



KO'OLAU MOUNTAINS
WATERSHED PARTNERSHIP

Invasive Species Control and Outreach in the Ko'olau
January 1, 2022 – March 31, 2022

2022 Final Report to:

HAWAII INVASIVE SPECIES COUNCIL

Prepared By:
KO'OLAU MOUNTAINS WATERSHED PARTNERSHIP

INTRODUCTION

The Ko'olau Mountains Watershed Partnership (KMWP) is a project of the Pacific Cooperative Studies Unit (PCSU) with the University of Hawai'i that addresses island-wide conservation issues by working with public and private conservation groups, state, municipal and federal agencies, and private landowners. KMWP's mission is to protect native forest resources in the Ko'olau Mountain range, O'ahu. The Ko'olau Mountains has one of the highest densities of rare species in the world. The area provides habitat for dozens of endangered species, many of which are endemic to the range and found nowhere else in the world.

Southern Helemano and Poamoho are areas in the northern Ko'olau Range that provide habitat for 11 animal species and 18 plant species that are vulnerable to or have a high risk of extinction. Since 2016, KMWP has worked to conduct control, monitoring, and delimiting surveys for cane ti (*Tibouchina herbacea*) in the Poamoho Forest Reserve and adjacent Kamehameha Schools lands. In 2020 a new population of mature cane ti was detected by KMWP near the summit of Poamoho at the headwaters of the Poamoho stream.

In 2015 and 2016, with funding from HISC, KMWP focused on the strategic establishment of the strawberry guava biocontrol agent, *Tectococcus ovatus* across the Ko'olau Range. In 2021, KMWP conducted an analysis of disbursal sites for *T. ovatus* across Partner lands and strategically established 9 new agent sites. Additionally, KMWP established a novel means of distributing inoculated materials via an sUAS platform.

Albizia (*Falcataria moluccana*) is an extremely fast-growing tree species and was planted as part of the early reforestation efforts in 1917. Since that time, it has come to dominate significant portions of the urban/forest interfaces, riparian zones, agricultural land, critical infrastructure corridors and low-elevation forests on O‘ahu. Since 2018, KMWP has been working to achieve regional eradications of albizia trees across priority watersheds. Although target numbers may be relatively low, the effort required to control individual trees is high. Access to target trees requires helicopter flights into the area and up to a full day to traverse across dense, steep terrain. Though the initial effort to control these incipient trees is relatively substantial, it is insignificant when compared to the future control costs associated with attempting to control a robust and dominant albizia populations. KMWP has also been working to empower and assist communities with local- level control efforts by producing and providing educational materials and training.

Feral goats are among the most harmful invasive species on oceanic islands, including Hawai‘i. They are notorious for destroying vegetation, increasing erosion, and thriving in a range of habitat types. Eradication efforts for goat populations in the Ko‘olau were conducted by KMWP in 2015 and 2016 in Kualoa and Southern Waimanalo. These were deemed successful as no animals were detected during follow up monitoring from 2017-2020. However, in mid-2020, KMWP received an unconfirmed report of goats in a new area along the Kuliouou summit and windward side of Pu‘u o Kona in central Waimanalo. In May 2020, KMWP staff conducted a ground survey of east Honolulu and visually confirmed the presence of two animals at Pu‘u o Kona. It is imperative that these new goats be managed before they establish a robust permanent population.

GOALS

The goals of this project were to:

- Reduce the impacts of invasive species on priority watersheds
- Protect water quality and supply for communities and agriculture on O‘ahu
- Improve habitat quality for at-risk species
- Increase public awareness on O‘ahu with regards to watersheds, general species information, and impacts caused by invasive species

EXPECTED OUTCOMES

1. Incipient Cane Ti Control

- 2 surveys per section per year completed for the upper 7 sections and 1 survey for the lower 7 sections of Paukauila Stream.
- One delimiting survey of the Poamoho Stream
- Based on results of surveys, point and polygon maps will be produced showing the extent of the infestation.
- Thorough documentation of all *T. herbacea* treated in Poamoho will be recorded and maintained in the KMWP project database

2. Incipient Albizia Control

- 4 days of on the ground control and surveys completed in N. Poamoho working towards regional eradication from the area.
- 4 days of on the ground control and surveys completed in Moanalua working towards regional eradication from the area.
- Based on results of surveys, point and polygon maps will be produced delimiting the extent of the infestation.
- Thorough documentation of all *F. moluccana* treated will be recorded and maintained in the KMWP project database

