



Kawaihae Fire

Burned Area Rehabilitation

FY 2016 Accomplishment Report



Heteropogon contortus (pili grass) seedlings sprouting in the burn area following a heavy rain event.

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BURNED AREA REHABILITATION SUMMARY (2016)

- Fire damaged irrigation infrastructure repaired
- 2 pili grass nurseries established
- 208 pili plugs transplanted and established in strategic locations
- 10 monitoring transects established and read 6 and 12 months post-fire
- 80 acres surveyed for key invasive plants 1, 6, and 12 months post-fire
- 7.5 acres surveyed for locally rare native fern 1, 6, and 12 months post-fire
- 4 trail counters repaired
- Water and fiber optic lines repaired

OBJECTIVES

The primary objectives of the Kawaihae Fire Burned Area Rehabilitation are:

- Restore pili grass to the cultural landscape
- Stabilize the post-fire site to limit erosion and further damage to cultural resources
- Reduce future wildfire risk to neighboring communities
- Restore site conditions that promote native species diversity and increase the potential for threatened and endangered species to be re-introduced to their appropriate habitat

INTRODUCTION

This report summarizes actions taken to fulfill the specifications laid out in the Kawaihae Fire Burned Area Rehabilitation Plan (2015) for the first year of rehabilitation following fire (FY 2016) at Pu'ukoholā Heiau National Historic Site (PUHE). The Kawaihae fire started on 8 August 2015 and burned a total of 4,500 acres including PUHE and the surrounding area. Within the park, 64 acres were burned equaling 74% of the total park area. This report primarily focuses on the BAR 1 specification, Pili Grass Rehabilitation to Exclude Non-Native Species. Under the BAR 2 specification, Non-Emergency Repairs to Infrastructure, the four PUHE trail counters damaged by the fire were repaired (2 are currently in use and 2 are being stored as back-ups) and the work on the fiber optic line to the Park Maintenance area and the water line to the Park Headquarters was also completed.

Figure 1. Two weeks after the Kawaihae fire and rain events, erosion resulted in large amounts of debris and poor water quality in Pelekane bay at Pu'ukoholā Heiau National Historic Site.



BACKGROUND

Site Description

PUHE encompasses 86 acres on the leeward western coast of the island of Hawai'i (lat 20°1'35.7"N, long 155°49'13.2"W). In 1972, the park was designated to preserve and protect three important ancient Hawaiian heiau (temples) with a management goal to recreate the historic landscape of the park's commemorative period (ca. 1790). This park is one of the driest parts of the island with mean annual rainfall around 275mm $\pm$ 75mm with most rain occurring between November and April (Giambelluca et al. 2013). Soils in the area are described as very rocky fine sandy loam on 6-12% slopes. They are highly erodible when denuded of vegetation by fire or non-native goats (National Park Service, 2015). Most of the vegetation has been extremely altered and consists primarily of non-native buffel grass (*Cenchrus ciliaris*) and kiawe (*Prosopis pallida*) trees and shrubs with patches of managed native pili grass (*Heteropogon contortus*). Plant nomenclature follows that of Wagner et al. (1999) for flowering plants and Palmer (2003) for ferns and Wagner et al. (2012) updates for all.

Fire Effects

The Kawaihae fire started Southeast of PUHE 8 August 2015 and within hours burned 64 acres within the park, or 74% of the area of PUHE. In total, the fire burned over 4,500 acres of the park and surrounding area. The following week, on 17 August 2015, an intense rainfall event resulted in substantial flash flooding, with the site receiving 50-125mm of rainfall in less than 24 hours. The return interval for rainfall events of this intensity is 25-500 years, with the combination of disturbance by fire followed by intense rainfall representing an even rarer event. Burn severity was not quantified; however, considering that grasses were the primary fuel type and root crowns were still present post-fire, the fire was likely low to moderate in intensity with very short residence time except in scattered kiawe tree stands which burned hot (National Park Service, 2015).

