MONITORING AND CONSERVATION OF ENDANGERED SEABIRDS ON LĀNAʻI

Rachel Sprague, Ph.D.

Director of Conservation

Pūlama Lānaʻi

PARTNERSHIPS

ARC

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

FORESTRY AND WILDLIFE
HAWAII

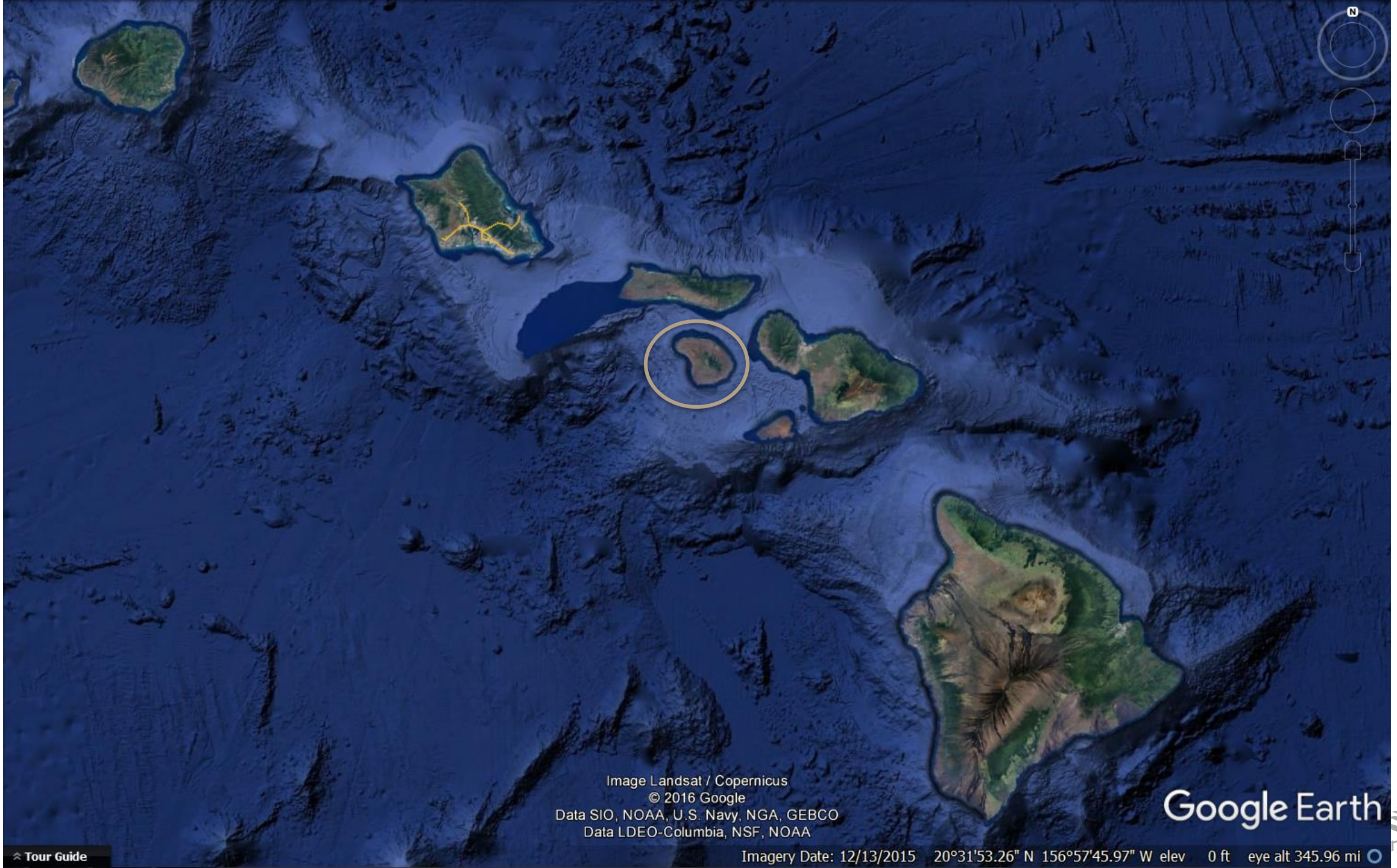
Natural Resource
DATA SOLUTIONS

Conservation Metrics
Improving conservation through better monitoring

GREY BEAR WILDLIFE SERVICES

SAN DIEGO ZOO
GLOBAL

PACIFIC RIM CONSERVATION
RESTORING BIODIVERSITY


N
Image Landsat / Copernicus
© 2016 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google Earth
Tour Guide
Imagery Date: 12/13/2015 20°31'53.26" N 156°57'45.97" W elev 0 ft eye alt 345.96 mi

NATIVE BIRDS OF LANAI, HAWAII

LAWRENCE T. HIRAI, 1323-2 Kinau Street, Honolulu, Hawaii 96814

DARK-RUMPED PETREL, *Pterodroma phaeopygia sandwichensis*. This endangered Hawaiian race formerly nested on most of the main islands, but is now considered restricted to Maui and Hawaii (Berger 1972). The population on Lanai was believed extirpated by pigs and cats (Munro 1960), but night field work from June to October 1976 confirmed the presence of the Dark-rumped Petrel in the mountain forest (Hirai 1978). A possible colony, estimated from calls and sightings to be about 100 individuals, was located in June 1976 at an elevation of 850 m at Kumoa Gulch. Although I found no burrows, the petrels probably nest on the ridge slopes, which are covered by uluhe fern and ohia-leuha. From the available information, the breeding season of the Dark-rumped Petrel on Lanai seems to be similar to that of the population in Haleakala Crater, Maui, beginning in May and extending until November.

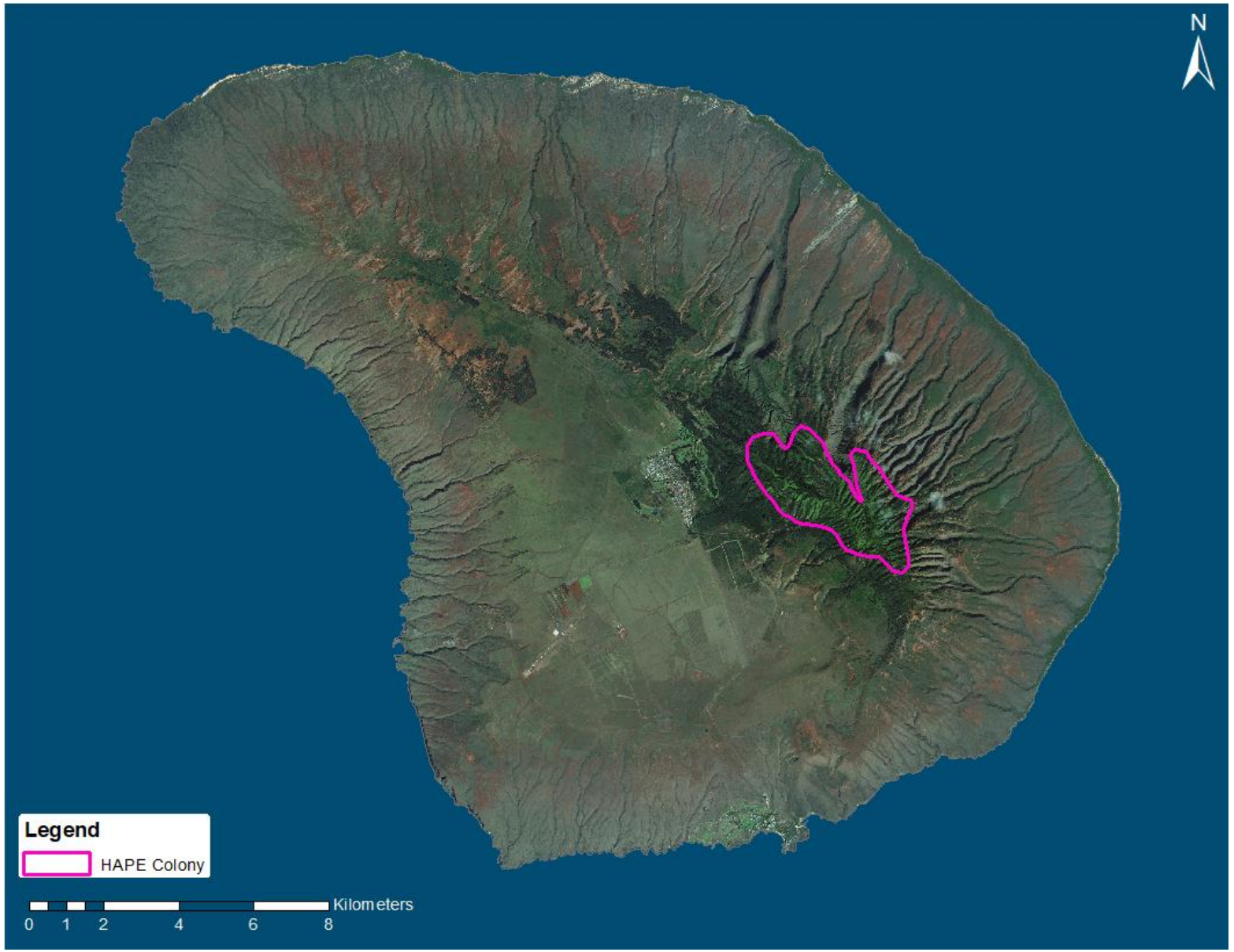
Western Birds 9:71-77, 1978

In summary, Lanai could be considered a microcosm of elements of the other Hawaiian islands in terms of mountain, valleys, forest, scrub, cliffs, and beaches; dominated by one crop, pineapple; with one company in sole ownership of its lands; and one town, the most sophisticated plantation settlement in the islands (Armstrong 1973).

- Lānaʻi ʻuaʻu colony: monitoring and trends
- Management: predator control
- Other ʻuaʻu conservation highlights
- Other endangered seabirds and landscape

‘UA‘U – HAWAIIAN PETREL

LĀNAʻI ʻUAʻU COLONY



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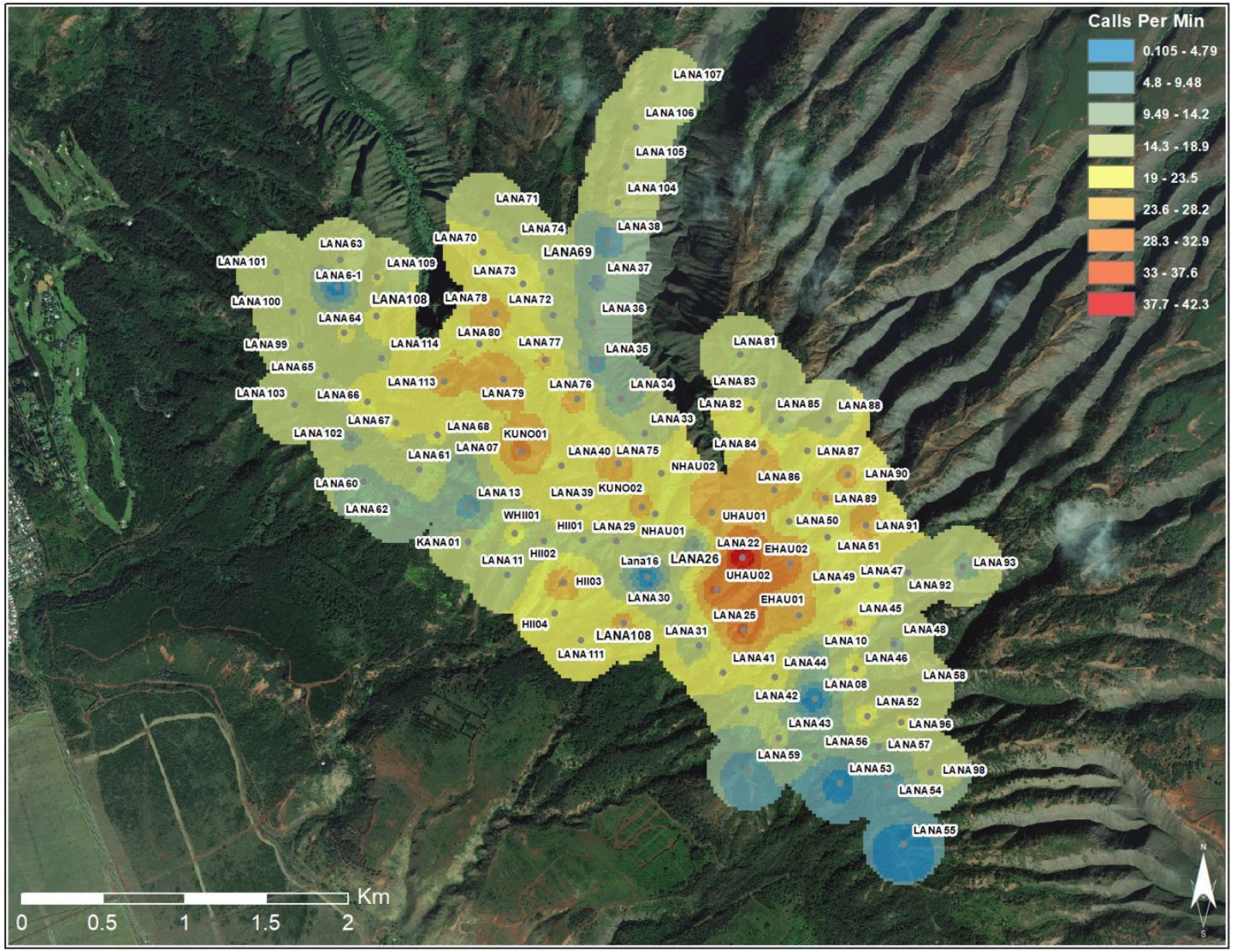
DISTRIBUTION MAPPING

