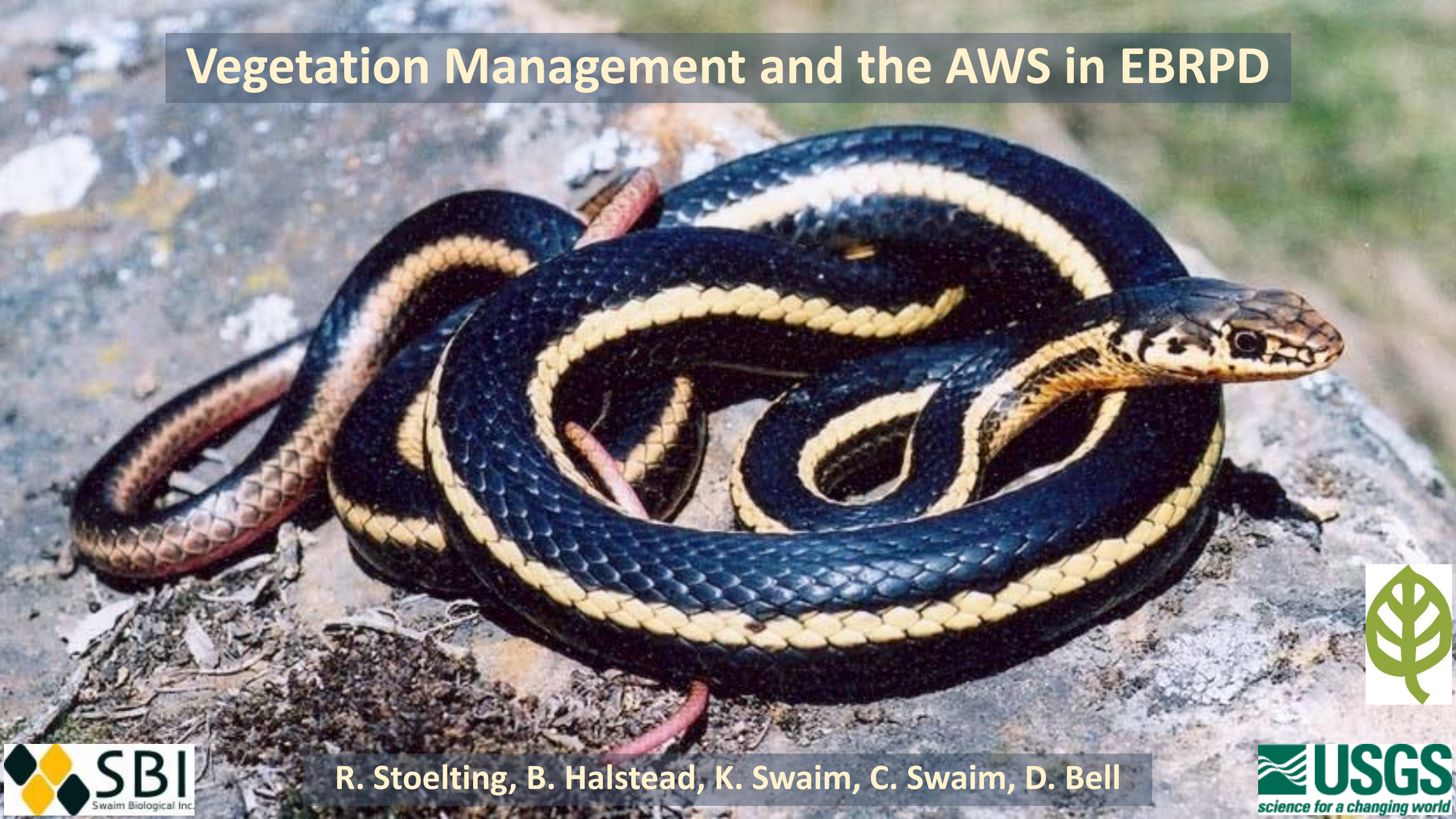
Vegetation Management and the AWS in EBRPD



R. Stoelting, B. Halstead, K. Swaim, C. Swaim, D. Bell

SBI
Swaim Biological Inc.

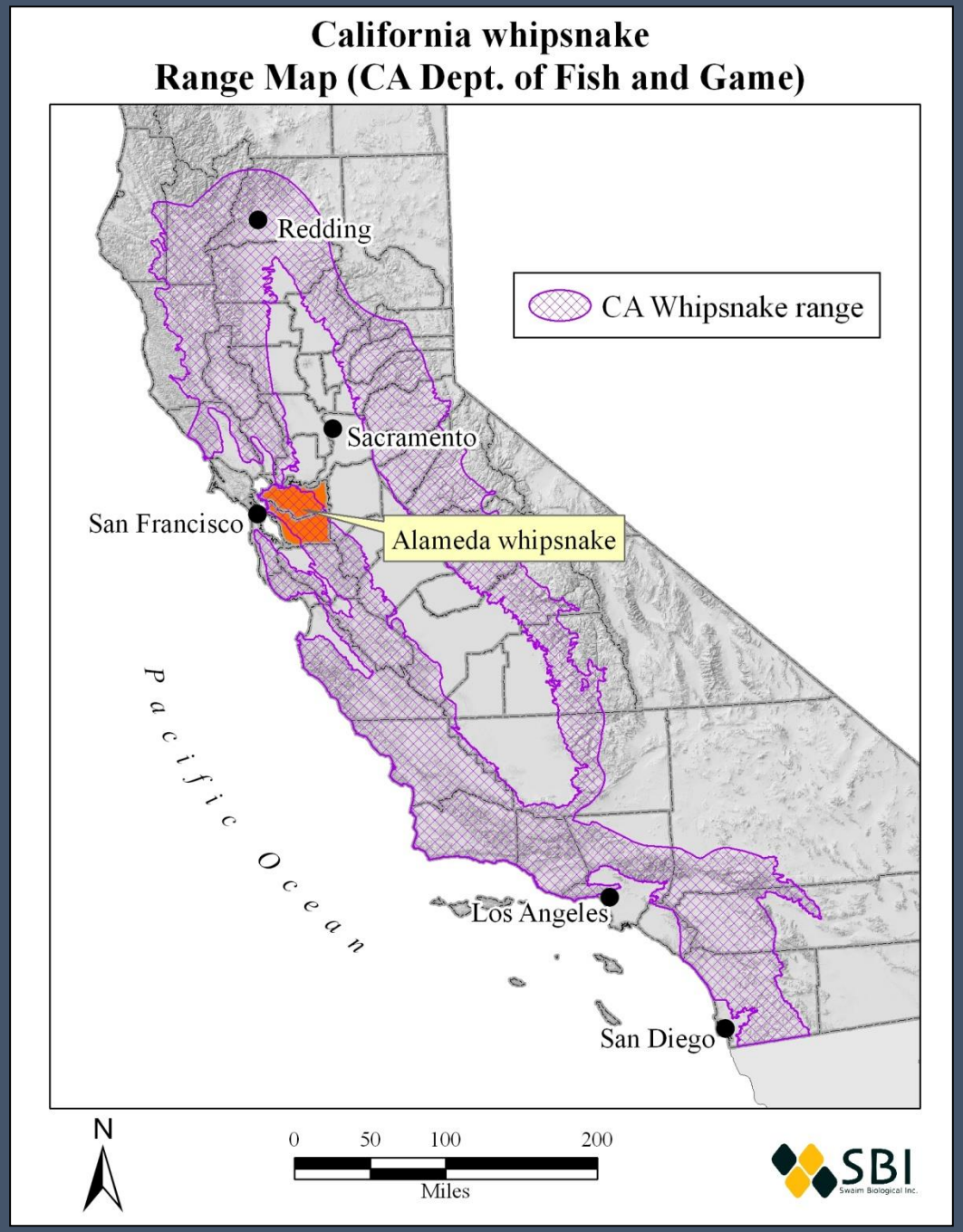
USGS
science for a changing world

Implementation of Study:

Measuring the response of the Alameda striped racer (=whipsnake) Masticophis lateralis euryxanthus *to fuels management in the East Bay Regional Park District, California* (Richmond et al. 2015)

J. Q. Richmond[1], C. S. Brehme[1], T. Lim[2] and R. N. Fisher[1]

[1]USGS-WERC, San Diego Field Station
[2]AECOM, Oakland, CA



Alameda whipsnake

Chaparral whipsnake

Research Objectives

1. Estimate the occupancy and behavioral responses of AWS to fuel-load reducing treatments, in particular to the creation of scrub islands.

2. Identify significant correlates of occupancy and habitat use across the sampled area regardless of treatment.

A priori hypotheses – structural habitat components

- % cover
- vegetation type
- distance to scrub
- scrub patch size
- fragmentation
- canopy height
- distance to urban edge
- distance to road
- presence of dominant invasive
- soil type
- aspect
- slope

***A priori* hypotheses –**
Primary Constituent Elements (2 & 3) of Critical Habitat

Study Design *Richmond et al. 2015*

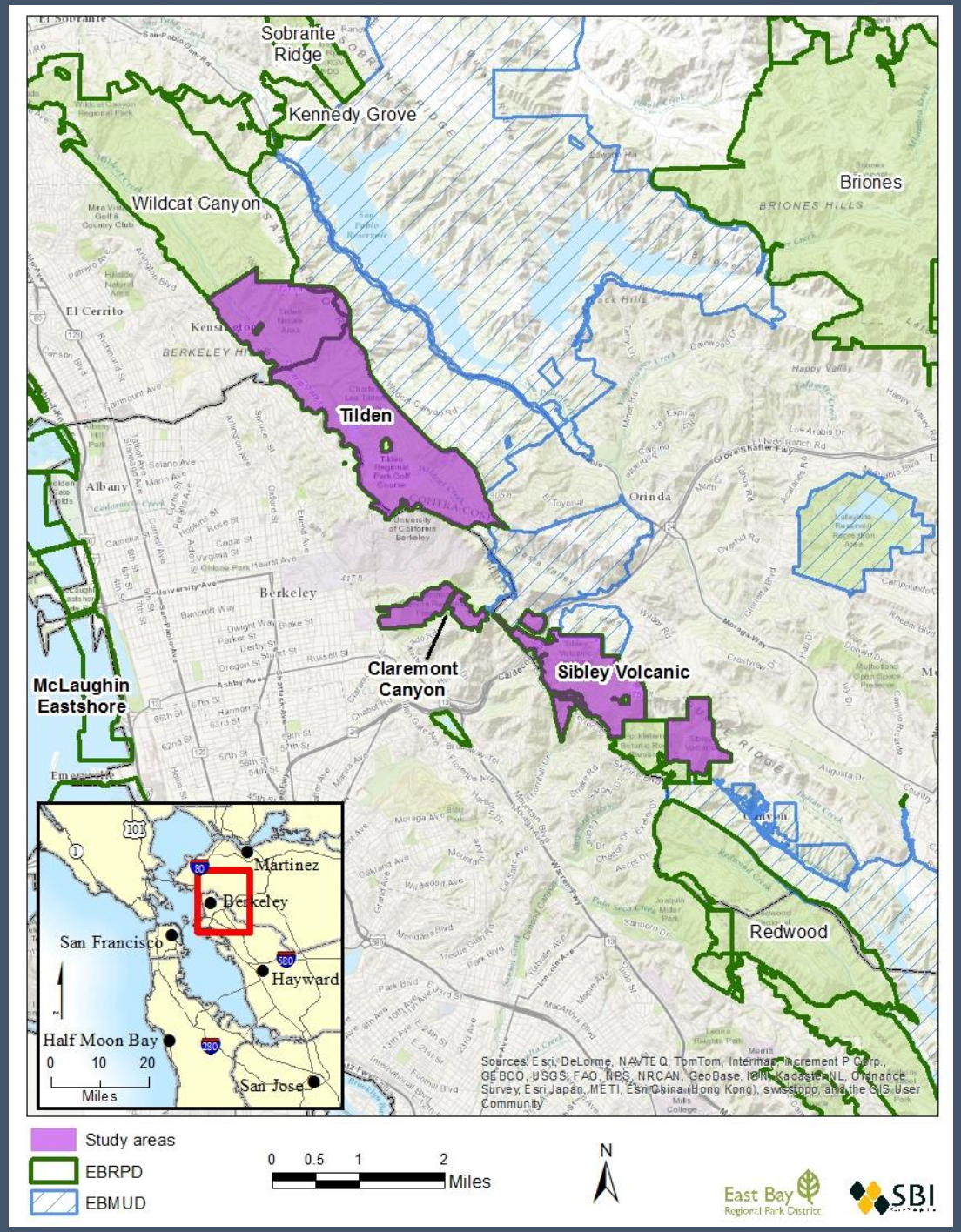
Before-After Control Impact Sampling in 2016, 2019, 2021

