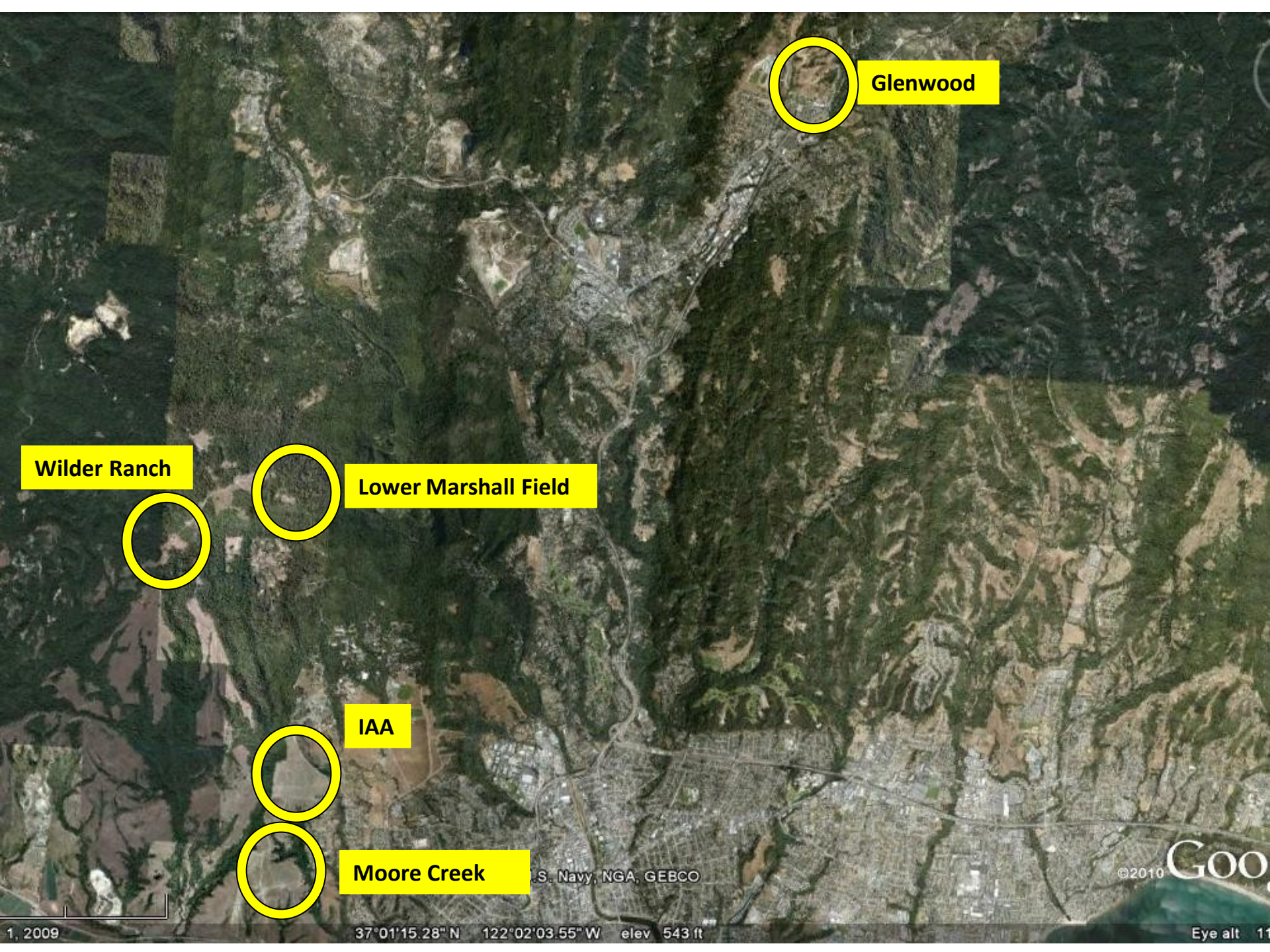
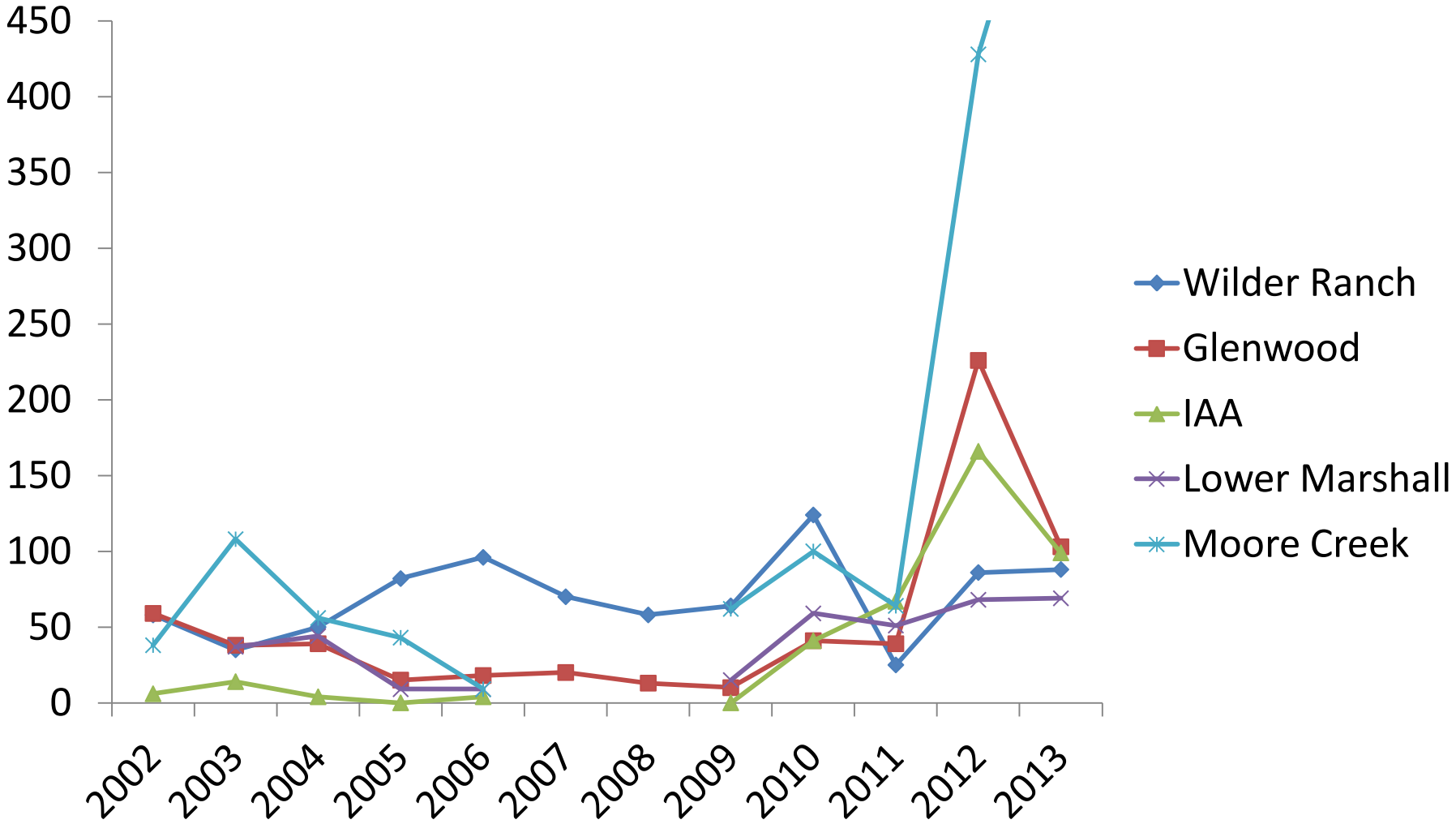
Status of Ohlone tiger beetle (OTB) populations

