pose a threat to public safety. In many cases, trees were scorched, but not necessarily killed upon first examination. An arborist with local knowledge is needed to determine which scorched trees are going to die as a result of the fire.

**B. Location/(Suitable Sites):** PUHE and other federal lands, right-of-ways, or easements within the Kawaihae Fire burned area.

**C. Design/Construction Specifications:** Use professional arborist with local vegetation knowledge to inspect and identify trees within the burned areas. Use crews to remove trees identified by the arborist within two weeks. Inspect and remove in October and April 2016.

**D. Purpose of Treatment Specifications:** Provide for public and employee safety.

**E. Treatment Effectiveness Monitoring Proposed:** Monitor areas with burned trees for additional dead or dying trees. Remove as necessary. Additionally, if visitors or employees are injured or killed, re-examine protocols and apply adaptive management techniques to mitigate failures.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 2 WG-5 x @ \$38/hr x 70 hrs x 2 FY                                                                                                                                                                           | \$10,640         |
| 1 GS-9 x @ \$50/hr x 80 hrs x 2 FY                                                                                                                                                                           | \$8,000          |
| 1 GS-11 @ \$ 63/hr x 80 hrs x 2 FY                                                                                                                                                                           | \$10,080         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 28,720</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ -</b>      |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| General Trail Maintenance Supplies @ \$100/each x 1 x 2 FY                                                                                                                                                   | \$200            |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 200</b>    |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| Personnel @ \$150 x 1 RT x 2 FY                                                                                                                                                                              | \$300            |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 300</b>    |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
| Arborist @ \$120/hr x 32 hrs x 1 FY                                                                                                                                                                          | \$3,840          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ 3,840</b>  |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 33,060</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS   | UNIT COST | PLANNED ACCOMPLISH MENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|---------|-----------|--------------------------|------------------|
| 2015         | 08/10/15                           | 09/30/15                           | F          | Removal | \$ 10,000 | 1                        | \$10,000         |
| 2016         | 10/01/15                           | 08/11/16                           | F, S       | Removal | \$ 11,530 | 2                        | \$23,060         |
|              |                                    |                                    |            |         |           |                          |                  |
| <b>TOTAL</b> |                                    |                                    |            |         |           |                          | <b>\$ 33,060</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         | P |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |   |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 3             | \$ 33,060        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 33,060</b> |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                      |                                  |                                  |
|------------------------------|----------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Replace Safety Signs | PART E SPECIFICATION #           | PS-2                             |
| NFPORS TREATMENT CATEGORY*   | Roads                | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Signs                | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawihae              | IMPACTED T&E SPECIES             | Pololei (Ophioglossun concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

|                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Number and Describe Each Task:</b>                                                                                                                                                     |
| <b>A. General Description:</b> Approximately 20 safety signs along roads and trails in PUHE were damaged or destroyed as a result of the fire.                                            |
| <b>B. Location/(Suitable Sites):</b> Roads and trails within PUHE.                                                                                                                        |
| <b>C. Design/Construction Specifications:</b> Replace safety signs damaged by the fire in-kind.                                                                                           |
| <b>D. Purpose of Treatment Specifications:</b> To protect public and employee safety.                                                                                                     |
| <b>E. Treatment Effectiveness Monitoring Proposed:</b> Monitor sign placement effectiveness. If injuries or death occurs, use adaptive management strategies to reword or relocate signs. |

### LABOR, MATERIALS AND OTHER COST:

|                                                                                                                                                                                                                     |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):</b><br>Do not include contract personnel costs here (see contractor services below).                                            | <b>COST / ITEM</b> |
| 2 WG 7 @ \$ 45/hr x 40 hr x 1 FY                                                                                                                                                                                    | \$3,600            |
| 1 WL 7 @ \$ 61/hr x 40 hr x 1 FY                                                                                                                                                                                    | \$2,440            |
| 1 GS-11 @ \$72/hr x 24 hr x 1 FY                                                                                                                                                                                    | \$1,728            |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                                 | \$ 7,768           |
| <b>EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):</b><br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | <b>COST / ITEM</b> |
|                                                                                                                                                                                                                     |                    |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                               | \$ -               |
| <b>MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):</b>                                                                                                                            | <b>COST / ITEM</b> |
| Sign installation materials @ \$100/ea. X 20 x 1 FY                                                                                                                                                                 | \$2,000            |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                              | \$ 2,000           |
| <b>TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):</b>                                                                                                                       | <b>COST / ITEM</b> |
| Archeologist @ \$400 x 1 RT x 1 FY                                                                                                                                                                                  | \$400              |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                            | \$ 400             |
| <b>CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):</b>                                                                                                                         | <b>COST / ITEM</b> |
| Manufacture 20 signs @ \$200/sign x 1 FY                                                                                                                                                                            | \$4,000            |
|                                                                                                                                                                                                                     |                    |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                          | \$ 4,000           |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                              | \$ 14,168          |

