DRAFT PROPOSAL FOR THE KALUANUI NATURAL AREA RESERVE

April 9, 2009

I EXECUTIVE SUMMARY

A portion of Sacred Falls State Park, on the island of Oahu, is proposed for inclusion in the State of Hawaii Natural Area Reserve System (NARS). Designation of the area as the Kaluanui NAR will represent and protect the unique natural features of a lowland wet and wet cliff ecosystem in the Windward Koolau Mountains, including a stream with outstanding biodiversity.

II INTRODUCTION (General)

The upper section of the Kaluanui watershed, currently managed as Sacred Falls State Park, is proposed to become part of the State of Hawaii Natural Area Reserve System. This Reserve would include an area of approximately 557 acres of the Kaluanui valley mauka of Kaliuwaa falls (Sacred Falls) up to and over the Koolau crest in the Koolauloa and Waialua districts of Oahu.

Kaluanui stream is very biologically rich as one of the few unaltered streams on Oahu, and contains the full assortment of native fishes. Appendix 1 lists the native as well as introduced aquatic crustaceans, fish, snails, worms, and insects found in Kaluanui stream.

In the proposed NAR, ohia forest covers the lower sections of ridges and cliffs, which thins to an open and sparse ohia forest and native shrubland nearing the Koolau summit crest (US Dept. of Interior, 2006). Interspersed among these ecosystems are patches of uluhe shrubland and native wet cliff vegetation (US Dept. of Interior, 2006). The inclusion of this area into the NARS would increase the representation of Oahu's lowland wet and wet cliff ecosystems which are found in only tiny sections of existing Oahu Reserves (Ecoregional Planning Team, TNC, 2006).

The proposed Reserve falls within Federally designated Critical Habitat for eleven plant species (See Appendix 3) (USFWS, 2003). The Hawaii Natural Heritage Program has records of twenty-two species that are listed as endangered, candidate, or species of concern species in the area (See Appendix 2).

Geologically, Kaluanui is a steep amphitheater-headed valley. Four small tributaries feed Kaluanui stream. From the headwaters, the valley becomes much steeper at around the 487m (1600ft) elevation, where a series of large waterfalls begin. The mauka boundary of the proposed Reserve is meant to end at roughly the top of Kaliuwaa (Sacred Falls) waterfall, at around the 121m (400ft) elevation.

III BACKGROUND AND HISTORY

Past Land Use and Conservation History

While the lower section of Kaluanui valley has many archeological signs of inhabitation and cultivation from pre-European times, there is little evidence of use mauka of Kaliuwaa falls (Yent, et al. 1981). One surveyed site above 609 m (2,000 ft) elevation consisted of an agricultural terrace near the stream (Rosendahl, 1973).

While archeological evidence suggests that the lowlands of Kaluanui were much more used historically than above the falls, the entire valley has significance as the legendary site of Kamapuaa's escape from Olopana, the king of Oahu. This story explains the origin of the Kaliuwaa chute as the impression of Kamapuaa leaning on the side of the valley, and the full legend is reproduced in Appendix 5.

As the flat lands at the mouth of the valley were further transformed in the early 1900s by cane cultivation, the upper reaches remained largely unmodified by humans, although major trends in resource use such as the sandalwood trade or firewood harvest may have impacted this area. In 1906 the Castle trail, which begins on the north flank of Punaluu valley and leads through the Kaluanui watershed to the Koolau crest was built, and following that access route, a summit trail was blazed by hunters working on behalf of the Territorial Forester Judd in 1930 (Ball, 2000). Following the creation of the summit trail in that area, further hunts were commissioned to remove pigs and a cabin was constructed in 1932. The Civilian Conservation Corps further blazed, widened, and graded a the summit trail, which included connecting the Castle trail to the summit (Ball, 2000).

During this time, the land was owned by Bishop Estate, but much of the coastal portion was leased. Following a sale to Sakota/Tamashiro and Zion Securities, the threat of private development encroaching on the park led to Act 195 in 1975, which appropriated funds for the State Park acquisition. After the purchase of 1,374.46 acres for roughly $3.48 million, Executive Order 2830 set aside the area in 1977 to the Division of State Parks.

A master plan and associated biological and archeological surveys for the newly formed park focused mainly on the lower portion below Kaliuwaa falls. This plan stated that "A prime management concern for Sacred Falls State Park is the preservation and protection of natural resources on the site" (Reddick, 1978).

Since the designation of the park, the area has been monitored by various scientists from DLNR as well as the U.S. Army's Natural Resources Program, Bishop Museum, and other conservation and data-collection entities. In 1990 the Hawai`i Stream Assessment ranked Kaluanui an "Outstanding" stream, and following in 1998, was nominated by the Multi-Attribute Prioritization of Streams as a Potential Heritage Stream (Parham, et. al., 2008). The next year, the area was included as part of the Koolau Mountains Watershed Partnership. That year, after a fatal rockslide in the lower section, the park was closed. Subsequently, the Division of State Parks has involved the community as well as contracted Oceanit Laboratories to assess the risks as well as plan for the future of the park. A preliminary list of involved or potentially interested parties is included in the Appendix 4.

Recently, portions at the Koolau crest have been fenced as part of the U.S. Army's Natural Resources Program's Peahinaia and Helemano exclosures. These adjacent fences together enclose an area of 275 acres. Approximately 64 acres are on the State Park's land.