3. Albizia Outreach

- Continued Participation in the Statewide Albizia Working Group
- Creation of O'ahu-specific albizia outreach materials
- One presentation to a community group on albizia impacts and control methods
- One volunteer event with a community-based control team

4. Tectococcus ovatus Biocontrol Deployment

- *T. ovatus* established at 3 new sites
- Thorough documentation of all *T. ovatus* establishment sites will be recorded and maintained in the KMWP project database

5. Goat Control

- One aerial survey completed
- One ground survey / hunt completed
- Thorough documentation of all observed/controlled goats will be recorded in the KMWP project database.

Summary

1. Incipient Cane Ti Control

Two sets of surveys of the upper 7 established sections of Paukauila Stream were conducted roughly six months apart, as well as a single survey of the lower 7 established sections and a delimiting survey of the remainder of the stream up to the conservation district boundary, cumulatively totalling 46.1 acres and controlling 87 cane ti plants (figure 1). These surveys were supplemented by funding from the Watershed Partnership Protection Grant (WPPG) to allow for two more sets of surveys of the same 14 sections, providing for quarterly and biannual control operations of the top 7 and bottom 7 sections, respectively.

While a survey of the Poamoho stream to the south was intended for this project, the remainder of Paukauila was surveyed instead as the Department of Land and Natural Resources' Native Ecosystem Protection & Management program offered to assist with Tibouchina control efforts and begin surveying Poamoho stream. The remainder of Paukauila stream surveyed eventually became ephemeral, being siphoned off by a ditch tunnel towards Dole Plantation. The output of this tunnel and its associated reservoir were surveyed, as well, despite being outside of the conservation use area. Thankfully no plants were found.

2. Incipient Albizia Control

A total of 9 days were spent controlling albizia across both the Poamoho Complex and Moanalua, resulting in 89 trees treated over 113 acres (figure 2). Leveraged funding from the Board of Water Supply allowed for significant albizia control across Moanalua, resulting in only 3 trees remaining in the highest, most remote portions of the area. Only a single tree was treated in Moanalua using HISC22 funding, with the remaining 3 days being pivoted towards the much larger population across both Northern and Southern Poamoho fences. Due to variable weather conditions, and these two fenced areas being adjacent to each other, work for this project expanded beyond the intended N. Poamoho area. Removal of the invasive tree in only one of these areas will not ensure the safety of the other.

KMWP HISC22 Incipient Cane Ti Control

Projection: NAD83 UTM Zone 4N
Basemap: USGS OAHU DRG
Vector Data: KMWP
Scale: 1:32,100
Map Production Date: 6/22/2023