Tara Cornelisse

OTB Recovery Workshop 2013


Glenwood
Wilder Ranch
Lower Marshall Field
IAA
Moore Creek
S. Navy, NGA, GEBCO
©2010 Goo
1, 2009
37°01'15.28" N 122°02'03.55" W elev 543 ft
Eye alt

OTB Adult numbers



LIFE CYCLE OF THE Ohlone Tiger Beetle

Late January – early March

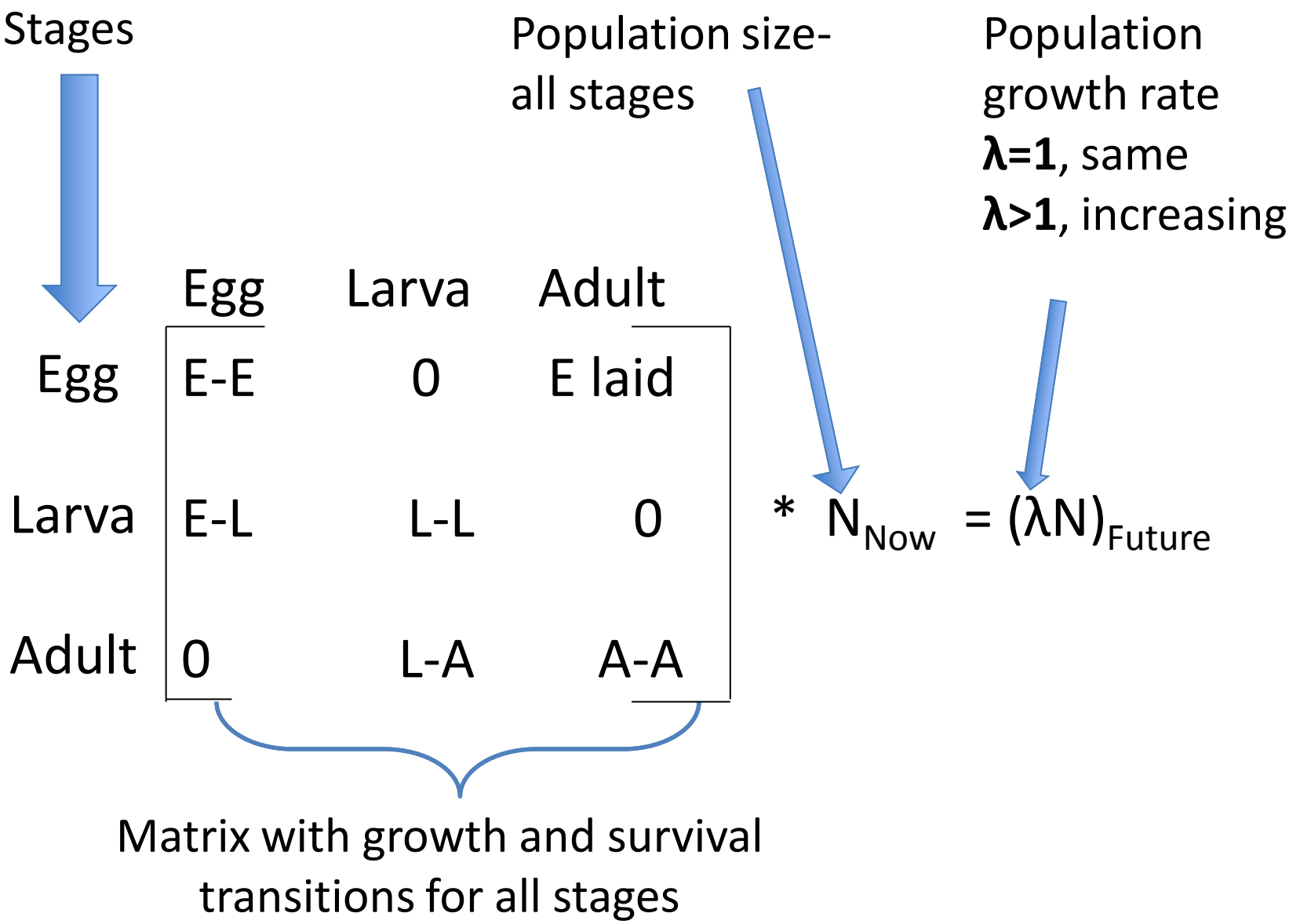
February- Early May

March -May

1st Instar – April
2nd Instar– May
3rd Instar – June – August of Year 1 or 2

3rd Instar burrow

September – January


Stages
Population size- all stages
Population growth rate
λ=1, same
λ>1, increasing
Egg
Larva
Adult
Egg
E-E
0
E laid
Larva
E-L
L-L
0
Adult
0
L-A
A-A
* N Now = (λN) Future
Matrix with growth and survival transitions for all stages

