

# Monitoring for Marbled Murrelet and Northern Spotted Owl at Naval Radio Station Jim Creek with Implications for Future Marbled Murrelet Surveys

Adam Duarte<sup>1</sup>, Alicia M. Higgs<sup>2</sup>, Alaina D. Thomas<sup>1</sup>, Damon B. Lesmesister<sup>1</sup>

1. USDA Forest Service, Pacific Northwest Research Station

2. Naval Facilities Engineering Systems Command, Naval Station Everett



# ***DoD Natural Resources Management Program***

- Sikes Act - the conservation and rehabilitation of natural resources on military installations
- Requires Integrated Natural Resources Management Plan (INRMP)



# ***DoD Natural Resources Management Program***

**Marbled Murrelet**  
(MAMU)

*Brachyramphus marmoratus*  
ESA threatened



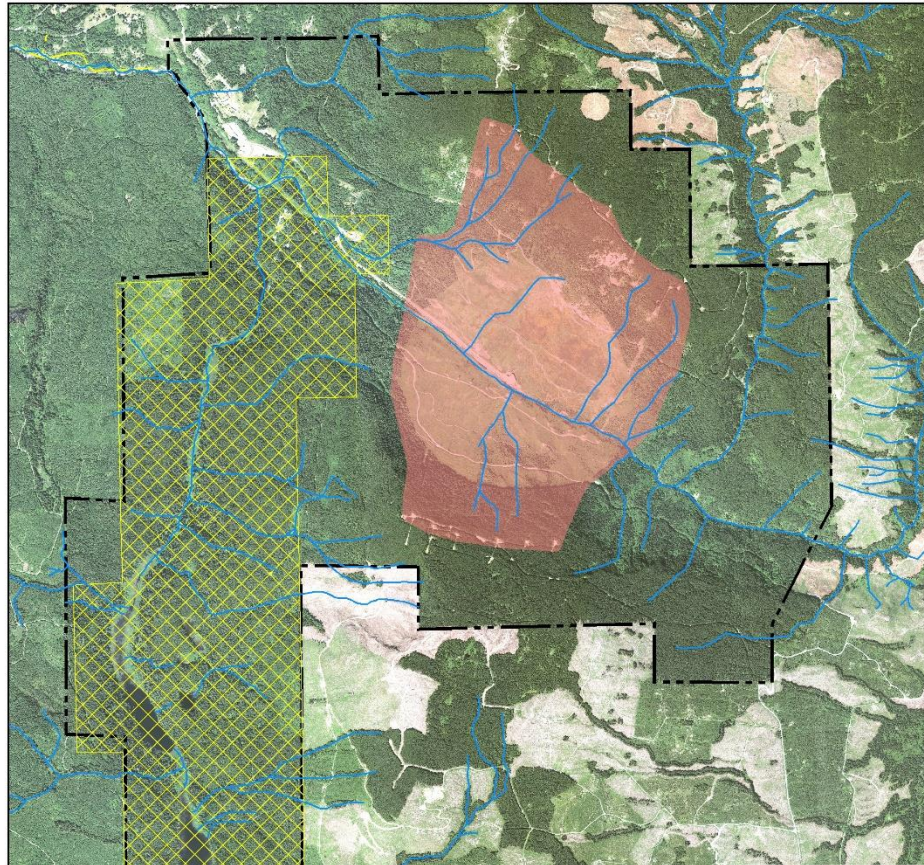
**Northern Spotted Owl**  
(NSO)