Present Land Use and Access

Currently, this area is in the State Conservation District, in Protective, General, and Limited Subzones.

As mentioned previously, Sacred Falls State Park is closed due to landslide threats in the lower valley on the trail to Kaliuwaa Falls. However, the planning process and community discussions have led to various alternatives being discussed for re-opening the park and developing visitor facilities in the lower area. While planning and community discussions have focused mainly on the lower section as well as the Sacred Falls trail, the Final Risk Assessment recommended for the upper portion that the "DLNR and community designate a large portion of the park a NAR" (Oceanit, 2004, p. 15). This plan included the proposed NAR-designated portion extend along the Sacred Falls trail, which was recommended to remain closed due to rockslide and flash flood danger. The plan states:

> "Redesignation of the upper park area to a Natural Area Reserve System (NARS) would curtail unlimited visitation to the falls and would take the management of a large portion of the current park, out of the purview of the Division of State Parks. The Division of Forestry and Wildlife maintains the NARS, and would maintain the majority of the upper valley gorge area. The remainder of the site, makai of the trailhead, would be operated as a state park with applicable rules and regulations.
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> "Under the NARS designation, the trailhead to the falls would have limited access, most likely with the accompaniment of a docent/guide. This area would be held to the more restrictive NARS preservation and conservation regulations. While the goal of the NARS would be the preservation of the habitat and environment, the secondary benefit to this designation would be fewer visitors exposed to the risks associated with the falls area.
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> "The NARS –designated portion of the park, including the falls, will be closed to the general public. Entrance to that area will be appointment only with a designated representative of DOCARE, NARS or the Division of State Parks will be required. This will ensure that:
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> -Visitations to the falls [sic];
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> -Access to the falls will be restricted when weather conditions indicate flooding is imminent; and
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> -Visitors are aware of the risks associated with the area and the need to take personal responsibility for their safety.
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> (Oceanit, 2004).

The Draft Master Plan also covers pig hunting issues:

> "Currently the park is not within a designated DLNR hunting area. The upper reaches of Kaluanui should be designated a formal Hunting Area by DLNR. Hunting regulations should be similar to those applicable to the DLNR Hunting Area B located just to the north of Kaluanui. Further, hunting should be permitted only as a vector control measure at specified times and locations set by DLNR" (Oceanit, 2004).

Access to all areas of Sacred Falls State Park is closed to the general public. There are various unmanaged, unmaintained, long, and difficult trails that can access the above-waterfall section:

Castle Trail: Access is controlled by Bishop Estate. This graded trail is generally unmaintained and climbs the north flank of Punaluu valley, ascending 609m (2000ft) in 4 km (2.5 mi) to reach the State Park Boundary at the ridge between Punaluu and Kaluanui. Then, the trail crosses Kaluanui stream and connects with the Koolau Summit Trail (KST) after 2.5km (1.6 mi). This last section of the Castle trail leaves Sacred Falls State Park and follows the ridge that separates the Hauula Forest Reserve from Kaipapau Forest Reserve on DOFAW lands.

Kamapuaa Trail: (Est. 3.5m to connect with KST) Access is closed as this trail is within Sacred Falls State Park. This unmaintained and overgrown trail leads up Puu Wahilahila to meet with the Castle trail at the 731m (2400ft) elevation, which leads to the KST.

Papali Ridge: This overgrown, unofficial, and unmaintained trail through the Maakua Forest Reserve traverses Papali ridge to meet with the Kamapuaa trail at a ridge junction. This trail takes a side spur from the Papali gulch loop trail, which is maintained and managed by Na Ala Hele.

Koolau Summit Trail (KST): This historic trail is overgrown and unmaintained. The KST leads across the Koolau Mountain Crest to various connector trails to windward and leeward access points. From the Castle trail, which ends in Forest Reserve land, the trail goes south through the Park, Bishop Estate land, and finally to the end of the Poamoho trail after 4km (2.5 mi). It is roughly 1.2 km (¾ mi) from the south end of the State Park boundary to the Poamoho trail junction. From there, the Poamoho trail leads 4.3km (2.7 mi) to a trailhead which is accessed by a 4WD road. The first two miles of the Poamoho trail are maintained by Na Ala Hele, and a special access agreement allows public visitation during weekdays through the DOFAW's Oahu branch office. To the north of the Castle Trail Junction with the KST, the nearest junction trail is the Kawailoa Trail on the leeward side, 4.9km (3mi) away. The Kawailoa Trail would be the longest and most difficult option to access the upper portion of Kaluanui State Park.

Various helicopter landing zones exist at the southernmost part of the Park boundary, around the Koolau crest and exclosures.

Cultural/Recreational Uses

The upper portion of the park is closed and visitation is extremely difficult, yet a few intrepid hikers visit this area via the trails mentioned above. As this area is not part of a hunting unit, no information is known about poaching in the park above the falls. The area is adjacent to hunting areas in the Forest Reserves to the north.