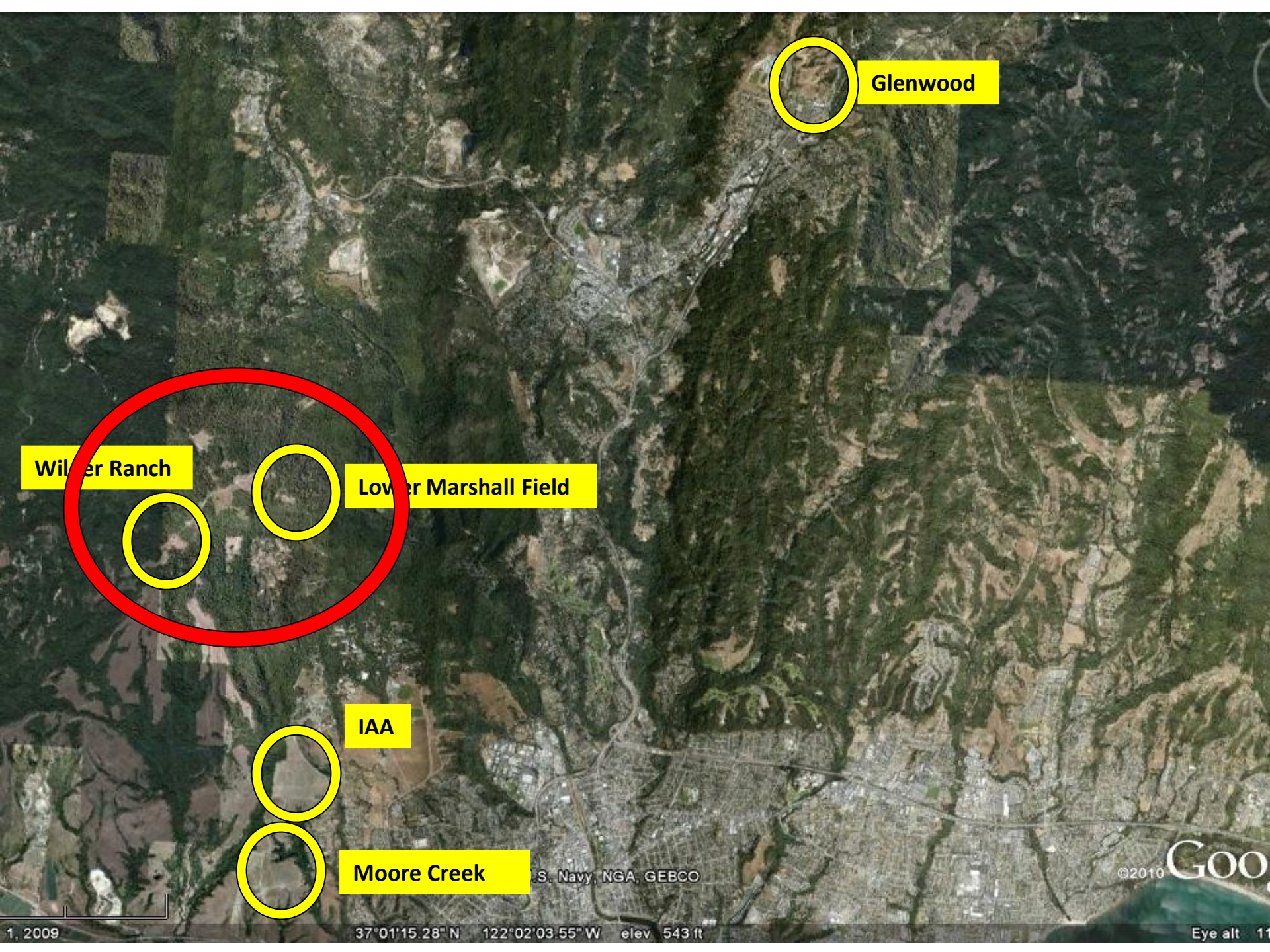
Resulting matrix

	Eggs	1st Larva	2nd Larva	3rd Larva	Adults
Eggs	0	0	0	0	Sf4*Ss0
1st Larva	Ss0	Sg1	0	0	0
2nd Larva	0	Ss1	Sg2	0	0
3rd Larva	0	0	Ss2	Sg3	0
Adults	0	0	0	Ss3	0