*Strix occidentalis caurina*  
ESA threatened

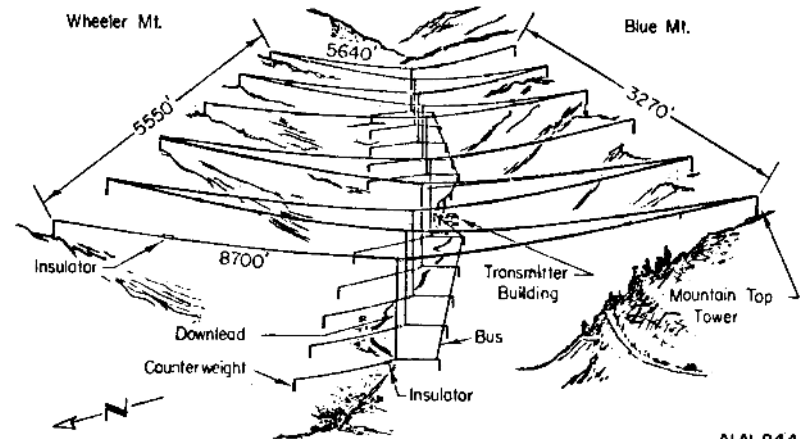


# Study Area: NRS(T) Jim Creek

- Very low frequency radio transmitter
- Recreation area
- Old-growth forest conservation area

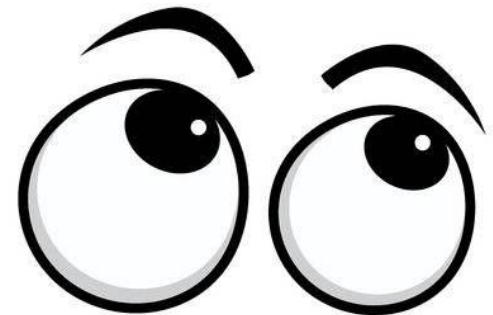


-  Marbled Murrelet **Critical Habitat**
-  Installation Area
-  Operational Area



# ***Study Objectives***

- Determine NSO and MAMU status
- Compare detectability of MAMU
  - Standard AV surveys
  - Passive acoustic monitoring