‘UA‘U ACTIVITY DISTRIBUTION



Surveyed ~800 ha
(~1,900 acres)

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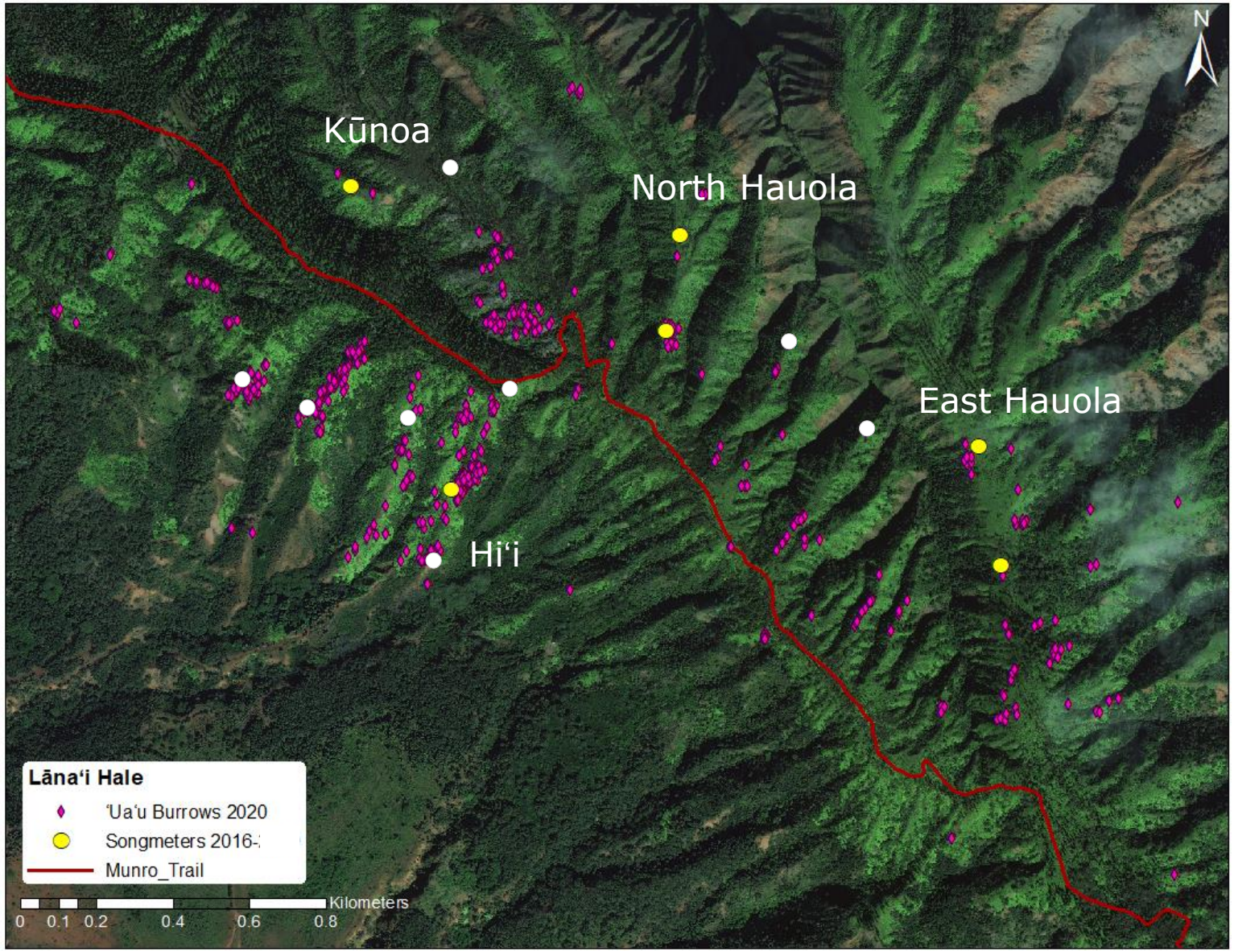
LONG-TERM COLONY MONITORING



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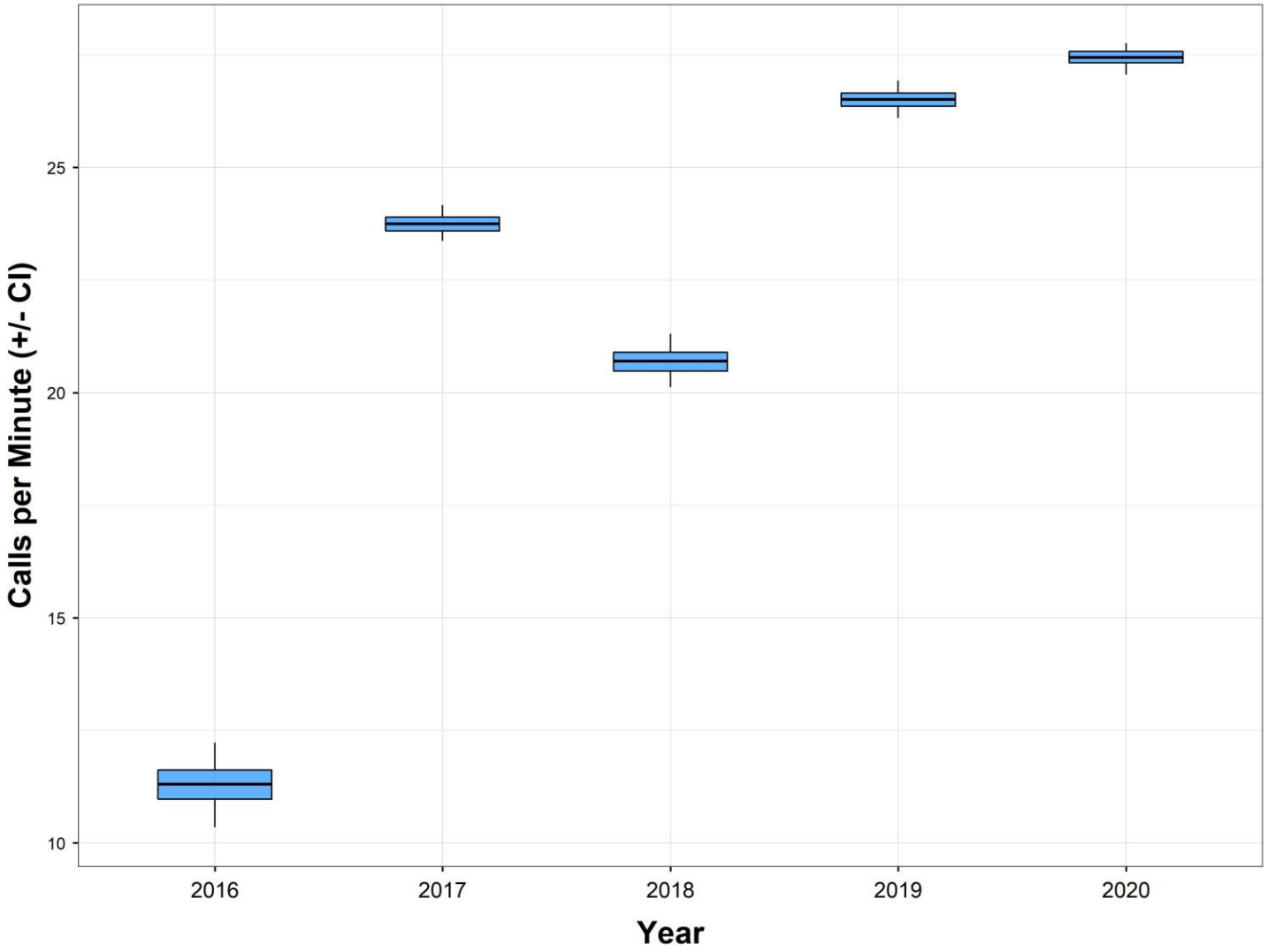
‘UA‘U ACTIVITY OVER TIME



Bayesian trend analysis:

Non-zero increase from 2016-2020

Mean yearly increase 21.74% (CI 7.71%-39.65%)

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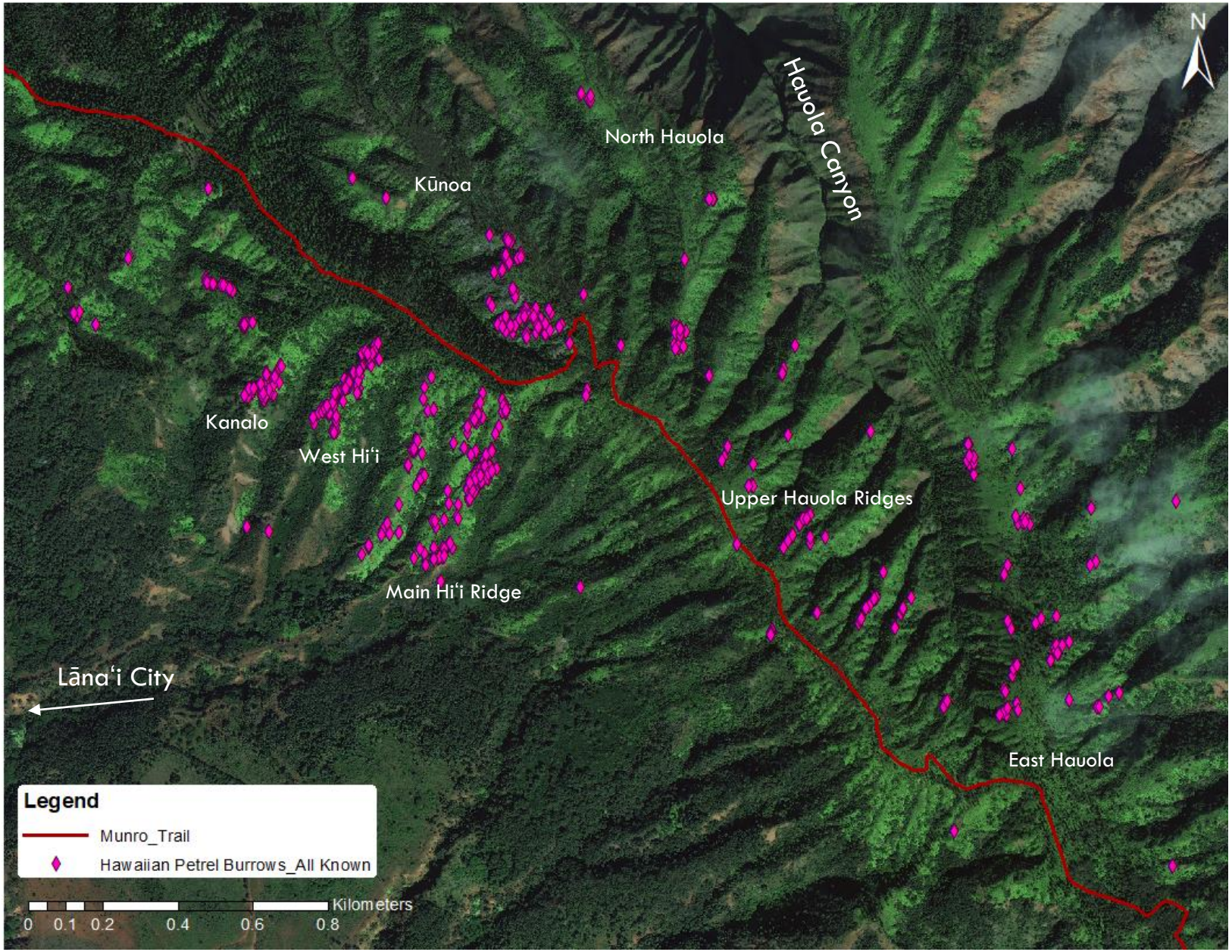
‘UA‘U KNOWN BURROWS



550+ known burrows

Perhaps found 10-15% of all burrows?