As mentioned in the "Past Land Use" section, the valley has great significance for cultural practitioners as being associated with Kamapuaa, the Hawaiian pig god. This area also contains plants and animals that Hawaiians traditionally collect for practical, medicinal, decorative, and spiritual uses (Gutmanis, 1979, Krohn, 1978). Some of these plants and animals are considered sacred to certain gods or because they are associated with cultural practices (Kanahele, 1986). Preservation of these species is essential to the continuation of traditional Hawaiian cultural practice.

Previous Studies

Kaluanui stream has had 12 biological surveys and/or sampling efforts, from 1929 to 2004 and many more Division of Aquatic Resources surveys (Parham et. al., 2008). While most of these have occurred makai of Kaliuwaa falls, a few past surveys from the Hawaii Division of Fish and Game, as well as more recent damselfly surveys have sampled the stream mauka of the falls. A short term USGS gage was also installed where the Castle trail intersects the stream. Records of aquatic species are listed in Appendix 1.

Biological and archeological survey efforts for the Division of State Parks have focused on the lower section of the park. However, botanical surveys over the years have located various rare plant and snail population data, which are listed in Appendix 2. Information on the natural communities of Kaluanui is from aerial mapping surveys from the Hawai`i GAP Analysis. Koolau Mountains Watershed Partnership intends to conduct on-the-ground or aerial surveys to determine the distributions of invasive species (KMWP, 2002).

IV JUSTIFICATION (Specifics)

Scientific Value

Kaluanui is scientifically significant for its perennial undiverted stream, and largely intact lowland wet forests and cliffs, which contain rare plant and snail populations. Preservation of these biological resources will allow future generations to study and learn about a native Hawaiian ecosystem in the Windward Koolau mountains. Further, this is part of the Oahu Important Bird Area, which is a status designated by the Audubon Society to identify and conserve areas that are vital to birds and other biodiversity. As ecosystems in this area are lost to invasion by plant species, pigs, and other threats, a relatively intact section such as in Kaluanui is especially important for conservation. Similar and adjacent areas in the Hauula and Kaipapau Forest Reserves were originally proposed to include in the NARS in the 1970s.

Kaluanui and northern drainages such as Maakua and Kaipapau comprise the core habitat for four damselfly *(Megalagrion)* species that inhabit upper stream reaches (Polhemus, 2007). Three of these species are endemic to Oahu, and have experienced a progressive decline in known population range and numbers since the 1970s, which are limited by precipitation, urbanization, invasive species, and catchment flow regime (Polhemus, 2007).

Representativeness

Hawaii Revised Statutes Chapter 195 established the NARS “to preserve in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna, as well as geological sites, of Hawaii.” In order to accomplish this statutory mandate, various publications and compilations of survey information have been created to identify native natural communities that need representation in the System.

In 2006, a statewide mapping project was published to find the current locations of native natural communities. The GAP Analysis of Hawaii (HI-GAP) sought to cover all of Hawaii, and spatially demonstrate and identify "the degree to which native animal species and natural communities are represented in our present-day mix of conservation lands" (US Dept. of Interior, 2006). The aerial surveys mapped both the extent and type of the remaining communities, both alien, native or mixed. The landcover was then compared against the existing land stewardship of areas. The level of stewardship was determined by National GAP standards, and then modified to reflect Hawaii-specific considerations – named the Management Intent Status (MIS). The definitions of these designations are:

Management Intent Status 1: An area having designated protection from conversion of natural land cover and a mandated management plan in operation to maintain or restore to a natural state.

Management Intent Status 2: An area having designated protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of existing natural communities (US Dept. of Interior, 2006).

Management Intent Status can also help guide which areas are most "unrepresented" from a land stewardship standpoint.

Statewide, the surveys found that native wet forest and shrubland natural community has less than 10% of its current range within a MIS 1 or 2 area.

In Oahu, less than 10% of the native wet cliff vegetation, uluhe shrubland, and Ohia forest (native shrubs and uluhe) natural communities was represented in an MIS 1 or 2 area. Examples of these types of natural communities, in addition to native shrubland/sparse ohia, open ohia forest, and open ohia forest (uluhe) are found in the proposed reserve (US Dept. of Interior, 2006).

Currently, the only MIS 1 or 2 area in the Koolau mountains is the Oahu Forest National Wildlife Refuge, which is on the Leeward side of the range.

The Nature Conservancy of Hawaii conducted "An Ecoregional Assessment of Biodiversity Conservation for the Hawaiian High Islands" which distinguished 10 ecosystems based on biogeoclimatic differences (Ecoregional Planning Team, 2006). This assessment mapped the distribution of the remaining native ecosystems, and rated their viability, based on their size, landscape context, and condition. Currently, on Oahu, only 70 acres of lowland wet forest are represented in a NAR, and 10 acres of wet cliff, both of which are located on the Waianae Mountains. While a separate NAR proposal for Poamoho which is undergoing public review contains lowland wet Koolau ecosystems, Kaluanui would increase the representation of wet cliff and complement the Poamoho section by representing the Windward side of the Koolaus.

The current Oahu NARS do not contain the geological features, stream aquatic life, and many of the rare plant and snail species found in the proposed Reserve.

Natural Communities and their Status

Appendix 6 contains a map of these natural communities, as mapped by the Hawaii GAP Analysis.