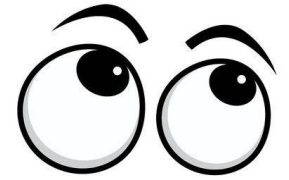
# Passive Acoustic Surveys



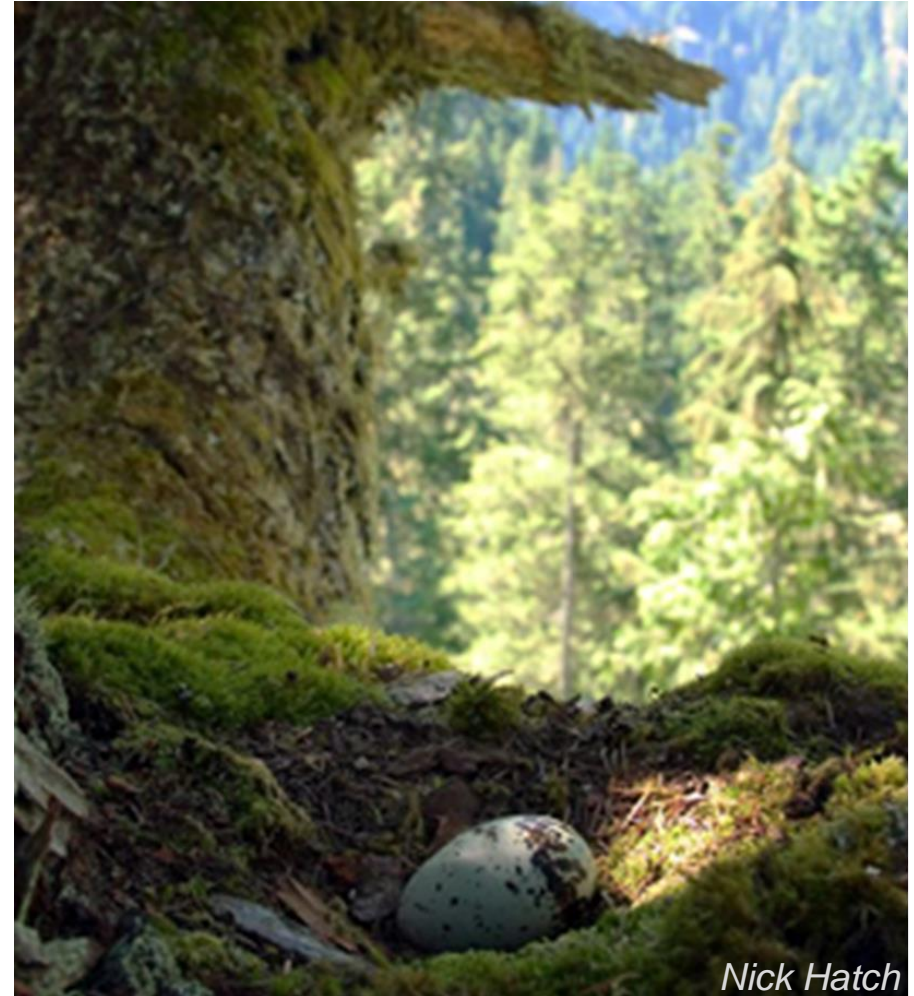
Alaina Thomas

- Pros:
  - Detect whole suite of vocalizing species
  - Permanent record
  - Monitor many sites at once over longer periods
  - Detect rare or cryptic vocalizing species
- Cons:
  - Storing, processing, validating many hours of sound data
  - At mercy of technology

# *Audio-visual Surveys*



- Pros
  - Detect vocalizations and flight behavior for MAMU
- Cons
  - Navigate to site in dark, early mornings
  - At mercy of weather and technician availability, ID skill, and attention span



*Nick Hatch*

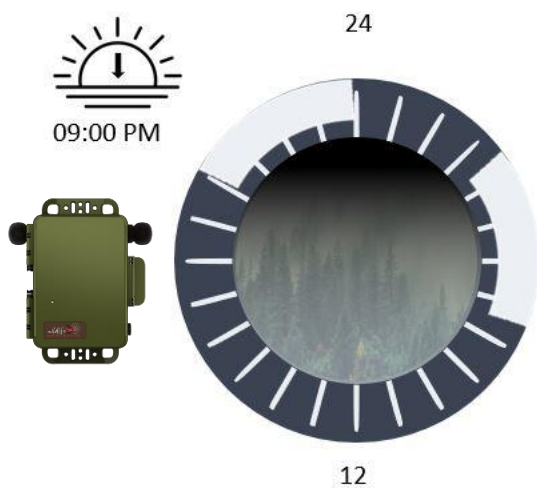
# Survey Design

## Passive Acoustic

- Within 10m of the audio-visual survey station
- Throughout study area
- 39 total stations

## Audio-visual Surveys

- Pacific Seabird Group (inland forest survey protocol)
- 19 stations throughout quality MAMU nesting habitat