### SPECIFICATION COST SUMMARY

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED ACCOMPLISH MENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|-------|-----------|--------------------------|------------------|
| 2016         | 10/01/15                           | 08/11/16                           | F, S       | Sign  | \$ 709    | 20                       | \$14,168         |
|              |                                    |                                    |            |       |           |                          |                  |
|              |                                    |                                    |            |       |           |                          |                  |
| <b>TOTAL</b> |                                    |                                    |            |       |           |                          | <b>\$ 14,168</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C, M |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | P, T |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

## RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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## TOTAL COST BY JURISDICTION

| JURISDICTION | UNITS TREATED | COST      |
|--------------|---------------|-----------|
| NPS          | 20            | \$ 14,168 |
|              |               |           |
|              |               |           |
|              |               |           |
|              |               |           |
|              |               |           |
|              | TOTAL COST    | \$ 14,168 |

## INDIVIDUAL SPECIFICATION

|                              |                                    |                                  |                                  |
|------------------------------|------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Emergency Repair to Infrastructure | PART E SPECIFICATION #           | FD-1                             |
| NFPORS TREATMENT CATEGORY*   | Facility & Infrastructure          | FISCAL YEAR(S) (list each year): | 2015                             |
| NFPORS TREATMENT TYPE *      | Repair Administrative Facility     | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                           | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** The Kawaihae Fire damaged critical facilities at PUHE, including electrical, water, communications (telephone, network, alarm system), structures, and various other features. Almost three weeks after the fire began, PUHE remains without fully functioning and critical utilities. This specification is based on the best estimate of the expenditures required to bring the facilities back online, restore public and employee safety, and to protect critical cultural resources (e.g., archeological sites, museum objects). Expenses include personnel service time for field assessment for damages, emergency stabilization, and time and materials to complete repairs. Upon completion of this specification, PUHE will submit an accomplishment report detailing all actual expenditures by activity.

**B. Location/(Suitable Sites):** Facilities within the administrative boundary of PUHE.

**C. Design/Construction Specifications:** Costs include reconstruction of the fiber optic system, electrical reconnection, facility inspections, and time and materials to stabilize features in the park. Some charges are for actions that have already occurred, but remaining activities include repair of the fiber optic system, roof inspections, and telephone system. The estimate is written as a contract, but may be replaced by time and equipment. The fiber optic repair replaces 2,400 feet of cable and conduit as with water line and electric. Estimates have been made by PUHE and HAVO staff.

**D. Purpose of Treatment Specifications:** Restore critical infrastructure to full function as soon as possible for public and employee safety and resource protection.

**E. Treatment Effectiveness Monitoring Proposed:** Provide an accomplishment report with tasks completed and actual costs.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Maintenance PUHE WG-4 @ \$35/hr x 40 hrs x 1 FY                                                                                                                                                              | \$1,400          |
| Maintenance PUHE WS-7 @ \$61/hr x 25 hrs x 1FY                                                                                                                                                               | \$1,525          |
| Maintenance PUHE WG-7 @ \$45/hr x 15 hrs x 1FY                                                                                                                                                               | \$675            |
| Cultural PUHE WG-7 \$45/hr x 20 hrs x 1 FY                                                                                                                                                                   | \$900            |
| Cultural ALKA WG-5 \$38/hr x 15 hrs x 1 FY                                                                                                                                                                   | \$570            |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 5,070</b>  |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
| Traffic sensor                                                                                                                                                                                               | \$1,500          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ 1,500</b>  |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ -</b>      |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ -</b>      |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
| Repair fiber optic system @ \$30,000 x 1 FY                                                                                                                                                                  | \$30,000         |
| Inspect and repair roof @ \$1,500 x 1 FY                                                                                                                                                                     | \$1,500          |
| Repair telephone lines @ \$7,321 x 1 FY                                                                                                                                                                      | \$7,321          |
| Repair water lines @ \$6,264 x 1 FY                                                                                                                                                                          | \$6,244          |
| Repair Electric line @ \$2,490 x 1 FY                                                                                                                                                                        | \$2,490          |
| Replace traffic sensor @ \$2,000 x 1 FY                                                                                                                                                                      | \$2,000          |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ 49,555</b> |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 56,125</b> |