30 days April-May

40 Control vs
40 Maintenance Treatment vs
40 Initial Treatment Plots

Plot Selection Constraints

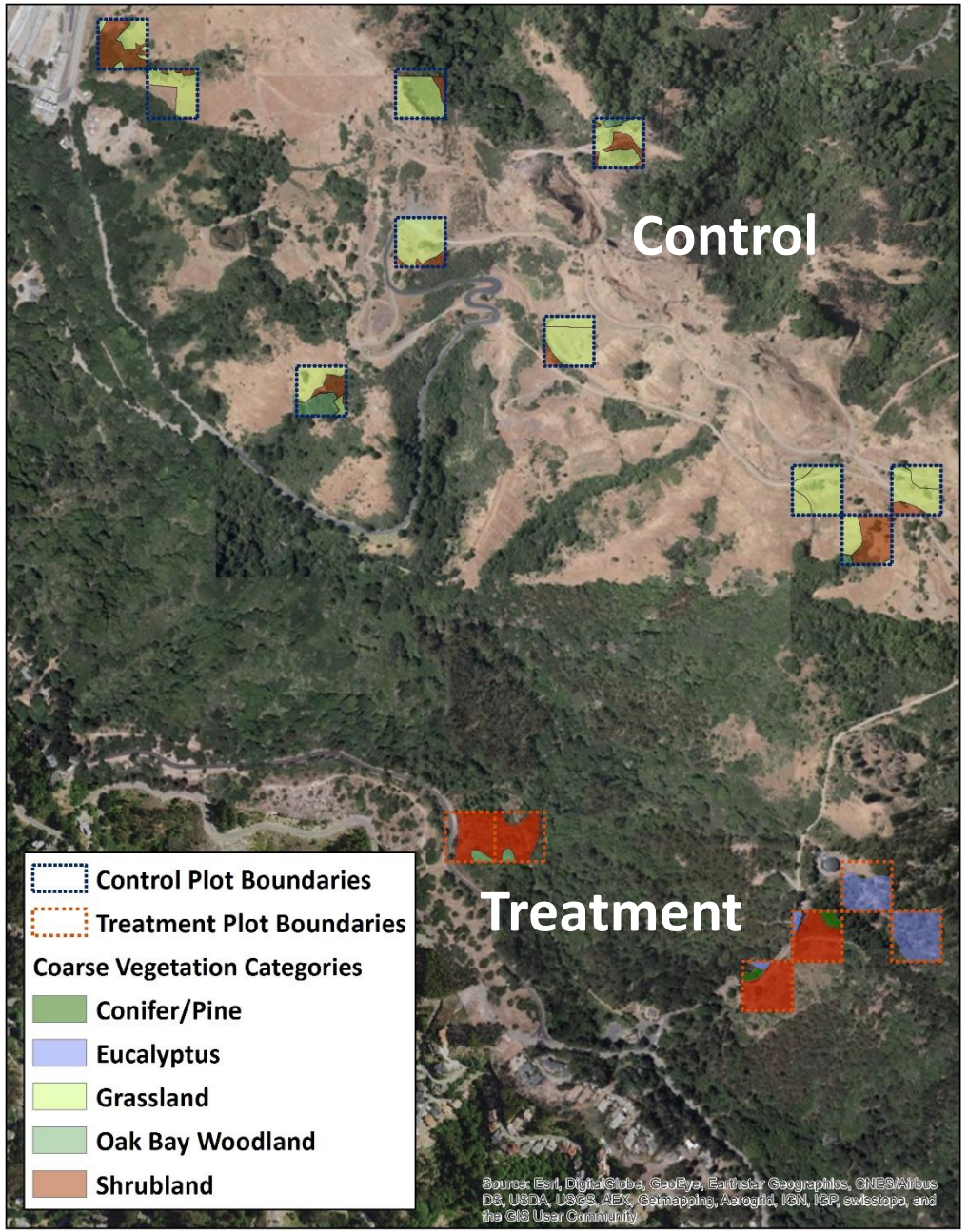
- **Control and Treatment: Shrub**
- **Treatment: FEMA-funded**



Methods – Trapline Placement

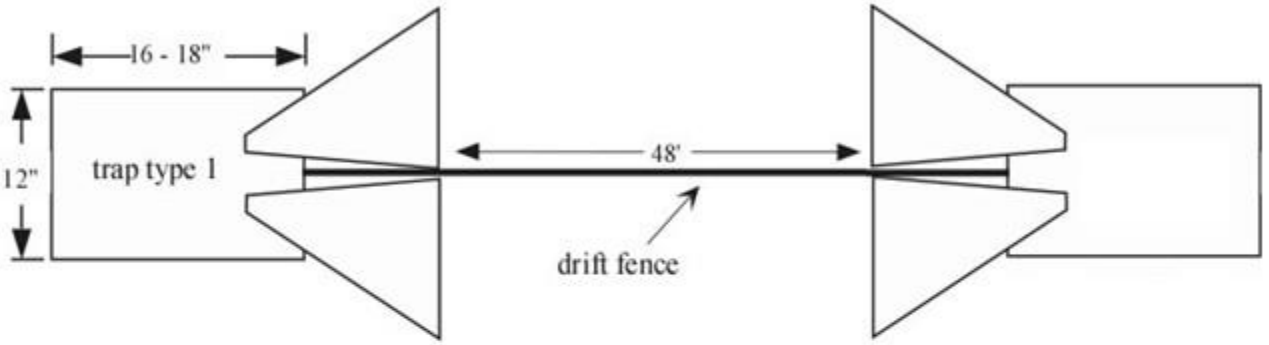
Plot Selection Constraints

- Control and Treatment: Shrub
- Control: exclude RTA
- Treatment: FEMA-funded



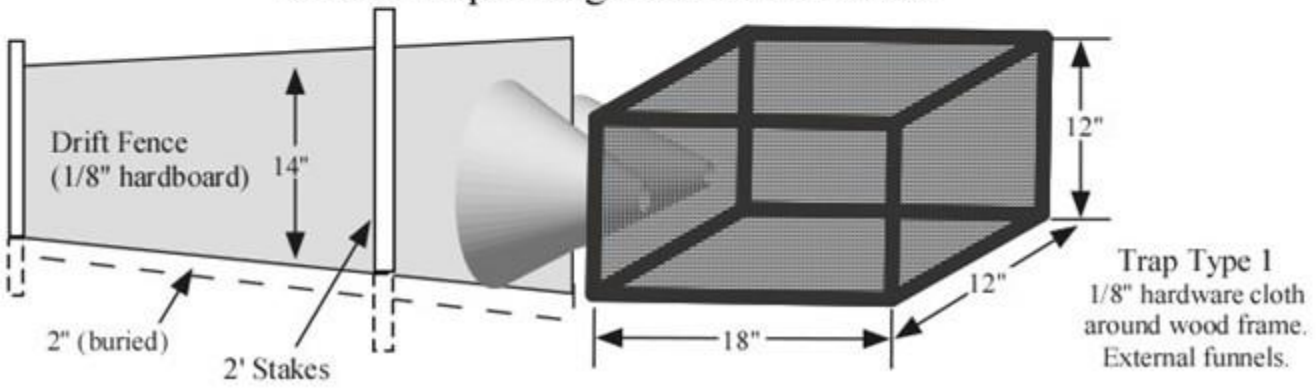
Methods – Drift-Fence Funnel-Trap Design

Trapline Schematic (plane view)



Trapline Schematic (oblique view)

Snake Trap Design and Dimensions

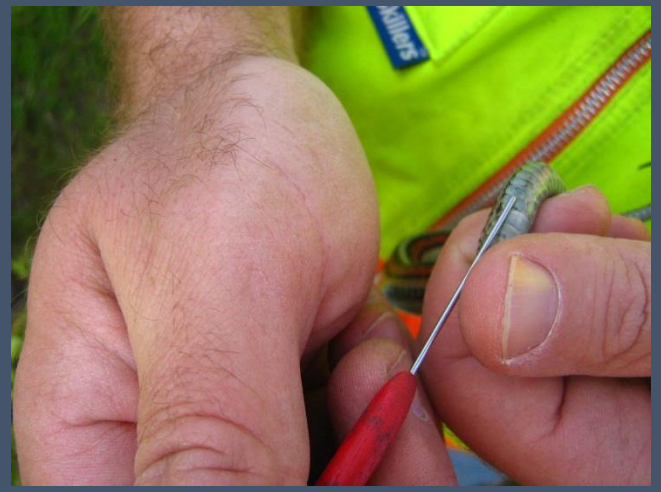


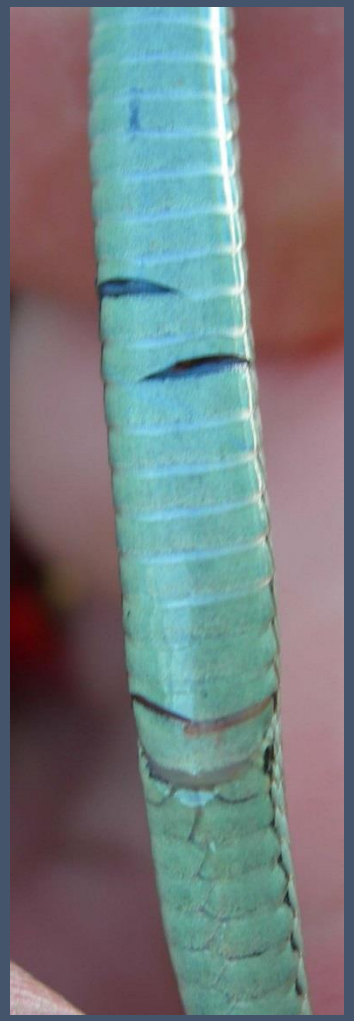
Trap Type 1
1/8" hardware cloth
around wood frame.
External funnels.

Example of actual trapline set up.