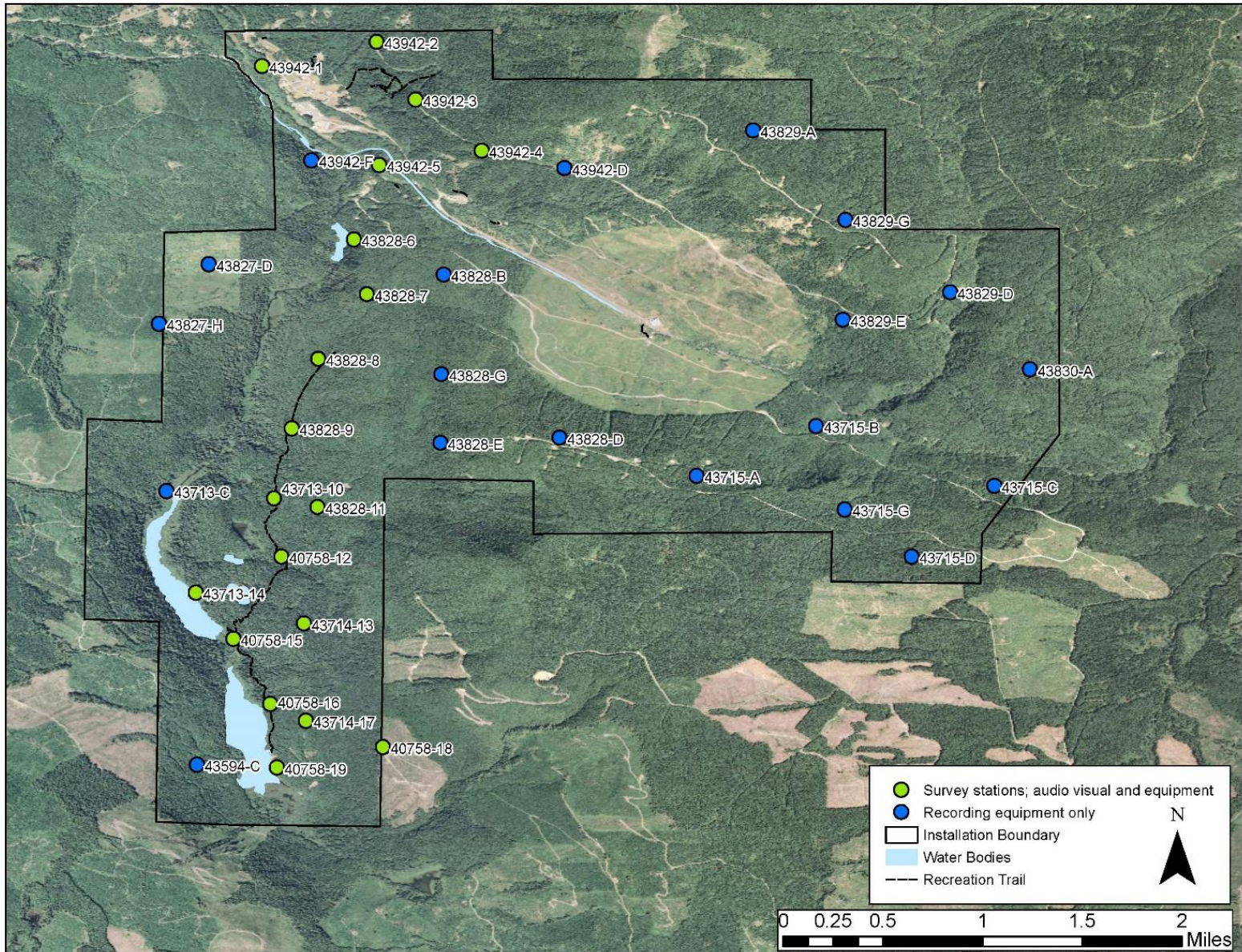


**June 14 – Aug 5, 2022**