Some areas in the proposed Reserve have been invaded by *Psidium cattleianum (*Strawberry Guava), which thins out further mauka. *Clidemia hirta* is also prevalent in the lower sections, especially near the stream bed, and can be found throughout the proposed Reserve. *Schinus terebinthifolius* (Christmasberry) is also common lower in the ridges. Despite these major threats, as well as the threats posed by less established alien species, a relatively intact native ecosystem remains, especially in the mauka regions.

The lower and middle reaches of Kaluanui stream have been invaded by 23 recorded alien aquatic species (Parham et. al, 2008). However, the discovery of a new aquatic insect attests to the high quality of the stream: "*Campsicnemus* are sensitive to any type of disturbance such as poor water quality, introduced species, or water diversions and this finding indicates Kaluanui Stream contains largely unimpacted and high quality aquatic habitats" (Englund, et.al, 2003). Only the alien Tahitian prawn *(Macrobrachium lar)* has been recorded in the upper reaches of the stream, and no alien species have been recorded from the headwaters (Parham et. al, 2008). It is likely that waterfalls such as Kaliuwaa are natural barriers to the spread of many of these non-native species.

Rarity

Appendix 2 lists the 22 rare plant and invertebrate species that have been recorded in the proposed Reserve, not counting any records prior to 1950. In that Appendix, information from The Recovery Plan for Oahu Plants from the US Fish and Wildlife Service includes the known populations and numbers of individuals of these endangered plants (USFWS, 1998).

The Koloa maoli *Anas wyvilliana,* Alae Ula *Gallinula chloropus sandwichensis*, Alae keokeo *Fulica alai,* Aeo *Himantopus mexicanus knudsenii* are endangered waterbirds with ranges in the proposed Reserve. However, these species have not been recorded from Kaluanui (Mitchell et. al, 2005).

Biological/Ecological Design

The boundaries of the proposed Reserve were designed to include where native – dominated vegetation exists, and also to encompass the area of the parcel that is not a popular recreational destination. These boundaries also avoid the ridges where the Draft Kaluanui Master Plan proposes the creation of ridge trails. These trails are intended to provide visitors a waterfall view without rock fall dangers.

The NARS Commission has indicated that it would be beneficial for Reserves to be adjacent to areas currently managed for conservation so that management activities could be leveraged. The proposed Reserve, as well as areas adjacent in the Koolau crest have been managed by the Army Natural Resources Program, as well as the Koolau Mountains Watershed Partnership. Additionally, the proposed Poamoho Natural Area Reserve is only 1.2 km (3/4 mi) from the boundary of the proposed Kaluanui Reserve,

facilitating combined management of both proposed Reserves. The work done by these partners and by NARS to conserve these areas, especially with suppression of weeds and ungulates, will mutually benefit each other.

Location and Size

The proposed Kaluanui Natural Area Reserve's boundaries roughly follow natural management units of ridges and cover the mauka zone of the Kaluanui watershed/ahupuaa (See Figure 1). The pie-shaped proposal's east side roughly follows along the west Slope of Punaluu valley, and a tiny sliver of the parcel also extends over the Koolau crest over to the leeward side. From there, the parcel's boundary does not follow natural features until the 799m (2622 ft) elevation, which is also at the point of the intersection of the Castle Trail. From there, the boundary roughly follows the ridge that divides Kaluanui Valley from Punaiki gulch to the west.

The makai boundaries of the proposed Reserve is a straight line between the 621m (2040ft) elevation on the west side of the parcel's boundaries, to the 621m (2040 ft) elevation on the east parcel boundary on the ridge of Punaluu valley.

This steep reserve is proposed to span 732m (2400ft) from the lowest elevation, at the top of Kaliuwaa falls at 121m (400 ft) elevation, to over 853m (2800 ft) at the Koolau crest.

Threats (Human/Biological)

High priority threats to Kaluanui ecosystems are invasive plant species and feral pigs. Additionally, rats and predatory invertebrates such as *Euglandina rosea* threaten the native snail species, and rare plants. Other types of flatworms, mollusks, and ants also are threats to native snails.

The Koolau Mountains Watershed Partnership has specifically prioritized the protection of the Kaluanui drainage from feral ungulates. Their management plan's summary of recommended actions for their feral animal program includes "Expand upon established fencing exclosures, in areas such as the Upper Helemano drainage of the Opaeula fencing project, Upper Kawai Iki Drainage (leeward side) and Upper Kaluanui (windward side)" (KMWP, 2002, pg. 48).

Invasive plant species are present throughout the proposed Reserve, with Strawberry Guava and *Clidemia* being the main ecosystem-modifying weeds found at the highest elevation portions of the parcel. *Clidemia* is especially prevalent in the drainages.

The major invasive plant species at the lower elevations of the proposed Reserve include Strawberry Guava (*Psidium cattelianum*), Christmasberry (*Schinus terebinthifolius*), the Gunpowder Tree (*Trema orientalis)* and the Octopus tree *(Schefflera actinophylla)*. Mules Foot Fern *(Angiopteris evecta)* infests the bottom section of the adjacent Maakua gulch, which threatens to spread to Kaluanui, if it has not already.

Present Level of Protection

The proposed NAR lies almost entirely within the State Conservation District, Protective (P) Sub-zone. Small portions fall under the Resource (R) Sub-zone, and Limited (L) Sub-zone.