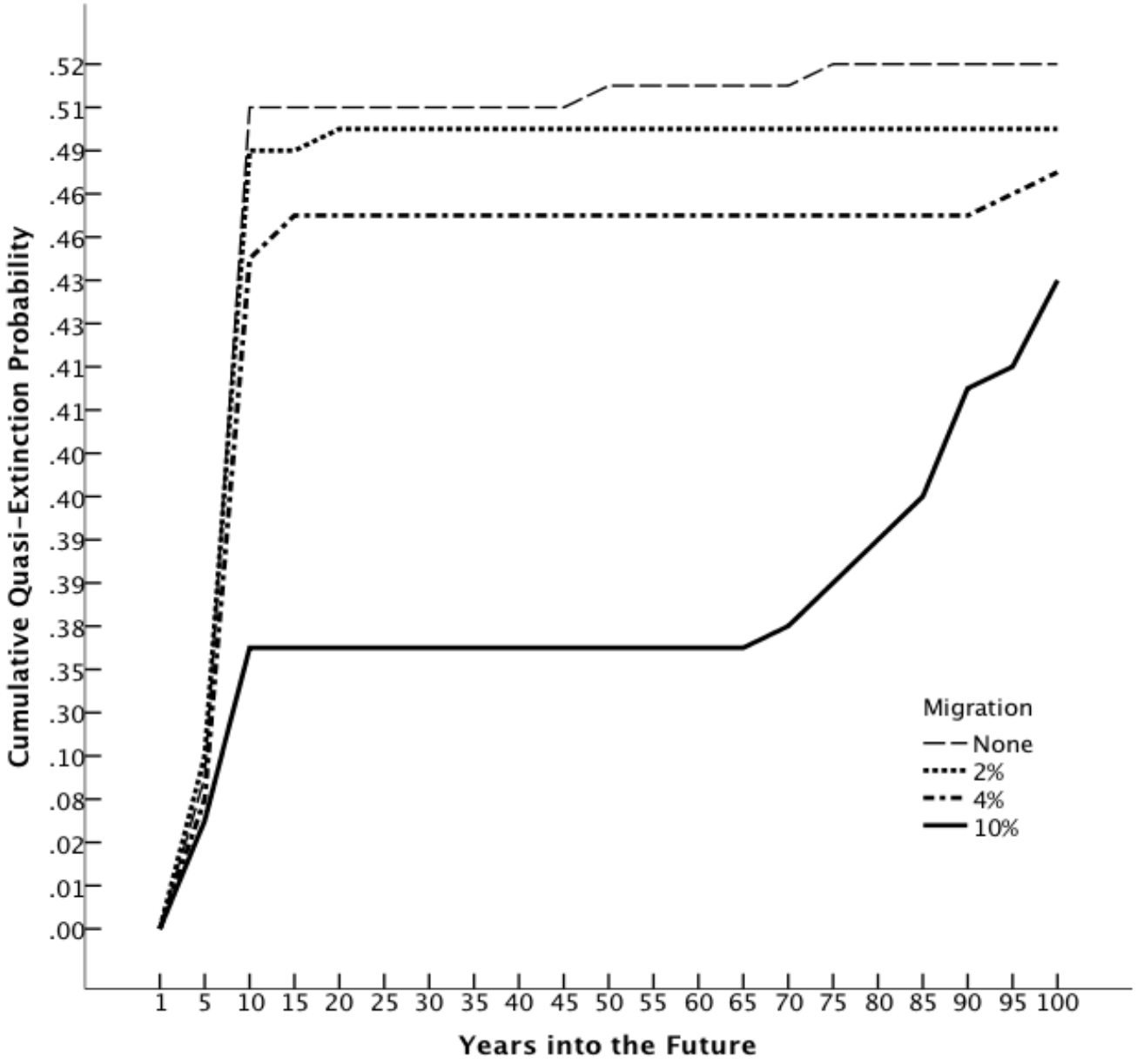
Measuring Larval Growth & Transition

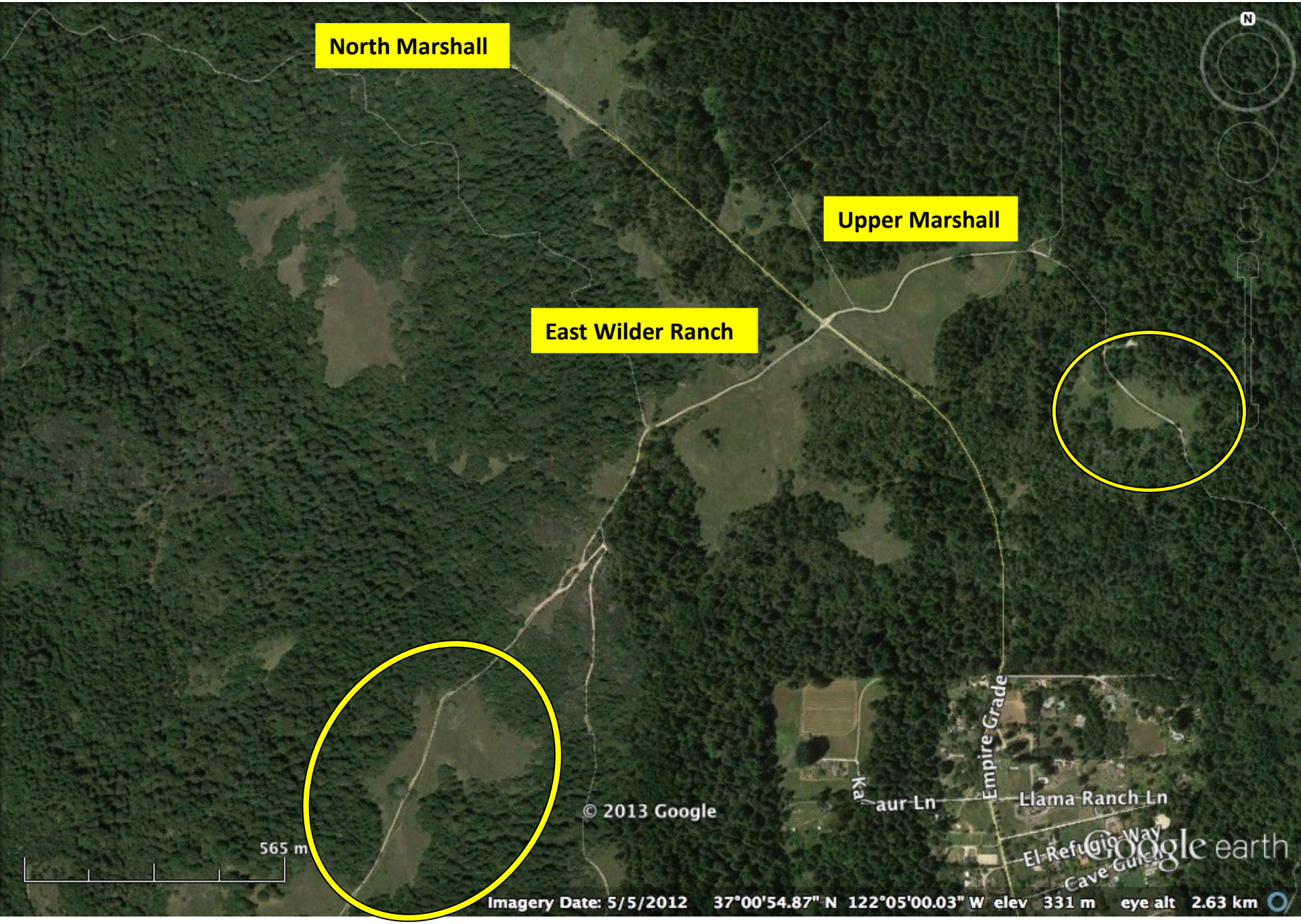
Population Growth Rates

Population Site	Growth Rate λ
Glenwood	1.41
Moore Creek	1.16
Inclusion Area A	1.16
Lower Marshall Field	1.03
Wilder Ranch	0.601