Five weeks post-fire, a vegetation risk assessment by NPS botanists was conducted to assess how native species were affected by the fire and if re-establishment was possible. At this time, pili grass was resprouting and establishing from seed primarily in sites where it was present prior to fire (Figure 2). Native shrubs 'uhaloa (*Waltheria indica*) and 'ilima (*Sida fallax*) were also resprouting post-fire. The locally rare native fern pololei (*Ophioglossum polyphyllum*), was not detected at this time, but typically this ephemeral species disappears quickly and only reappears after heavy rains. Buffel grass was the most abundant vigorous resprouter post-fire with tall flowering individuals in the burn (Figure 2). Additionally, a single fountain grass (*Cenchrus setaceus*) was observed near the battlefield and numerous kiawe seedlings were found in the vicinity of fire-killed trees just east of Pu'ukoholā Heiau. The observed vigorous post-fire response of native and invasive species is likely attributable to the anomalous and repeated abundant rainfall events post-fire. Without intervention, the Kawaihae fire would have provided the conditions for incremental expansion and further entrenchment of fire-adapted invasive species, particularly buffel grass, fountain grass, and kiawe trees, at the expense of non-fire adapted and/or slow growing native flora.



Figure 2. Vegetation regeneration following a heavy rain event one month post-fire. The larger, bright green individuals are the invasive buffel grass, while the small, pale, light-green seedlings are mostly native pili grass (see inset).

Fortunately, the Kawaihae fire also provided a unique opportunity for active restoration of the cultural vegetation landscape that represents the Park's commemorative period. Pili grass is one of the few indigenous Hawaiian species that benefits from fire. Native Hawaiians, until the late 19th century repeatedly burned pili in large areas of the coastal lowlands to enhance the grass density for use as roof thatching (Kirch 1982, Cuddihy and Stone 1990, Daehler and Carino 1998). At the time of the park's commemorative period, pili grasslands dominated the vegetation in and around what is now PUHE. While buffel grass is normally too extensive and well established to be displaced by pili, reduced densities of buffel grass following the Kawaihae fire offered this unique opportunity to once again establish pili on the landscape. Using proven post-fire outplanting methods pioneered at both PUHE and Hawaii Volcanoes National Park (HAVO), buffel grass can be replaced by pili. Once established, pili grass is capable of resisting re-invasion as long as fountain grass and kiawe trees are controlled. Taking advantage of this unique restoration window offered the park an opportunity to not only re-establish, but also maintain the cultural vegetation landscape. Under the stewardship of the current park management, the park has become a focal point for the practice of Hawaiian cultural traditions. The post-fire restoration of pili grass offers the opportunity for the park to continue and enhance these cultural traditions on the landscape at PUHE.

In order to revegetate with native pili grass, abundant source populations or *in situ* nurseries are necessary, along with post-fire target non-native plant control and feral ungulate exclusion. Previous small scale efforts to establish pili populations in the park were successful when adequate source material was available and the buffel grass biomass was reduced with prescribed fire. To allow space and resources for successful re-establishment post-fire, disruptive colonizing non-native species were controlled. Monitoring the plant community response to fire and management efficacy of restoration efforts provides valuable metrics to enhance future adaptive management.

METHODS

Infrastructure Repair & Pili Nursery Establishment

The treatment plan provided for supporting pili restoration through *in-situ* nurseries utilizing both pre-fire source populations and newly established nursery populations (Figure 3). Two of the three pili nurseries that existed pre-fire resprouted vigorously, and a third was unburned. While significant (and unusual) rainfall immediately post-fire contributed to the vigorous resprouting, irrigation is needed to support the *in-situ* nurseries in the arid climate that predominates at PUHE. This irrigation system existed at PUHE, but was severely damaged during the Kawaihae fire. The treatment plan provided for repair of this irrigation system, and the establishment of additional irrigation to new *in-situ* nurseries.

Pili Propagation & Transplanting

Previous work at HAVO (Wasser 2014) found that outplanting survival of transplanted pili plugs was higher than traditional nursery-reared planted individuals. Transplanting plugs from *in-situ* nurseries also represents a significant labor savings relative to a traditional nursery operation. With this in mind, the BAR treatment plan provided for pili propagation via the *in-situ* nurseries nearby, and then transplanting of pili plugs into strategic locations across the burn area. To prepare the plugs, individuals of pili were allowed to reach sufficient size, then sections of individuals were dug up and separated from the root mass of the rest of the plant. These sections were then further divided into appropriate size plugs and transplanted into their new locations.