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‘UA‘U MONITORING

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‘UA‘U MONITORING PROGRAM

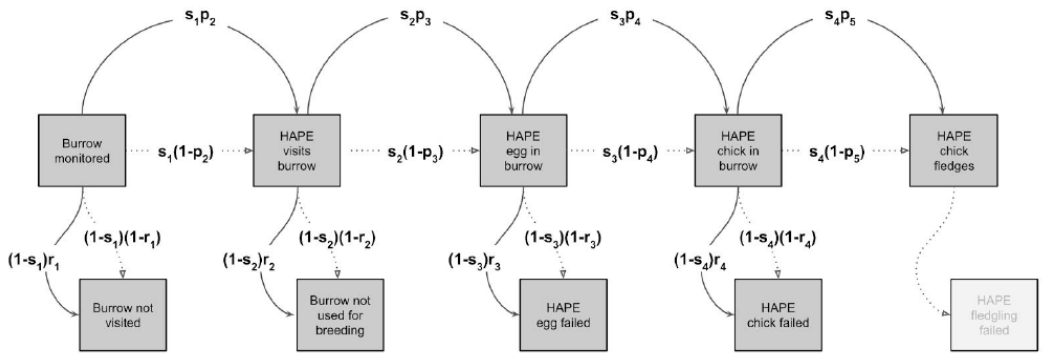
56 → 550+ known burrows from 2015-2021

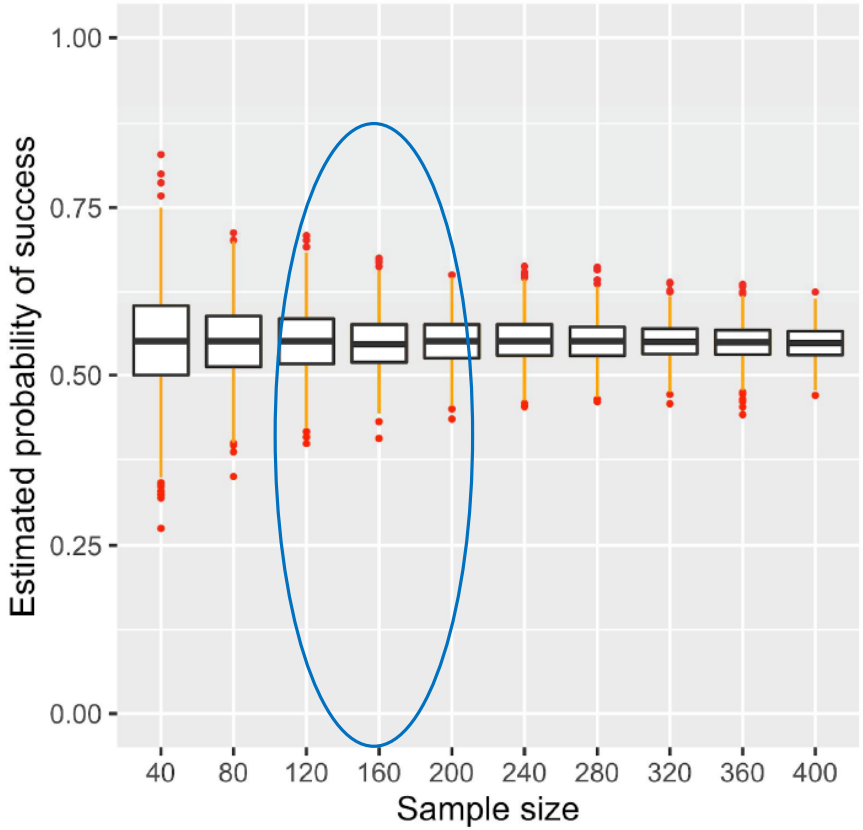
Regression and power analysis to examine variation

Optimize sample size to balance monitoring effort with confidence in results

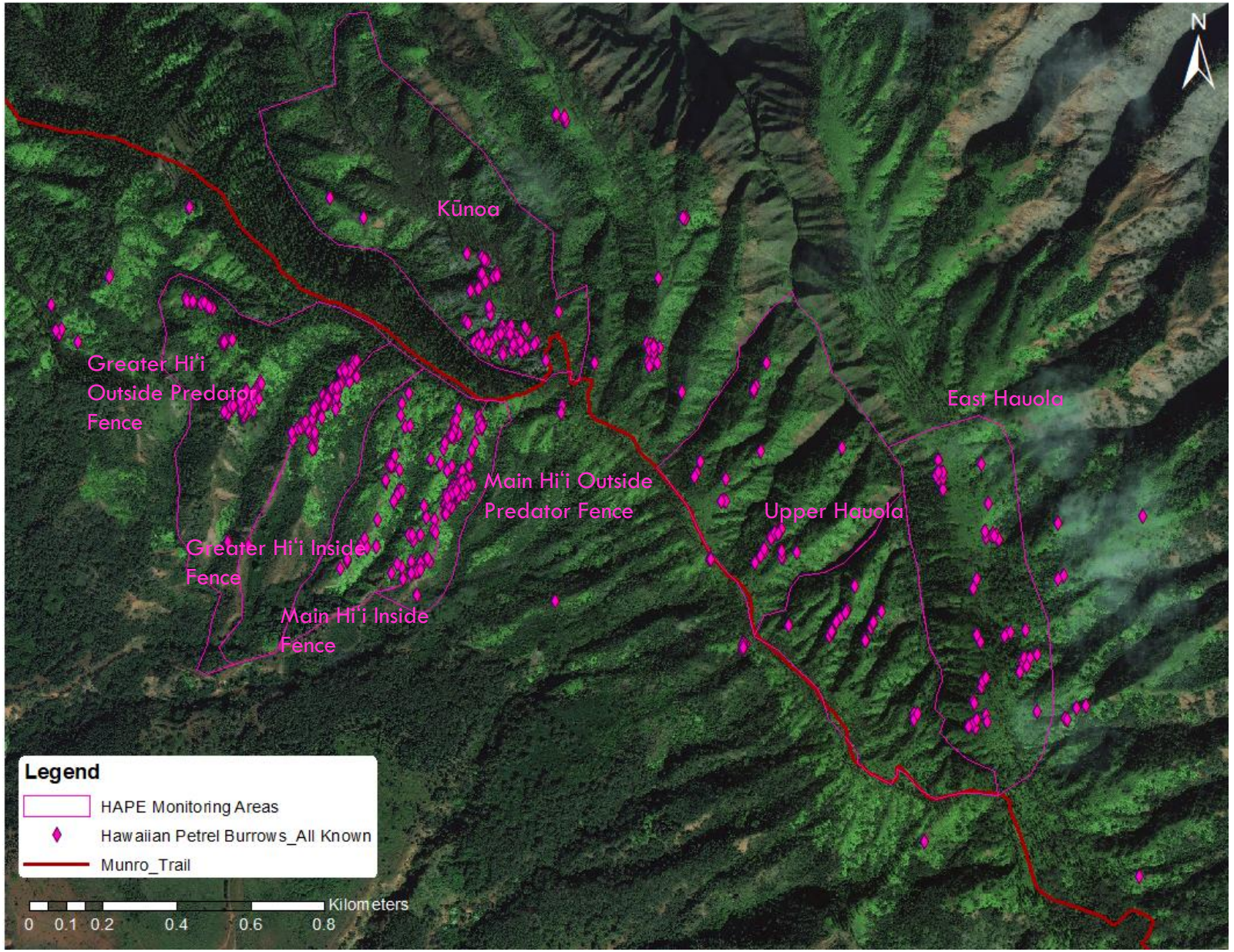
All burrows monitored with cameras and burrow scopes = ↑ confidence in assigning burrow status and outcome

New sampling design implemented in 2020





‘UA‘U MONITORING PROGRAM



In each monitoring area:

- 10 “fixed” burrows monitored each year
- 10+ additional burrows randomly selected for monitoring each year
- All burrows monitored with cameras for entire season, and in-burrow checks monthly w/scope

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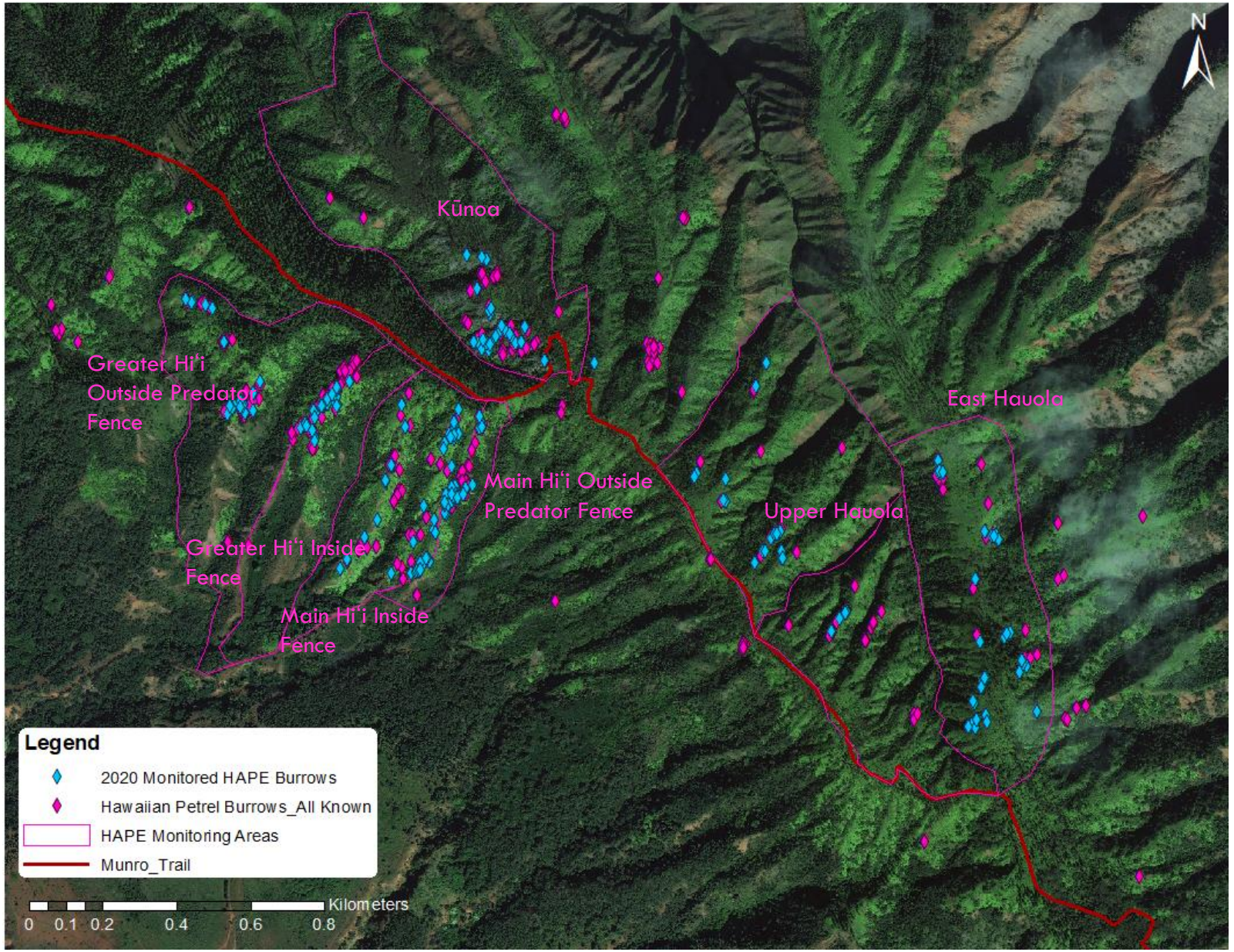
‘UA‘U MONITORING PROGRAM



2020 Monitored Burrows
N = 135

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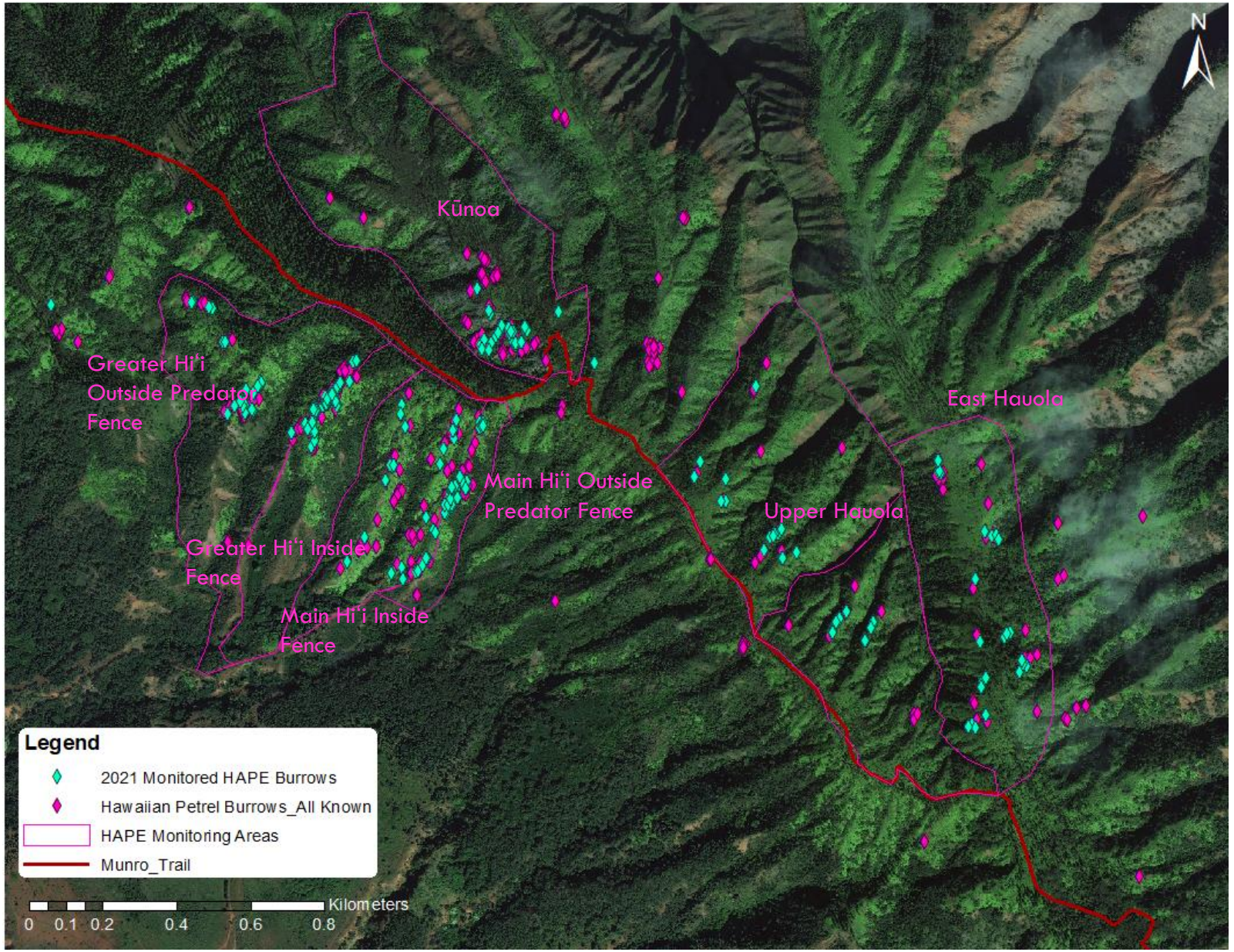
‘UA‘U MONITORING PROGRAM