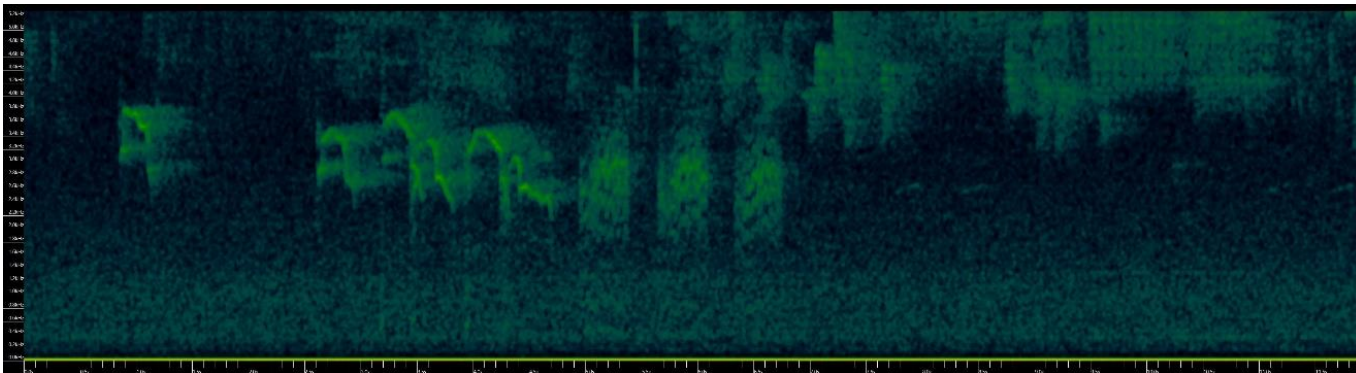
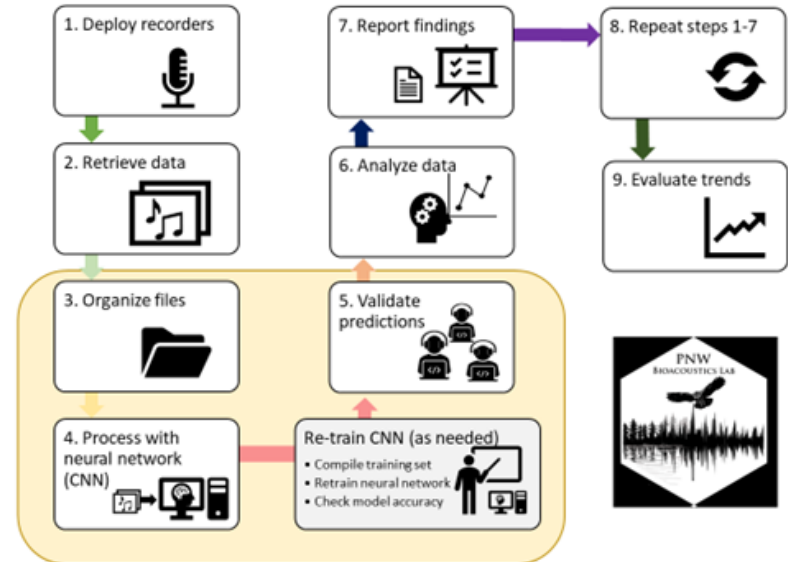
# Survey Design



