

PROPOSAL FOR KAHAUALEA NATURAL AREA RESERVE EXPANSION -
TRACT 22
April 9, 2009

I EXECUTIVE SUMMARY

This proposal is to expand the Kahaualea Natural Area Reserve to a southwest portion of land between the Reserve and the Hawaii Volcanoes National Park. Inclusion of Tract 22 into the Natural Area Reserve System would facilitate management of the native ecosystems found in that region, and strengthen the protection of the areas already protected in the Kahaualea NAR.

II INTRODUCTION (General)

DLNR proposes that the unencumbered state lands (portion of TMK 311001001) immediately south of Kahaualea NAR and north of Hawaii Volcanoes National Park (HAVO) on the island of Hawaii be designated as an extension of the Kahaualea NAR. This would add 5,795 acres to the existing NAR.

This proposed Kahaualea NAR Extension contains a sampling of native ohia-dominated open and closed-canopy plant communities, as well as pioneer vegetation from recent lava flows. While these types of natural communities can be found in the adjacent NAR and HAVO, this parcel would increase the protective designation for these types of natural communities, which harbor rare and endangered species. Additionally, this parcel is characterized by high management contiguity, bounded by all sides by areas with designated protection from conversion of natural land cover and a mandated management plan in operation to maintain or restore to a natural state (US Dept. of Interior, 2006).

Tract 22 is within the recovery habitat of the Hawaii Creeper and the Akepa, which are both federally listed as endangered. Additionally, the endangered fern *Adenophorus periens* can be found in this area.

III BACKGROUND AND HISTORY

Past Land Use

Tract 22 and Kahaualea NAR were transferred from Campbell Estate to the State in 1987 as part of a land exchange. Campbell Estate's original intention was to develop geothermal resources on the parcel. This area was exchanged for the Wao Kele O Puna NAR (E.O. 3130), which was withdrawn in 1987 by former Governor Waihee.

Present Land Use

Tract 22 is a 5794.88-acre parcel of unencumbered state land, in State Conservation District, Limited Subzone. This is in the County of Hawaii CZO A-20a (Agriculture District, minimum building site of 20 acres).

Cultural/Recreational Uses

Tract 22 abuts Nahuku, otherwise known as Thurston Lava Tube, which is a popular visitor attraction in the Park. The trail to Napau crater, which lies less than a fourth of a mile from the boundary of Tract 22, is also a nearby recreational feature. However, there are no established trails inside Tract 22.

As this area is unencumbered state land, public hunting is not permitted.

To Hawaiian cultural practitioners, Kilauea is considered the home as well as the embodiment of Pele, the volcanic goddess, as well as her brothers that are associated with volcanic activity (Westervelt, 1916). Adjacent Hawai'i Volcanoes National Park has been designated a World Heritage Site (1987) for its natural and cultural resources. Tract 22 is also part of the active volcanic region of Kilauea Volcano, and thus shares many of the cultural values that led to the designation of the World Heritage Site.

This area also contains plants and animals that Hawaiians traditionally collected for practical and spiritual uses, for instance various types of ferns and bird feathers were used as decoration, and plants for medicinal and other practical values (Bishop Museum, 2008). Preservation of these species is essential to the continuation of traditional Hawaiian cultural practice.

Conservation History

In 1992, informal discussions between then-DOFAW Administrator Michael Buck and the NPS considered a long-term lease for park-management of Tract 22. Buck supported the plan due to lack of DOFAW funds for management, as did then-NARS Program Manager Peter Schuyler, and then-Hawai'i NARS Branch Manager William Stormont. This request was denied by the Division of Land Management due to previous discussions with NPS, which mentioned that their initial position was to exchange surplus federal lands for Tract 22. The memo from the Division of Land Management stated that until the NPS is willing to bargain to exchange the land, no lease for management would be granted.

Nearby conservation management occurs in Kahaualea NAR as well as in the National Park. These entities are currently part of the Three Mountain Alliance, which is bound by a Memorandum of Agreement that can be viewed at <http://hawp.org/library/documents/three-mountain-alliance/tma%20mgmt%20plan.final.2.pdf>

However, Tract 22, as unencumbered state land, is not part of the Three Mountain Alliance, and thus is not covered under their Management Plan and associated conservation activities. However, much of the work done adjacent to the parcel, as well as native ecosystem outreach done by all the entities of the Alliance positively impact Tract 22.