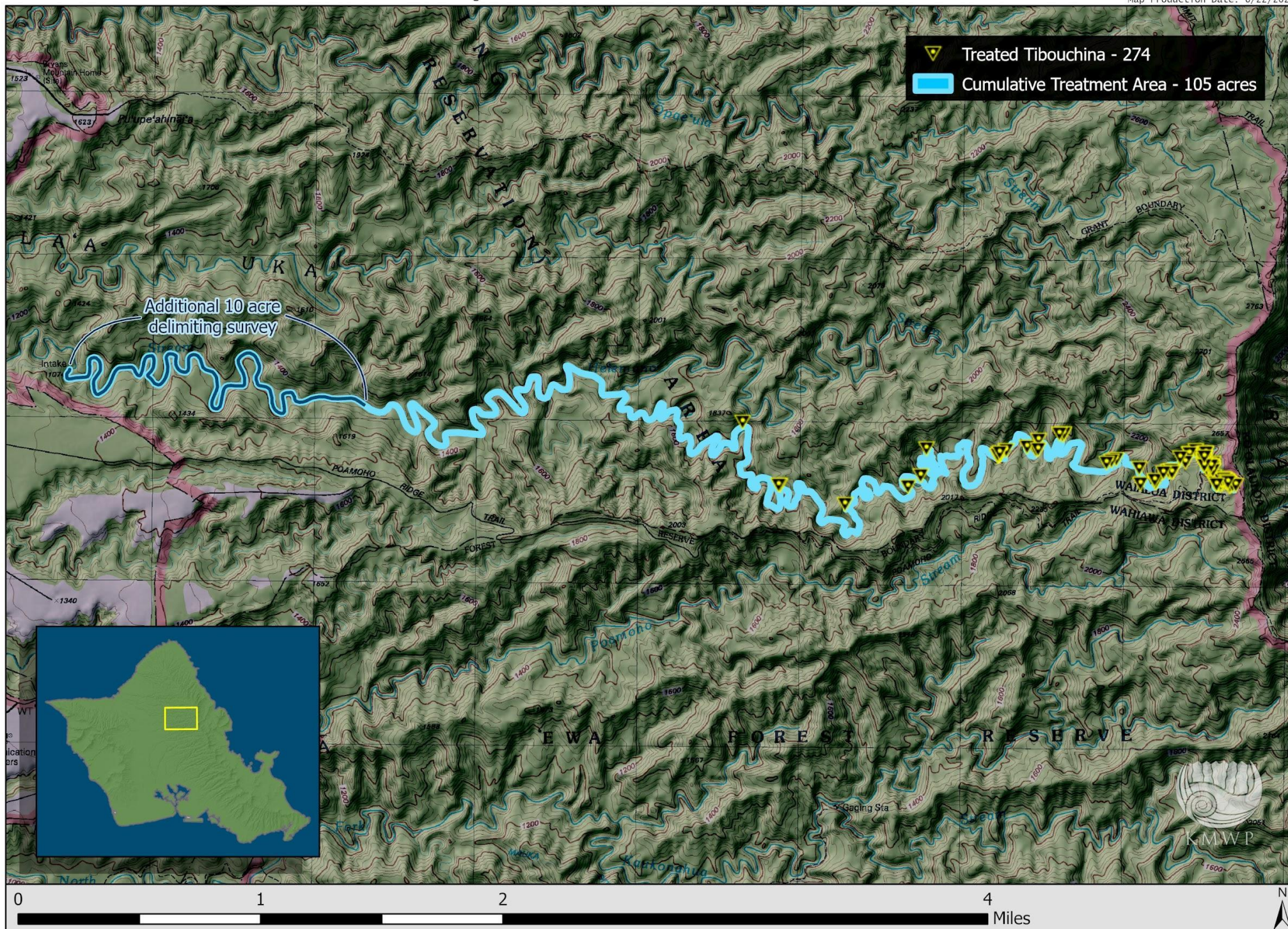


Figure 1

Incipient Albizia Control

Projection: NAD83 UTM Zone 4N
Basemap: USGS OAHU DRG
Vector Data: KMWP
Scale: 1:20,000
Map Production Date: 6/23/2023