Methods – Drift-fence Funnel Trapping

Methods – Trapping Data





Methods – Vegetation Data

- Species ID
- % Cover
- Height
- Substrate
- Aspect

Methods - Telemetry

- Locate every 48 hrs

- Substrate
- Vegetation
- Temperature
- Activity

Results

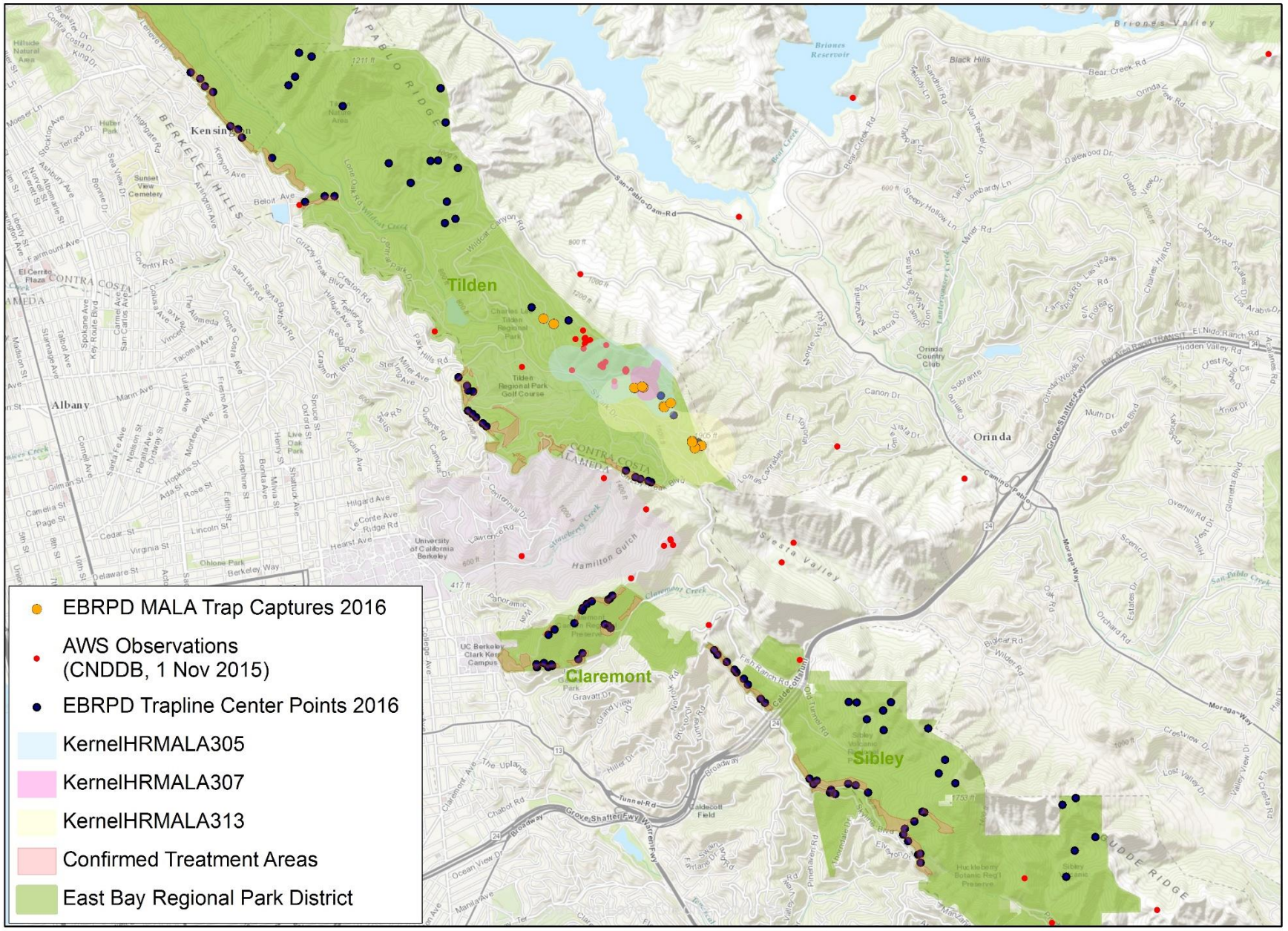
- 22 AWS (28 x)
- 9 traplines
- South Tilden

- $\widehat{N}$ = 32 (22-61)

- $\widehat{\bar{p}}$ = 0.068 (0.038-0.103)
- p^* = 0.93

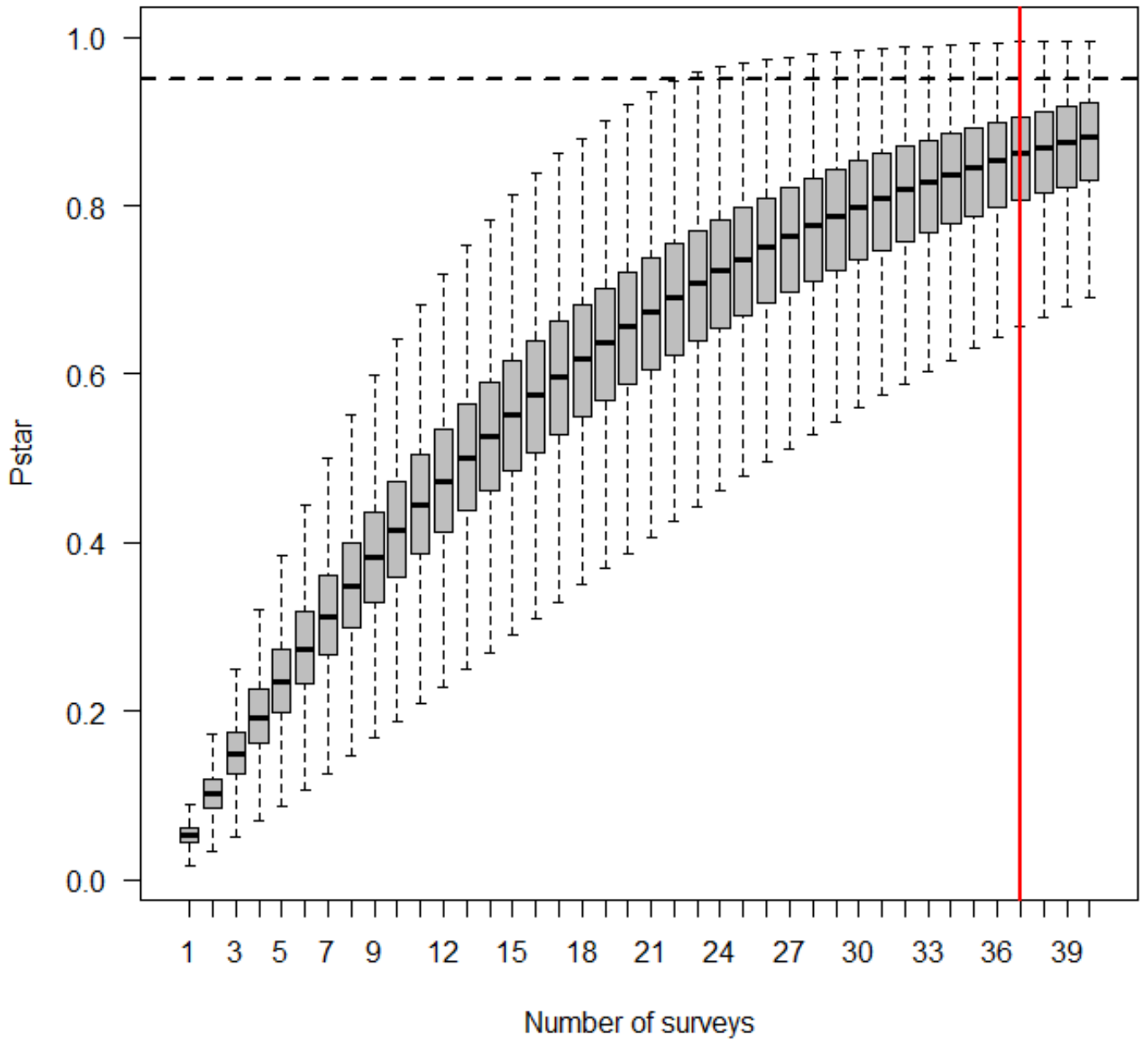
- $\widehat{\psi}$ = 0.080 (0.002-0.369)

- *# Occupied 'Sites'* = 11 (9-15)