Glenwood
Wil er Ranch
Lov r Marshall Field
IAA
Moore Creek
S. Navy, NGA, GEBCO
©2010 Goo
1, 2009
37°01'15.28" N 122°02'03.55" W elev 543 ft
Eye alt 11

Lower Marshall and Wilder Ranch




North Marshall
Upper Marshall
East Wilder Ranch
Empire Grade
Llama Ranch Ln
El Refugio Way
Cave Gulch
© 2013 Google
565 m
Google earth
Imagery Date: 5/5/2012 37°00'54.87" N 122°05'00.03" W elev 331 m eye alt 2.63 km

Summary/Increasing viability

- Four of Five “viable”
  - Close to 1!
- Connectivity
  - Create habitat
    - East Wilder Ranch
    - Upper Marshall Field
    - North Marshall Field

Questions?

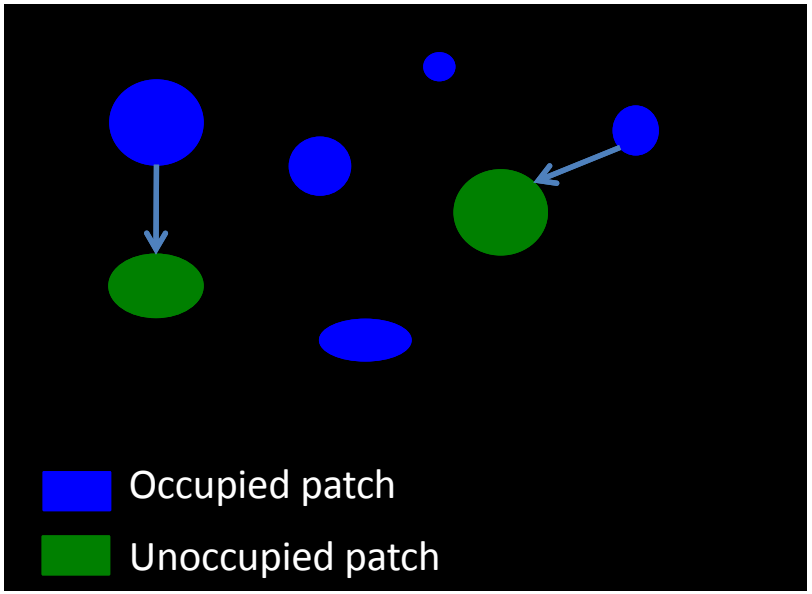
Characteristics of OTB habitats

Tara Cornelisse

OTB Recovery Workshop 2013

Importance of Unoccupied Patches

- Retain recolonization potential
  - OTB metapopulation dynamics
- Mitigate risk of
  - Fire
  - Climate change
  - Inbreeding
  - Ecosystem changes