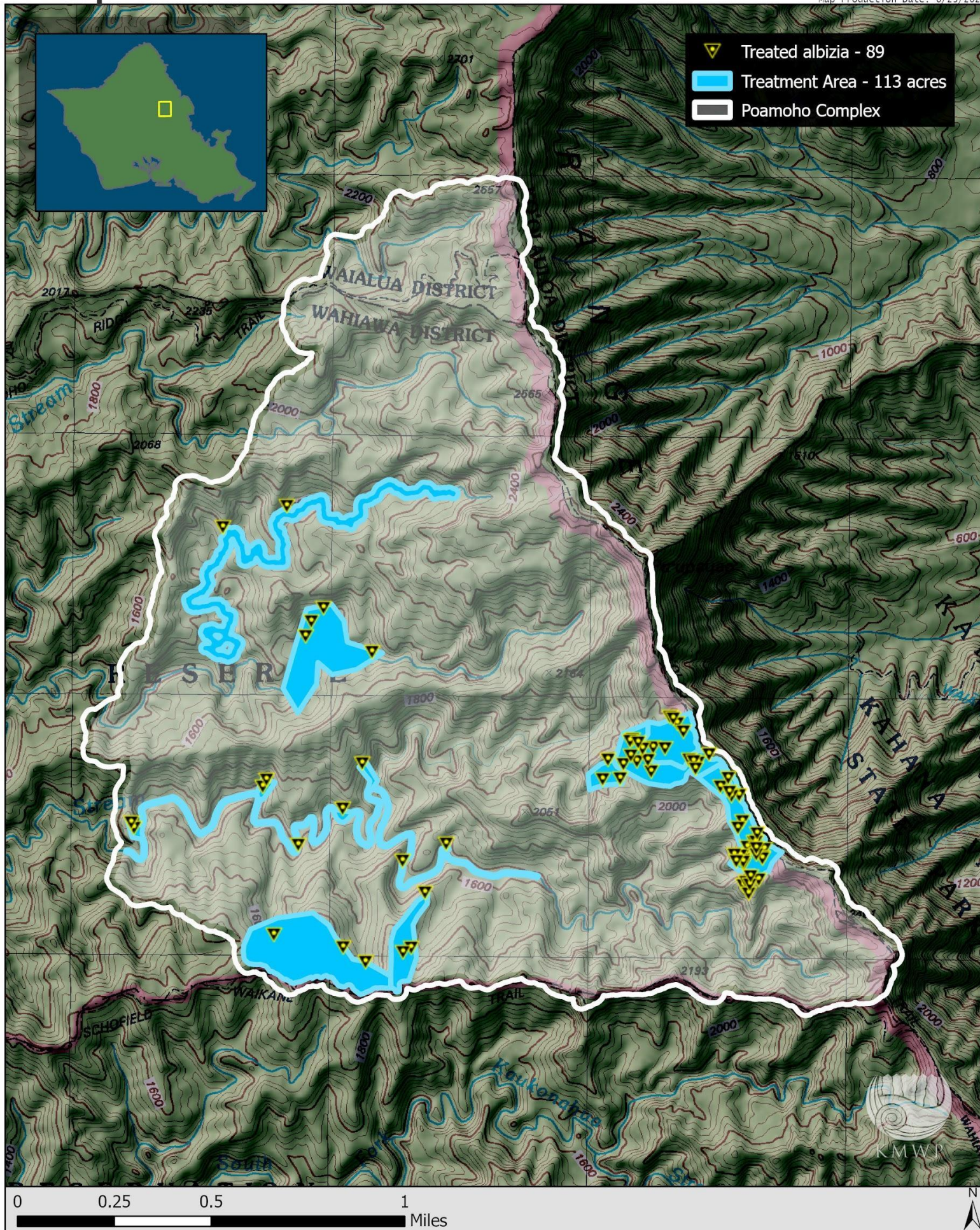


Figure 2

3. Albizia Outreach

The Rapid Albizia Death Hui had a significant impact during the project period, seeing 5 community educational events and two major community weed control outings with the Malama Manoa Community Foundation. These outings focused on clearing non-hazard albizia from Manoa stream, starting at the Manoa Shopping Center and reaching upstream to the edge of the residential zone. These two events engaged 29 community members (figure 4) and resulted in the control of over 1,100 albizia trees (figure 3) - the largest mobilization of the public for albizia management to-date. In addition to the significant work in Manoa, outreach materials were also produced in the form of a mass mailer distributed throughout Palolo valley, reaching 450 homes. Work continues to expand the reach of hui, with future efforts focused on activating windward communities.

4. Tectococcus ovatus Biocontrol Deployment

In coordination with the state's Forestry and Wildlife program, KMWP continued to distribute the *Tectococcus ovatus* biocontrol throughout the Koolau, totaling 57 sites (figure 5). Moving forward, efforts will be made to increase population density in areas with previous releases as opposed to widening distribution.

5. Goat Control

In lieu of a ground survey (due to anticipated times of goat activity and logistical limitations), a second aerial survey of the area was performed in addition to the first, covering over 3,000 acres (figure 6). The initial survey, performed on 7/6/2022, utilized a FLIR infrared camera at sunrise but no goats were seen, only a trail that they had established along the northern ridge leading to Puu Okona. A follow-up survey was performed on 12/28/2022, during which 4 adults and 2 juveniles were spotted (figure 7). Unfortunately, the northern face where these animals are spending most of their time is owned by the Department of Hawaiian Homelands - a former landowning member of the Koolau Mountains Watershed Partnership but now a non-member due to a complete lack of communication and involvement. Despite numerous attempts across over a year to engage the department, both by KMWP and by DOFAW, there has been no response. Efforts to conduct on-the-ground control have pivoted towards attempting to acquire access permission from DHHL and facilitate a joint control response with DOFAW.