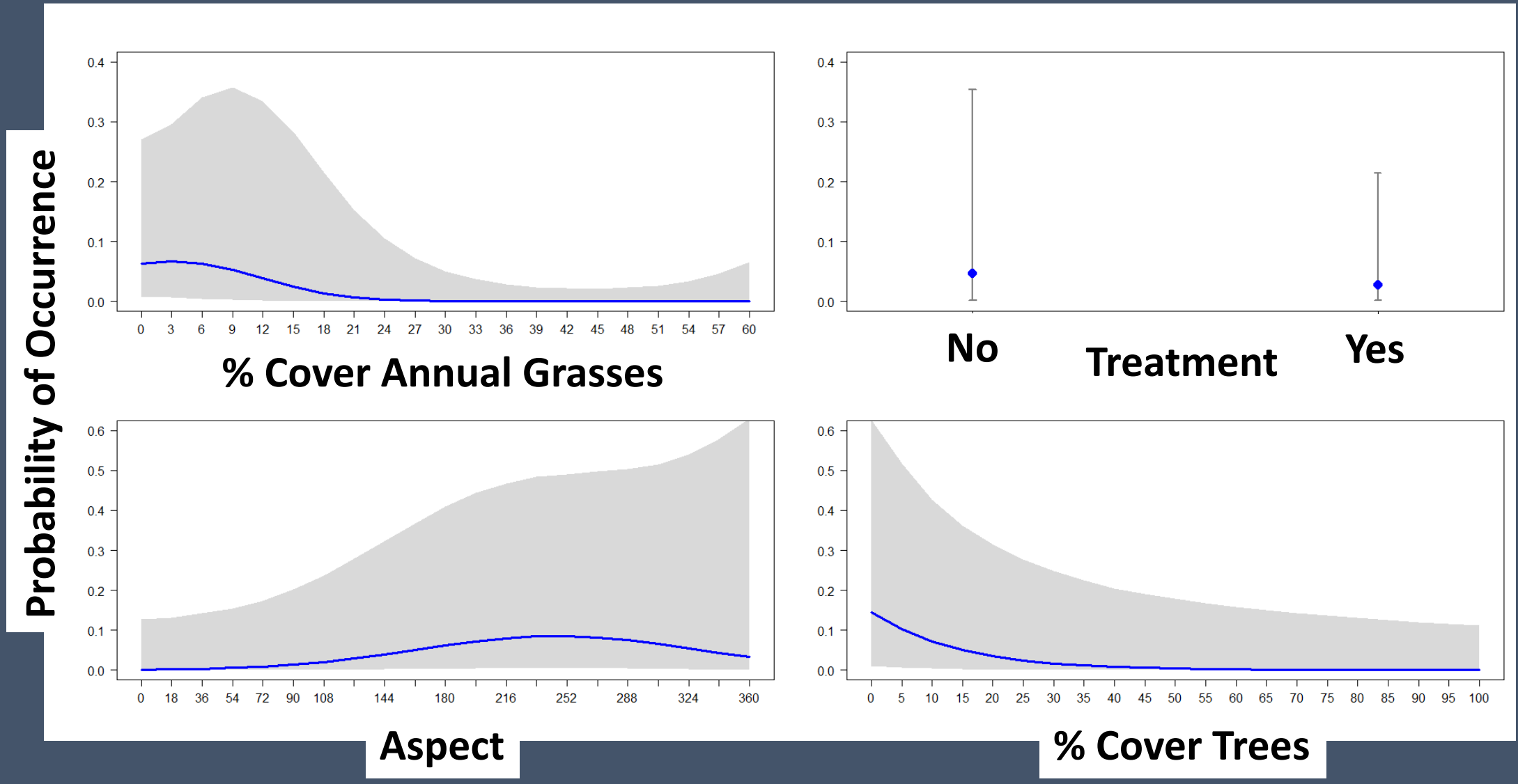


Results – Occupancy: *Detection Probability*

p^* = 0.93

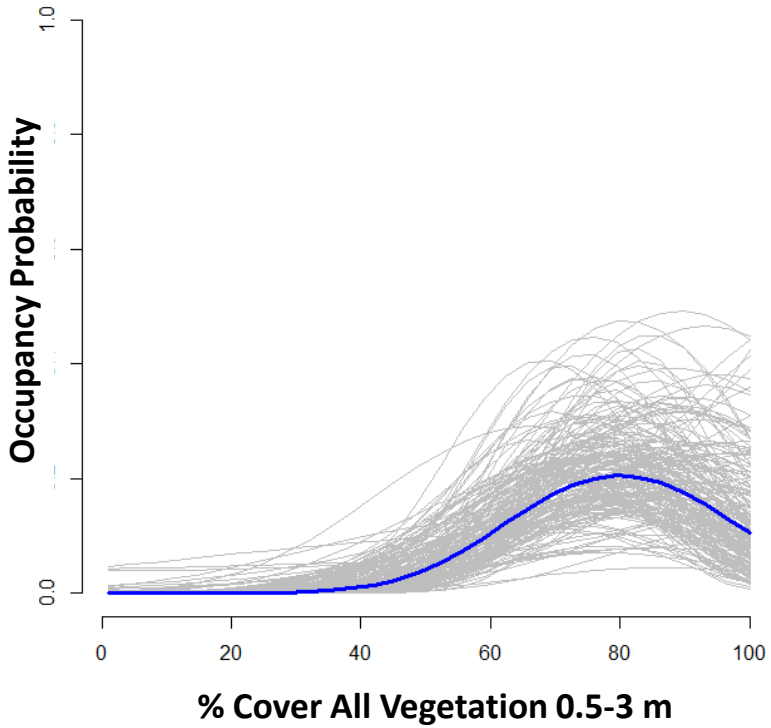


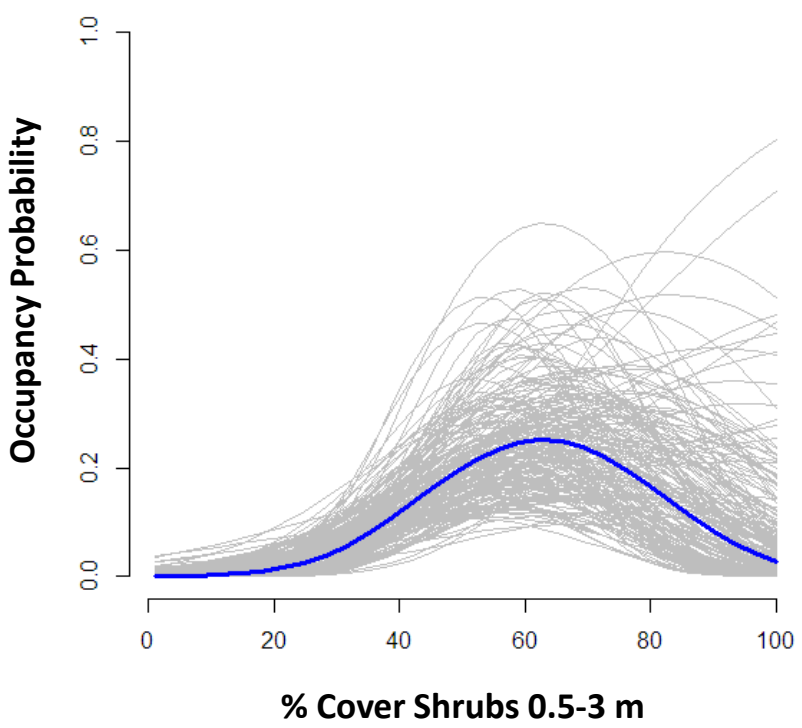
Results

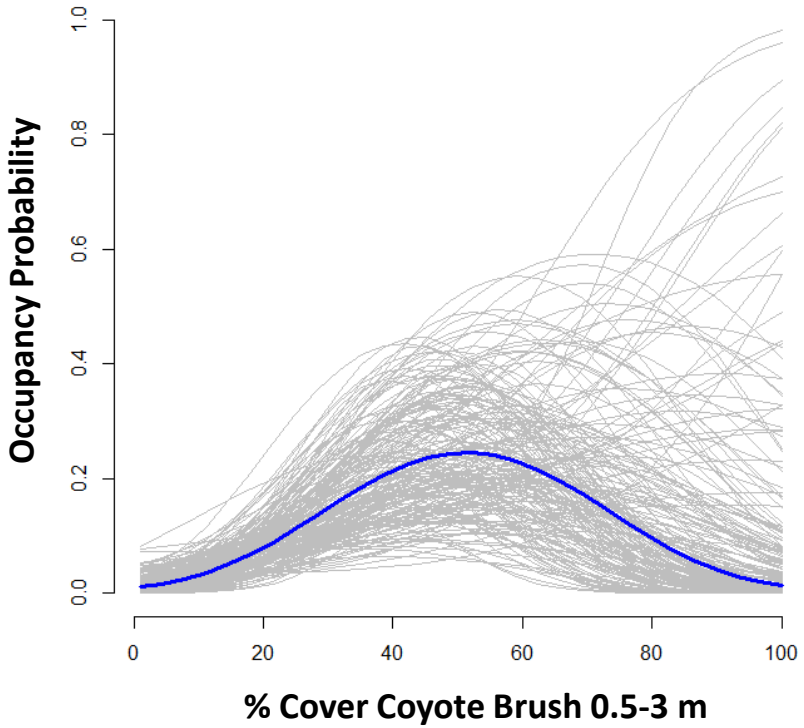


Best model covariates based on marginal posterior probabilities.

Results - Occupancy







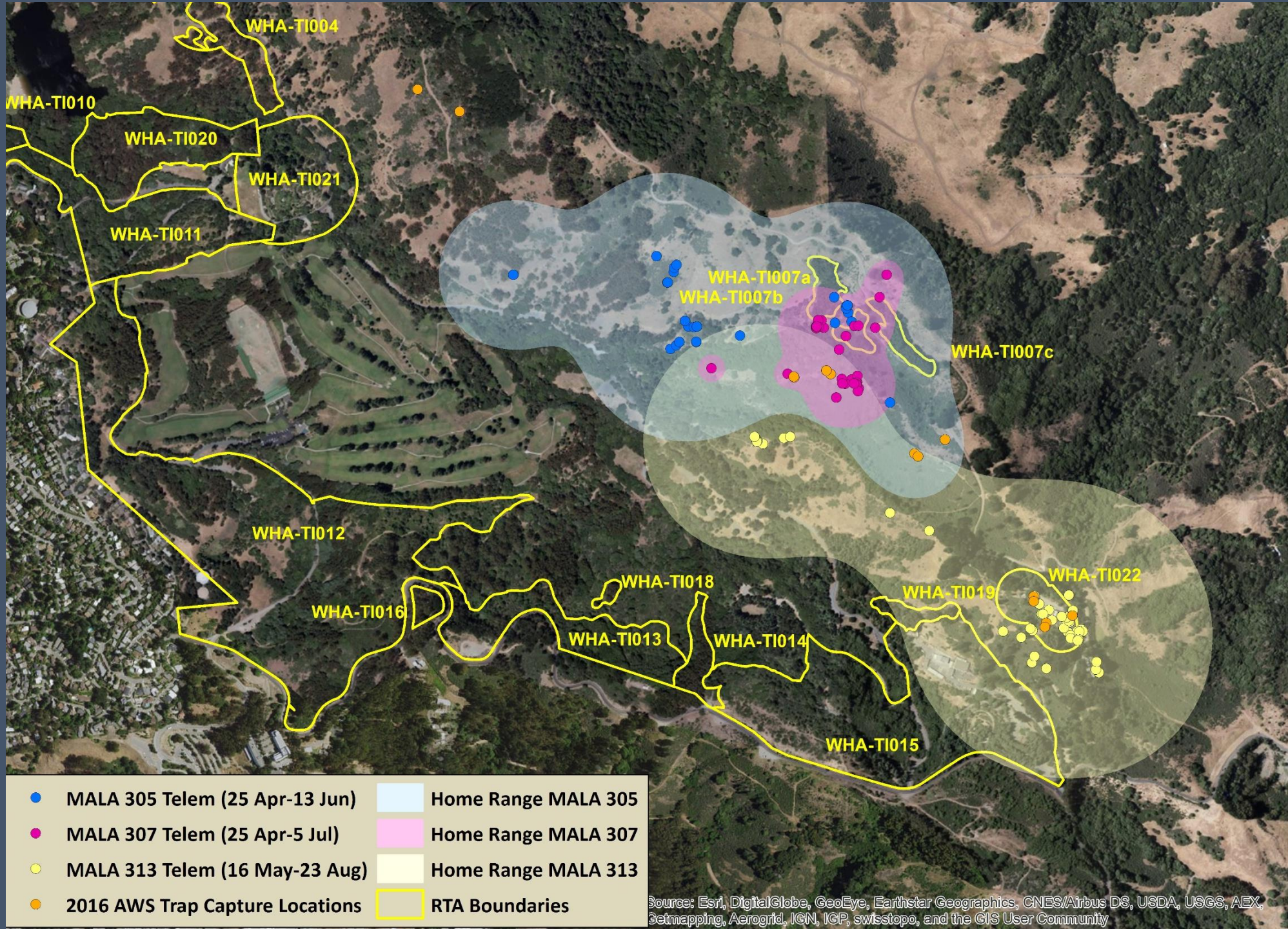
Relationship of Shrub Cover to Occupancy Probability