The Management Plan of the Three Mountain Alliance has listed adding Tract 22 to the Kahaualea NAR as one of its priority actions in the Olaa-Kilauea Management Area (TMA, 2007).

In July 2007, Kahaualea NAR closed due to safety concerns from ongoing volcanic activity, and in February 2008, the BLNR ratified the closure until July 25, 2009. Some of the safety hazards in the reserve are also present in Tract 22.

In 2009, the Land Division of the DLNR was contacted about this proposal and indicated a willingness to help process the set aside.

On April 6, 2009, this proposal was submitted to the Natural Area Reserves System Commission, which voted to approve referring this proposal to the Division of Forestry and Wildlife, for a 90-day review period.

Previous Studies

A vegetation map of this area was published in 1980 by Jim Jacobi as part of the Hawai'i Forest Bird Survey by the U.S. Fish and Wildlife Service and the Ohia Forest Study by the University of Hawai'i (Jacobi, 1989).

In response to proposed geothermal development in the area, Cooperative National Park Resources Study Unit published "A Botanical Baseline Study of Forests Along the East Rift of Hawai'i Volcanoes National Park Adjacent to Kahaualea" in 1986 (Cuddihy, et. al., 1986). That report contained three study sites within a fourth of a mile from Tract 22 and in similar natural communities, with a botanical inventory as well as information about the climate, soils, and vegetation types of the area. Additionally, a "Puna Geothermal Area Biotic Assessment" was prepared in 1985 for the Hawai'i State Department of Planning and Economic Development by the Department of Botany at UH Manoa, to compile information on how geothermal resources would affect the flora and fauna of the Puna District (Lamoureux, 1985).

The Hawaiian Volcanic Observatory continues to monitor this and surrounding areas for lava flows, seismic events, ground cracking, emissions, and other related volcanic activity.

IV JUSTIFICATION (Specifics)

Scientific Value

This area part of one of the most active volcanoes on earth, and numerous studies have been conducted of the surrounding area. Lava flows from 1968, 1969, and 1972 have covered parts of the southeastern portion of Tract 22. Geologically, this area is on the East Rift Zone of Kilauea, and lava flows between 1983-86, 1992-2002 and in 1997 have encroached within a fourth of a mile of Tract 22. Seismic events are continually being recorded in Tract 22 and surrounding areas, and ground cracking events are also documented to the immediate south of Tract 22, in addition to the many cracks already present in the parcel (USGS, 2008). The nearby Puu Oo eruption has been continuously active since 1983, and Napau crater also briefly erupted in 1997 (USGS, 2008).

Tract 22 also has significant biological value. While no records of invertebrate studies on this particular area could be found, it is likely that many of the known invertebrates found in nearby HAVO areas could also inhabit this similar habitat type. Of particular scientific interest and uniqueness are the Aeolian lava fields, which are colonized by arthropods quickly after eruptions (Howarth, 1979). This may be the primary habitat for some locally endemic arthropods, such as *Caconemobis fori*, a cricket, and the native wolf spider *Lycosa sp.* (Howarth, 1979).

This area is likely to contain many forest bird species. In a 1988 survey of Kahaualea NAR, the Omao (*Myadestes obscurus*), Apapane (*Himatione sanguinea*), Elepaio (*Chasiempis sandwichensis*), Amakihi (*Hemignathus virens*), Iiwi (*Vestiaria coccinea*), Io (*Buteo solitarius*) were observed (DLNR, 1992).

The diverse vegetation of Tract 22 is composed of predominantly native

ecosystems and is further described below in the “Natural Communities and Their Status” section.

Representativeness

The natural communities of Tract 22 are also contained in the Kahaualea NAR, as well as in HAVO (Jacobi, 1989). However, the necessary size for a representative sample of these ecosystems may require the addition of Tract 22, as well as other areas in order to sustain the native forest birds, which are declining due to habitat loss among other factors. Indeed, over half of Tract 22 has been designated as recovery habitat for the endangered Hawaiian creeper and Akepa. As the habitat for these species declines, the bird population also drops, so it is important to preserve every remaining native habitat to sustain their populations.

Additionally, as this area has not received similar levels of study as the adjacent parcels, it is possible that it contains unique and undiscovered resources that need the increased protection that is afforded by NAR designation.