# Audio Data Analyses

## PNW C-net v4

- Prediction thresholds
  - $\geq 0.95$  for MAMU kee calls
  - $\geq 0.25$  for NSO location calls



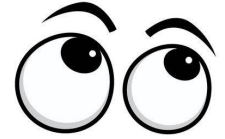
# Results

## Passive Acoustic



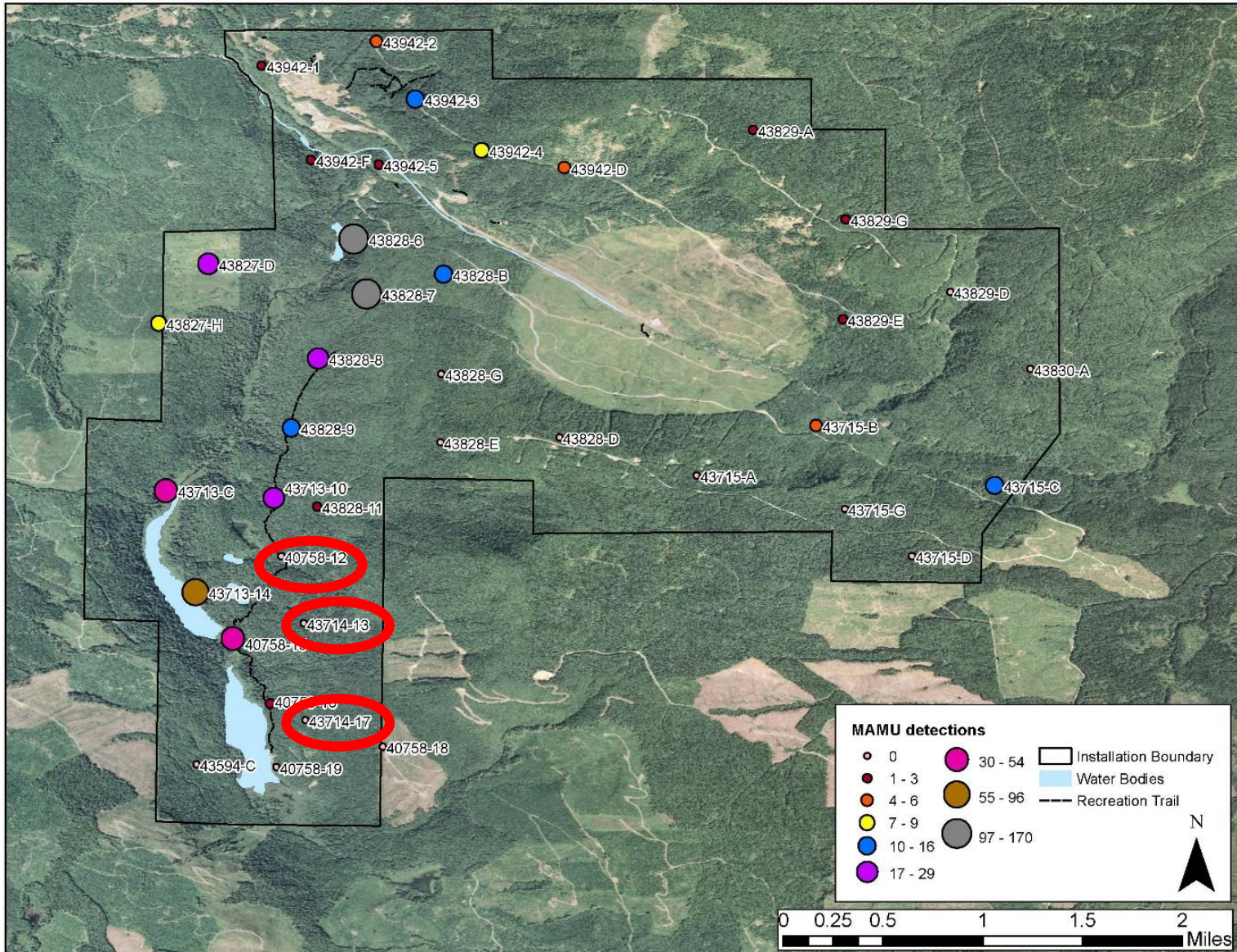
- 39 total stations
- Aimed for 6 week deployments
  - Days fully operational averaged 46.7 (range: 13–64)
  - Recorded 1,840,970.24 total hours
    - Range across stations: 133.00–664.86 hours
    - Approximately 4.74 Tb of audio data
- No detections of NSO
  - BADO detected at 38 stations
- MAMU detected at 24 stations
  - 573 total detections

## Audio-visual Surveys

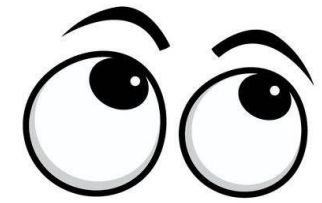


- 19 total stations
- Replicate surveys
  - 70 total surveys
  - 2–5 replicate surveys per station (avg. = 3.68)
- MAMU detected at 10 stations
  - 88 total detections

# Passive Acoustic MAMU Detections



# Audio-visual Survey MAMU Detections



88 total detections across 10 stations

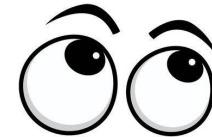
- 69 were auditory
- Visual detections
  - 4 flying over the canopy
  - 1 circling over the canopy
  - 8 circling at or below canopy
  - 6 flying through at or below canopy