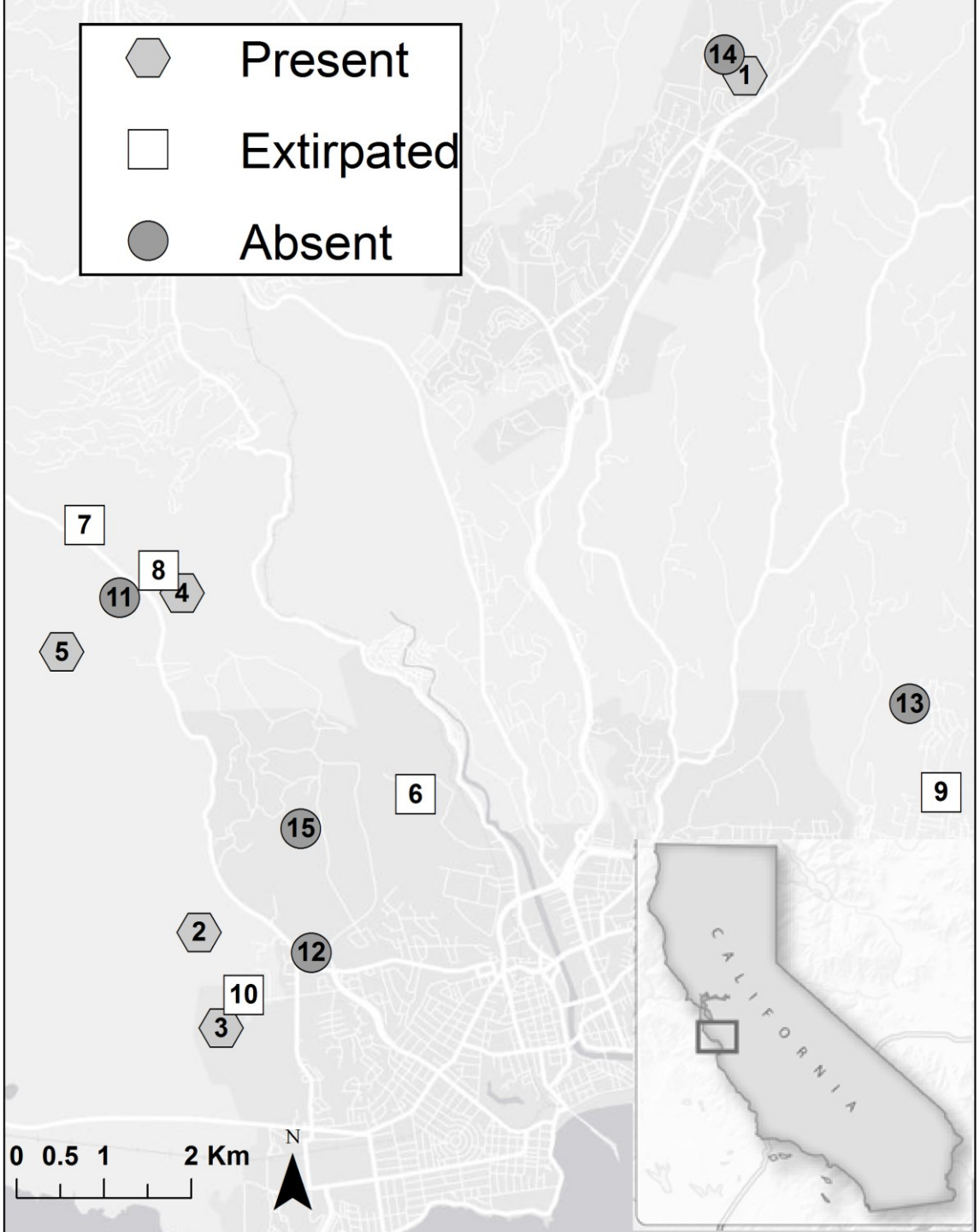


How do we manage unoccupied sites for recolonization?

What are the differences between present sites and unoccupied- both extirpated and potential habitat?