Natural Communities and their Status

Various studies and projects have mapped and distinguished the natural communities of Tract 22. The mauka portion of the parcel is classified as montane wet, while the area roughly below 3,300 feet elevation has been identified as lowland wet (Ecoregional Planning Team, The Nature Conservancy, 2006). Open and closed-canopied ohia-dominated natural communities with matted fern, tree fern, native shrub, and introduced shrubs are the prevalent in Tract 22 (Jacobi, 1989). Additionally, this area has scrub ohia forests and bare lava flows, as well as a tiny area that in the 1970s was identified as recently burned, mesic habitat that was composed of scrub trees, predominantly ohia, with a native shrub and introduced grass understory (Jacobi, 1989).

A GAP Analysis of Hawai'i mapped the natural communities of this area, which identified the parcel to be primarily closed ohia forest, while vegetation covering the 1969 flow and a few interspersed areas was determined to be open ohia forest. In the interior of the flow, a sparse ohia/native shrub community was mapped (U.S. Department of the Interior, 2006). In the mauka portion of the reserve, a few interspersed pockets of alien forest were mapped (U.S. Department of the Interior, 2006).

Surrounding vegetation maps of HAVO indicate that the borders of Tract 22 are dominated by *Cibotium glaucum* (the portion roughly above 3,700 feet elevation), and below that *Dicranopteris linearis* and pockets of the invasive *Myrica faya*. Below roughly 3,300 feet elevation, the vegetation returns to being dominated by *Cibotium glaucum*, interspersed with sparsely vegetated areas corresponding to recent lava flows as well as tiny pockets of native shrubland.

Kahaualea NAR, which was surveyed using a different method of distinguishing natural communities contains ohia/hapuu montane wet forest, ohia/uluhe montane wet forest, ohia/hapuu lowland wet forest, ohia/uluhe lowland wet forest, and ohia/hapuu lowland mesic forest, and pioneer vegetation on lava flows. It is noted that portions of the reserve above 3,500 feet (Thurston unit) were disturbed by old and fresh pig damage, as well as several invasive nonnative plants were present including firetree (*Myrica faya*), which was codominant with ohia in places. The central unit below, which extends to 2,600 feet was also impacted by pigs and non-native plants, especially firetree in the

mauka portions and strawberry guava in lower elevations. This type of disturbance is also found in lower elevations, as well as cattle disturbance in the Puu Oo unit (DLNR, 1992). It is likely that there are similar types of disturbance in the similar and adjacent ecosystems of Tract 22.

Rarity

The endangered fern *Adenophorus periens* has been documented in various locations in Tract 22. *Tetraplasandra hawaiienseis*, which is a candidate for listing as endangered has been located on the parcel's boundaries with HAVO, by HAVO surveys. In Kahaualea, the endangered *Adenophorus periens*, and candidates for listing as endangered species *Bobea timonioides*, and *Phyllostegia floribunda* were confirmed within the reserve's boundaries during a 1988 survey (DLNR, 1992).

During that survey, the endangered Io (*Buteo solitairus*) was observed. The area is also part of the recovery habitat for the endangered Hawaii creeper (*Oreomystis mana*) and the Akepa (*Loxops coccineus coccineus*).

Biological/Ecological Design

The design of this proposal is meant to increase management contiguity between two areas that are managed for conservation purposes, in order to leverage management resources. Management in Tract 22 will benefit the native resources of that area as well as further protection efforts on adjacent parcels.

This area is part of a larger primarily-native forest, so the design of the proposal also has a high amount of habitat contiguity, which leads to the area being more likely to be a viable native forest in the future. Thus, this area is important from a regional perspective.

Location and Size

The proposed Kahaualea Extension is 5794.88 acres and is located in the Puna District, on the Eastern Rift Zone of Kilauea between 2480' and 4000' elevation, identified as a portion of TMK 31001001. Lava flows from the 1960s and 70s run through parts of the lower west side of the parcel, as do cracks. Just outside of the Northwest boundary is the entrance to Nahuku, or Thurston Lava Tube. A fourth of a mile South of the parcel is Napau crater.

As stated, this parcel is immediately south of Kahaualea NAR, and is bounded to the East, South, and West by Hawai'i Volcanoes National Park.

Threats (Human/Biological)

Threats to the native vegetation of the proposed Extension of Kahaualea NAR includes volcanic activity, and invasive species such as feral pigs (*Sus scrofa*), and various plant species, especially Faya tree (*Myrica faya*) and strawberry guava (*Psidium cattleianum*), based on the identified threats in Kahaualea NAR (DLNR, 1992).

Major threats to endemic forest birds include mosquitoes and the avian diseases that they transmit, mongoose (*Herpestes auropunctatus*), rats (*Rattus rattus*, *Rattus norvegicus*), mice (*Mus musculus*), feral cats (*Felis catus*), and the feral dog (*Canis familiaris*) (Lamoureux, 1985).