Manoa Stream Albizia

Projection: NAD83 UTM Zone 4N
Basemap: World View 2
Vector Data: KMWP
Scale: 1:30,000
Map Production Date: 4/11/2023

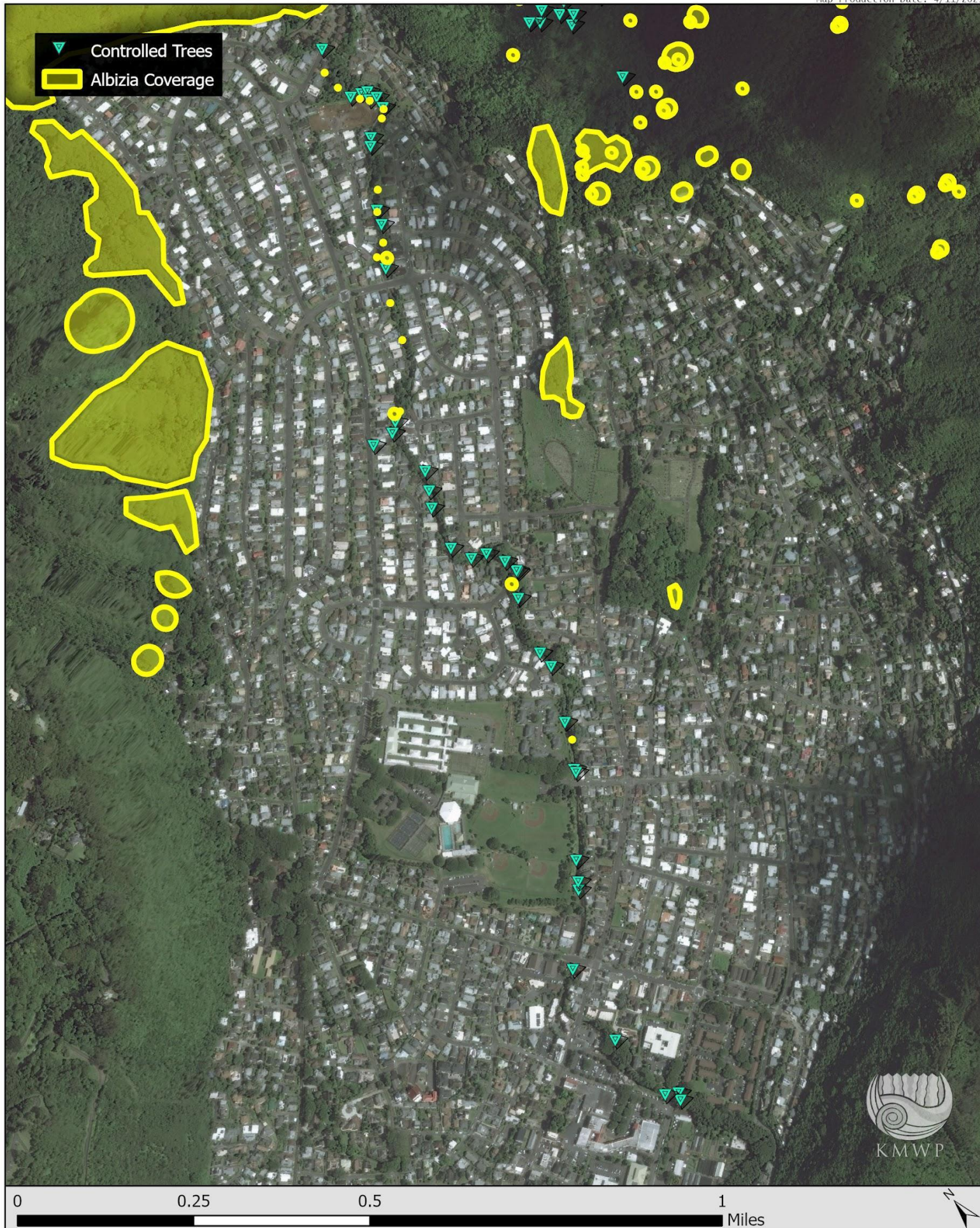


Figure 3



Figure 4. Manoa RAD hui post-stream treatment

HISC22 Biocontrol Deployment

Projection: NAD83 UTM Zone 4N
Basemap: USGS OAHU DRG
Vector Data: KMWP + DOFAW DLNR
Scale: 1:350,000
Map Production Date: 6/22/2023