2021 Monitored Burrows
N = 180

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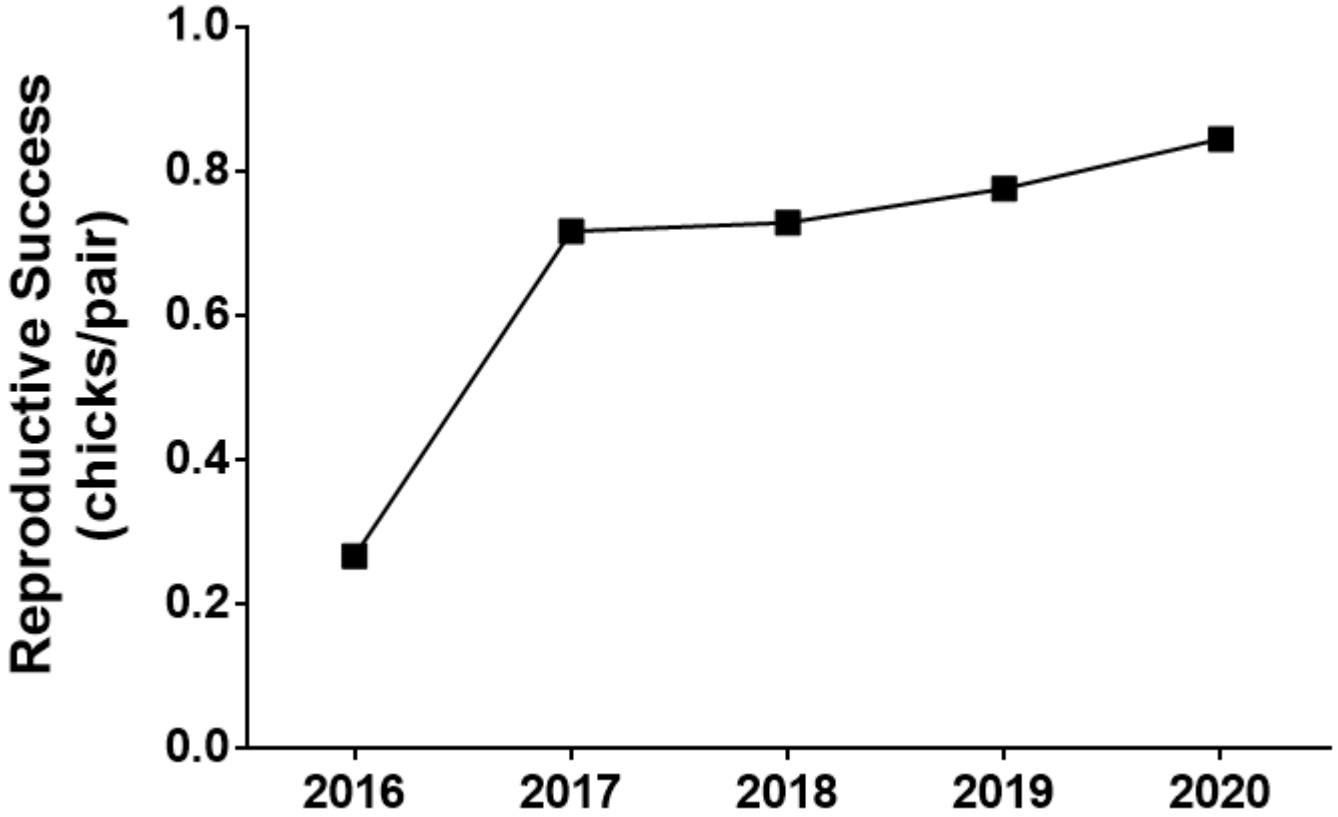
‘UA‘U REPRODUCTIVE SUCCESS



Over 200 percent increase in reproductive success

- Lānaʻi ʻuaʻu colony: monitoring and trends
- **Management: predator control**
- Other ʻuaʻu conservation highlights
- Other endangered seabirds and landscape

PREDATOR CONTROL & MONITORING

Note for Lānaʻi:

- No pigs
- No mongoose

Landscape control – use best practices for trap spacing from NZ DoC

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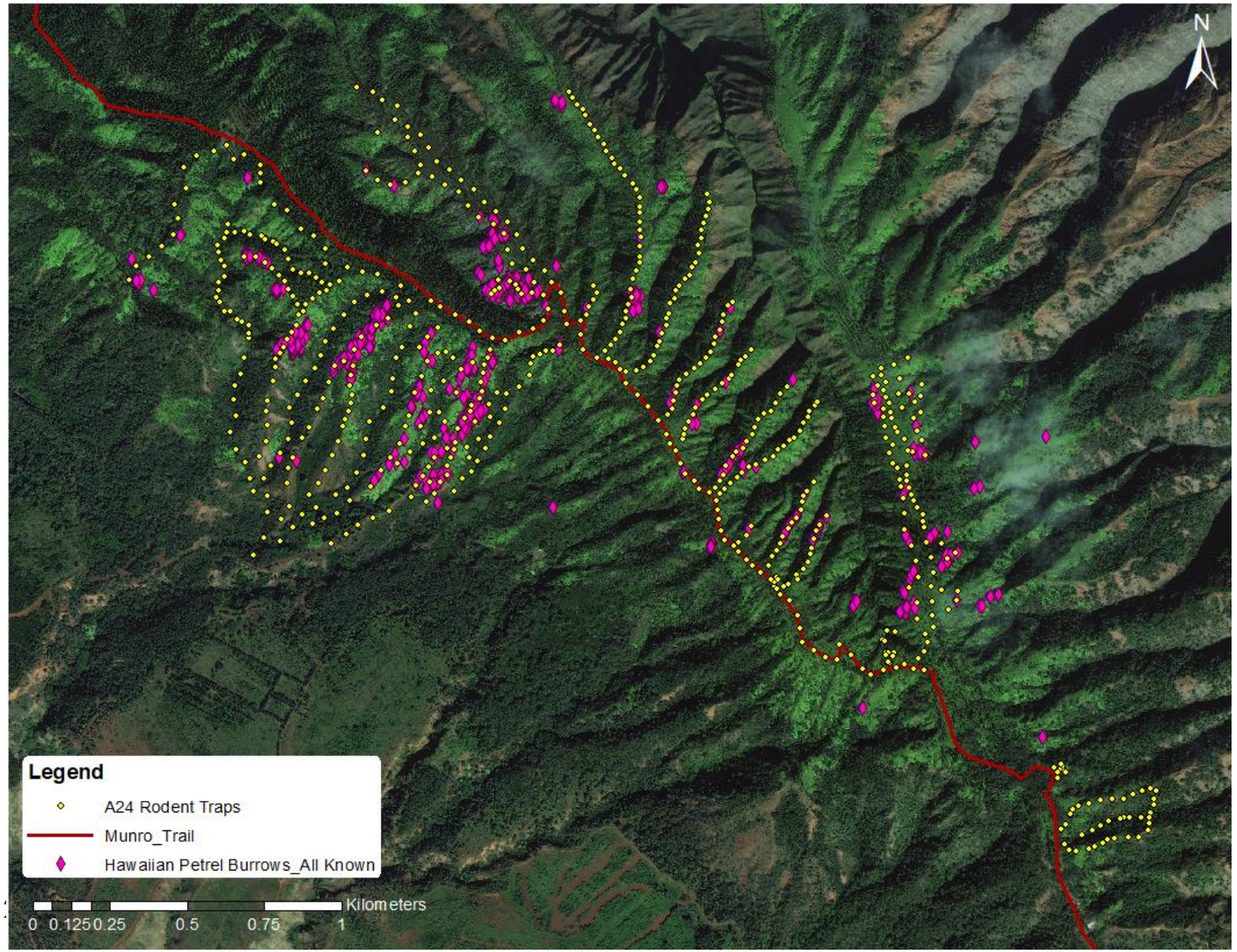
RODENT CONTROL



A24 Automatic Trap Grid:

- Traps ~25-50 m x transects ~ 100m apart
- 775 traps over ~450 acres

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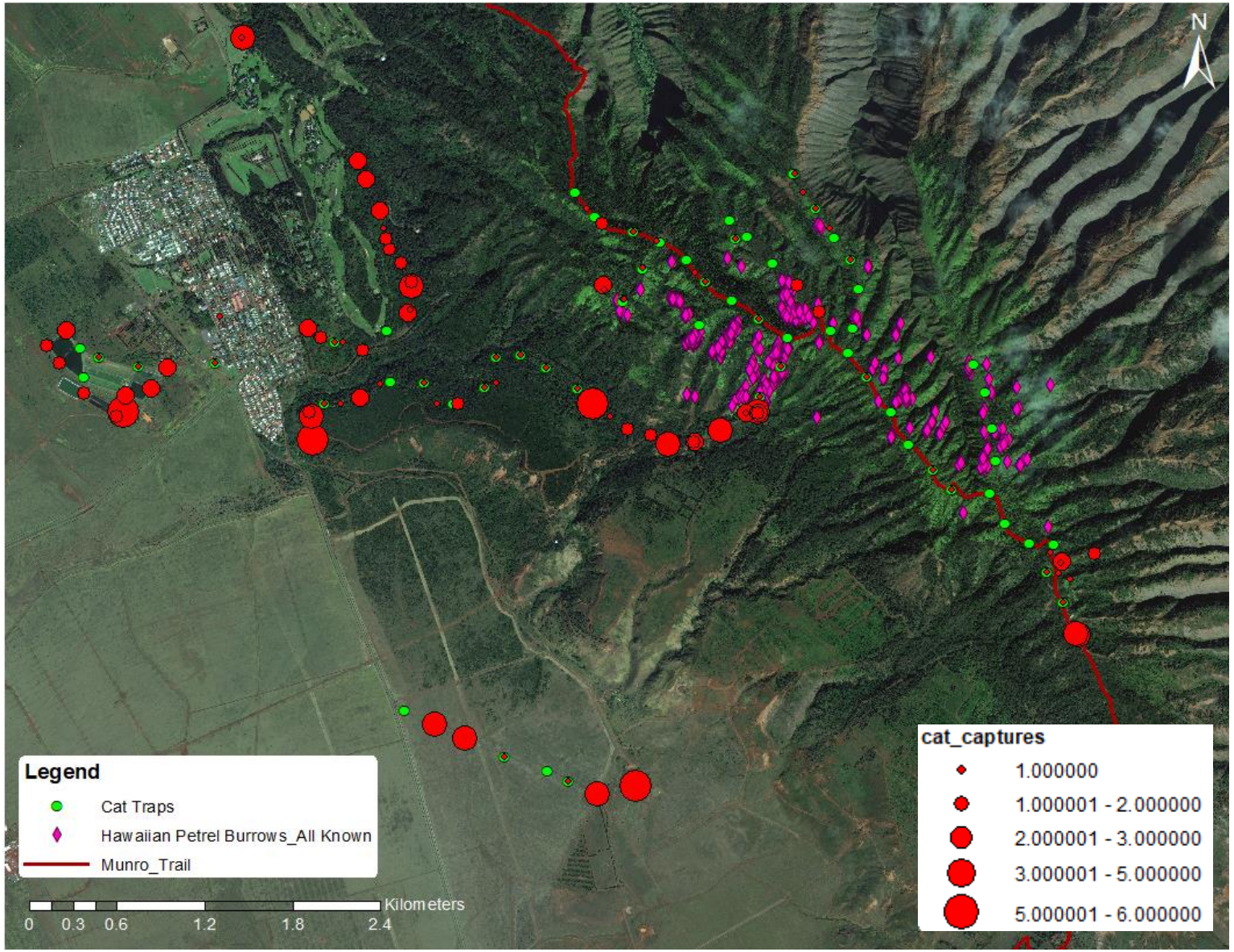
CAT CONTROL



Mesocarnivore trapping:

- Traps ~250 m x transects ~ 1 km apart
- 145 traps over ~10 miles of trails
- Landscape control
  - With large mesocarnivore home range, do not need to only trap in immediate proximity to resource
  - Space traps to cover landscape rather than cluster

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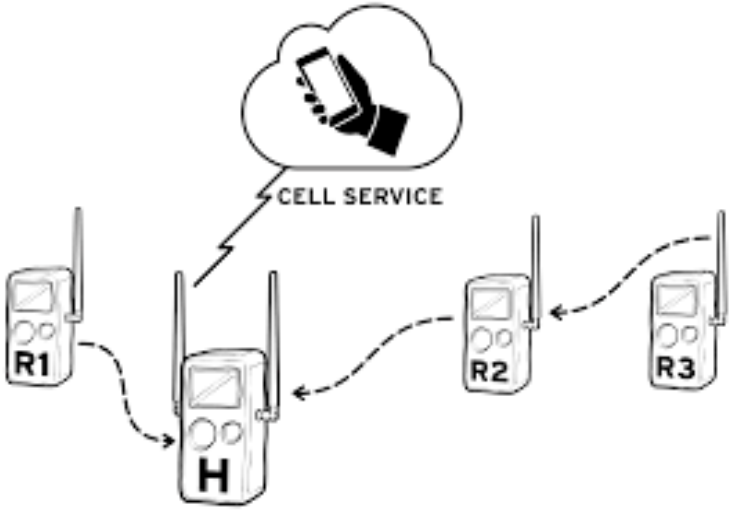
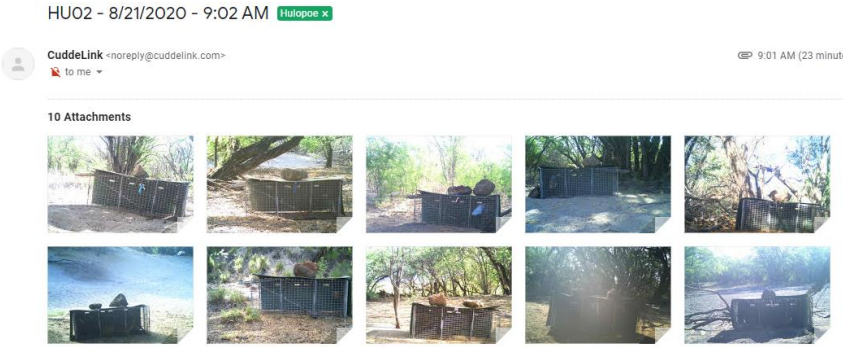
CAT TRAP CAMERA MONITORING

Mesh-networked cellular cameras



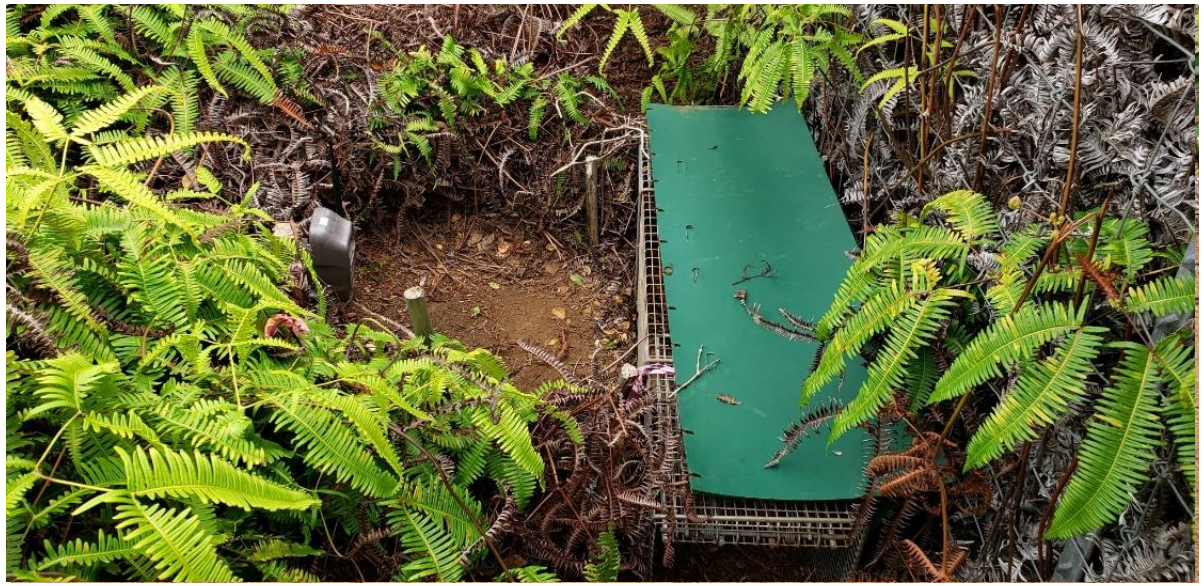


Date: 7/4/2020 - Network: HU02 - Channel: 15

#	Mode	Location ID	Camera ID	Level	Links	Battery	Battery Days	Image Queue	SD Images	SD Free Space	HW Version	FW Version	CL Version
1	! Home	001	HU02	-	-	Low !	87	0	16783	12720 MB	K-23	8.0.0	1.0.33 / 5.5.10
2	Camera	002	HU01	28	1	OK	23	1	0	12956 MB	J-3	8.0.0	1.0.33
3	Camera	003	HU03	20	1	OK	23	0	0	13674 MB	J-3	8.0.0	1.0.33
4	Camera	004	HU04	22	3	OK	23	0	0	13719 MB	J-3	8.0.0	1.0.33
5	Camera	005	HU05	18	2	OK	23	0	0	13671 MB	J-3	8.0.0	1.0.33
6	Camera	006	HU06	34	4	OK	23	0	0	13528 MB	J-3	8.0.0	1.0.33
7	Camera	007	HU07	20	3	OK	21	0	0	13817 MB	J-3	8.0.0	1.0.33
8	Camera	008	HU08	16	3	OK	23	0	0	13824 MB	J-2	8.0.0	1.0.33
9	Camera	009	HU09	30	2	OK	23	0	0	13517 MB	J-2	8.0.0	1.0.33
10	Camera	010	HU10	84	1	OK	23	0	0	14003 MB	J-2	8.0.0	1.0.33
11													

...

24 This network supports up to 24 devices.



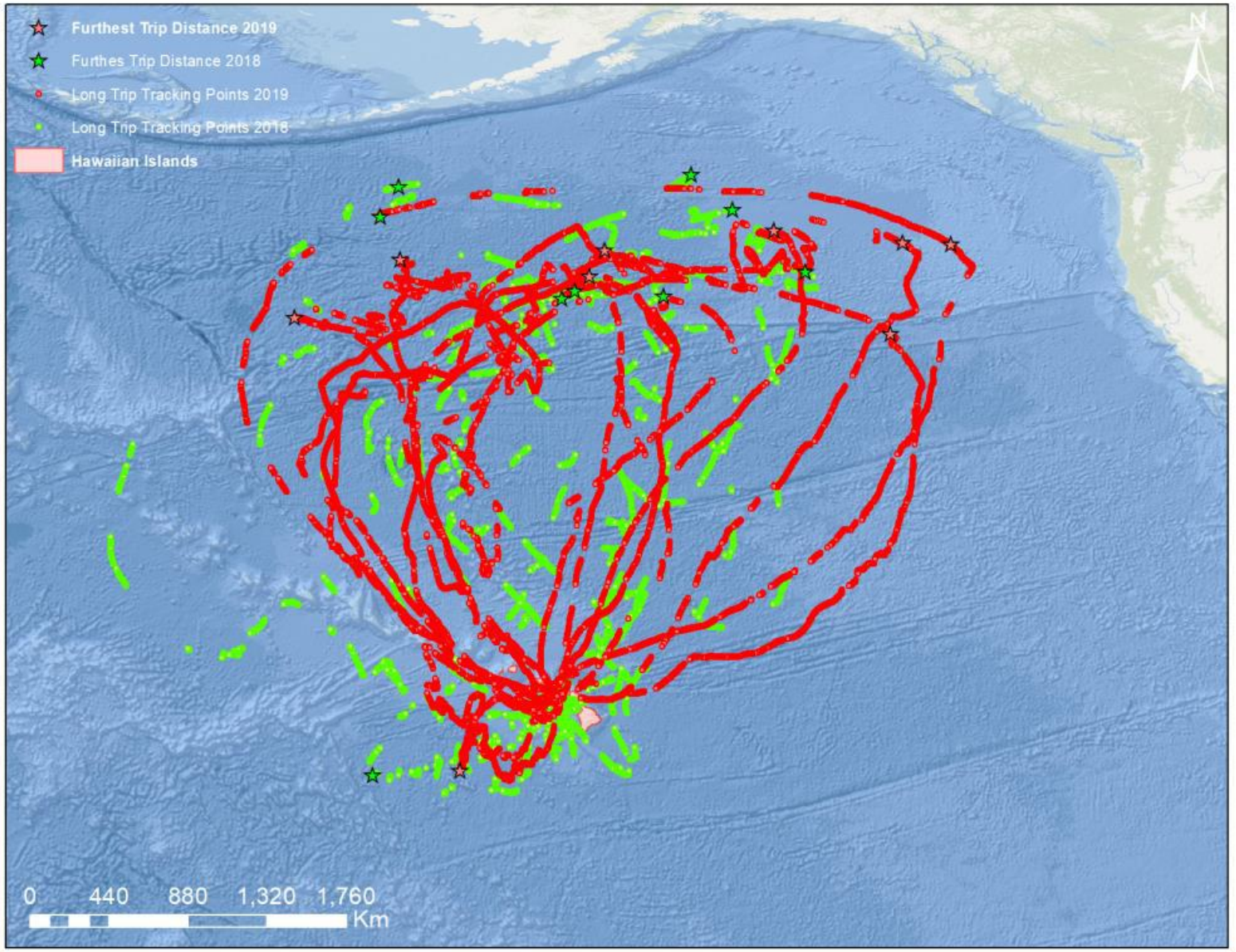
Ulama Lānaʻi

- Lānaʻi ʻuaʻu colony: monitoring and trends
- Management: predator control
- **Other ʻuaʻu conservation highlights**
- Other endangered seabirds and landscape