Pigs eat native plant species and their digging encourages the spread of alien species, including grasses that displace native ground cover (Loh et. al, 1999). Some of these weed species include *Holus lanatus*, *Anthozanthum odoratum*, *Hypochaeris radicata*, *Gnaphalium purpureum*, *Senecio sylvaticus*, *Axonopis affinis*, and *Erechtites valerianaefolia* (Lamoureux, 1985). Non-native insects, such as mosquitoes, ants, and yellow jackets are also a threat (DLNR, 1992).

Pathogens that threatened the native ecosystems of this area are avian malaria (*Plasmodium relictum*) and avian pox (*Avipoxvirus*). As Tract 22 is below 4,000 feet elevation, mosquitoes which are the vectors for these pathogens can survive, threatening native bird species. Additionally, a recently introduced fungus, the ohia rust (*Puccinia psidii*) threatens the dominant tree species in this area (TMA, 2007).

Fire is also a threat to this area, and can create conditions for the invasion of alien species, especially grasses. While fire can be a natural activity caused by volcanic events, tiny pockets of Tract 22 in the southeastern section were converted to introduced grasslands from a fire in the 1970s (Jacobi, 1989).

Human use may also threaten the area, as marijuana cultivation which threatens native forest and staff has been documented in surrounding areas (DLNR, 1992).

Present Level of Protection

The proposed NAR is state unencumbered land in the State Conservation District, Protective (P) Sub-zone.

The Protective (P) Sub-zone includes lands “necessary for protecting watersheds” and “necessary for preserving natural ecosystems of native plants, fish and wildlife, particularly those which are endangered.”

Long-term Ecological Viability

Adding this section to the NAR would connect the existing Kahaualea NAR to Hawaii Volcanoes National Park. This connection would facilitate ecosystem-level conservation efforts by protecting a contiguous block of native habitat from and result in increased protection for both the existing NAR and HAVO.

Environmental Consequences of No Action

The environmental consequence of no action on the northern section would result in limited protection for this area.

Urgency

While this area remains in the protective subzone of the Conservation District, various types of land uses or developments are possible. A recent example is the interest in using many State-owned areas on the Big Island for biofuels production. NAR designation would help to justify the preservation of this area.

If this area was included as part of the Kahaualea Natural Area Reserve, NAR rules (<http://hawaii.gov/dlnr/dofaw/nars/rules>) would apply to that area. The NAR System was established in 1970 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. Designation of this area would increase the level of protection and guide future management of the area to focus on the conservation

of the native ecosystems. Further, the area would be afforded additional protection by the oversight of the NARS Commission which is composed of scientific experts as well as representatives from the hiking and hunting communities, as well as from the DLNR, the Office of Planning, the Department of Education, the University of Hawaii, and the Board of Agriculture.

V. MANAGEMENT NEEDS

Threats Requiring Management

As noted earlier, threats to the proposed addition to the proposed Extension include:

- Volcanic activity.
- Invasion by non-native plants, including pasture grasses and non-native weeds.
- Trampling of vegetation and weed dispersal by feral pigs.
- Loss of genetic diversity.
- Pathogens.
- Fire.

Weed control would focus primarily on eradicating habitat-modifying species. In the Kahaualea NAR Management Plan, these were identified as Faya tree (*Myrica faya*), Broomsedge (*Andropogon virginicus*), Kahili Ginger (*Hedychium gardnerianum*), Meadow Ricegrass (*Erharta stipoides*), Blackberry (*Rubus argutus*), Palm grass (*Setaria palmifolia*), Strawberry Guava (*Psidium cattianum*), *Tibouchina herbacea*, Hilo grass (*Paspalum conjugatum*), and *Cyperus halpan*.

Protective management would primarily entail construction of fences (on-going) to exclude feral ungulates from the reserve, and the removal of any animals within the fences.

Outplanting, predator control and translocation of native wildlife would address the loss of native biodiversity.

To address the risks of fire, the Kahaualea NAR management plan recommends the creation of a fire management plan for the area, training NAR personnel in fire safety and control, as well as establishing connections with other fire managers for more efficient coordination in the event of a fire (DLNR, 1992).

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

The overall size of the proposed Extension of the Kahaualea NAR is approximately 5795 acres. It is a portion of TMK 31001001, in the Puna district, Hawaii. The parcel is Section 5 (a) lands of the Hawaii Admission Act: Non ceded. Maps 1 and 2 in the appendix depict the general location of the proposed Extension, and its' relationship to adjoining properties.