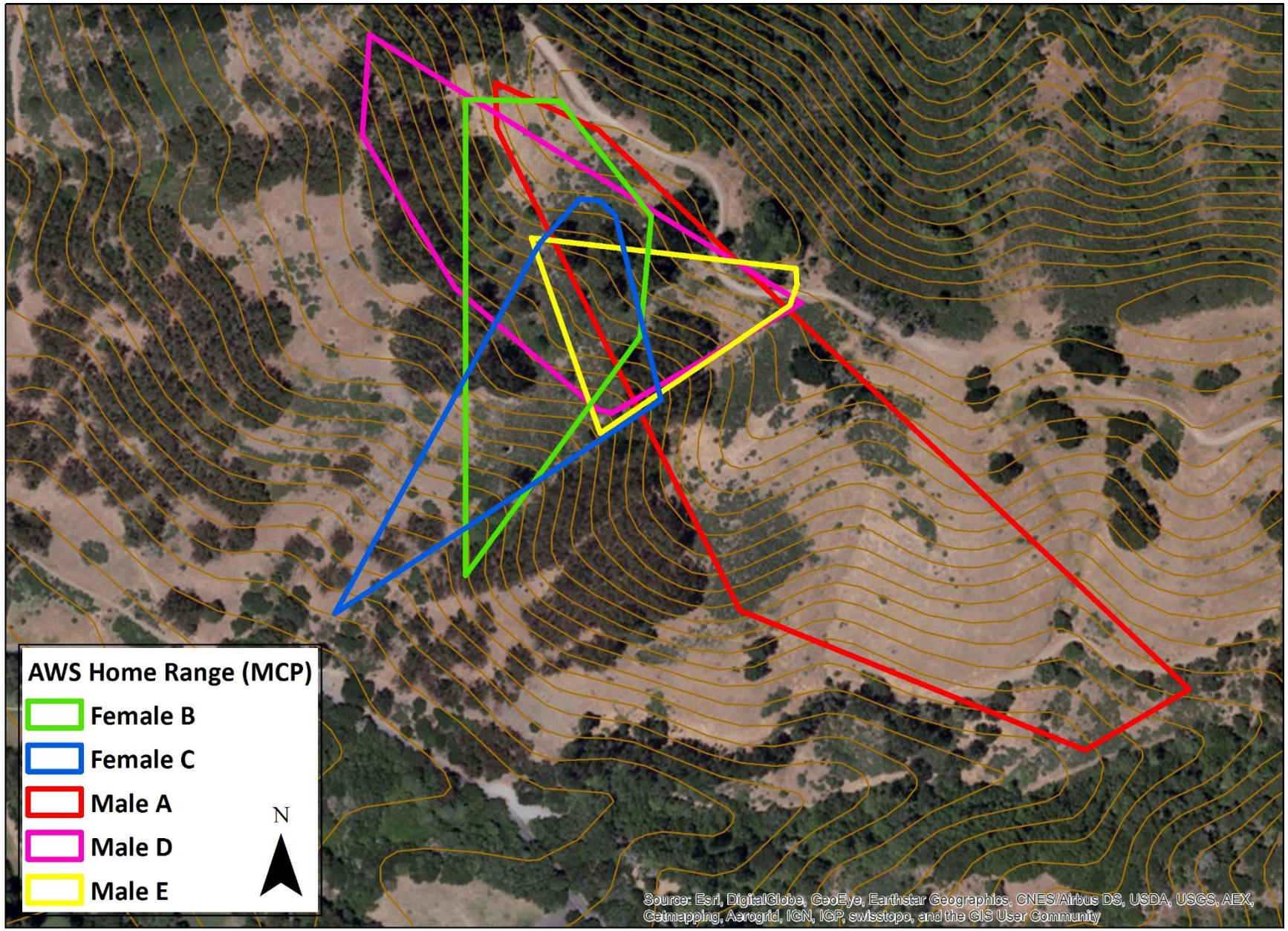
Results - Telemetry

Home Range = 95% Kernel Utilization Distribution

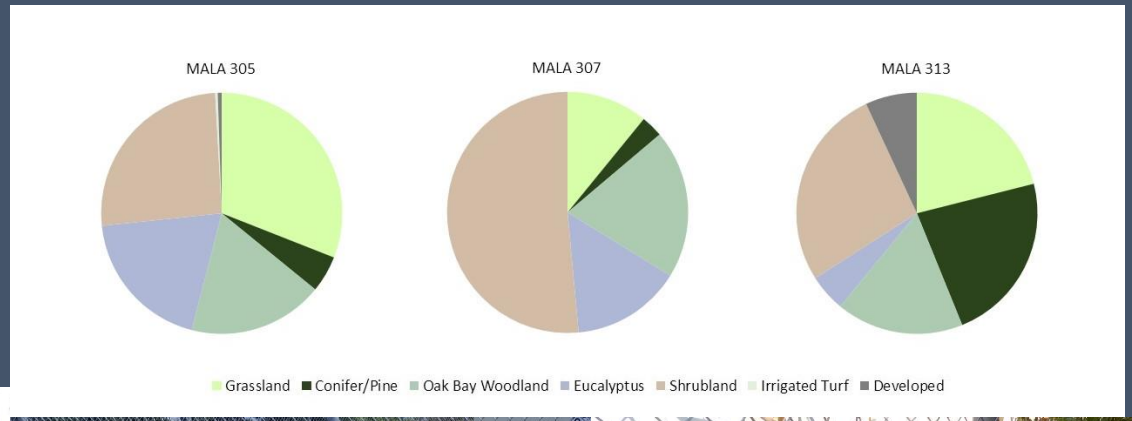
66.7 ha M
9.5 ha F
81.0 ha F

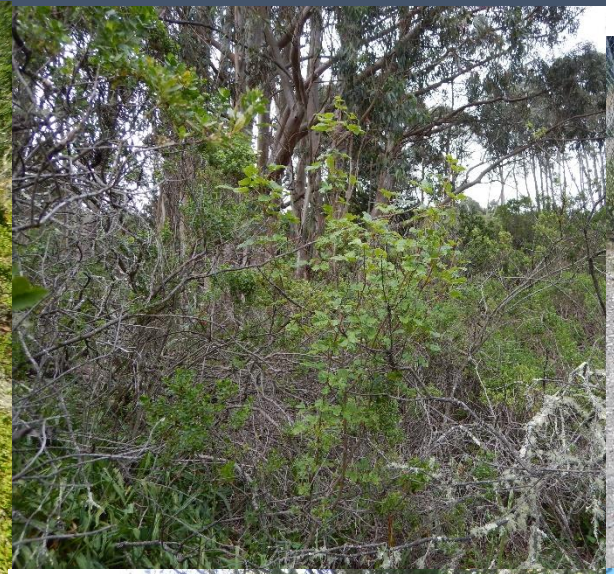
April – August

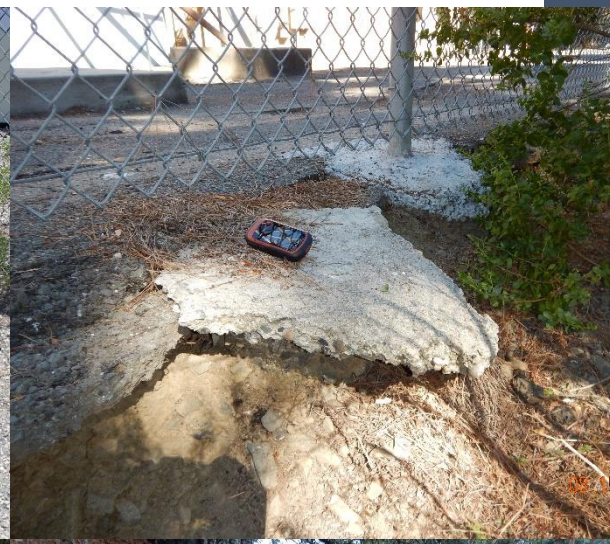


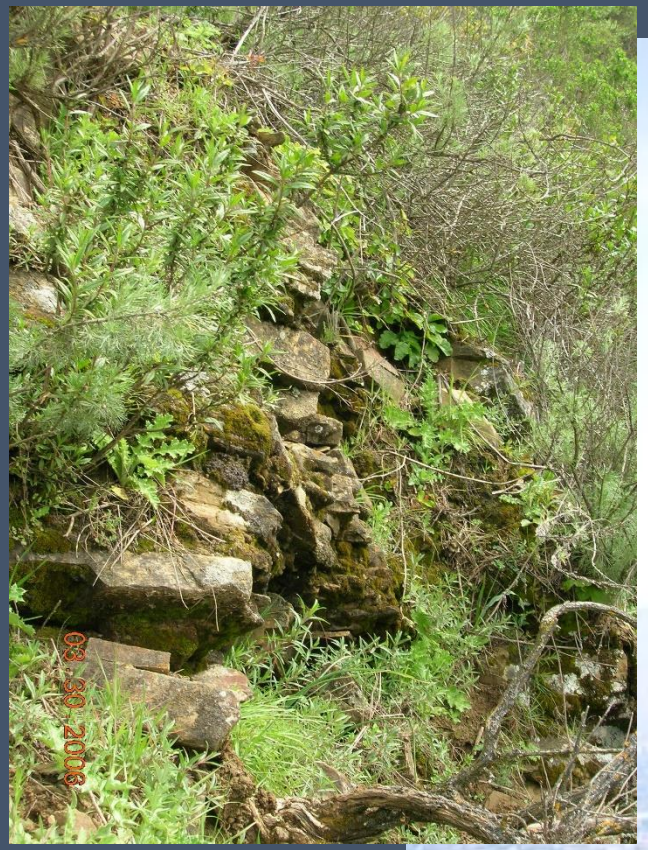

AWS Home Range (MCP)
Female B
Female C
Male A
Male D
Male E
N
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
Meters
0 50 100 200 300 400 500