According to Hawaii Revised Statutes, Title 13, Chapter 5, the objective of the Protective Sub-zone is to "protect valuable resources in designated areas such as restricted watersheds, marine, plant, and wildlife sanctuaries, significant historic , archaeological, geological, and volcanological features and sites, and other designated unique areas."

The objective of the Resource Sub-zone is to "…develop, with proper management, areas to sustain use of the natural resources." Some allowable activities identified for the Resource subzone include national, state, county or private parks; outdoor recreation; commercial forestry; mining and extraction; astronomy facilities, and aquaculture.

The objective of the Limited Subzone is to limit uses where natural conditions suggest constraints on human activities. Limited Subzones fall on areas that are steep pali in Kaluanui valley.

This area is designated in the P- Protective zone of Honolulu County. Preservation lands include those lands not valued primarily for agriculture, but which form an important part of a region's open space fabric. They possess natural, cultural, or scenic resource values, and include important wildlife habitat, cultural sites, significant landforms, views, or hazard areas.

The area proposed as a NAR is presently under the stewardship of the Department of Land and Natural Resources' Division of State Parks. As directed in Hawaii Revised Statutes §184-6, **"**The department of land and natural resources shall preserve the parks and parkways in the state park system in their natural condition so far as may be consistent with their use and safety, and improve them in such manner as to retain to a maximum extent their natural scenic, historic, and wildlife values for the use and enjoyment of the public."

Additionally, this area is closed due to unsafe conditions of the Sacred Falls trail. §184-5 establishes the ability of the department to make, amend, and appeal rules in the State Parks system.

On-the-ground conservation efforts have been concentrated at the Koolau summit crest region of the proposed Reserve, which includes the work done by KMWP as well as by the Army's Natural Resources Program.

Long-term Ecological Viability

While much of the proposed Reserve is dominated by native vegetation, many native species have been reduced and are nearing extinction (See Appendix 2). This area has experienced a great reduction in native forest birds, which are listed in the Rarity section. Some native forest birds that once ranged in Kaluanui, such as the Oahu Creeper *(Paroreomyza maculata)*, are probably extinct (Mitchell, et. al., 2005). The Endangered Oahu Elepaio *(Chasiempis sandwichensis ibidis)* has not been seen in this area for over 30 years (Mitchell et. al, 2005). While the Iiwi *(Vestiria coccinea)* has been recorded in Kaluanui in the last 35 years, the Oahu Amakihi *(Hemignathus chloris*) and the Apapane

(Himatone sanguinea) are the only native forest bird predicted to still range in the mauka areas of the proposed Reserve (Mitchell et. al, 2005).

A large number of native plants have also become rare, which also has presumably impacted invertebrates that may have been host specific to those species. The native snail population has also been drastically reduced to a few known sites.

While long-term ecological viability is a vague concept, especially in an place with many ecological components severely reduced or extinguished, it is apparent that this ecosystem is becoming increasingly degraded. However, the mauka sections may be one of the more intact areas on Oahu as far as having predominantly native vegetation and still supporting rare plant and snail species. Figure 2 shows the distribution of native and alien natural communities. The Division of Forestry and Wildlife's Management Guidelines have mapped areas directly adjacent to Kaluanui as having the vegetation class of "V2: relatively Intact Communities with Predominant Native Plants."

Natural waterfall barriers have protected this incredibly rich and relatively undisturbed stream ecosystem. However, high priority alien aquatic species have invaded Kaluanui stream, and threaten ecological viability (Parham et. al. 2008).

Environmental Consequences of No Action/Urgency

Designating this important core section of lowland wet forest, cliff, and stream as a NAR would enhance the ability of the NARS to participate and contribute to conservation and restoration actions across the entire watershed.

As this area has already experienced native species extinctions, and contains many species that are in danger of extinction, it is projected that no management action would result in additional loss. Including this area in the Natural Area Reserves System would not ensure the preservation of any of the species, but increased conservation management activity would be beneficial to these species and the whole native ecosystem.

Further, the NARS Enhancement Initiative has created the capacity to dedicate areas to the Natural Area Reserves System at this time. In many previous cases, proposals and opportunities to identify and to designate NARS have been delayed or lost because of a lack of staff time to proceed with the multi-step Reserve nomination process. Recent meetings with the Subcommittee of Enhancement and DOFAW staff have indicated an interest and current input into this process. Finally, the recommendations of the Kaluanui Master Planning process have also suggested that this area be put into the NAR System. If a Reserve is an appropriate designation for this area, this momentum should not be lost.

V. MANAGEMENT NEEDS

Threats Requiring Management

In addition to the invasive species threats noted, there are needs for a reduction or elimination of ungulates, as well as predatory species that threaten the most endangered elements.

Fencing and other ungulate control methods may be appropriate in the upper regions, and have been constructed in the past. Invasive species control should also be employed, with the primary focus being on the more native areas as well as incipient species populations throughout the parcel. Currently, the Oahu Invasive Species Council is not active in the proposed Reserve, as it is not known to contain the highest priority alien species. However, managers must monitor for the presence of these species.

Removing or reducing the amounts of predatory mammals, especially rats, would be needed, with priority near the existing snail and rare plant populations. Mice, rats, cats, and mongoose have been documented in the lower sections of the State Park. Managers should keep informed about appropriate and feasible methods for the control of *Euglandia rosea*.