Pili Monitoring

Ten 25 m transects were established to monitor vegetation in February 2016, six months post-fire, and reread twelve months post-fire (Figure 4). Pili abundance and general vegetation characteristics were assessed along these transects using three different methods – cover, pili seedling density, and pili frequency (presence/absence). Transects were located opportunistically to both ensure the capturing of existing pili populations with sampling, and to avoid any sensitive cultural features. The start and end of each transect was marked with a stamped bronze tag, and a GPS point was taken to record each location. Transects are located at three different sites: The vicinity of old Daehler pili research plots (transects 1-4), the ‘Battlefield’ (5-8), and near the PUHE visitor center (Figure 3). During the twelve month post-fire monitoring, the tags of four transects (5-8) could not be relocated and the transects were established in approximately the same area based on geographic coordinates.

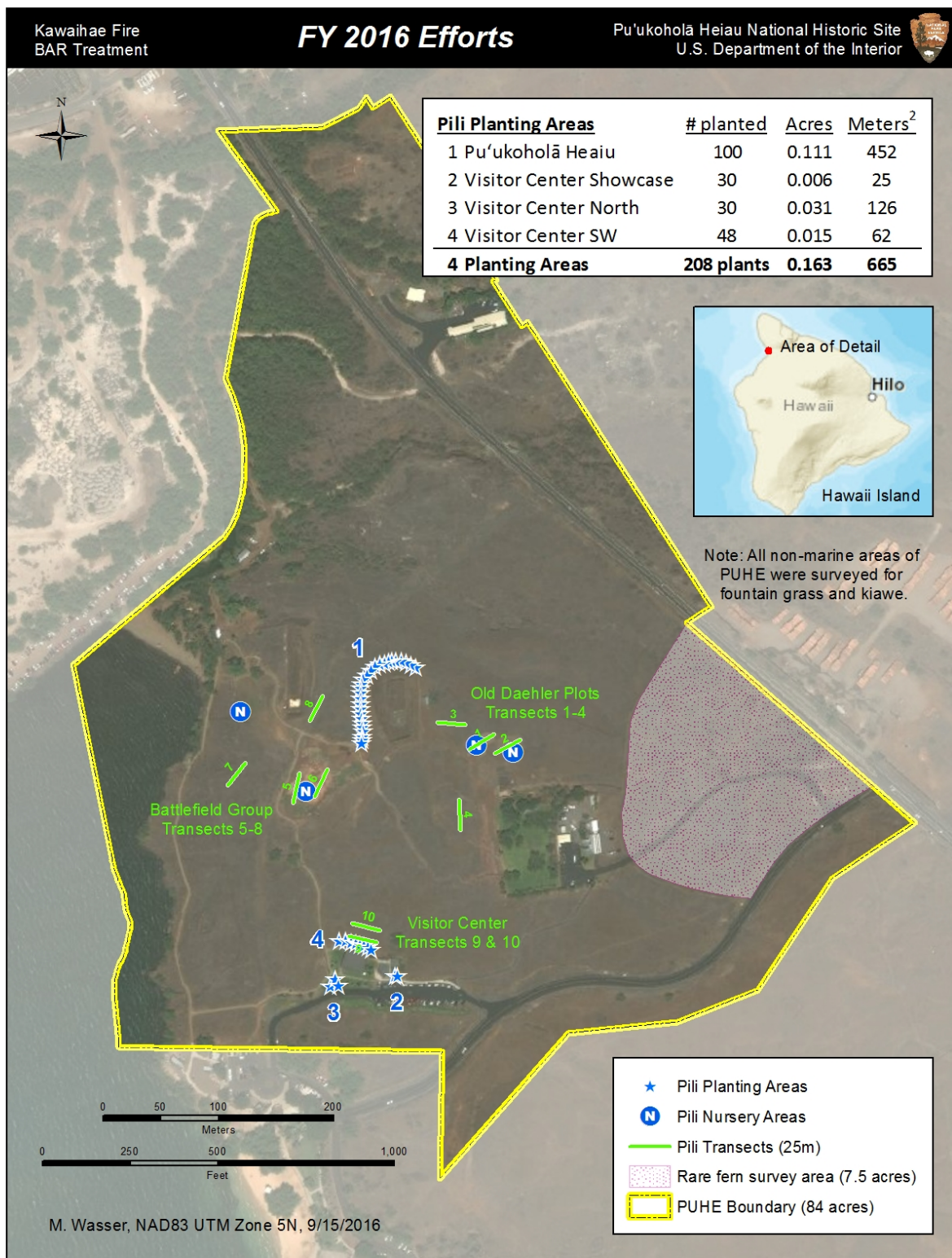


Figure 3. Locations of BAR treatment activities for FY 2016 at PUHE following the Kawaihae fire.