|                        |           |               |
|------------------------|-----------|---------------|
| <b>TOTAL ALL COSTS</b> | <b>\$</b> | <b>56,125</b> |
|------------------------|-----------|---------------|

### SPECIFICATION COST SUMMARY

| FISCAL YEAR | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS   | UNIT COST | PLANNED ACCOMPLISHMENTS | PLANNED COST |
|-------------|------------------------------------|------------------------------------|------------|---------|-----------|-------------------------|--------------|
| NPS         | 08/10/15                           | 09/30/15                           | F, S       | Repairs | \$ 9,187  | 6                       | \$56,125     |
|             |                                    |                                    |            |         |           |                         |              |
|             |                                    |                                    |            |         |           |                         |              |
| TOTAL       |                                    |                                    |            |         |           |                         | \$ 56,125    |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer.

**SOURCE OF COST ESTIMATE**

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C    |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | P, E |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

## RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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## TOTAL COST BY JURISDICTION

| TOTAL COST BY JURISDICTION |               |           |
|----------------------------|---------------|-----------|
| JURISDICTION               | UNITS TREATED | COST      |
| NPS                        | 6             | \$ 56,125 |
|                            |               |           |
|                            |               |           |
|                            |               |           |
|                            |               |           |
|                            | TOTAL COST    | \$ 56,125 |

## INDIVIDUAL SPECIFICATION

|                              |                                                    |                                  |                                  |
|------------------------------|----------------------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | BAER Implementation Coordinator and Administration | PART E SPECIFICATION #           | ADM-1                            |
| NFPORS TREATMENT CATEGORY*   | Administration                                     | FISCAL YEAR(S) (list each year): | 2015, 2016, 2017, 2018           |
| NFPORS TREATMENT TYPE *      | Contract Administration                            | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                                           | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

### Number and Describe Each Task:

**A. General Description:** This plan is complex, involving protection and stabilization of extremely significant cultural and natural resources. PUHE and ALKA are NPS units with limited personnel, and implementation will require complex management skills, especially in the first year of the project. Cooperative agreements will need to be developed immediately, as well as implementing emergency repairs. Timing is also crucial to treatments that will protect cultural resources and stabilize native vegetation to reduce runoff and prevent further dominance of native plant communities by invasive species. Work will need to be coordinated with staff from among the local NPS units and with partner resource conservation groups. Finally, funding and expenditures related to treatments will need to be tracked and, if necessary, modifications to the plan be prepared and submitted. All of this requires a single person who can act as the point of contact to implement the plan. In addition, the plan will impose an additional administrative burden on the park, requiring extra support in the first year.

**B. Location/(Suitable Sites):** Areas within and downstream of the Kawaihae Fire covered by this BAER plan.

**C. Design/Construction Specifications:** The BAER Implementation Coordinator should be familiar with Hawaiian cultural and natural resources, compliance, cooperative agreements and general project management.

**D. Purpose of Treatment Specifications:** The Kawaihae Fire burned 80% of PUHE, and a large proportion of the watershed draining to the park. It damaged basic infrastructure that has inhibited safe use of PUHE and ALKA, resulting in a temporary closure. This plan includes many different activities that require collaboration among the local NPS parks, partner conservation groups and landowners. To be successful, this project must be overseen and coordinated by a single lead that will be responsible for its implementation.