Outplanting may be needed to preserve populations of very rare and endangered species. It would be far-sighted to establish more populations of these species to preserve biodiversity. Management could include coordination with the Army Natural Resources Program, which already conducts some of these activities in adjacent lands that are part of the Kawailoa Training Area.

Administrative (size, boundaries, access: roads & trails, maps more specific than in introduction, TMKs)

The proposed Reserve is an estimated 557-acre portion of TMK 5-3-001-009, which is currently Sacred Falls State Park, in the Koolauloa District of the Island of Oahu, State of Hawaii. It is Section 5 (a) lands of the Hawaii Admission Act: Non ceded.

The Present Land Use and Access section describes the roads and trails that lead to this area, which are not accessible by any road. The east, south, and part of the west boundaries are private land owned by Kamehameha Schools/Bishop Estate. The Hauula Forest Reserve, under the Division of Forestry and Wildlife makes up the rest of the western boundary. The Mauka (north) boundary is proposed to remain under the Division of State Parks, as the Sacred Falls State Park.

VI. PUBLIC SUPPORT

Agencies, Organizations, and Individuals Contacted:

Natural Area Reserves System Commission
Department of Land and Natural Resources:
- Division of Forestry and Wildlife, Oahu Branch
- Division of State Parks

VII. BIBLIOGRAPHY/REFERENCES

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Appendices

Appendix 1
Aquatic Species found in Upper and Headwater Regions of Kaluanui Stream

Scientific Name	Common Name	Status	Type
Atyoida bisulcata	Opae kalaole	Endemic	Crustacean
Macrobrachium grandimanus	Opae, Hawaiian River Shrimp		Crustacean
Megalagrion hawaiiense	Pinao, Damselfly	Endemic	Insect
Megalagrion nigrohamatum nigrolineatum	Pinao, Damselfly	Endemic	Insect
Megalagrion oceanicum	Pinao, Damselfly	Endemic	Insect
Megalagrion sp.	Pinao, Damselfly	Endemic	Insect
Ferrissia sharpi	Limpet	Endemic	Snails
Neritina granosa	Hihiwai	Endemic	Snails
Gobiid sp.		Indigenous	Fish
Macrobrachium lar	Tahitian prawn	Introduced	Crustacean

(Source: Parham, et. al., 2008)

Appendix 2
Rare Species Recorded in the Proposed Kaluanui NAR

Federal Status E = Endangered, C = Candidate for Listing, SOC = Species of concern

Scientific Name	Common Name	Federal Status	Last Obs.	Type	Total Known Populations*	Total Known Individuals*
Plantago princeps var. longibracteata	Ale	E	1976	Plant		
Viola oahuensis		E	2001	Plant	8	<180
Myrsine juddii	Kolea	E	1997	Plant	3	500-3,000
Pteris lydgatei		E	1997	Plant		
Hesperomannia arborescens		E	1997	Plant	15	<100
Cyanea acuminata	Oha, Haha, Oha wai	E	1997	Plant	15	<100
Tetraplasandra gymnocarpa	Oheohe	E	1997	Plant	17	<200
Gardenia mannii	Nanu, Nau	E	2001	Plant	28	7-100
Chamaesyce rockii	Akoko	E	2000	Plant	11	200-400
Cyrtandra viridiflora	Haiwale, Kanawao Keokeo	E	2001	Plant	4	21
Phyllostegia hirsuta		E	2000	Plant	16	150-200
Pteralyxia macrocarpa	Kaulu	C	1995	Plant		
Cyanea lanceolata ssp. Calycina		C	2001	Plant		
Cyanea calycina	Oha, Haha, Oha wai	C	1997	Plant		
Joinvillea ascendens ssp. Ascendens	Ohe	C	1999	Plant		
Platydesma cornuta var. cornuta	Pilo kea	C	1997	Plant		
Bidens campylotheca ssp. Campylotheca	Kookoolau, Kokoolau	SOC	1988	Plant		
Cyanea purpurellifolia	Oha, Haha, Oha wai	SOC	1997	Plant		
Lobelia gaudichaudii ssp. Gaudichaudii		SOC	2001	Plant		
Lentipes concolor		SOC	1990	Fish		
Megalagrion nigrohamatum nigrolineatum		C	1993	Insect		
Achatinella pulcherrima		E	1993	Snail		

*Total known statewide populations and individuals (Source: USFWS, 1998).

Appendix 3

Plant Critical Habitat Designation in the Proposed Kaluanui NAR

Scientific Name	Common Name
Shiedea kaalae	Maolioli
Cyanea crispa	Oha, Haha, Oha wai
Cyrtandra subumbellata	Haiwale
Tetraplasandra gymnocarpa	Ohe
Myrsine juddii	Kolea
Chamaesyce rockii	Akoko
Sanicula purpurea	
Viola oahuensis	Oahu violet
Eugenia koolauensis	Nioi
Hesperomannia arborescens	
Phlegmariurus nutans	Wawaeiole

(Source: USFWS, 2003)

Appendix 4

Interested or Involved Agencies/Organizations/Entities

Kamehameha Schools
Na Ala Hele Advisory Council
Koolauloa Hawaiian Civic Club
Army Natural Resources Program
Koolau Mountains Watershed Partnership
US Fish and Wildlife Service
University of Hawaii Botany Department
Hawaii Trail and Mountain Club
Sierra Club
State Legislators
Attorney General
Department of Land and Natural Resources
    State Parks
    Division of Aquatic Resources
    Division of Forestry and Wildlife
    Natural Area Reserves System Commission
Governor of Hawaii
Kaluanui Advisory Council
Community members
Hunting community

Appendix 5

Legend and History

There are many ancient legends which have their source in Kaluanui Valley. Many of these legends deal with the demigod Kamapuaa. According to the legend, Kamapuaa, a god from Kauai made the valley his home for many years. He was empowered with the special ability to transform himself into a hog. In this form he would plunder his neighbor's lands and perform other misdeeds.