‘UA‘U – CONNECT MAKAI TO MAUKA

eObs - Solar GPS data loggers
2018 & 2019
30 tags deployed

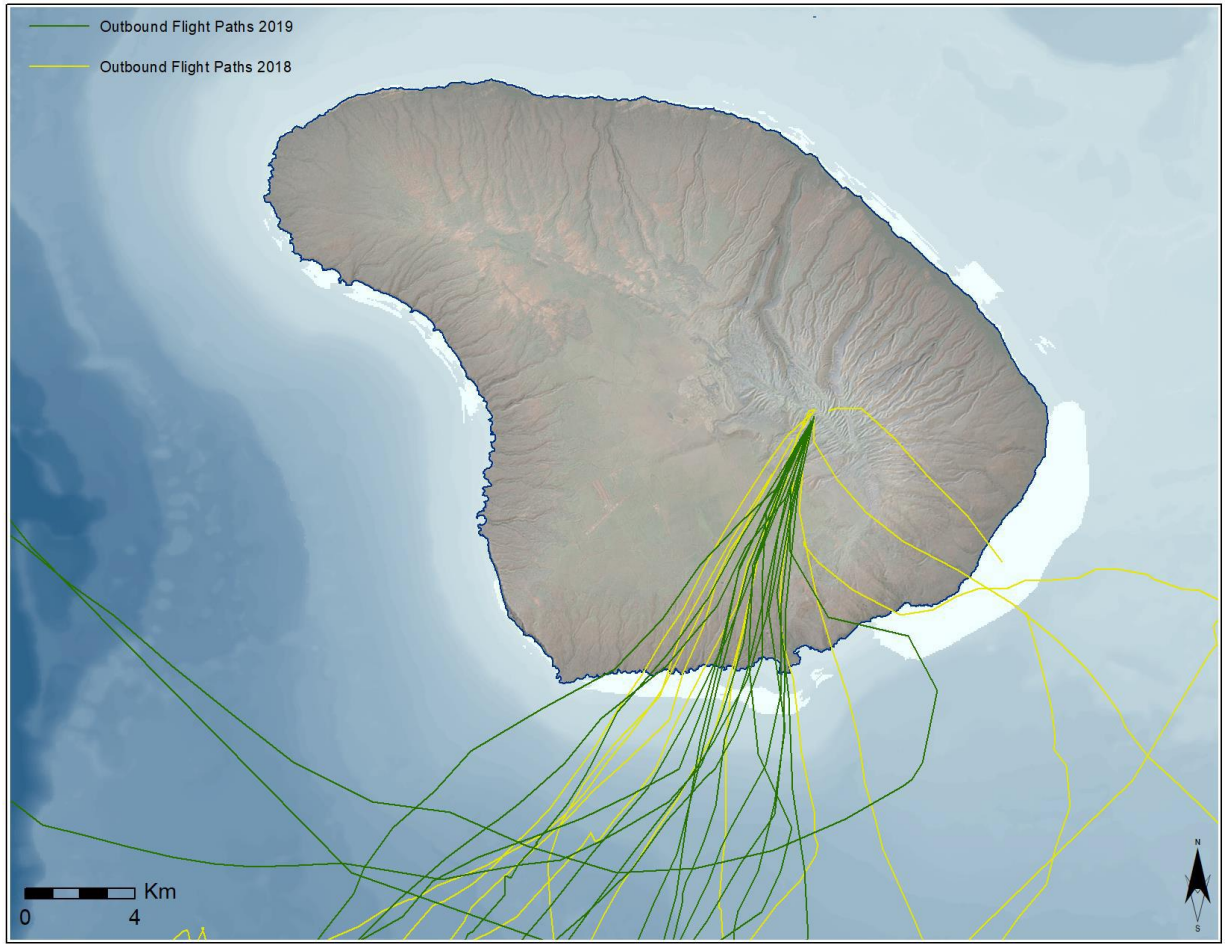
LĀNAʻI ʻUAʻU AT-SEA



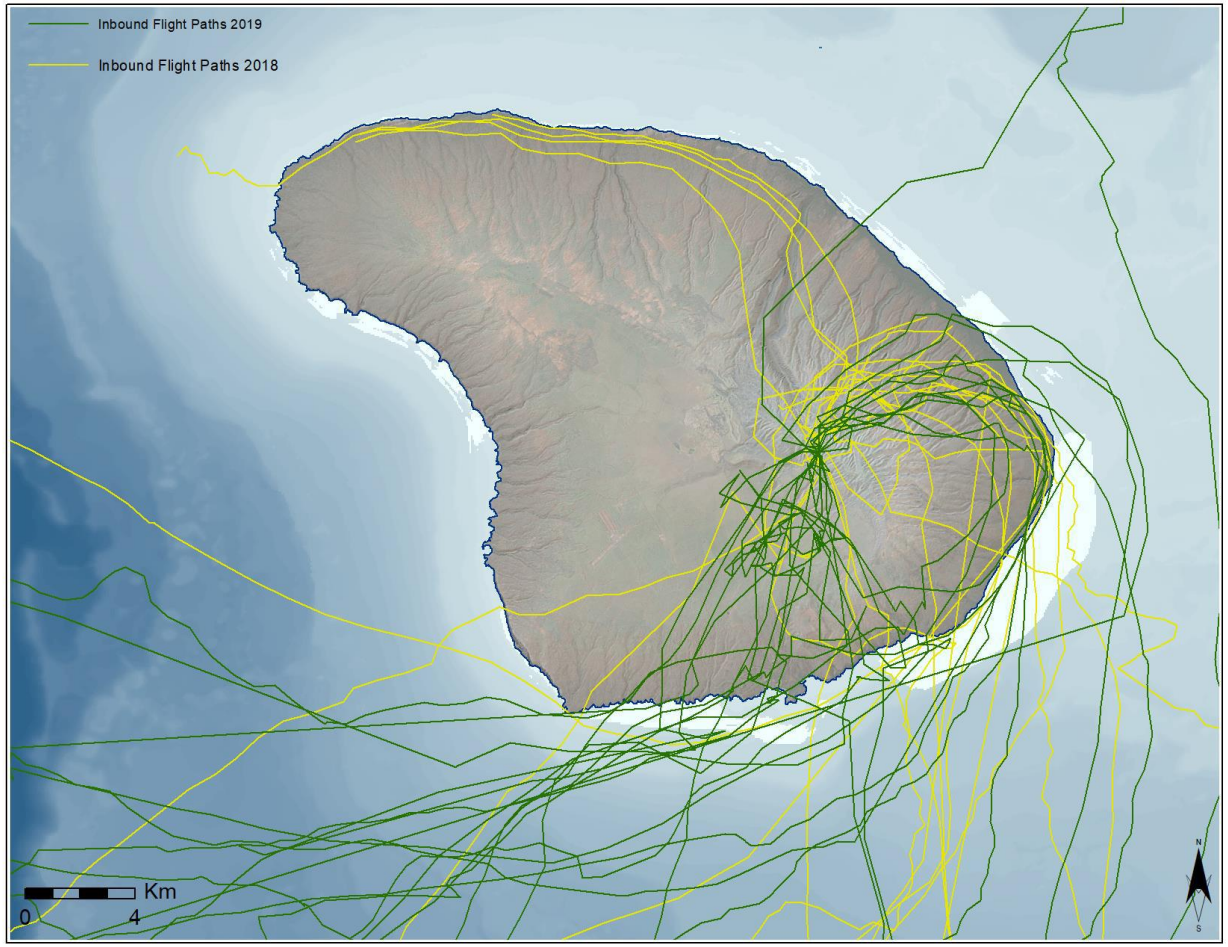
Pūlama Lānaʻi

LĀNAʻI ʻUAʻU FLYWAYS

(Raine et al. 2020)



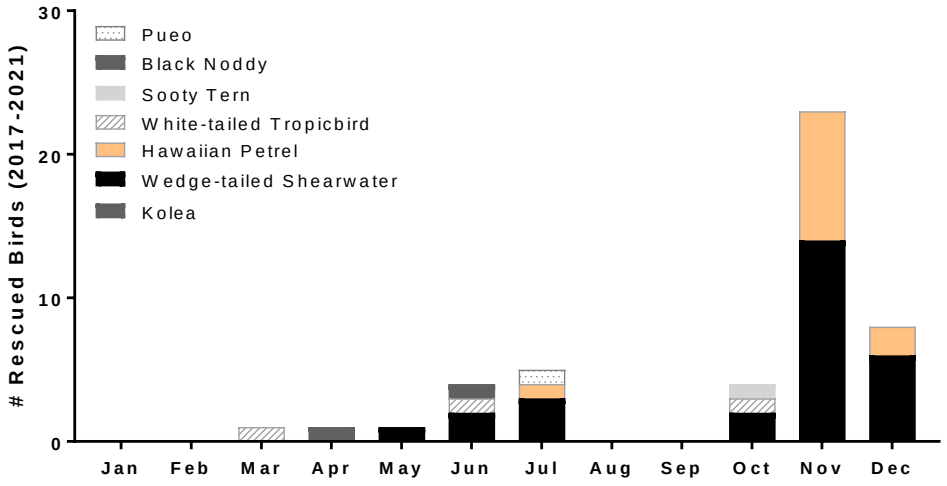
Outbound Flight Paths



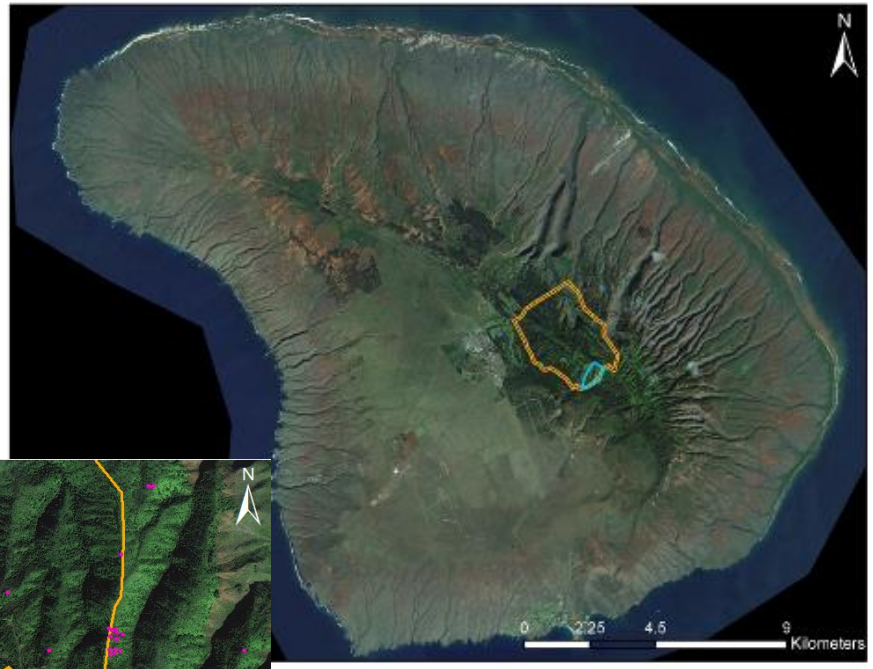
Inbound Flight Paths

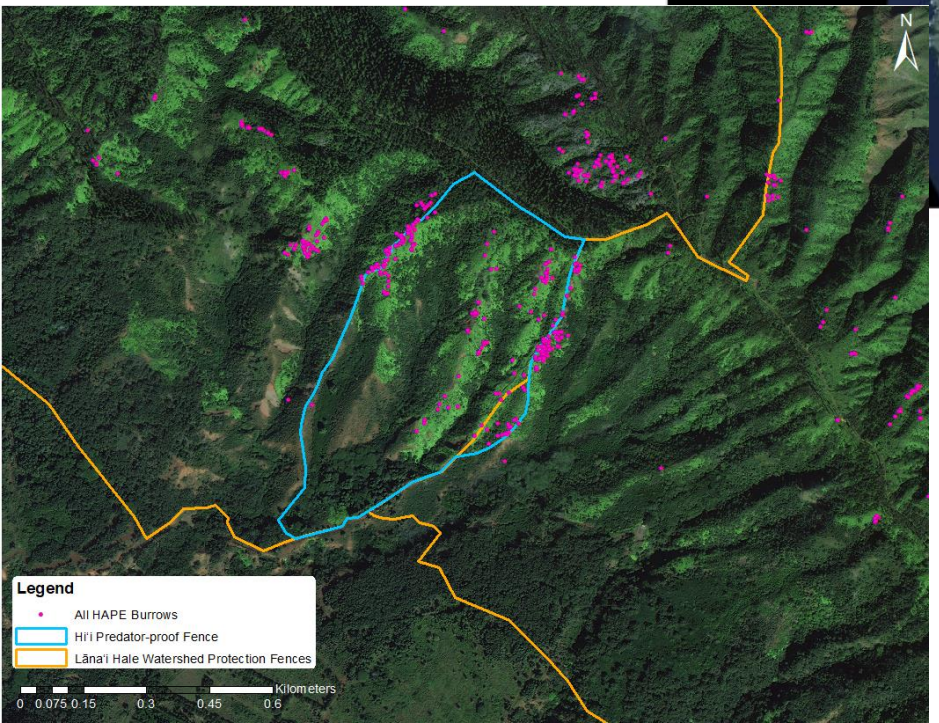
Pūlama Lānaʻi

DOWNED WILDLIFE RESPONSE



‘UA‘U PROTECTION- HI‘I PREDATOR-PROOF FENCE





Details

- Predator-proof fence enclosing ~80 acres, fully private funding
- Completion expected spring 2022
- Will protect over 130 known burrows, likely more than 500 ‘ua‘u burrows
- Will be focal area for habitat restoration (help endangered plants impacted by both rodents and ungulates)

Partners

National Fish and Wildlife Foundation NFWF

Pono Pacific Ecosystem Restoration Services

Pacific Rim Conservation Restoring Biodiversity

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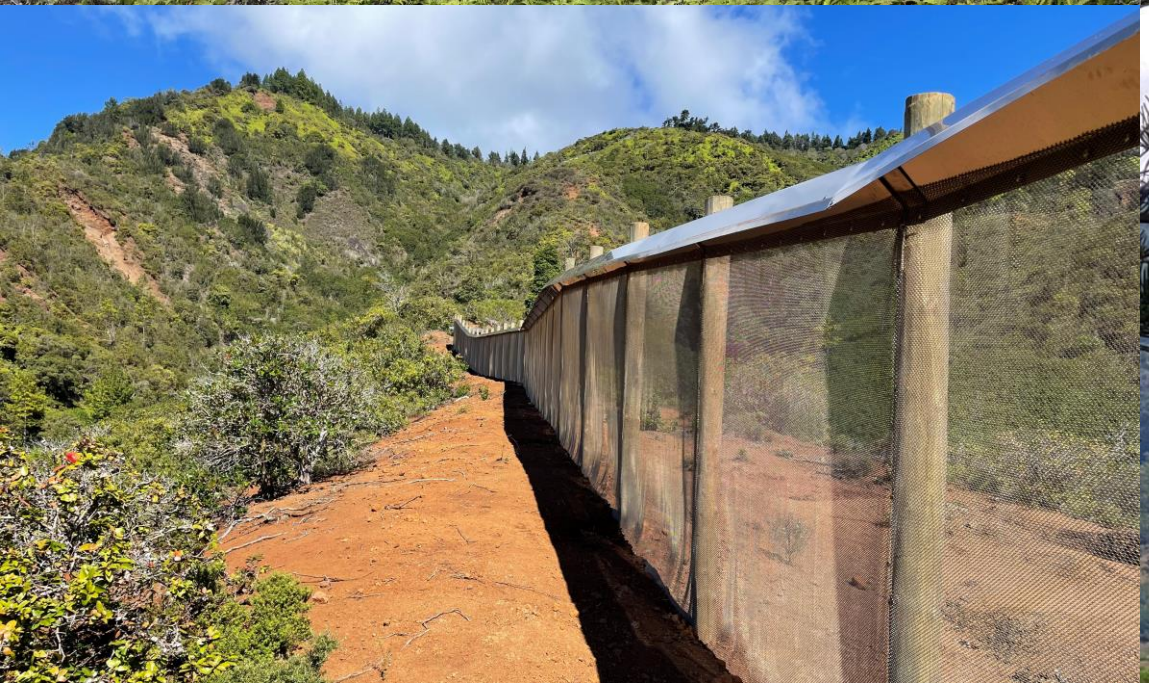