**E. Treatment Effectiveness Monitoring Proposed:** The submission of annual and final accomplishment reports.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Coordinator GS-11 @ \$63/hr x 80 x FY15                                                                                                                                                                      | \$5,040          |
| Coordinator GS-11 @ \$63/hr x 1040 x FY16                                                                                                                                                                    | \$65,520         |
| Coordinator GS-11 @ \$63/hr x 160 x FY17                                                                                                                                                                     | \$10,080         |
| Coordinator GS-11 @ \$63/hr x 40 x FY18                                                                                                                                                                      | \$2,520          |
| Admin assistant GS-5 @ \$33/hr x 416 x FY16                                                                                                                                                                  | \$13,728         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 96,888</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
| Miscellaneous field and office supplies@ \$1000 x FY16                                                                                                                                                       | \$1,000          |
| Miscellaneous field and office supplies@ \$500 x FY17                                                                                                                                                        | \$ 500           |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ 1,500</b>  |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ -</b>      |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| Coordinator @ \$1300 X 2 X FY 15                                                                                                                                                                             | 2,600            |
| Coordinator @ \$1300 X 10 X FY 16                                                                                                                                                                            | 13,000           |
| Coordinator @ \$1300 X 2 X FY 17                                                                                                                                                                             | 2,600            |
| Coordinator @ \$1300 X 1 X FY 18                                                                                                                                                                             | 1,300            |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 19,500</b> |

| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item): | COST / ITEM |
|--------------------------------------------------------------------------------------|-------------|
|                                                                                      |             |
| <b>TOTAL CONTRACT COST</b>                                                           | \$ -        |
| <b>TOTAL ALL COSTS</b>                                                               | \$ 117,888  |

#### SPECIFICATION COST SUMMARY

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST      |
|--------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|-------------------|
| 2015         | 09/01/15                                 | 09/30/15                                    | F          | N/A   | N/A       | N/A                            | \$7,640           |
| 2016         | 10/01/15                                 | 09/30/16                                    | F          | N/A   | N/A       | N/A                            | \$93,248          |
| 2017         | 10/01/17                                 | 09/30/17                                    | F          | N/A   | N/A       | N/A                            | \$13,180          |
| 2018         | 10/01/17                                 | 08/11/18                                    | F          | N/A   | N/A       | N/A                            | \$3,820           |
| <b>TOTAL</b> |                                          |                                             |            |       |           |                                | <b>\$ 117,888</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

#### SOURCE OF COST ESTIMATE

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. | P, M, T |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         |         |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

#### RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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#### TOTAL COST BY JURISDICTION

| JURISDICTION | UNITS TREATED     | COST              |
|--------------|-------------------|-------------------|
| NPS          | N/A               | \$ 117,888        |
|              |                   |                   |
|              |                   |                   |
|              |                   |                   |
|              |                   |                   |
|              | <b>TOTAL COST</b> | <b>\$ 117,888</b> |

## INDIVIDUAL SPECIFICATION

|                              |                         |                                  |                                  |
|------------------------------|-------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Kawaihae Fire BAER Plan | PART E SPECIFICATION #           | PL-1                             |
| NFPORS TREATMENT CATEGORY*   | Planning                | FISCAL YEAR(S) (list each year): | 2015                             |
| NFPORS TREATMENT TYPE *      | ES/BAER Plan            | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

**WORK TO BE DONE** (describe or attach exact specifications of work to be done):

| Number and Describe Each Task:                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A. General Description:</b> Prepare and submit the Kawaihae Fire BAER plan.                                                                                                                                   |
| <b>B. Location/(Suitable Sites):</b> Areas within and downstream of the Kawaihae Fire covered by this BAER plan.                                                                                                 |
| <b>C. Design/Construction Specifications:</b> Salary, travel and miscellaneous expenses for personnel completing this BAER plan.                                                                                 |
| <b>D. Purpose of Treatment Specifications:</b> Develop a BAER plan conforming to Interagency, Department of the Interior and NPS BAER policy, and consistent with federal, state and local laws and regulations. |
| <b>E. Treatment Effectiveness Monitoring Proposed:</b> N/A                                                                                                                                                       |