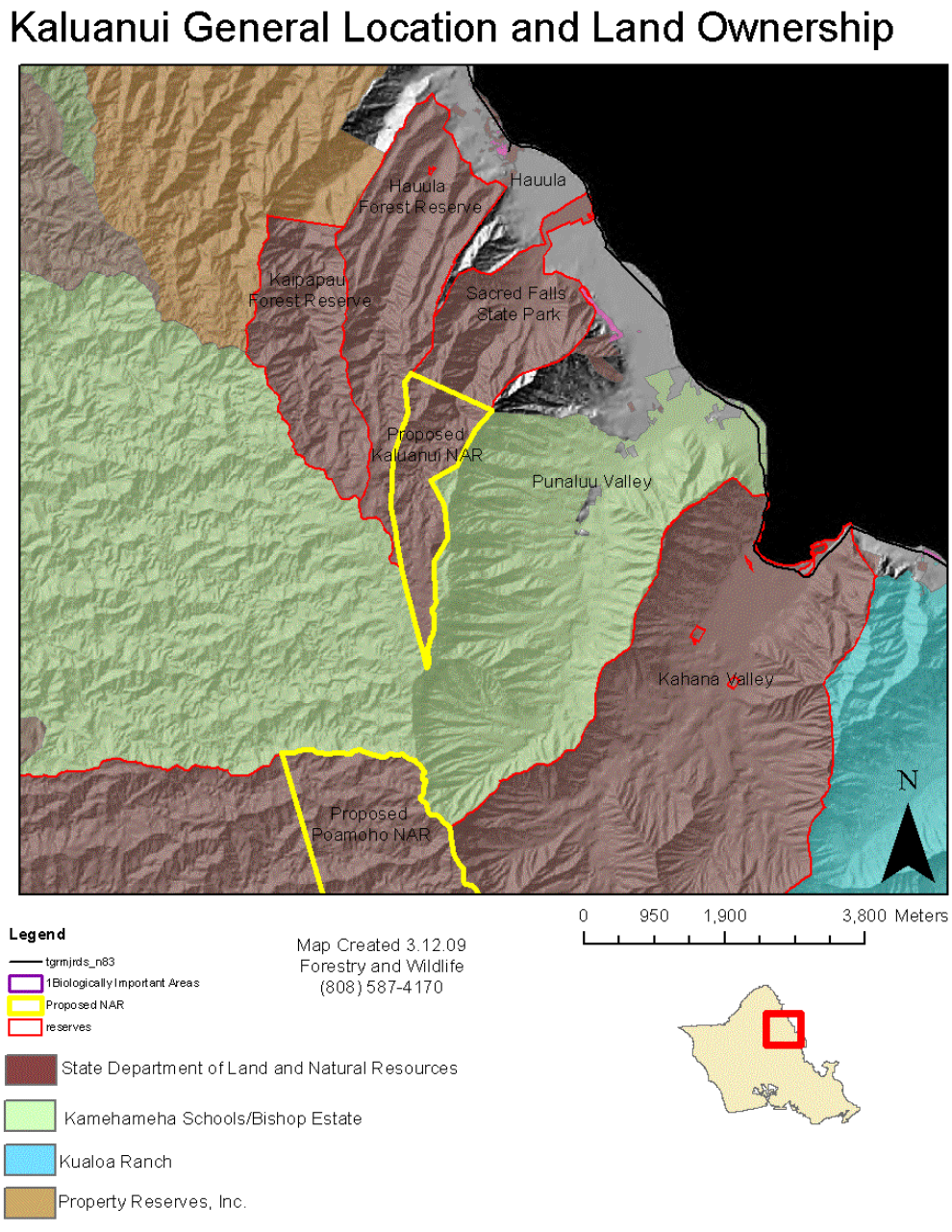
A story is told of the time he stole fowl from Olopana, the King of Oahu, who was living in Kaneohe. The King sent his men to get the thief. Seeing them approach, Kamapuaa hid beneath a large hollowed-out boulder. His hiding place was revealed to the pursuers by two men on the ridge of the valley. Kamapuaa was so mad that he turned them to stone where they stood. The Kind's men captured him, tied his feet and set off triumphantly bearing him on a pole to the King.

Enraged, Kamapuaa burst his cords, and ate all the men except one whom he permitted to bear the news of his escape to the King. This defeat angered the monarch so much that he set off with his entire army to destroy Kamapuaa.