*Laurel Mundy*

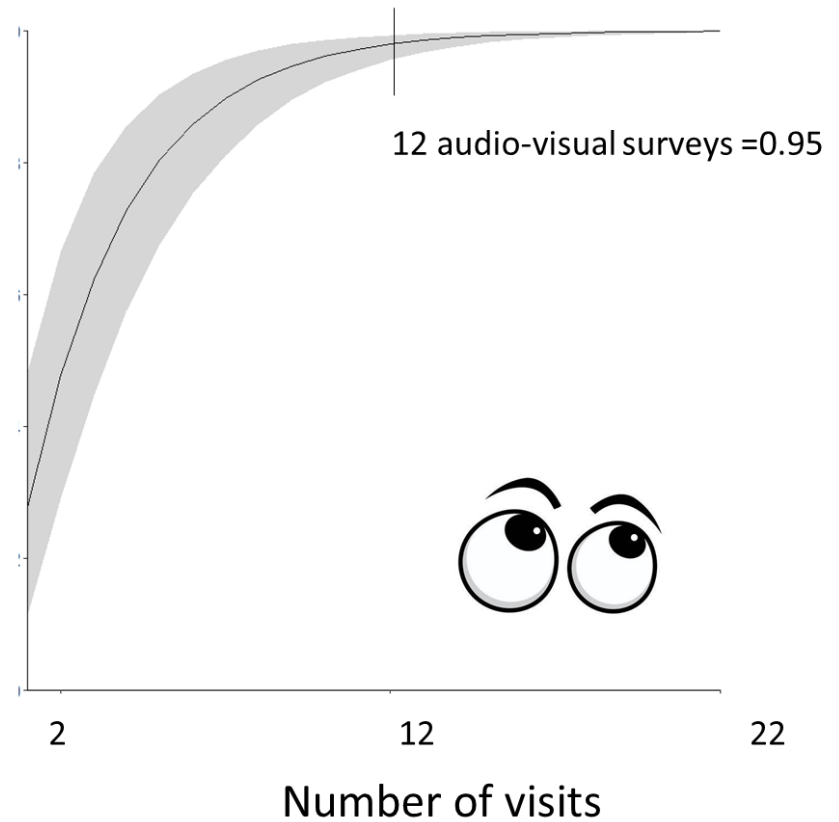
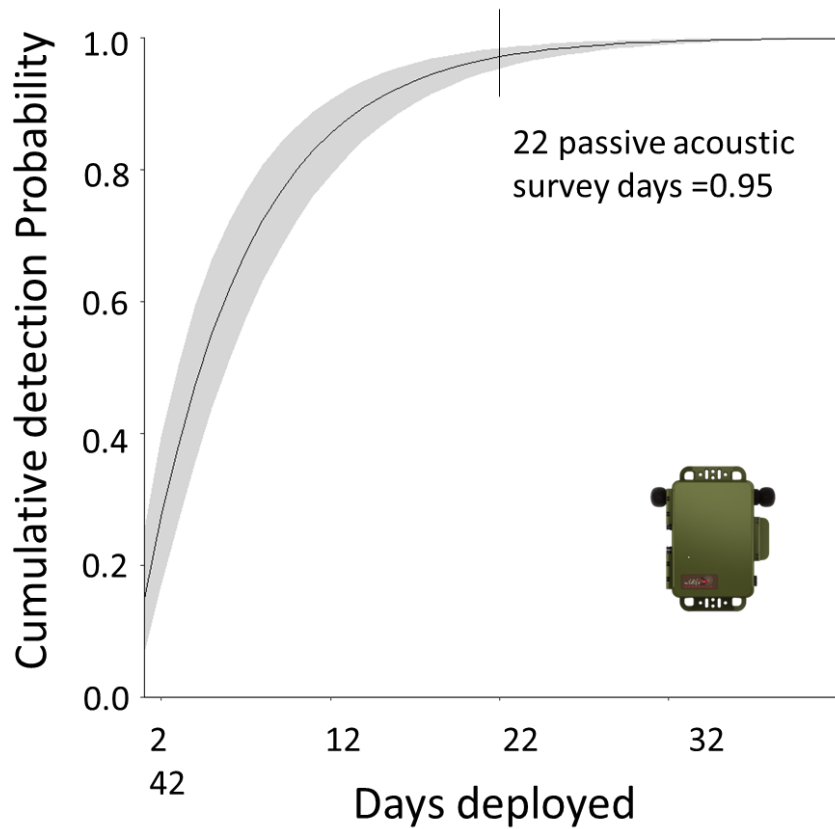
# Comparing MAMU Detections

- AV surveys
  - MAMU status
    - 4 stations MAMU Occupied
    - 6 stations MAMU Present
    - 9 stations MAMU Not Detected
  - Missed 7 **at least** MAMU Present
- Passive acoustic
  - Never missed MAMU Occupied
  - Missed 3 MAMU Present