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Marti Witter 165 hours @ \$50/hr.                                                                                                                                                                            | \$8,250          |
| Brian Rasmussen 162 hours @ \$50/hr.                                                                                                                                                                         | \$8,100          |
| Jim Roche 100 hours @ \$50/hr.                                                                                                                                                                               | \$5,000          |
| Joe Svinarich 140 hours X @ \$50/hr.                                                                                                                                                                         | \$7,000          |
| Amy Hoke 100 hours @ \$50/hr.                                                                                                                                                                                | \$5,000          |
| Local CR and NR staff assessments for BAER plan (see attached spreadsheet)                                                                                                                                   | \$13,833         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 47,183</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
| Meeting Room 8 days x \$175                                                                                                                                                                                  | \$1,400          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ 1,400</b>  |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| Copies                                                                                                                                                                                                       | \$275            |
| Office supplies                                                                                                                                                                                              | \$110            |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 385</b>    |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
| Marti Witter (Vehicle 1)                                                                                                                                                                                     | \$5,158          |
| Brian Rasmussen                                                                                                                                                                                              | \$5,380          |
| Jim Roche                                                                                                                                                                                                    | \$3,974          |
| Joe Svinarich                                                                                                                                                                                                | \$5,500          |
| Amy Hoke                                                                                                                                                                                                     | \$3,800          |
| Vehicle 2 (Rasmussen)                                                                                                                                                                                        | \$500            |
| Gas (estimated)                                                                                                                                                                                              | \$125            |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ 24,437</b> |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ -</b>      |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 73,405</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED INITIATION DATE (M/D/YYYY) | PLANNED COMPLETION DATE (M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED ACCOMPLISHMENTS | PLANNED COST     |
|--------------|------------------------------------|------------------------------------|------------|-------|-----------|-------------------------|------------------|
| 2015         | 08/14/15                           | 09/30/15                           | F          | Plan  | N/A       | 1                       | \$73,405         |
|              |                                    |                                    |            |       |           |                         |                  |
|              |                                    |                                    |            |       |           |                         |                  |
| <b>TOTAL</b> |                                    |                                    |            |       |           |                         | <b>\$ 73,405</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |         |
|------------------------------------------------------------------------------------------|---------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |         |
| 2. Documented cost figures from similar project work obtained from local agency sources. | P, E, T |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |         |
| 4. Estimates based upon government wage rates and material cost.                         | P       |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |         |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION      | UNITS TREATED | COST             |
|-------------------|---------------|------------------|
| NPS               | 1             | \$ 73,405        |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
|                   |               |                  |
| <b>TOTAL COST</b> |               | <b>\$ 73,405</b> |

Specification Form Created September 23, 2006

# **CULTURAL RESORCE ASSESSMENTS PERSONNEL EXPENSES**

|                  |           |                         |      |           |       |         |             |          |
|------------------|-----------|-------------------------|------|-----------|-------|---------|-------------|----------|
| Name             | Grade     | Role                    | Park | "PP17 Hrs |       |         |             |          |
| Fire"            | "PP18 Hrs |                         |      |           |       |         |             |          |
| Fire"            | "PP18Hrs  |                         |      |           |       |         |             |          |
| BAER"            | Rate      | Estimated Payroll costs |      |           |       |         |             |          |
| Fogarty          | GS-11     | Admin                   | PUHE |           | 11    | \$42.96 | \$472.56    |          |
| Subiono-Morikawa | GS-5      | Admin                   | PUHE |           |       | 8.5     | \$23.44     | \$199.24 |
| Akima            | WG-7      | CR                      | PUHE | 16        | 14    | \$35.77 | \$1,073.10  |          |
| Gordon           | GS-11     | CR                      | PUHE |           | 45    | \$42.96 | \$1,933.20  |          |
| Akima            | WG-5      | CR                      | ALKA | 11.5      | 2     | \$30.45 | \$411.08    |          |
| Ballard          | WG-5      | CR                      | ALKA |           | 12    | \$30.45 | \$365.40    |          |
| Gmirkin          | GS-11     | CR                      | ALKA |           | 46    | \$42.96 | \$1,976.16  |          |
| Johnson-Campbell | GS-9      | CR                      | ALKA |           |       | 28      | \$35.50     | \$994.00 |
| Johnson          | GS-12     | CR                      | PUHO | 5         | 14    | \$51.49 | \$978.31    |          |
| Maigret          | GS-9      | CR                      | PUHO |           | 10.5  | \$35.50 | \$372.75    |          |
| Rumsey           | GS-9      | CR                      | PUHO |           | 16    | \$35.50 | \$568.00    |          |
| Beavers          | GS-12     | CR                      | KAHO |           | 6     | \$51.49 | \$308.94    |          |
| Lizama           | GS-9      | CR                      | KAHO |           | 30.25 | \$35.50 | \$1,073.88  |          |
| Blakemore        | GS-11     | CR                      | HAVO |           |       | 12      | \$42.96     | \$515.52 |
| Houck            | GS-9      | CR                      | HAVO |           | 31    | \$35.50 | \$1,100.50  |          |
| Nakamura         | GS-9      | CR                      | HAVO |           |       | 10      | \$35.50     | \$355.00 |
| Robins           | GS-9      | CR                      | HAVO |           | 32    | \$35.50 | \$1,136.00  |          |
|                  |           |                         |      |           |       |         | \$13,833.63 |          |