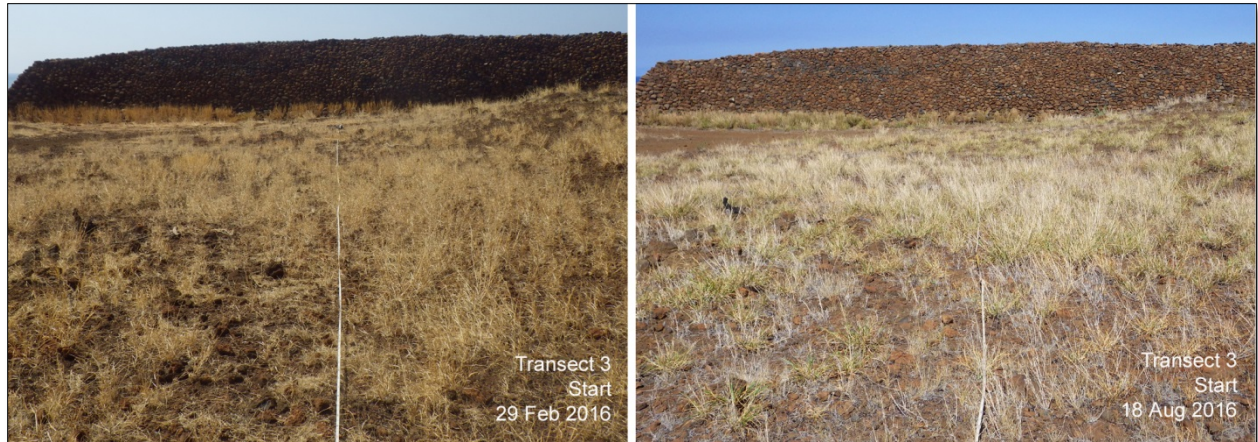


Figure 4. Photos of pili monitoring transect #3 six (left) and twelve (right) months post-fire.

Vegetation cover was measured using the point-intercept method along the transects. On each transect, a tent pole was placed perpendicular to the ground at 50 cm intervals (50 points/transect), and any species touching the pole was recorded (Figure 5). Dead vegetation attached to live vegetation was counted as live. Substrate was recorded for a point only when no vegetation was intercepted. Frequency and seedling density of pili were measured in 1 x 1 m subplots located along each transect line (Figure 5). Subplots were located along the right edge of each of the transects, at the following distances (0-1, 5-6, 10-11, 15-16, 20-21m). Within each subplot, all pili individuals were tallied and recored by size class ($\leq 25\text{cm}$ or $>25\text{cm}$). Frequency was measured as the presence/absence of pili in each of the seedling density subplots.



Figure 5. Counting pili seedlings for density estimates six months post fire (left) and monitoring plant cover along transect twelve months post-fire (right).

Results

Infrastructure Repair & Pili Nursery Establishment

All PUHE water lines were damaged during the Kawaihae fire including the irrigation systems that supplied water to the existing pili nurseries located at and below the battlefield area and the old Daehler plots area (Figure 1). The irrigation systems running to the battlefield area, and the nursery area to the NW of the battlefield were repaired. Additional irrigation systems were established to support the pili outplanting areas around Pu'ukoholā Heiau (Figure 5) and the parks' visitor center (3 sites around the visitor center). The irrigation line to the Daehler plot area has not been restored.



Figure 6. New irrigation lines to facilitate pili transplanting around Pu'ukoholā Heiau.

Pili Propagation & Transplanting

Ten months post-fire (June 2016), pili plugs were taken from the battlefield nursery area and transplanted into four areas around Pu'ukoholā Heiau and the PUHE visitor center (Figures 6). Over 200 plugs were transplanted. At the heiau, a strip of 100 plugs was planted on the outside edge of the footpath running the length of the north and west sides of the heiau. Plantings at the visitor center were concentrated in three areas: outside edge of the rockwall on the north (Kawaihae) side of the visitor center [48 plugs], in a 'showcase' garden area east of the visitor center adjacent to the restrooms and the main parking lot [30 plugs], and in a high visibility area to the southwest in between the visitor center trail and the road to Spencer Beach Park [30 plugs].