Results - Telemetry



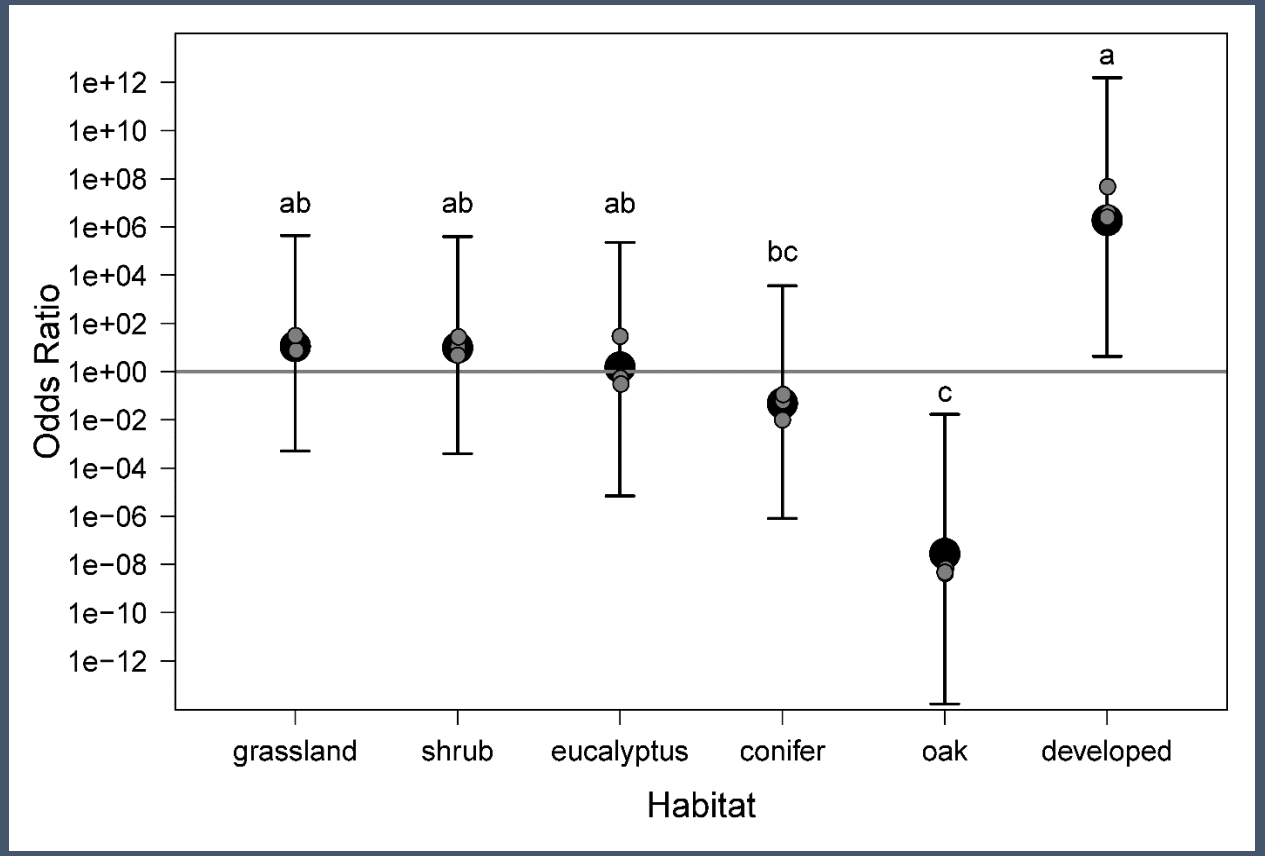


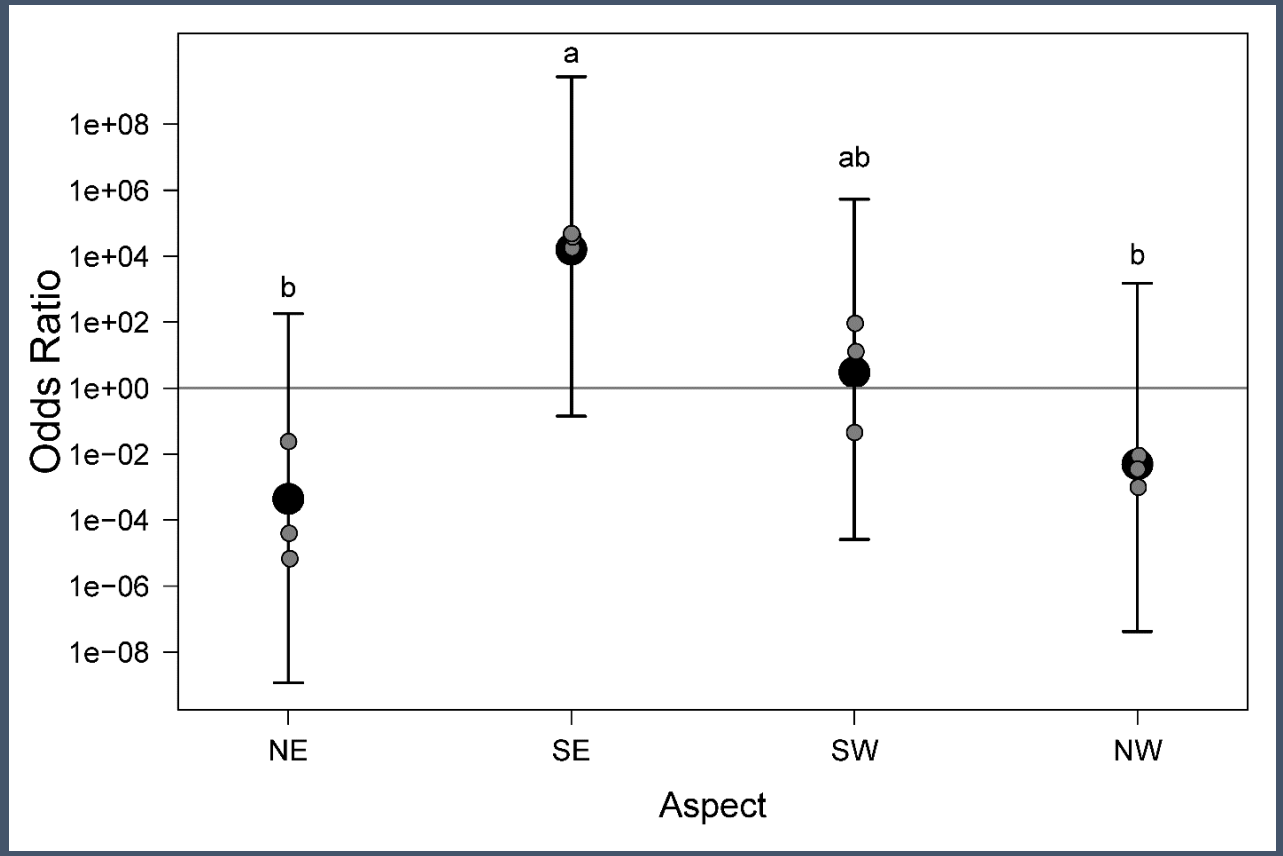




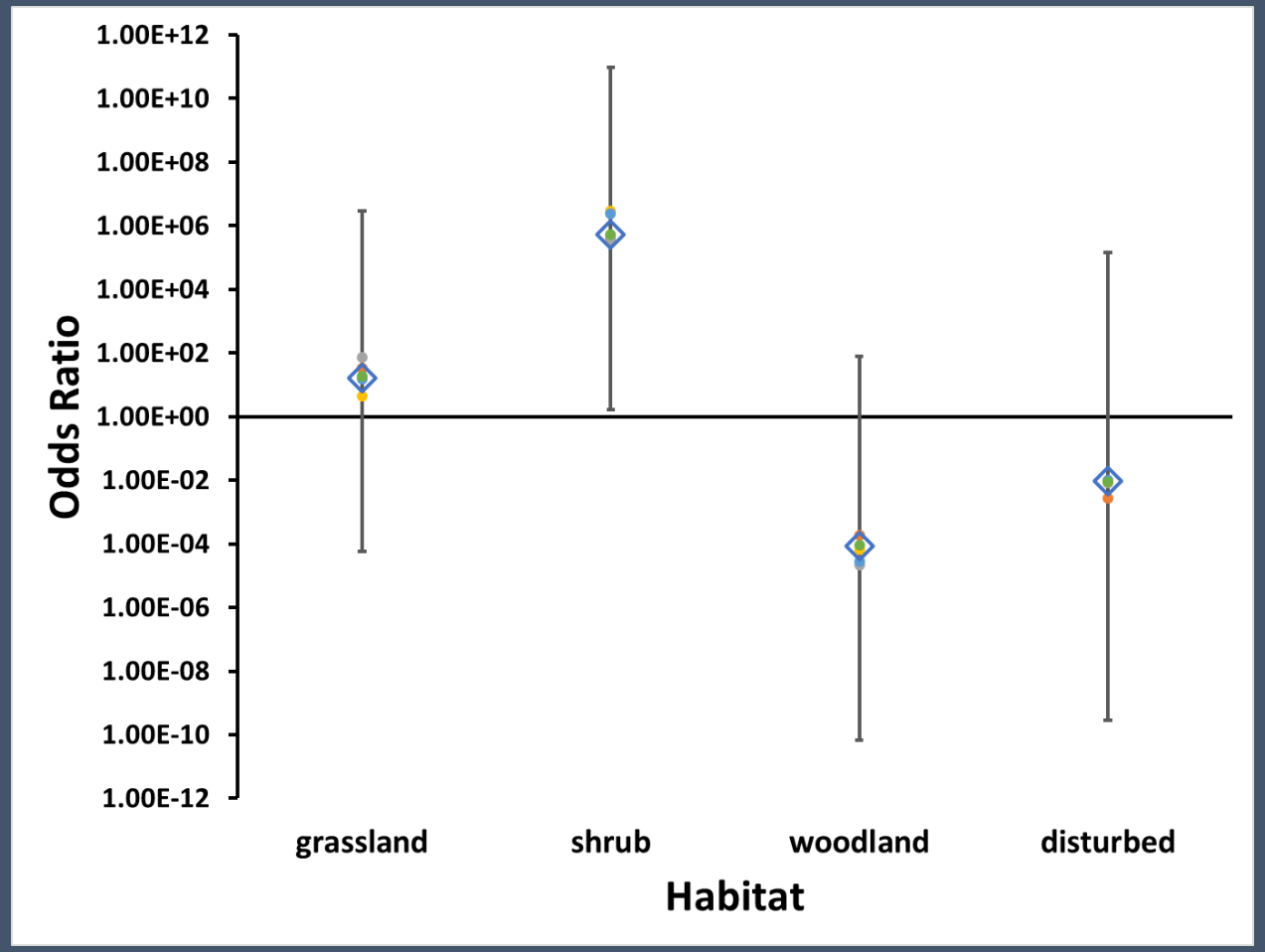
Stonebrae/ Garin

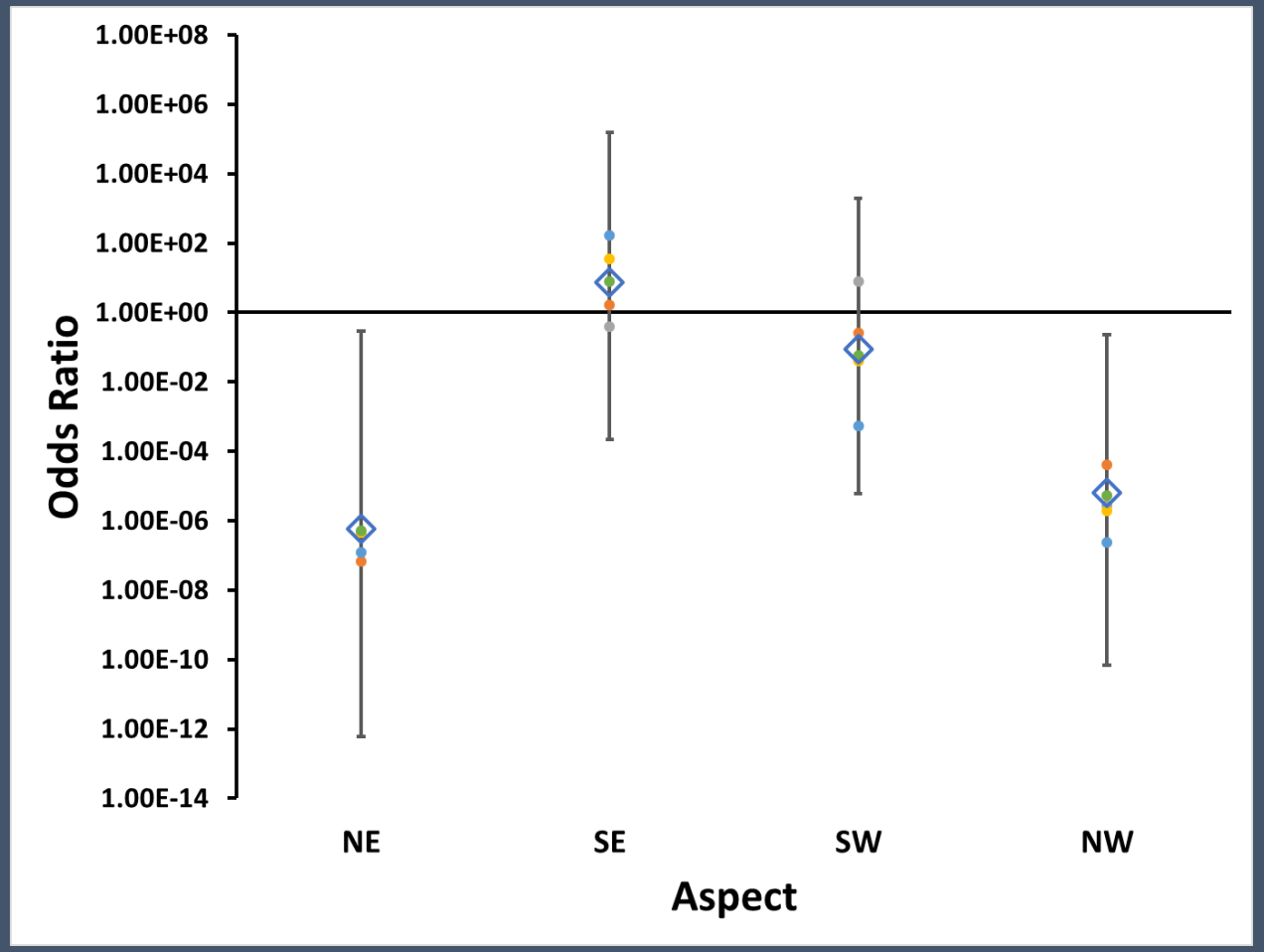
Results - Telemetry

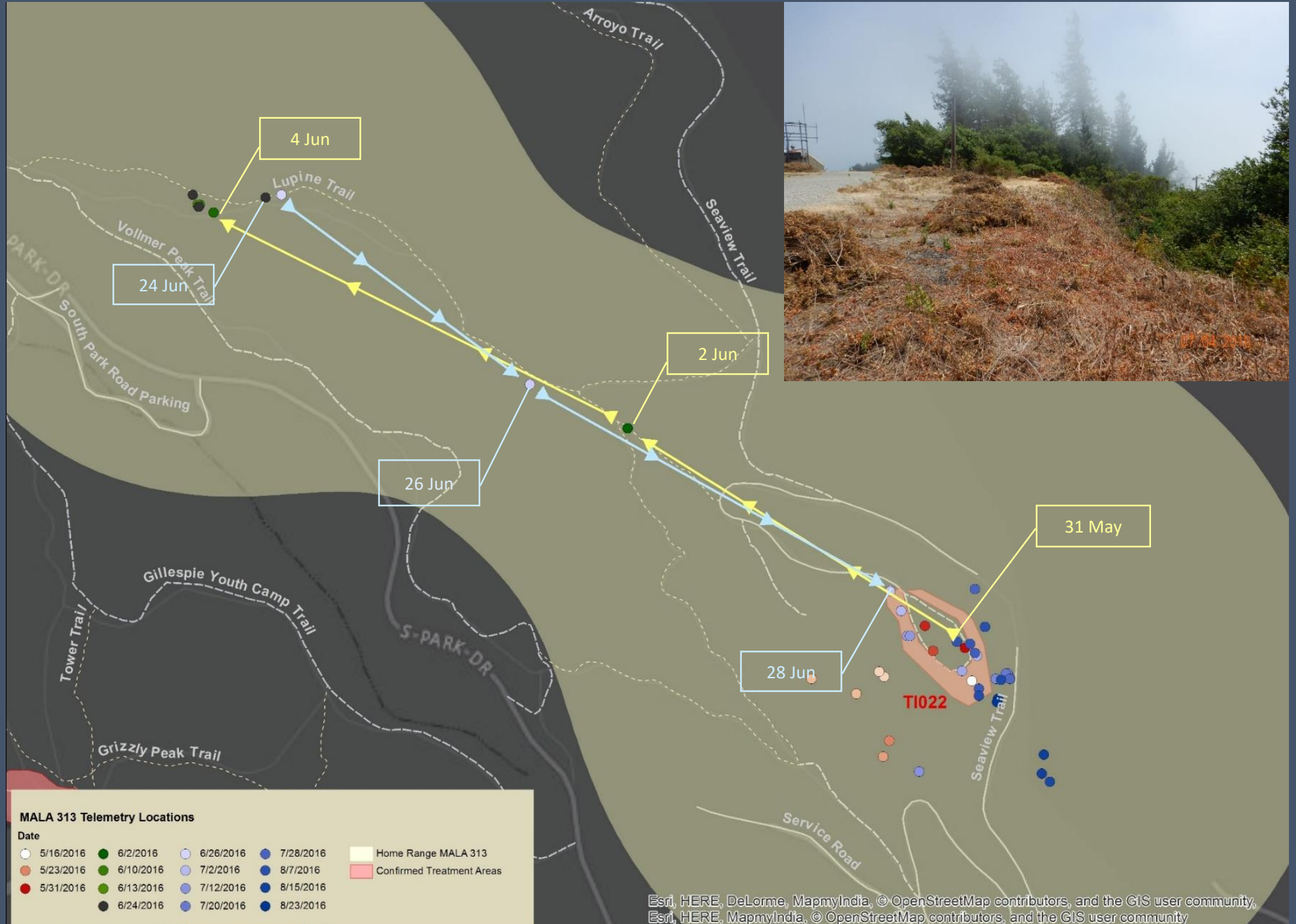




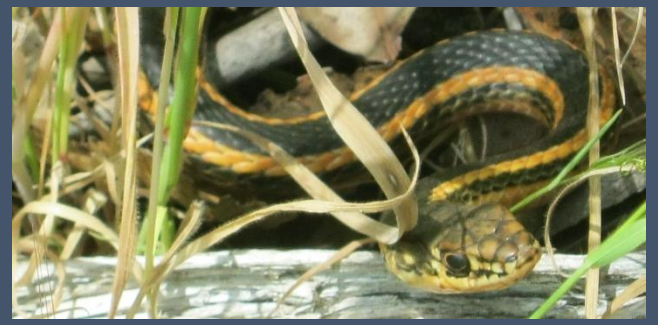
Vs. . . . . Results – Telemetry (1990-1992)