- Lānaʻi ʻuaʻu colony: monitoring and trends
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- **Other endangered seabirds and landscape**

OTHER SEABIRD SPECIES SURVEYS

All songmeter units in 2016-2019 also analyzed for:

‘A‘o, Newell‘s Shearwater

‘Ake‘ake, Band-rumped Storm-Petrel

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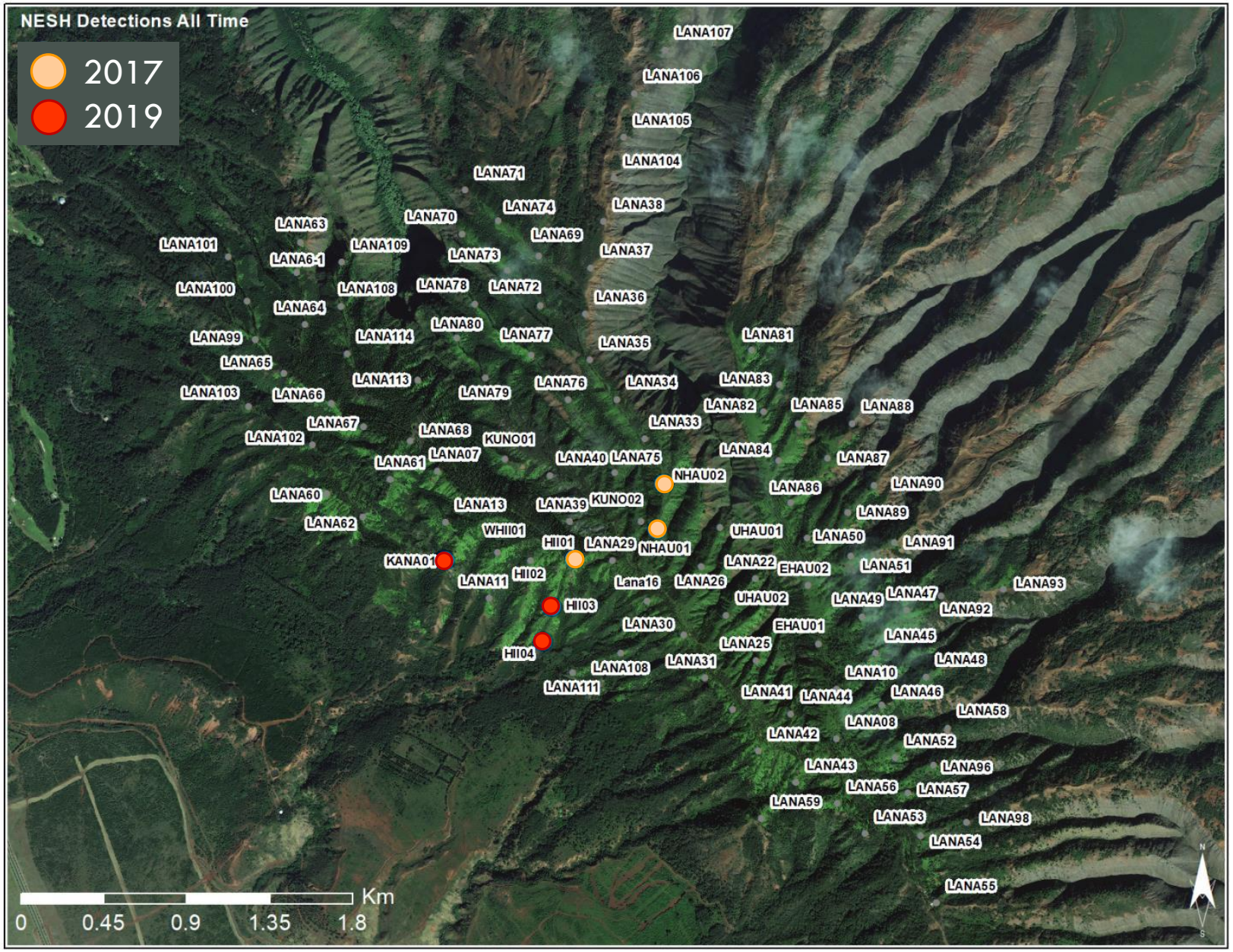
‘A‘O DETECTIONS



Single calls over 4 years of acoustic monitoring

Potential for social attraction or translocation into Hi‘i predator-proof fence?

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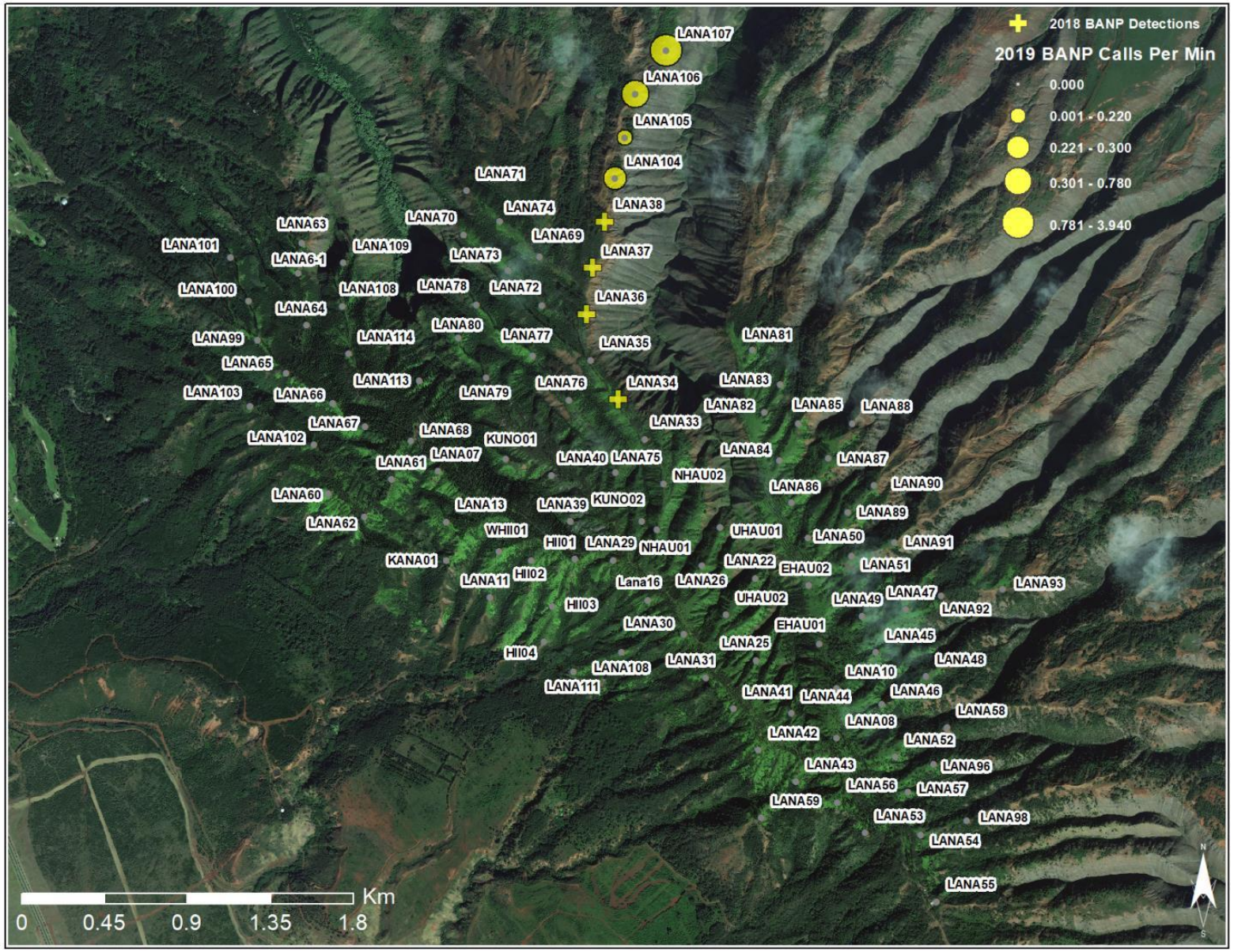
‘AKE‘AKE ON LĀNA‘I



Detected ‘ake‘ake (band-rumped storm-petrel):

2018 – six calls detected at 4 locations

2019 – moved songmeters down-canyon, found repeated calling at 4 new locations

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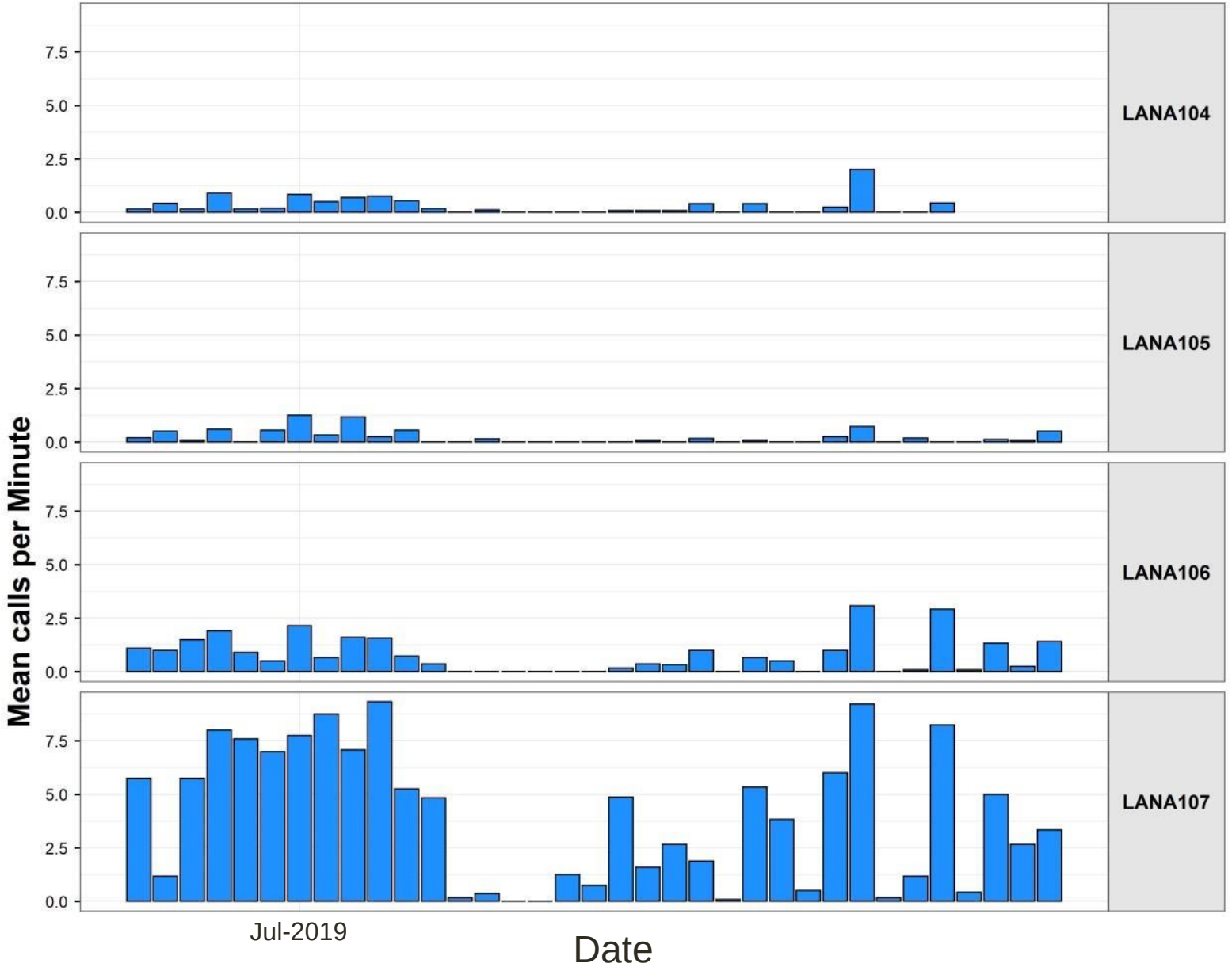
‘AKE‘AKE ON LĀNA‘I



Call rates calculated for nightly peak activity period from 60 to 120 minutes after sunset