**KAWAIHAE FIRE BURNED AREA REHABILITATION: SUMMARY OF ACTIVITIES AND COSTS**

| LINE<br>ITEM<br>NUMBER | SPECIFICATION<br>NUMBER | TITLE                                                   | UNIT  | UNIT COST | NUMBER<br>OF<br>UNITS | WORK<br>AGENT | FY16           | FY17       | FY18       | COSTS           |
|------------------------|-------------------------|---------------------------------------------------------|-------|-----------|-----------------------|---------------|----------------|------------|------------|-----------------|
| 1                      | BAR-1                   | Pili Grass Rehabilitation to Exclude Non-Native Species | Acres | TBD       | 90                    | F             | TBD            | TBD        | TBD        | \$0             |
| 2                      | BAR-2                   | Non-Emergency Repairs to Infrastructure                 | Each  | \$ 1,500  | 5                     | F             | \$7,500        |            |            | \$7,500         |
| <b>TOTAL COSTS</b>     |                         |                                                         |       |           |                       |               | <b>\$7,500</b> | <b>\$0</b> | <b>\$0</b> | <b>\$ 7,500</b> |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

## INDIVIDUAL SPECIFICATION

|                              |                                                         |                                  |                                  |
|------------------------------|---------------------------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Pili Grass Rehabilitation to Exclude Non-Native Species | PART E SPECIFICATION #           | BAR-1                            |
| NFPORS TREATMENT CATEGORY*   | Heritage Resources                                      | FISCAL YEAR(S) (list each year): | 2016, 2017, 2018                 |
| NFPORS TREATMENT TYPE *      | Site Stabilization                                      | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                                                | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** PUHE, like much of the lowlands of the Big Island of Hawaii, is a vastly transformed landscape dominated by non-native tropical grasses and exotic kiawe woodlands, the result of several hundred years of land-use practices that degraded the indigenous flora. Fire is just the latest disturbance that threatens the remnants of the native landscape. Without intervention, the Kawaihae Fire will provide the conditions for incremental expansion and further entrenchment of fire-adapted invasive species, particularly buffelgrass, at the expense of mostly non-fire adapted native flora.

Under the stewardship of the current park management, PUHE has become a focal point for the practice of Hawaiian cultural traditions. These extend beyond ceremonial practices to include daily living needs such as traditional food production. The park has collected over 50 varieties of taro which are maintained by, and shared with, the local Hawaiian community. Similarly the park has begun restoration of the native cultural landscape, focused especially on the native pili grass, one of the few native Hawaiian fire-adapted species. It was in fact the Hawaiian practice to burn it and use it for thatch for homes. Buffelgrass is too extensive and too well established to be displaced by pili grass. However, using proven out planting methods, buffelgrass can be replaced by pili grass which is then capable of resisting re-invasion (see Vegetation Assessment).

This specification provides for the 5-man PUHE crew to manage pili grass plantings and buffelgrass control for one day/week in FY16, 1/pay period in FY17 and 1 day/2 pay periods in FY18. We have included the time for a botanist/restoration ecologist to coordinate with the crew, other park cultural landscape specialists and restoration ecologists, and scientists working on fire and restoration of native Hawaiian landscapes. The ecologist will also be responsible for monitoring the success of the treatments, providing feedback on best methods, and submitting reports on accomplishments in collaboration with the BAER Implementation Coordinator.