Arroyo Trail
Seaview Trail
Lupine Trail
Vollmer Peak Trail
PARK-DR
South Park Road Parking
Gillespie Youth Camp Trail
Tower Trail
S-PARK-DR
Grizzly Peak Trail
Service Road
TI022
4 Jun
24 Jun
2 Jun
26 Jun
31 May
28 Jun
MALA 313 Telemetry Locations
Date
5/16/2016
5/23/2016
5/31/2016
6/2/2016
6/10/2016
6/13/2016
6/24/2016
6/26/2016
7/2/2016
7/12/2016
7/20/2016
7/28/2016
8/7/2016
8/15/2016
8/23/2016
Home Range MALA 313
Confirmed Treatment Areas
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community,
Esri, HERE, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Summary (Year 1)



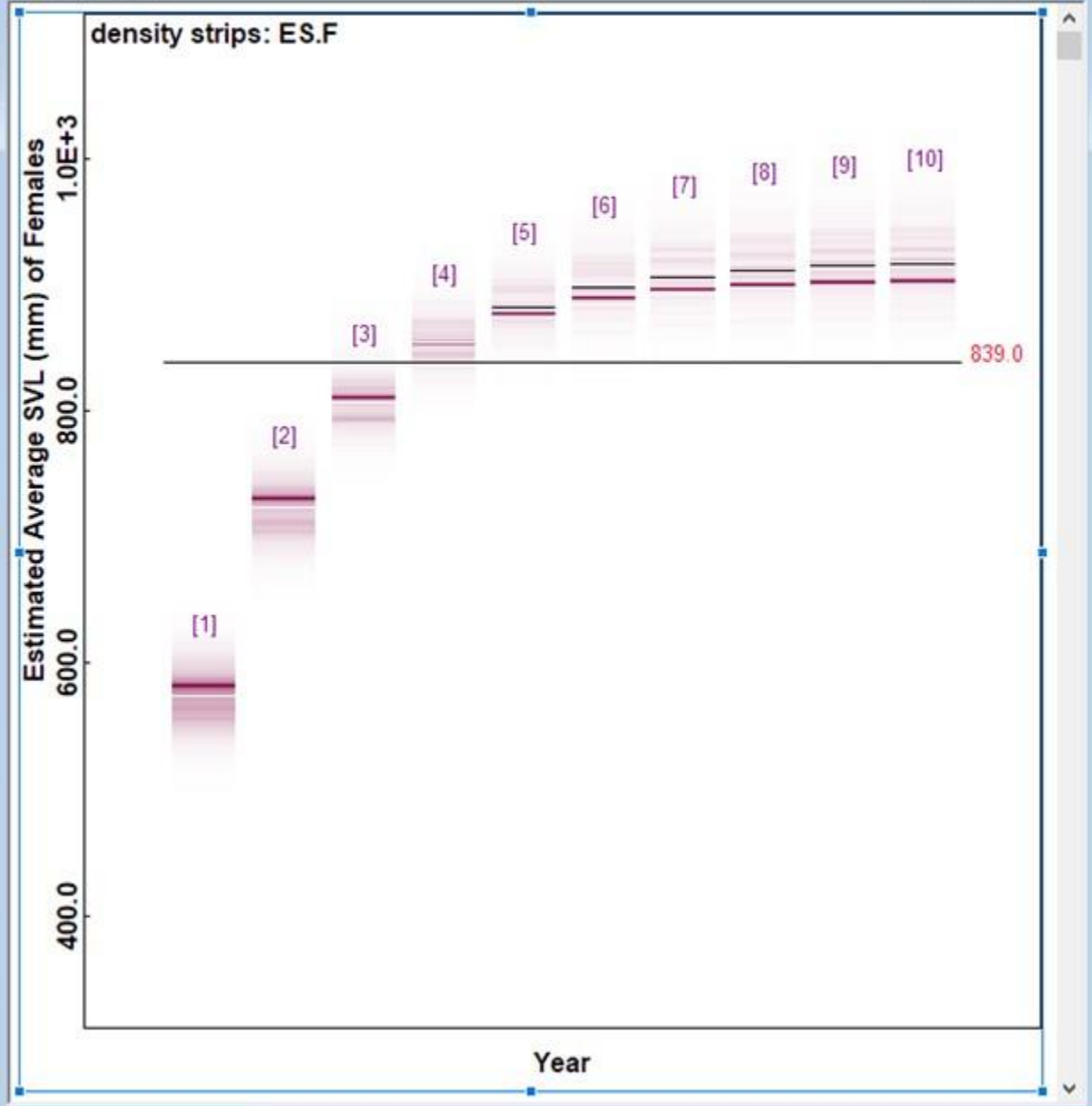
- Low daily detection probability ($\widehat{\bar{p}}$ = 0.068)
- High cumulative detection probability (p^*= 0.93, $n_{surveys}$ = 37)
- Low occupancy ($\widehat{\psi}$=0.080)
- Clumped distribution within Tilden
- Number of individuals in breeding population ($\widehat{N}$=34)
- Able to relate occupancy probability to variation in habitat
- Snakes already utilizing maintenance treatment area
- Conflicting habitat results, but similar aspect pattern from telemetry
- *Preliminary results* – more to follow after treatment . . .

SBI Previous Studies

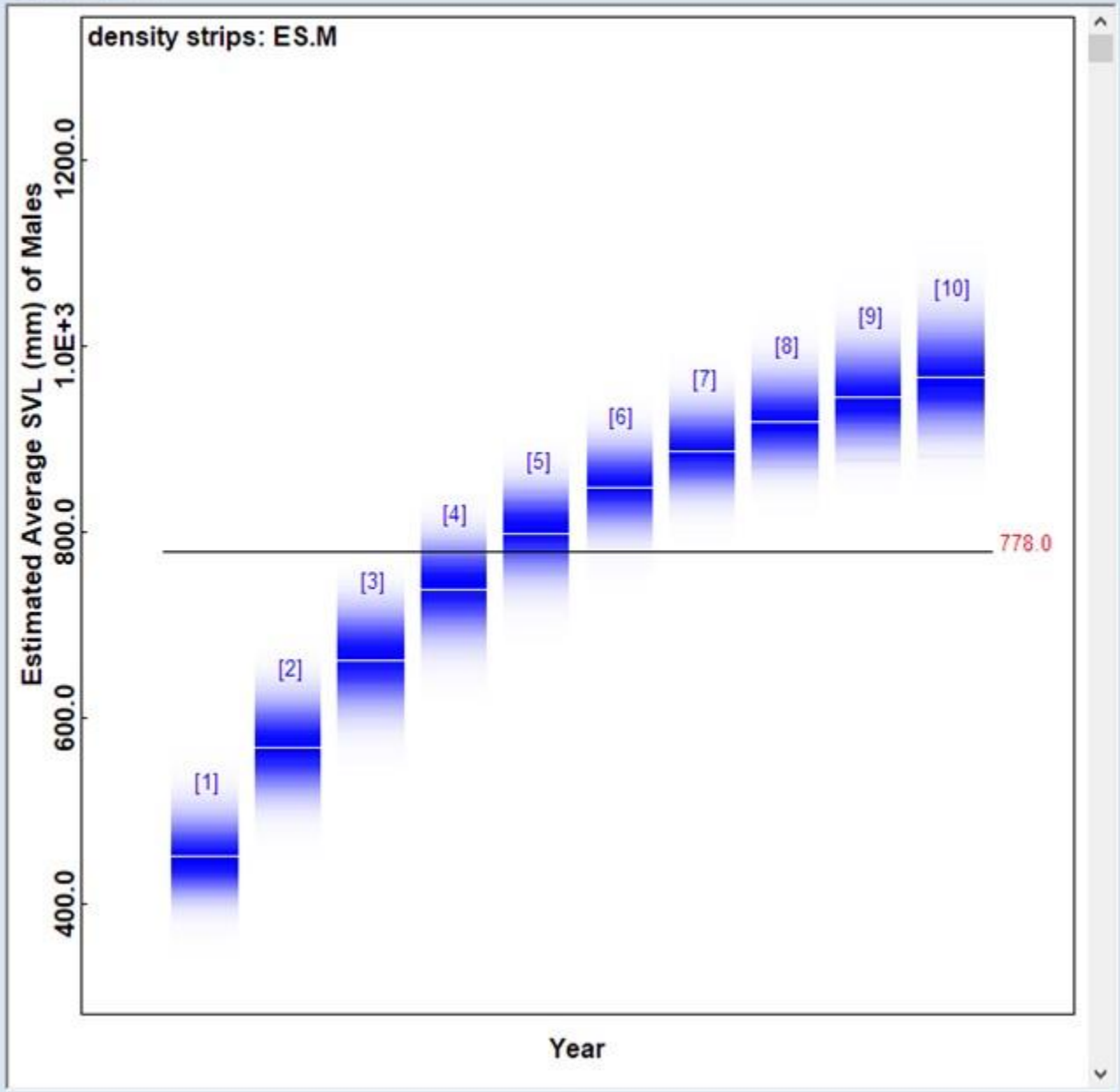
OpenBUGS

File Edit Attributes Tools Info Model Inference Doodle Map Text Window Examples Manuals Help