Figure 7. PUHE natural resource staff transplanting pili plugs from the battlefield *in-situ* nursery.



In general, each plug received a dedicated drip line off an ancillary irrigation line from the repaired system. Plants were initially watered daily for several weeks, watering was then reduced to once a week for one month, after which irrigation of the transplants was restricted to supplemental needs as necessary. Resources did not allow time for plugs to be censused for survival prior to reporting, but anecdotal estimates from PUHE natural resource management staff indicate a high initial survival rate (>80%).

Pili Monitoring Transects

Eleven species (three native and eight non-native) were encountered on the ten transects established to monitor pili abundance. Nearly 60% of the landscape was vegetated six months post-fire, whereas cover dropped to 45% at one year post-fire due to seasonal drought conditions. Buffel grass was the species most frequently encountered during both (6 and 12 months post-fire) monitoring periods (40-50% cover). Pili cover was low (2-8%), but this was expected given the paucity of naturally occurring pili on the landscape before fire. Overall vegetation cover was lower during the 12 month post-fire monitoring period (August 2016), and most individual species cover declined accordingly (Figure 8). This reduction in vegetation cover was likely due to a period of prolonged dryness preceding the 12 month monitoring period.

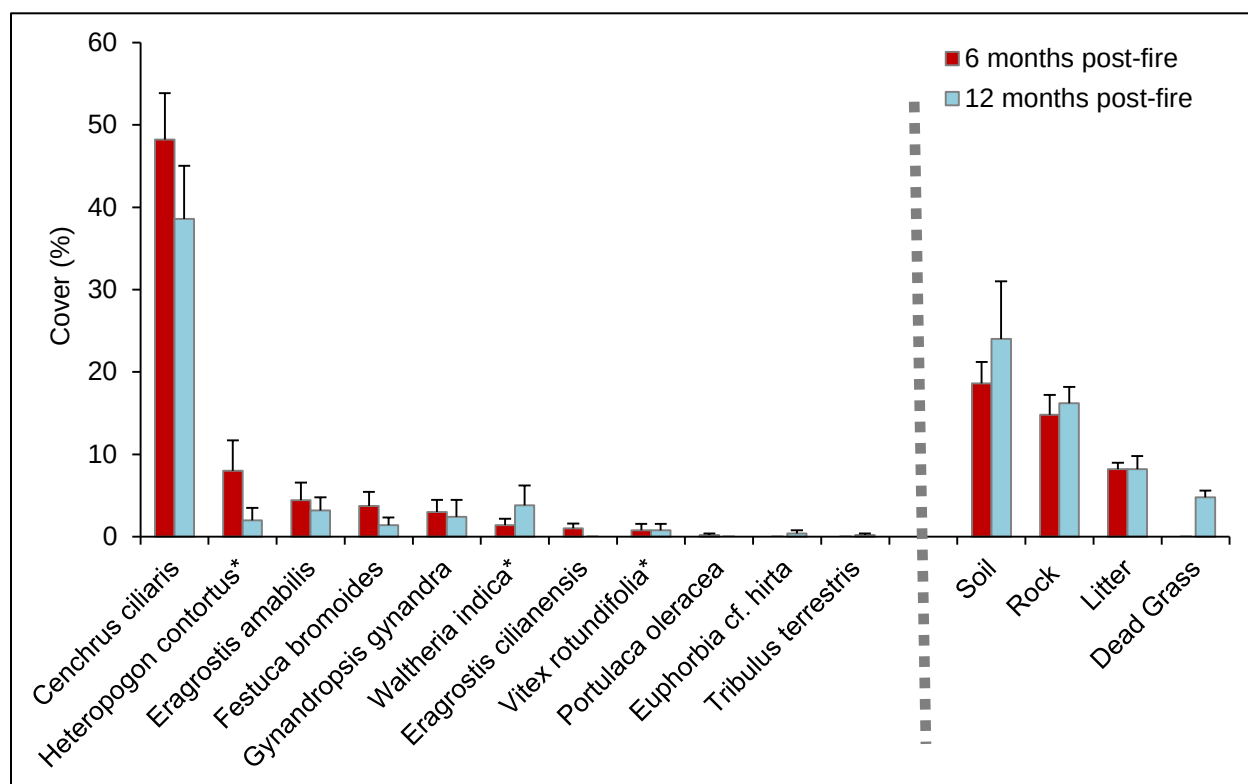


Figure 8. Mean plant cover (n=10 transects) six (February 2016) and twelve (August 2016) months post-fire. Native plant species are indicated with an asterisk. Substrate type, right side of graph, was only recorded in unvegetated areas.

Pili abundance (frequency and density) was also assessed using the five 1m² sub-plots along each transect. There was a dramatic difference of both pili cover and density between the six month and one year post-fire monitoring periods (Table 1). Mean frequency (presence/absence) decreased from 40% at six months to 4% at one year. Likewise seedling (≤ 25 cm tall) density decreased from 10.5 seedlings/plot at six months to 0.1 seedlings per plot at one year. Too few mature pili plant (2 at six months and none at one year) were found for a meaningful comparison.

Table 1. Native pili grass frequency (percent of subplots with pili) and seedling density by size class for ten 25m transects (TR) monitored six and twelve months (mn) post-fire.

TR	Frequency		Density (≤ 25 cm)		Density (> 25 cm)	
	6 mn	12 mn	6 mn	12 mn	6 mn	12 mn
1	100%	40%	38.8	1.4	0	0
2	40%	0%	6.8	0	0	0
3	0%	0%	0	0	0	0
4	0%	0%	0	0	0	0
5	100%	0%	38.6	0	0.8	0
6	100%	0%	14.2	0	0	0
7	60%	0%	6.2	0	0	0
8	0%	0%	0	0	0	0
9	0%	0%	0	0	0	0
10	0%	0%	0	0	0	0