This extension is rectangular, and roughly 7.75 miles long and 1.25 miles wide.

There are no roads or trails that enter the proposed Extension. However, Crater Rim Drive is within meters of the boundary of the proposal, and the "Escape Road" runs very near the western boundary of Tract 22. Crater Rim Trail intersects with the Escape Road but does not enter the parcel's boundaries.

Eight miles in, the Napau Crater Trail nearly touches the southeast boundary of the proposed area. The end of the closed Captains Trail inside Kahaualea NAR comes within a mile of the northeast boundary of the NAR.

VI. PUBLIC SUPPORT

Agencies, Organizations, and Individuals Contacted

Natural Area Reserves System Commission
Department of Land and Natural Resources:
 Division of Forestry and Wildlife, Big Island Branch
 Division of Land, Big Island Branch

VII. BIBLIOGRAPHY/REFERENCES

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Appendices

Table 1

Native Vertebrates Recorded From Vicinity of Proposed Extension of Kahauale`a NAR

Scientific Name	Common Name	NatureServe Heritage Rank	Federal Status
<i>Himatone sanguinea</i>	Apapane	G4	-
<i>Chasiempis sandwichensis sandwichensis</i>	Elepaio	G3	-
<i>Myadestes obscurus</i>	Omao	G3	-
<i>Buteo solitarius</i>	Io	G2	E
<i>Hemignathus virens</i>	Hawaii Amakihi	G3	-
<i>Lasiurus cinereus semotus</i>	Opeapea- Hawaiian Hoary Bat	G2	E

Table 2

Endangered Birds with Recovery Habitat in Proposed Extension of Kahauale`a NAR

Scientific Name	Common Name	NatureServe Heritage Rank	Federal Status
<i>Loxops coccineus coccineus</i>	Hawaii Akepa	G1	E
<i>Oreomystis mana</i>	Hawaii Creeper	G2	E

Table 3

Rare Plants Recorded From Vicinity of Proposed Extension of Kahauale`a NAR

Scientific Name	Common Name	Federal Status	CH info	Location Info
<i>Adenophorus periens</i>	Pendent kihi fern	E	B	1
<i>Tetraplasandra hawaiienseis</i>	Oheohe	C		1
<i>Bobea timonioides</i>	Ahakea	SOC		2
<i>Phyllostegia floribunda</i>		C		2

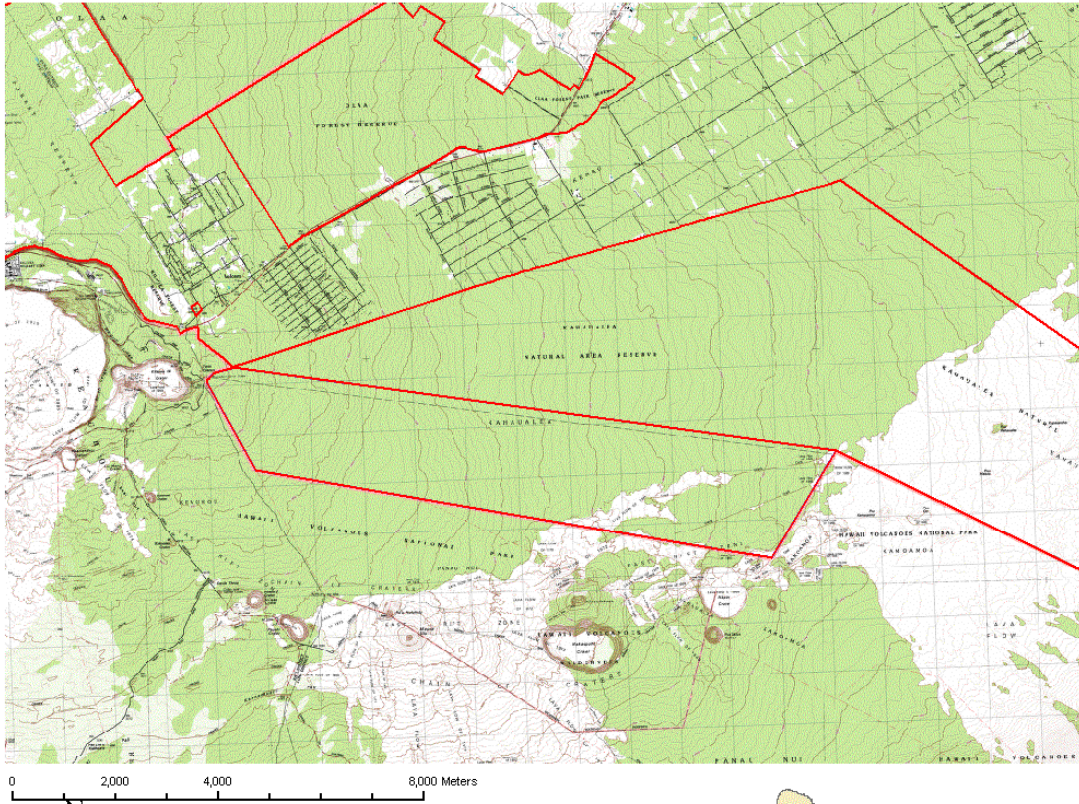
Federal Status E = Endangered, C = Candidate for Listing, SOC = Species of Concern