DensityStripsES-F



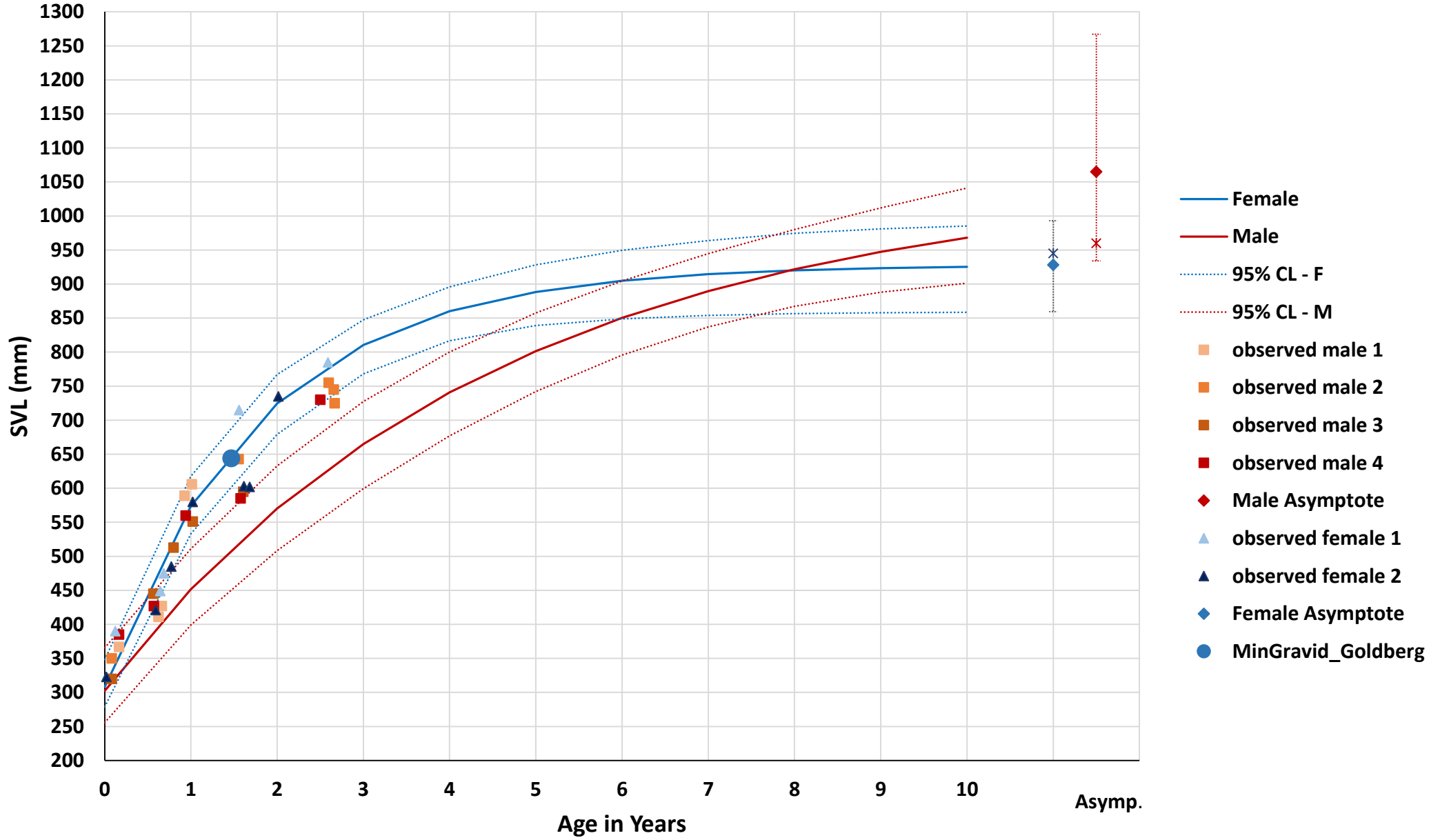
DensityStripsES-M

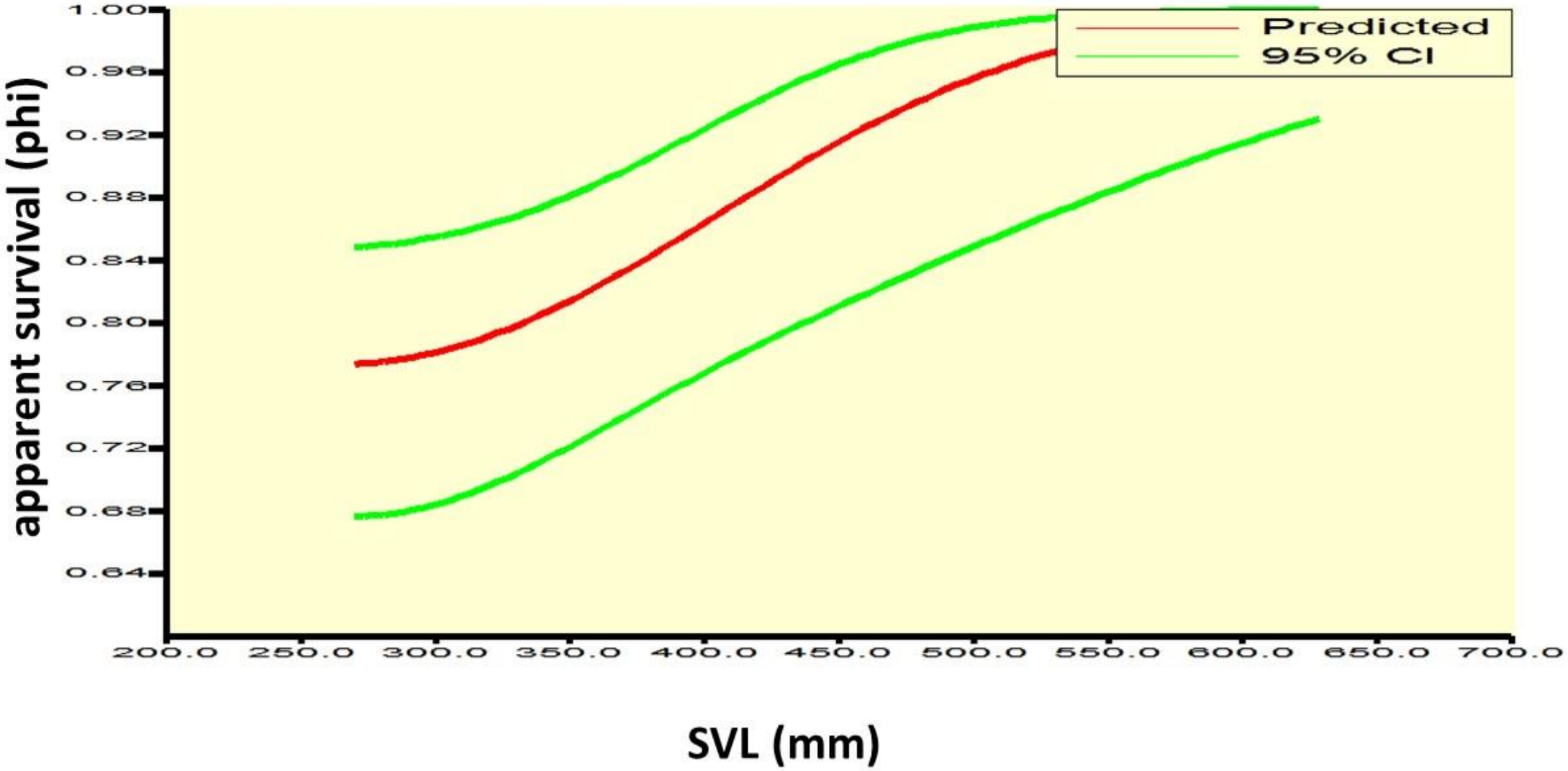


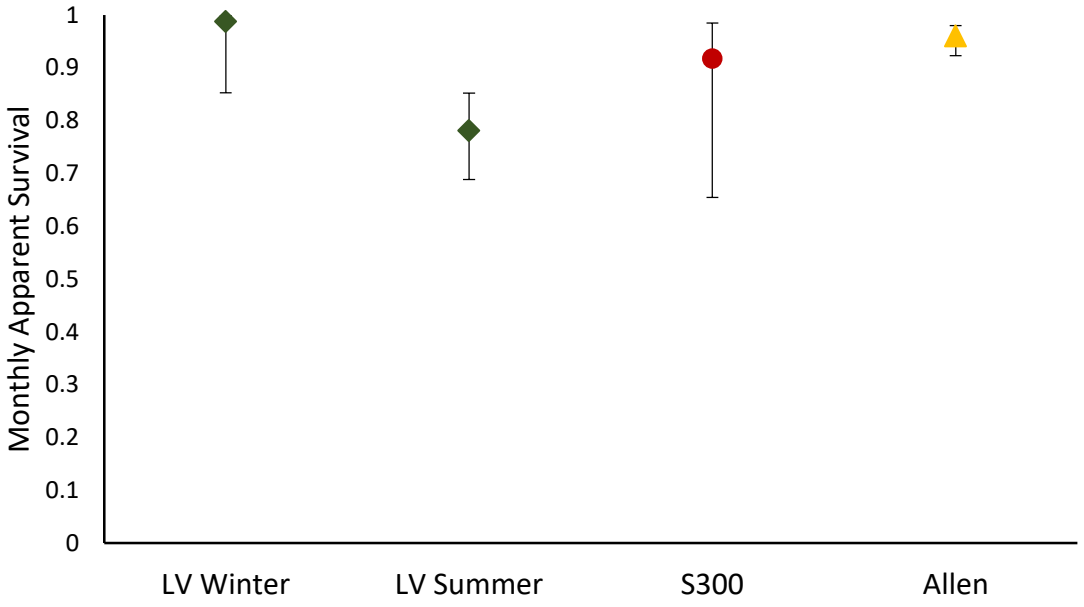
saved

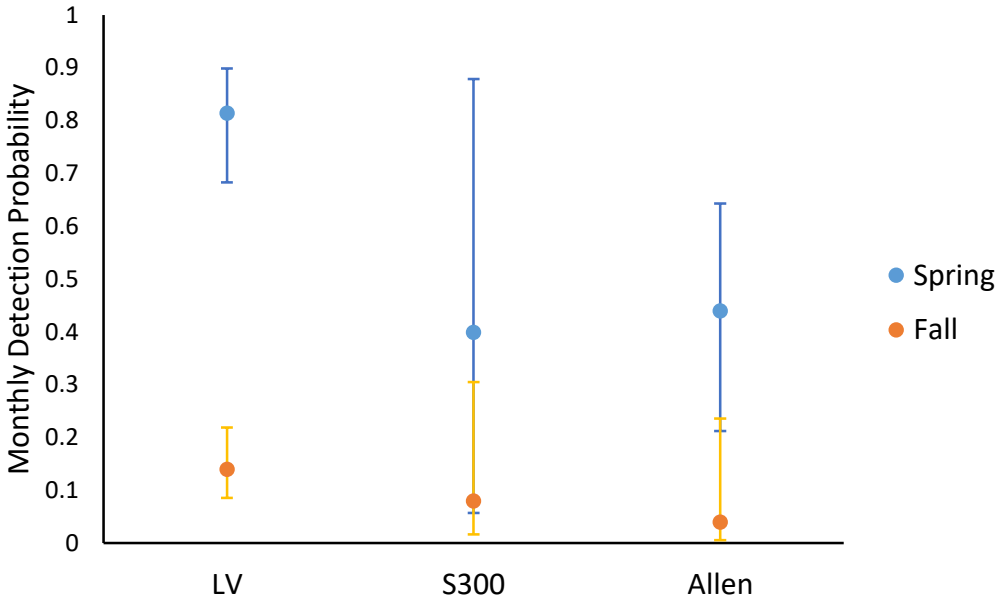
Estimated Size at Age of ASR at Los Vaqueros

(Von Bertalanffy Growth Model 9,652 iterations)




apparent survival (phi)
1.00
0.96
0.92
0.88
0.84
0.80
0.76
0.72
0.68
0.64
Predicted
95% CI
200.0
250.0
300.0
350.0
400.0
450.0
500.0
550.0
600.0
650.0
700.0
SVL (mm)





<u>Top-Ranking Seasonal CJS Models of Adult ASR Only Per Site</u>*

LV:	ϕ(season)p(season)	[trapped Spring 2001-Fall 2005]	c-hat = 0.93 (0.79 – 1.08)
S300:	ϕ(.)p(season)	[trapped Spring 2002-Fall 2004]	c-hat = 1.57 (-0.48 – 3.62)
Allen:	ϕ(.)p(season)	[trapped Spring 2005-Spring 2009]	c-hat = 3.04 (0.67 – 5.39)

*Covariates tested for ϕ: Year, Sex, Season

*Covariates tested for p: Year, Sex, Season, Effort

Thank you!!

EBRPD:
Kristen Van Dam
Anne Beckley
Jessica Sheppard
Matt Graul
Jeff Rasmussen
Jim Rutledge
Sergio Huerta
Brad Gallup
Brian Cordeiro
Aileen Theile
Fire Crews
David Drueckhammer

SBI (past and present):
Sam Young
Adam Chassey
Hailey Pexton
Natasha Dvorak
Sarah Willbrand
Dan Gold
Megan Miranda
Glenn Woodruff
Hailey Mirts
Ryan Byrnes
Eric Britt
Cole Paris

SBI (cont'd):
William McCall
William Bauer
Chadwick McCready
Zach Leisz
Ashley Estacio
Spencer McClintock
Jacqueline Taylor
Jeff Mitchell

Sacramento Zoo/ UCD:
Dr. Ray Wack

Berkeley Dog and Cat:
Dr. Kenneth Harkewicz

USGS-San Diego:
Jonathan Richmond

USFWS:
Sarah Markegard
Ryan Olah

CDFW:
Laura Patterson
Justin Garcia

Questions?
Thank you!!