Mean	40%	4%	10.5	0.1	0.1	0
SE	13.9%	3.8%	4.7	0.1	0.1	0

Targeted species monitoring

Surveys were conducted for both a rare native fern species and two disruptive invasive plant species at one, six, and twelve months post-fire. No individuals of the rare fern *Ophioglossum polyphyllum* were located during any of the surveys. The fern is ephemeral and generally only appears after heavy rain events. There was a significant rain event preceeding the one month monitoring, no rain preceeding the six month monitoring, and a small rain event one week before the twelve month monitoring.

All non-marine areas of PUHE were surveyed for invasive fountain grass and kiawe seedlings. A single individual of fountain grass was located and pulled near the Battlefield Area during the one month post-fire survey, otherwise no individuals of this species were located during the six and twelve month post-fire surveys. Kiawe seedlings were located during all surveys and were pulled opportunistically. While there is a core population of kiawe established in the northern section of the park, most mature individuals outside this area were killed during the Kawaihae fire. Any seedlings located outside this core area were pulled.

DISCUSSION

Good progress was made towards achieving the primary objectives of the BAR treatment plan in FY 2016. Objectives were addressed and priority work was completed in the year following the Kawaihae fire. Continued funding over the next two years should allow for the completion of all objectives prescribed in the BAR treatment plan.

The restoration of pili grass to the cultural landscape, along with almost all other objectives, was dependent on the repair of fire damaged irrigation infrastructure. The majority of this irrigation was repaired early in 2016. These repairs allowed for the re-establishment of the primary *in-situ* nursery at the battlefield area. That, in-turn, allowed for increased production of pili plugs, and the irrigation of transplanted plugs in newly established planting areas. Supplemental irrigation repair in fiscal year 17 will allow another nursery to come on-line, which can increase the production of pili plugs and subsequently transplanting of more individuals onto the landscape.

With the irrigation system (mostly) repaired, two pili nurseries were re-established. Individuals grow quickly provided sufficient water, and plugs were quickly ready to be transplanted. Irrigation was also established at four transplanting locations. With this in place, over 200 plugs were transplanted into these strategic locations. Initial survival of the transplanted plugs has been high, and more individuals will continue to be transplanted with funding in FY17 into these locations to enhance pili density on the cultural landscape.