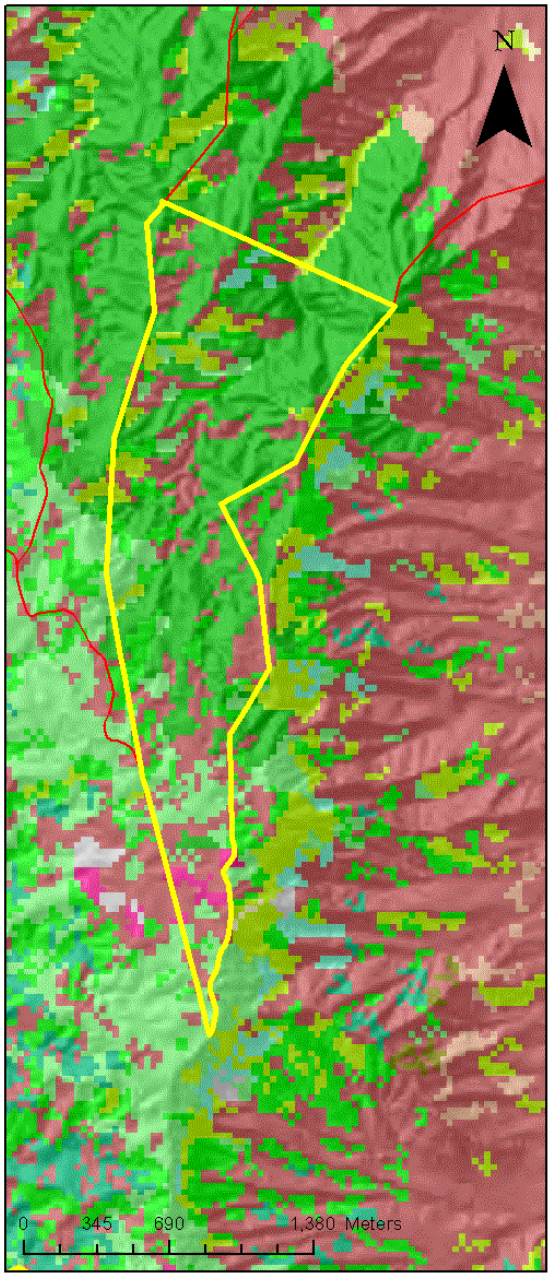
On hearing the approach of the King and his army, Kamapuaa was driven in haste from the field and was backed into Kaluanui Valley along with his grandmother, followers and servants. The King thought he had captured him; however just before the falls, Kamapuaa transformed himself into a gigantic hog. He leaned back against the valley wall making himself into a ladder which his followers ascended and made their escape. He followed them up and escaped. A large, rounded impression left by Kamapuaa remains today as proof that these events took place. Multiple impressions of a similar nature testify to the fact that he was really a rascal and had to use this means of escape quite frequently.

(Source: Reddick, 1978)

Figure 2.


Kaluanui General Location and Land Ownership
Hauula Forest Reserve
Hauula
Kaipapau Forest Reserve
Sacred Falls State Park
Proposed Kaluanui NAR
Punaluu Valley
Kahana Valley
Proposed Poamoho NAR
N
0 950 1,900 3,800 Meters
Legend
tgrmjrds_n83
1Biologically Important Areas
Proposed NAR
reserves
Map Created 3.12.09
Forestry and Wildlife
(808) 587-4170
State Department of Land and Natural Resources
Kamehameha Schools/Bishop Estate
Kualoa Ranch
Property Reserves, Inc.

Kaluanui Landcover



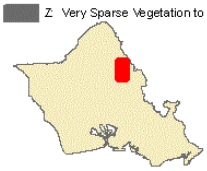
Legend

tgrmjrds_n83
1Biologically Important Areas
Proposed NAR
reserves

hi_lc

NAME

- M: Mixed Native-Alien Forest
- M: Mixed Native-Alien Shrubs and Grasses
- NG: Deschampsia Grassland
- NS: Aalii Shrubland
- NS: Bog Vegetation
- NS: Native Coastal Vegetation
- NS: Native Dry Cliff Vegetation
- NS: Native Shrubland / Sparse Ohia (native shrubs)
- NS: Native Wet Cliff Vegetation
- NS: Open Mao Shrubland
- NS: Uluhe Shrubland
- NT: Closed Hala Forest
- NT: Closed Koa-Ohia Forest
- NT: Closed Ohia Forest
- NT: Closed Pouteria Forest (native trees)
- NT: Koa Forest
- NT: Mamane / Naio / Native Trees
- NT: Native Mesic to Dry Forest and Shrubland
- NT: Native Wet Forest and Shrubland
- NT: Ohia Forest
- NT: Olopua-Lama Forest
- NT: Open Koa-Mamane Forest
- NT: Open Koa-Ohia Forest
- NT: Open Ohia Forest
- Undefined
- W: Water
- W: Wetland Vegetation
- X: Agriculture
- X: High Intensity Developed
- X: LowIntensity Developed
- XG: Alien Grassland
- XS: Alien Shrubland
- XT: Alien Forest
- XT: Kiawe Forest and Shrubland
- Y: Uncharacterized Forest
- Y: Uncharacterized Open-Sparse Vegetation
- Y: Uncharacterized Shrubland
- Z: Very Sparse Vegetation to Unvegetated



Map Created 3.12.09
Forestry and Wildlife
(808) 587-4170