CH Info Critical plant habitat designated: A = within proposed NAR, B = Adjacent lands with identical habitat

Location info 1 = recorded from within proposed NAR, 2 = recently recorded from lands adjacent to proposed NAR with identical habitat; could occur within NAR.



Map 1

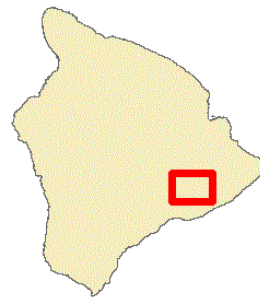
Tract 22



Map Created 10.28.08
Emma.Yuen@hawaii.gov

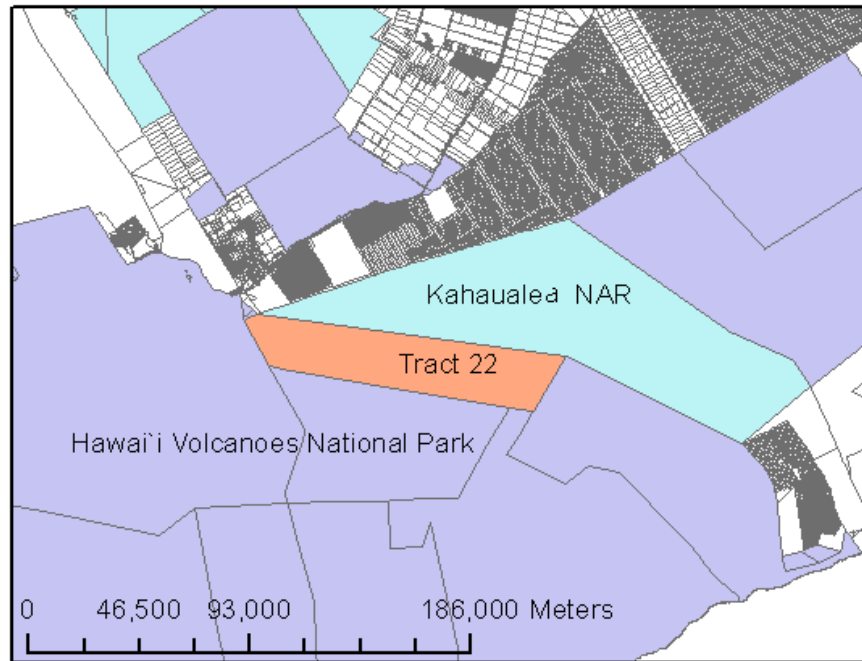
Legend

-  reserves
-  Biologically Important Areas






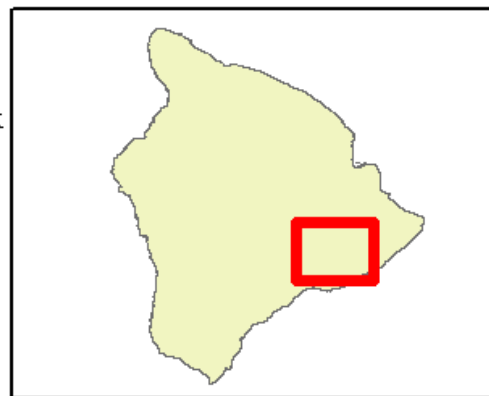
Map 2

Proposed Kahaualea NAR Extension - Adjacent Land Designations



Legend

-  Proposed Extension
-  Volcanoes Natl. Park
-  Kahaualea NAR



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Natural Area Reserves System
Division of Forestry and Wildlife