The restoration of pili to the cultural landscape also aided in progress towards other objectives of the BAR treatment plan. The establishment of stable vegetation in transplanting areas, particularly both up and downslope of the Pu'ukoholā Heiau access trail, further stabilizes the post-fire site and help to prevent further erosion. This in turn limits further damage to cultural resources.

The promotion of a native species back to the cultural landscape was also complimented by invasive species control and vegetation monitoring. The survey for and removal of key alien species from the landscape, along with the promotion of an important native species, is the first step towards increasing habitat suitability for threatened and endangered species to be re-introduced to the area. Additionally, multiple goat fences at and near PUHE have been repaired and/or installed following fire to exclude feral ungulate access to these transplanted and recovering native species. The control of invasive plant species also reduces the risk of future wildfires to neighboring communities by keeping a fire promoting grass (fountain grass) and a heavy fuel (kiawe) off the landscape. Ongoing vegetation monitoring at regular intervals allows for management staff to continually evaluate the efficacy of BAR treatment efforts, and to institute continued best practices of adaptive management over the cultural landscape.

Recommendations for 2017 and 2018

Importantly, pili rehabilitation needs to continue for a couple more years to ensure that adequate populations have been inoculated into PUHE's landscape post-fire to prepare this historic landscape for future wildfires. The resource managers at PUHE have identified the most effective techniques for transplanting pili grass during this first year post-fire and with continued support will be able to expand pili populations on the landscape with less effort in the following years. Additionally, climatic conditions are extremely fickle in this harsh environment and continued biannual plant community monitoring is necessary to both document success and enable managers to modify methodology as necessary based on landscape planting survival and success.

Progress made during fiscal year 2016 has been well received with increased interpretive opportunities for visitors and locals to learn about restoration and critically, to start to picture this important cultural landscape as Hawaiians likely saw it in the early 1800's (Figure 9).



Figure 9. Historic watercolor of Pelekane, Puukohola and Mailekini heiau (James Gay Sawkins ca. 1855 in Desha 2000).

FUNDING REQUEST

See fiscal year 2017 requests for personnel to continue rehabilitating native pili grass populations across the post-fire landscape at PUHE and contract monitoring expertise from the NPS Pacific Island Inventory & Monitoring Program to continue to document management efficacy, promote adaptive management and summarize and report annual successes and lesson's learned.

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APPENDIX A: BAR ACTIVITIES BY SPECIFICATION

BAR 1 - INDIVIDUAL TREATMENT SPECIFICATION – REHABILITATION:

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	Loulu (<i>Pritchardia maideniana</i>), 'Ohai (<i>Sesbania tomentosa</i>), Ma'o hau hele (<i>Hibiscus brackenridgei</i> ssp. <i>brackenridgei</i>), Wiliwili (<i>Erythrina sandwicensis</i>), Nene or Hawaiian Goose (<i>Branta sanvicensis</i>)

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

WORK TO BE DONE - REHABILITATION:

Rehabilitate pili grass to exclude non-native species

A. General Description: PUHE, like much of the lowlands of Hawaii Island, is a vastly transformed landscape dominated by non-native tropical grasses and invasive kiawe (*Prosopis pallida*) 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 (*Cenchrus ciliaris*), fountain grass (*Cenchrus setaceus*), and kiawe trees, 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 (*Colocasia esculenta*) 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 post fire, buffelgrass can be replaced by pili grass which is then capable of resisting re-invasion as long as fountain grass and kiawe are controlled (see Vegetation Assessment).

This specification provides for the 5-man PUHE crew to manage pili grass plantings and invasive grass and kiawe control for one day/week in FY16, 1 day/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 and botany technician 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 establishing techniques that have been used successfully to re-establish pili in the park and control target invasive fire-adapted colonizing plant species. 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 buffel grass excluded from existing pili grass stands; acres of new pili grass established; acres of buffelgrass replaced by pili grass; acres grid searched and treated for fountain grass and kiawe colonists, ratio of native:non-native plant community parameters (richness, abundance), man-hours/task (planting, weed control, monitoring and planning).