	Detected	Not detected
Detected	7	7
Not detected	3	2

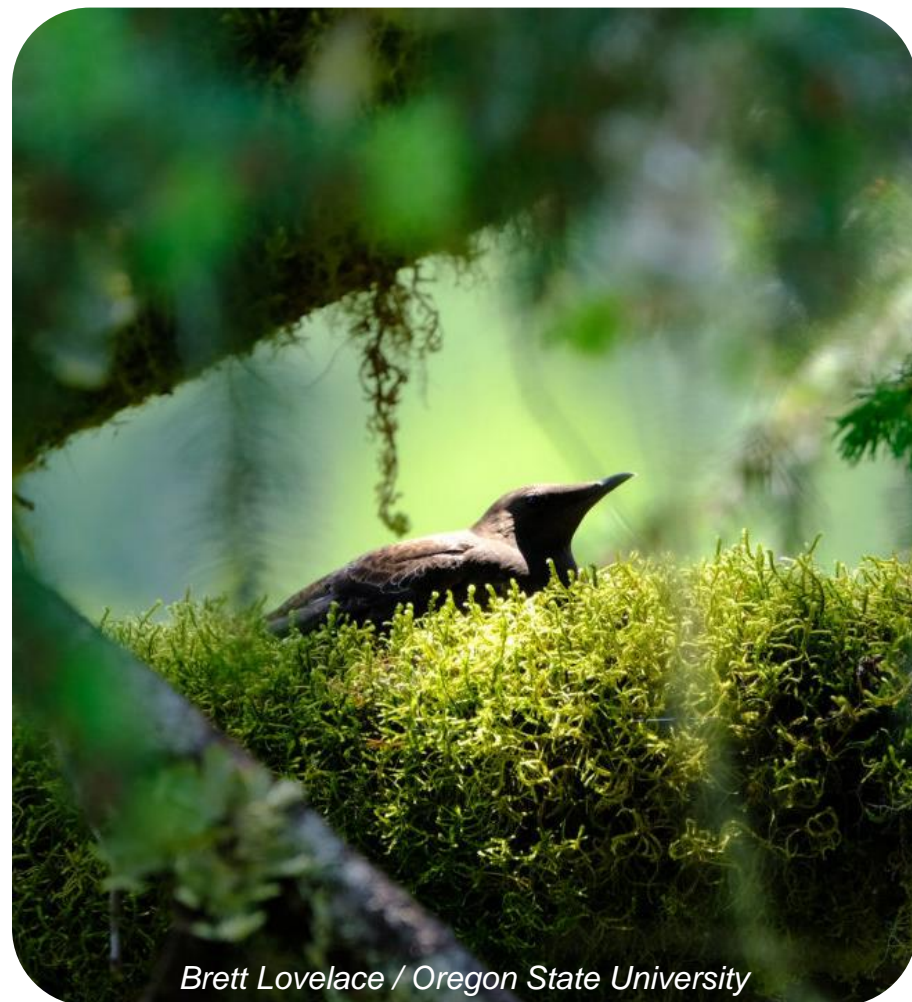
# Implications for Future MAMU Surveys



\*Preliminary results, subject to change

# ***Management Implications***

- Ensure Navy activities are implementing minimization measures
  - esp near MAMU hotspots
- Habitat enhancement through forestry projects
- Contribute to advancing science and conservation of this species



*Brett Lovelace / Oregon State University*



# ***Thank you!***

## ***Mapping, field support, surveyors, and validation:***

Juliana Jenkins

Bryan Begay

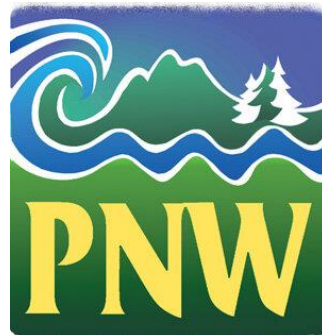
Sean Gee

Tom Munger

Nicole Mutchler

Jacob Schmidt

Natalie Rugg



# ***Questions/Comments?***

***Adam Duarte***

***Email: adam.duarte@usda.gov***

***Alicia Higgs***

***Email: alicia.m.higgs.civ@us.navy.mil***