ʻAKEʻAKE ON LĀNAʻI

2020 – in-person auditory surveys at peak activity areas

2021- acoustic monitoring further down-canyon

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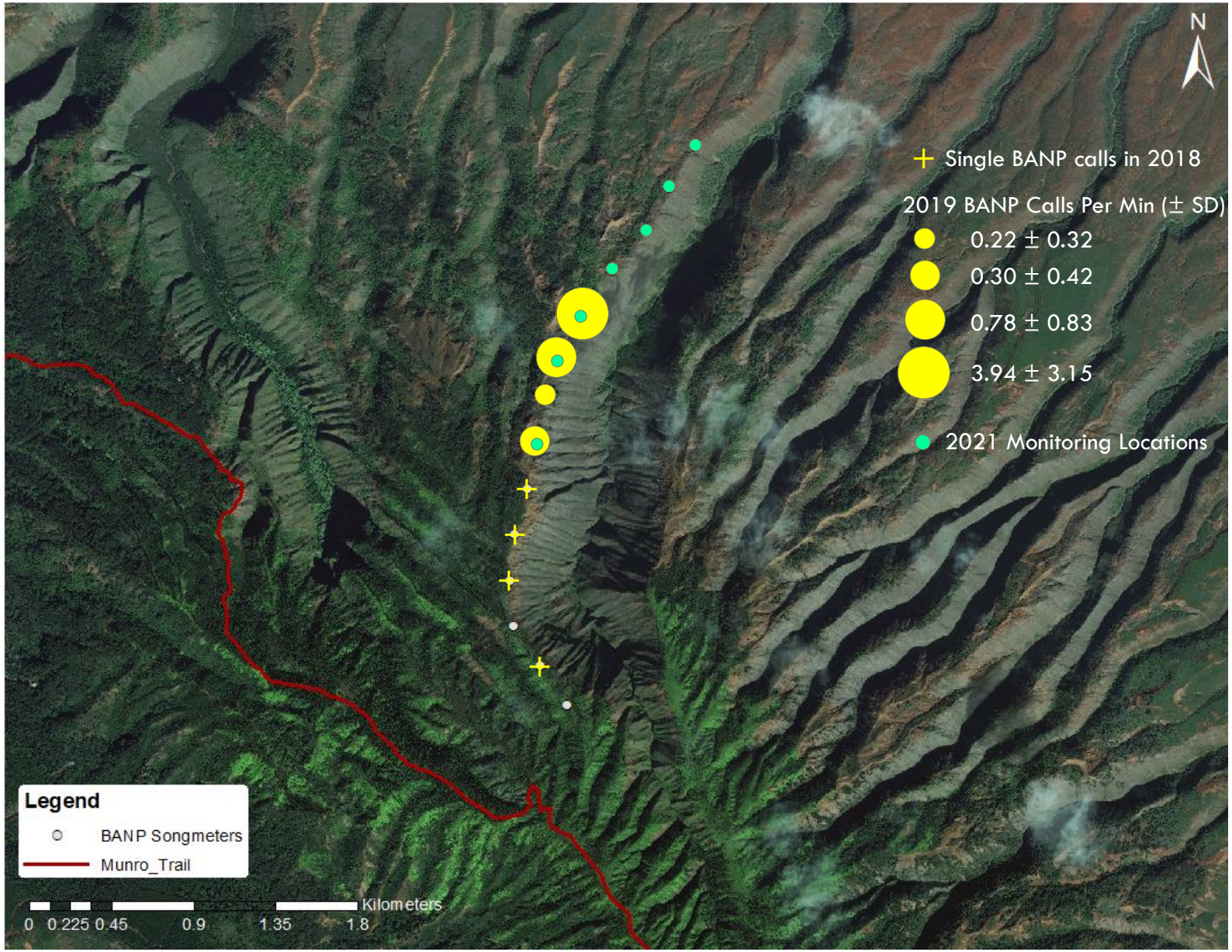
ʻAKEʻAKE ON LĀNAʻI



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ʻAKEʻAKE ON LĀNAʻI

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‘AKE‘AKE ON LĀNA‘I

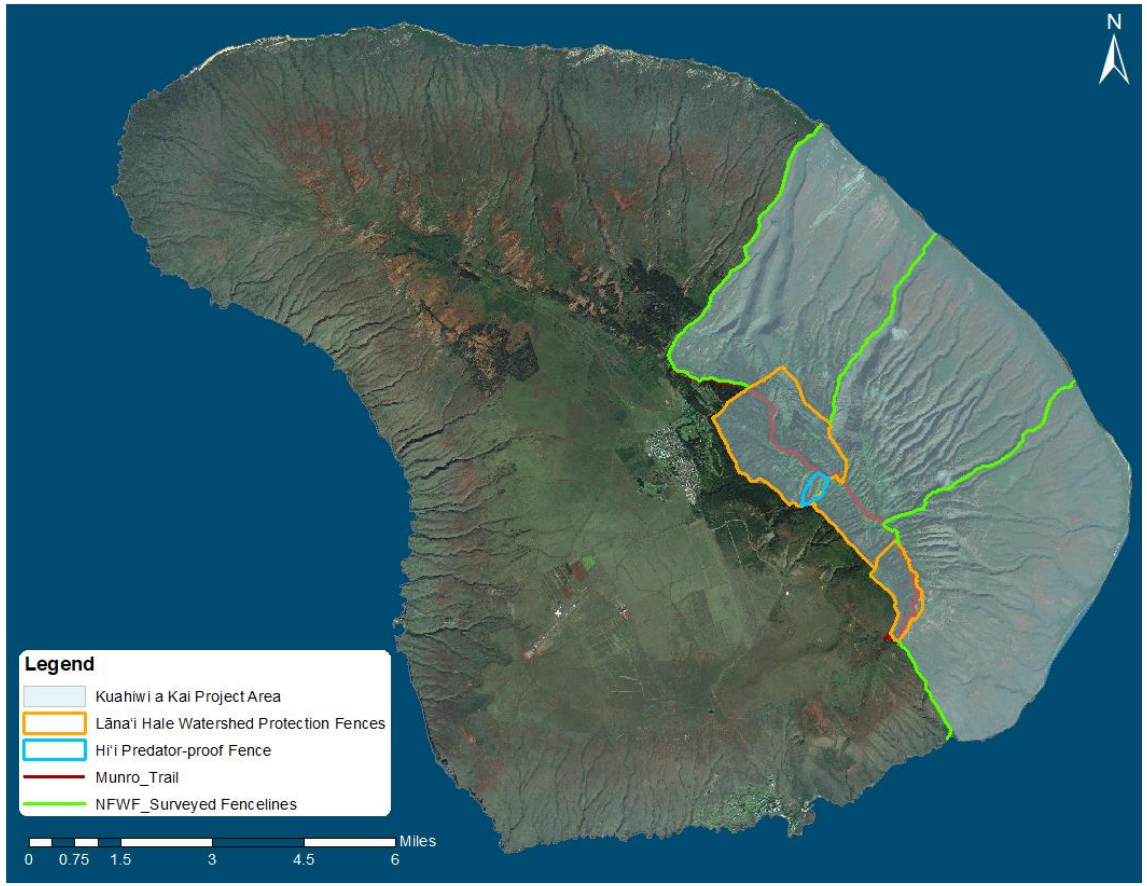
Potential for predator-proof social attraction site on the canyon rim

LANDSCAPE

Kuahiwi a Kai: Lanai Watershed Conservation

KUAHIWI A KAI: Lānaʻi Watershed Conservation Program

- Nearsighted agricultural practices and ungulate overgrazing → landscape damage and erosion destroyed ~97% of Lānaʻi's original native mesic forest.
- Threatens Lānaʻi's watershed, native plants and habitat, and continued existence of nearshore reef and fishery.
- Partnership with National Fish & Wildlife Foundation (NFWF).
- 20,000+ acre landscape level initiative to restore windward Lānaʻi; focal resources: **native seabirds** and nearshore reefs.
- Start of long-term committment to conservation on Lānaʻi's windward side – first grants awarded in 2020.



NFWF Pūlama Lānaʻi

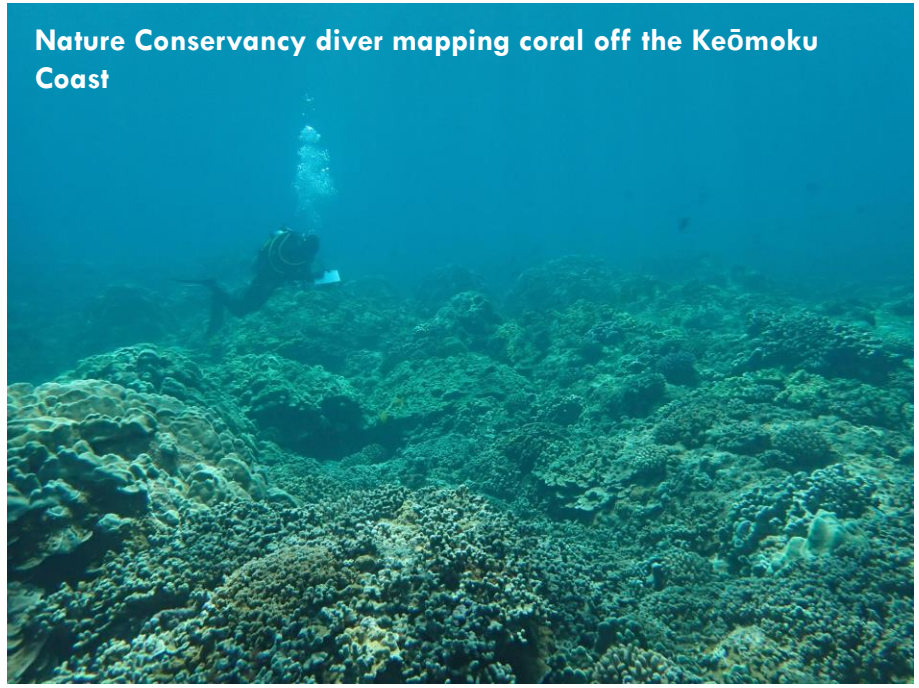
KUAHIWI A KAI

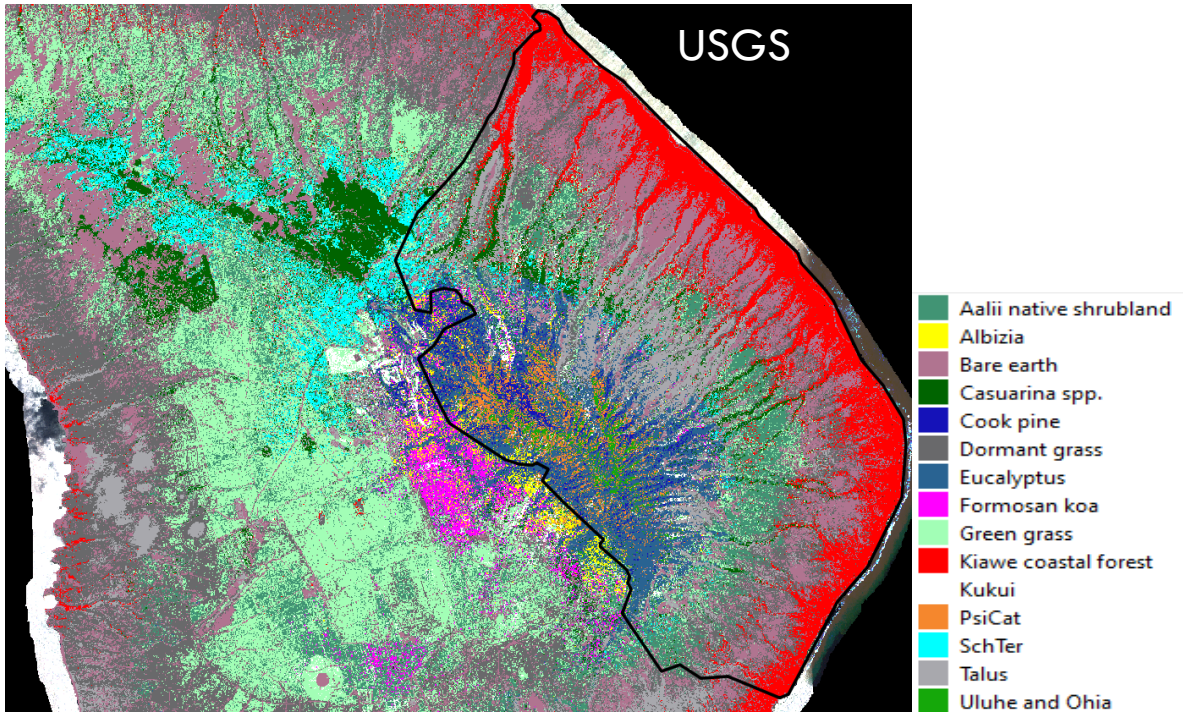
2020-2021 – Mapping & baseline assessment

- Field survey and LiDAR-based erosion maps *(USGS)*
- Vegetation classification, change over time, and prioritization *(USGS)*
- Water quality monitoring *(UH)*
- Nearshore reef health & coral mapping *(The Nature Conservancy, NASA)*
- Fenceline planning *(Pono Pacific)*
- Seabird monitoring plan development *(San Diego Zoo)*
- Hi‘i predator-proof fence *(Pono Pacific)*

2021+ – Implementation

- Begin ungulate fence construction *(Pono Pacific)*
- Community stewardship and deer removal *(Lāna‘i Culture and Heritage Center)*
- Outreach, documentation, and community storytelling *(Kekulamamo/Anthony Pacheco)*





MAHALO NUI LOA

Jonathan Sprague, co-Director of Conservation

Kurt Matsumoto

Current and former Pūlama staff, including

Elizabeth Kain, Grazel Caceres, John Deslippe, Zane Dela Cruz, Dr. Christina Donehower, Christina Pisani, Jonathan Rodriguez, Kari Bogner, Pili Gella, Ryline Benanua, Mos Masicampo, Gabe Johnson

Field Work:

Data Mgmt and Analysis

Funding Support:

Partnership and Guidance:

MAHALO!