**B. Location/(Suitable Sites):** Burned areas within the administrative boundary of PUHE.

**C. Design/Construction Specifications:** Continue with established techniques that have been used successfully to re-establish pili in the park. Select locations and modify methods as proposed in the vegetation assessment (VEG-1).

**D. Purpose of Treatment Specifications:** Restore the cultural landscape at PUHE, and curtail the spread of non-native invasive species.

**E. Treatment Effectiveness Monitoring Proposed:** Acres of buffelgrass excluded from existing pili grass stands; acres of new pili grass established; acres of buffelgrass replaced by pili grass; man-hours/task (planting, weed control, monitoring and planning).

#### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                            | COST / ITEM      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| GS-11 Ecologist @ \$63/hr x 80 hours x 3 FY ( 80 hr/yr)                                                                                                                                                      | \$15,120         |
| GS-7 @ \$41/hr x (208hr X FY16) + (104hr x FY17) + (52 x FY18)                                                                                                                                               | \$14,924         |
| WG-5 4 @ \$38/hr x (208hr X FY16) + (104hr x FY17) + (52 x FY18)                                                                                                                                             | \$55,328         |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ 85,372</b> |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM      |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ -</b>      |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM      |
| General Supplies @ \$1,167 x 1 x 3 FY                                                                                                                                                                        | \$3,500          |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ 3,500</b>  |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM      |
|                                                                                                                                                                                                              | TBD              |
|                                                                                                                                                                                                              |                  |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ -</b>      |

| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item): |  |  |  |  |  | COST / ITEM |     |
|--------------------------------------------------------------------------------------|--|--|--|--|--|-------------|-----|
|                                                                                      |  |  |  |  |  |             |     |
|                                                                                      |  |  |  |  |  |             |     |
| TOTAL CONTRACT COST                                                                  |  |  |  |  |  | \$          | -   |
| TOTAL ALL COSTS                                                                      |  |  |  |  |  |             | TBD |

#### SPECIFICATION COST SUMMARY

| FISCAL YEAR | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST |
|-------------|------------------------------------------|---------------------------------------------|------------|-------|-----------|--------------------------------|--------------|
| 2016        | 10/01/15                                 | 09/30/16                                    | F          | Acres | TBD       | 80                             | TBD          |
| 2017        | 10/01/16                                 | 09/30/17                                    | F          | Acres | TBD       | 80                             | TBD          |
| 2018        | 10/01/17                                 | 08/10/18                                    | F          | Acres | TBD       | 80                             | TBD          |
| TOTAL       |                                          |                                             |            |       |           | \$                             | -            |

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

#### SOURCE OF COST ESTIMATE

|                                                                                          |      |
|------------------------------------------------------------------------------------------|------|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |      |
| 2. Documented cost figures from similar project work obtained from local agency sources. |      |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |      |
| 4. Estimates based upon government wage rates and material cost.                         | F, M |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |      |

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

#### RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT

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#### TOTAL COST BY JURISDICTION

| JURISDICTION | UNITS TREATED | COST |
|--------------|---------------|------|
| NPS          | 30            | TBD  |
|              |               |      |
|              |               |      |
|              |               |      |
|              |               |      |
|              | TOTAL COST    | \$ - |

Specification Form Created September 23, 2006

## INDIVIDUAL SPECIFICATION

|                              |                                        |                                  |                                  |
|------------------------------|----------------------------------------|----------------------------------|----------------------------------|
| TREATMENT/ACTIVITY NAME      | Non-Emergency Repair to Infrastructure | PART E SPECIFICATION #           | BAR-2                            |
| NFPORS TREATMENT CATEGORY*   | Facility & Infrastructure              | FISCAL YEAR(S) (list each year): | 2016                             |
| NFPORS TREATMENT TYPE *      | Repair Administrative Facility         | WUI? Y / N                       | Yes                              |
| IMPACTED COMMUNITIES AT RISK | Kawaihae                               | IMPACTED T&E SPECIES             | Pololei (Ophioglossum concinnum) |

\* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

### WORK TO BE DONE (describe or attach exact specifications of work to be done):

#### Number and Describe Each Task:

**A. General Description:** The Kawaihae Fire damaged five road and trail counters at PUHE and ALKA.

**B. Location/(Suitable Sites):** Within the administrative boundaries of PUHE and ALKA.

**C. Design/Construction Specifications:** Replace road and trail counters in-kind. Cost estimates were provided by PUHE and ALKA staff.