LABOR, MATERIALS, AND OTHER COST - REHABILITATION:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):	COST/ITEM
GS-11 Ecologist @ \$63/hour x 80 hours x 3 FY (80 hr/yr)	\$15,120
GS-7 Botany Technician @ \$29/hr x 80 hours x 3 FY (80 hr/yr)	\$6,960
WG-7 @ \$41/hr x (208hr X FY16) + (104hr x FY17) + (52 x FY18)	\$14,924
WG-5 (4x) @ \$38/hr x (208hr X FY16) + (104hr x FY17) + (52 x FY18)	\$55,328
TOTAL PERSONNEL SERVICE COST	\$92,332
EQUIPMENT PURCHASE, LEASE AND/OR RENT	COST/ITEM
None	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$0
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
TOTAL MATERIALS AND SUPPLY COST	\$3,500
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
Travel @ \$400 x 4 x 3 FY	\$4,800
TOTAL TRAVEL COST	\$4,800
CONTRACT COST	COST/ITEM
None	
TOTAL CONTRACT COST	\$0
TOTAL ALL COSTS	\$100,632

SPECIFICATION COST SUMMARY – REHABILITATION:

FISCAL YEAR	PLANNED INITIATION DATE	PLANNED COMPLETION DATE	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2016	10/01/15	9/30/16	F	Acres	TBD	80	\$50,270
2017	10/01/16	9/30/17	F	Acres	TBD	80	\$30,200
2018	10/01/17	9/30/18	F	Acres	TBD	80	\$20,163
TOTAL							\$100,633

BAR-2 INDIVIDUAL TREATMENT SPECIFICATION – INFRASTRUCTURE:

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 (<i>Ophioglossum concinnum</i>)

WORK TO BE DONE - INFRASTRUCTURE:

Replace road and trail counters

- 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 - INFRASTRUCTURE:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item):	COST/ITEM
None	
TOTAL PERSONNEL SERVICE COST	\$0
EQUIPMENT PURCHASE, LEASE AND/OR RENT	COST/ITEM
Counter x 5 x \$1,500	\$7,500
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$7,500
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST/ITEM
None	
TOTAL MATERIALS AND SUPPLY COST	\$0
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST/ITEM
None	
TOTAL TRAVEL COST	\$0
CONTRACT COST	COST/ITEM
None	
TOTAL CONTRACT COST	\$0
TOTAL ALL COSTS	\$7,500

SPECIFICATION COST SUMMARY – INFRASTRUCTURE:

FISCAL YEAR	PLANNED INITIATION DATE	PLANNED COMPLETION DATE	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2016	10/01/15	9/30/16	F	Counters	\$1,500	5	\$7,500
TOTAL							\$7,500

APPENDIX B: BUDGET TRACKING SPREADSHEET

Summary of FY2016 Activities and Cost Estimates

Spec#	Title	Fund	FY16	FY17	FY18	Total
BAR-1	Pili Grass Rehabilitation to Exclude Non-Native Species	BAR	\$50,500*	\$30,200	\$20,163	\$100,833
BAR-2	Non-Emergency Repairs to Infrastructure	BAR	\$7,500			\$7,500
		Totals	\$58,000	\$30,200	\$20,163	\$108,363

*BAR-1 funded slightly higher (+\$230) for personnel than initial request (Appendix A)

Funding History for FY2016 by Specification

Spec#	Specification	FY16 Request	FY16 Approved	FY16 Spent
BAR-1	Pili Grass Rehabilitation to Exclude Non-Native Species	\$50,500	\$50,500	\$50,500
BAR-2	Non-Emergency Repairs to Infrastructure	\$7,500	\$7,500	\$7,304
	TOTALS	\$58,000	\$58,000	\$57,804

Funding History for FY2016 Specifications by Cost Service Type

Spec#	Cost Service Category	FY16 Request	FY16 Approved	FY16 Spent
BAR-1	Personnel	\$47,733		\$47,053
BAR-1	Equipment	\$0		\$0
BAR-1	Materials	\$1,167		\$3,447
BAR-1	Travel	\$1,600		\$0
BAR-1	Contract	\$0		\$0
	BAR-1 TOTALS	\$50,500	\$50,500	\$50,500
BAR-2	Personnel	\$0		\$5,488
BAR-2	Equipment	\$0		\$0
BAR-2	Materials	\$7,500		\$1,816
BAR-2	Travel	\$0		\$0
BAR-2	Contract	\$0		\$0
	BAR-2 TOTALS	\$7,500	\$7,500	\$7,304