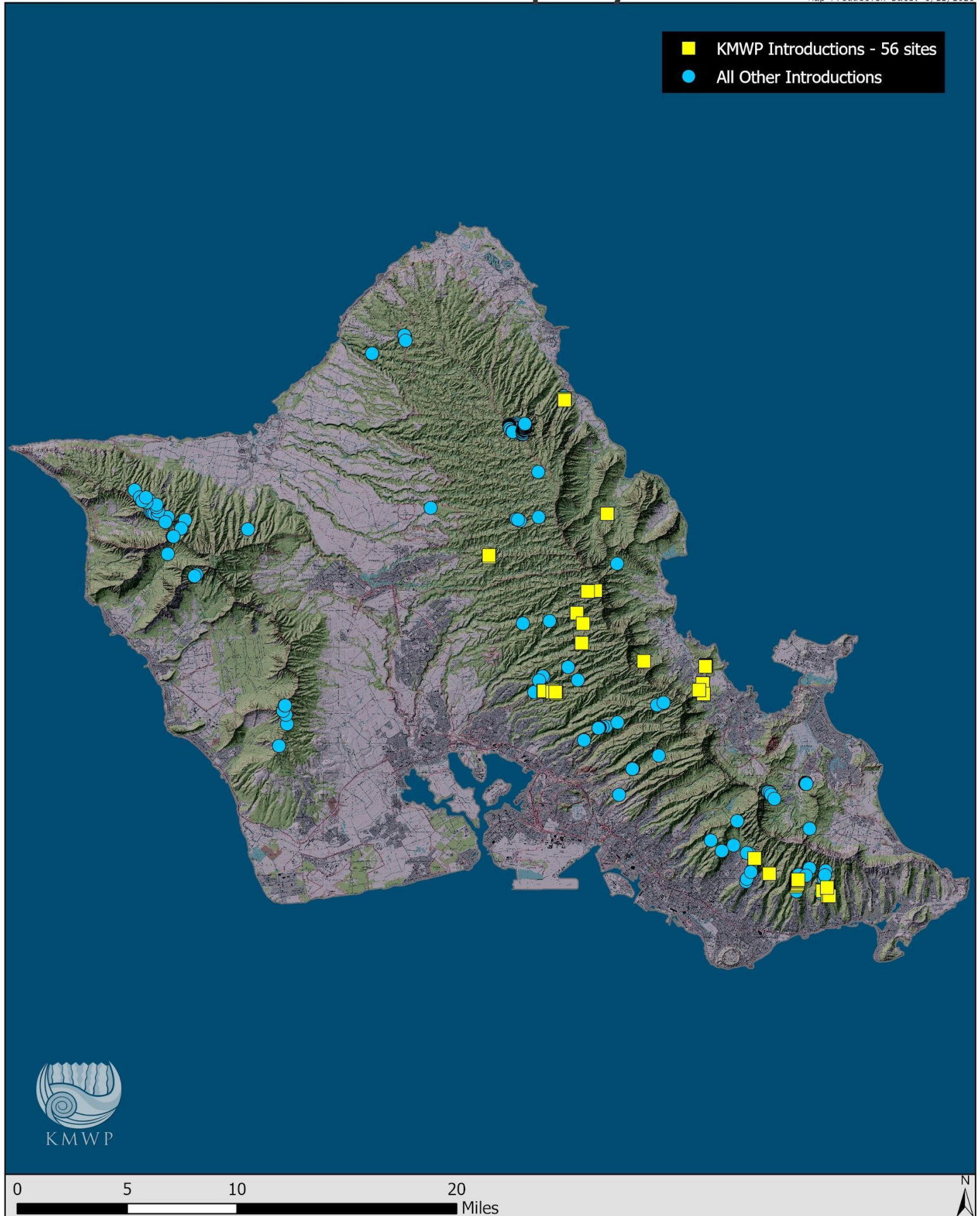


Figure 5

12/28/2022 Goat Aerial Survey

Projection: NAD83 UTM Zone 4N
Basemap: USGS OAHU DRG
Vector Data: KMWP
Scale: 1:11,770
Map Production Date: 1/3/2023



Figure 6



Figure 7. 12/28/22 Black Male in waterfall drainage, and White/black Nanny with 2 brown juveniles on windward side of Pu'u O Kona