**D. Purpose of Treatment Specifications:** Visitor use data are critical for fulfilling the NPS mission. This is especially true at ALKA, which lacks visitor contact facilities and relies on trail counter data for public use numbers.

**E. Treatment Effectiveness Monitoring Proposed:** Successful installation of replacement trail counters.

### LABOR, MATERIALS AND OTHER COST:

| PERSONNEL SERVICES: (Grade @ Cost/Hour X # Hours X # Fiscal Years = Cost/Item):<br>Do not include contract personnel costs here (see contractor services below).                                             | COST / ITEM     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
| <b>TOTAL PERSONNEL SERVICE COST</b>                                                                                                                                                                          | <b>\$ -</b>     |
| EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item):<br>Note: Purchases require written justification that demonstrates cost benefits over leasing or renting. | COST / ITEM     |
| Counters x 5 x \$1500                                                                                                                                                                                        | \$7,500         |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
| <b>TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST</b>                                                                                                                                                        | <b>\$ 7,500</b> |
| MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):                                                                                                                            | COST / ITEM     |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
| <b>TOTAL MATERIALS AND SUPPLY COST</b>                                                                                                                                                                       | <b>\$ -</b>     |
| TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):                                                                                                                       | COST / ITEM     |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
| <b>TOTAL TRAVEL COST</b>                                                                                                                                                                                     | <b>\$ -</b>     |
| CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):                                                                                                                         | COST / ITEM     |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
|                                                                                                                                                                                                              |                 |
| <b>TOTAL CONTRACT COST</b>                                                                                                                                                                                   | <b>\$ -</b>     |
| <b>TOTAL ALL COSTS</b>                                                                                                                                                                                       | <b>\$ 7,500</b> |

**SPECIFICATION COST SUMMARY**

| FISCAL YEAR  | PLANNED<br>INITIATION DATE<br>(M/D/YYYY) | PLANNED<br>COMPLETION<br>DATE<br>(M/D/YYYY) | WORK AGENT | UNITS    | UNIT COST | PLANNED<br>ACCOMPLISH<br>MENTS | PLANNED COST    |
|--------------|------------------------------------------|---------------------------------------------|------------|----------|-----------|--------------------------------|-----------------|
| 2016         | 10/01/15                                 | 09/30/16                                    | F          | Counters | \$ 1,500  | 5                              | \$7,500         |
|              |                                          |                                             |            |          |           |                                |                 |
|              |                                          |                                             |            |          |           |                                |                 |
| <b>TOTAL</b> |                                          |                                             |            |          |           |                                | <b>\$ 7,500</b> |

Work Agent: **C**=Coop Agreement, **F**=Force Account, **G**=Grantee, **P**=Permittees, **S**=Service Contract, **T**=Timber Sales Purchaser, **V**=Volunteer

**SOURCE OF COST ESTIMATE**

|                                                                                          |   |
|------------------------------------------------------------------------------------------|---|
| 1. Estimate obtained from 2-3 independent contractual sources.                           |   |
| 2. Documented cost figures from similar project work obtained from local agency sources. | C |
| 3. Estimate supported by cost guides from independent sources or other federal agencies. |   |
| 4. Estimates based upon government wage rates and material cost.                         |   |
| 5. No cost estimate required - cost charged to Fire Suppression Account.                 |   |

**P** = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

**RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT**

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**TOTAL COST BY JURISDICTION**

| JURISDICTION | UNITS TREATED     | COST            |
|--------------|-------------------|-----------------|
| NPS          | 5                 | \$ 7,500        |
|              |                   |                 |
|              |                   |                 |
|              |                   |                 |
|              |                   |                 |
|              | <b>TOTAL COST</b> | <b>\$ 7,500</b> |

Specification Form Created September 23, 2006