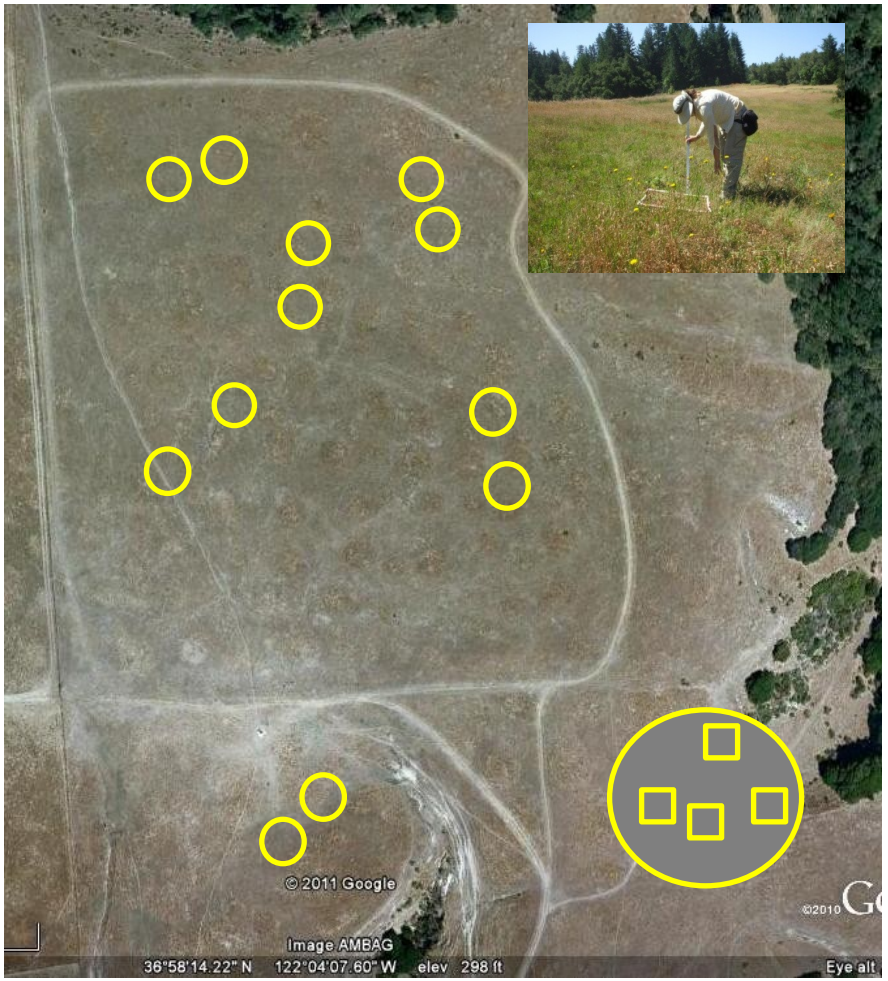
Study sites

- 5 occupied (present)
- 5 extirpated
- 5 absent
  - Potentially past habitat
  - Coastal Prairie within OTB range, same soil family
- Test habitat characteristics that are associated with the different site types

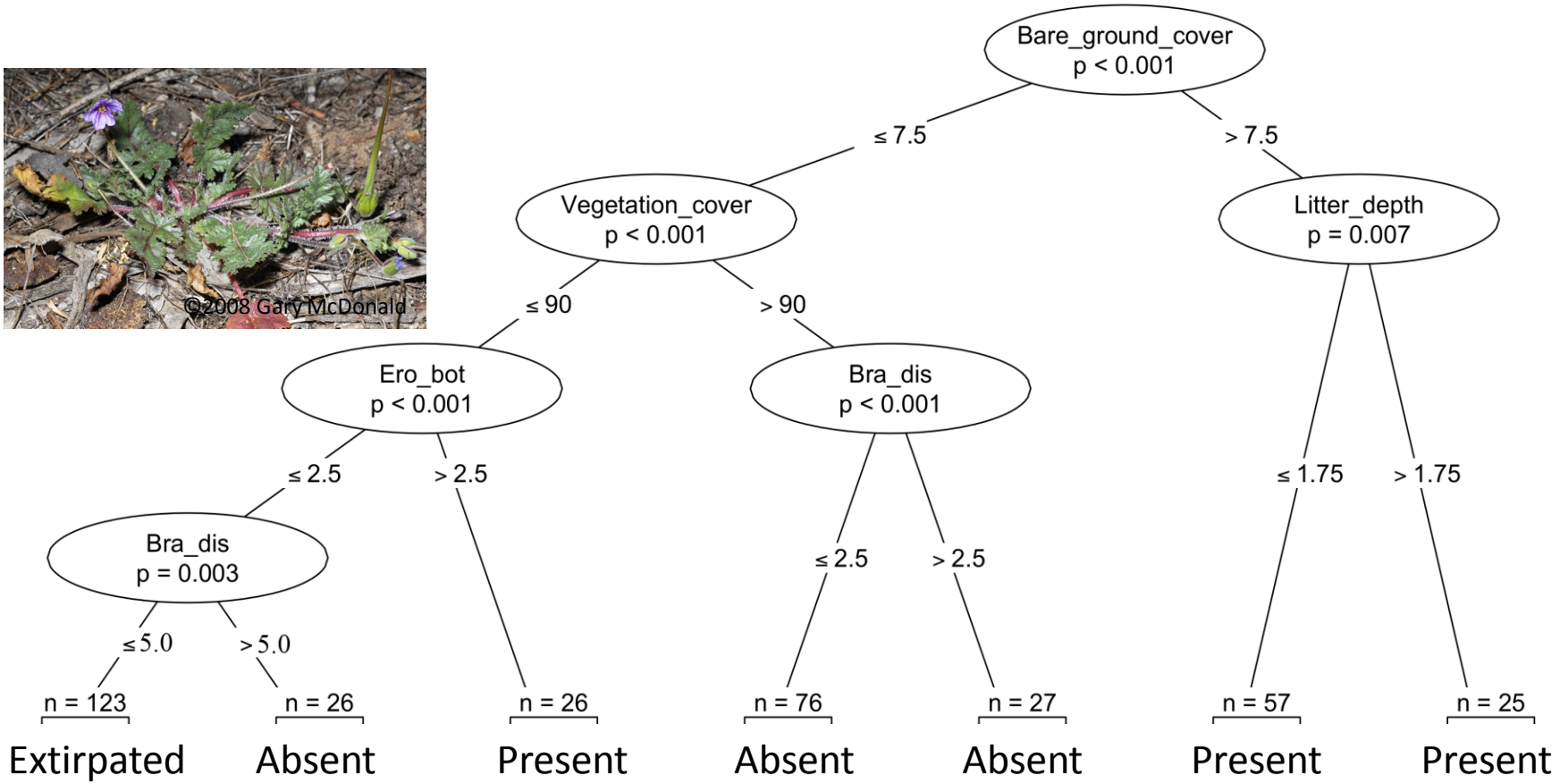

Present
Extirpated
Absent
14
1
7
8
11
4
5
13
6
9
15
2
12
10
3
0 0.5 1 2 Km
N
CALIFORNIA

Methods

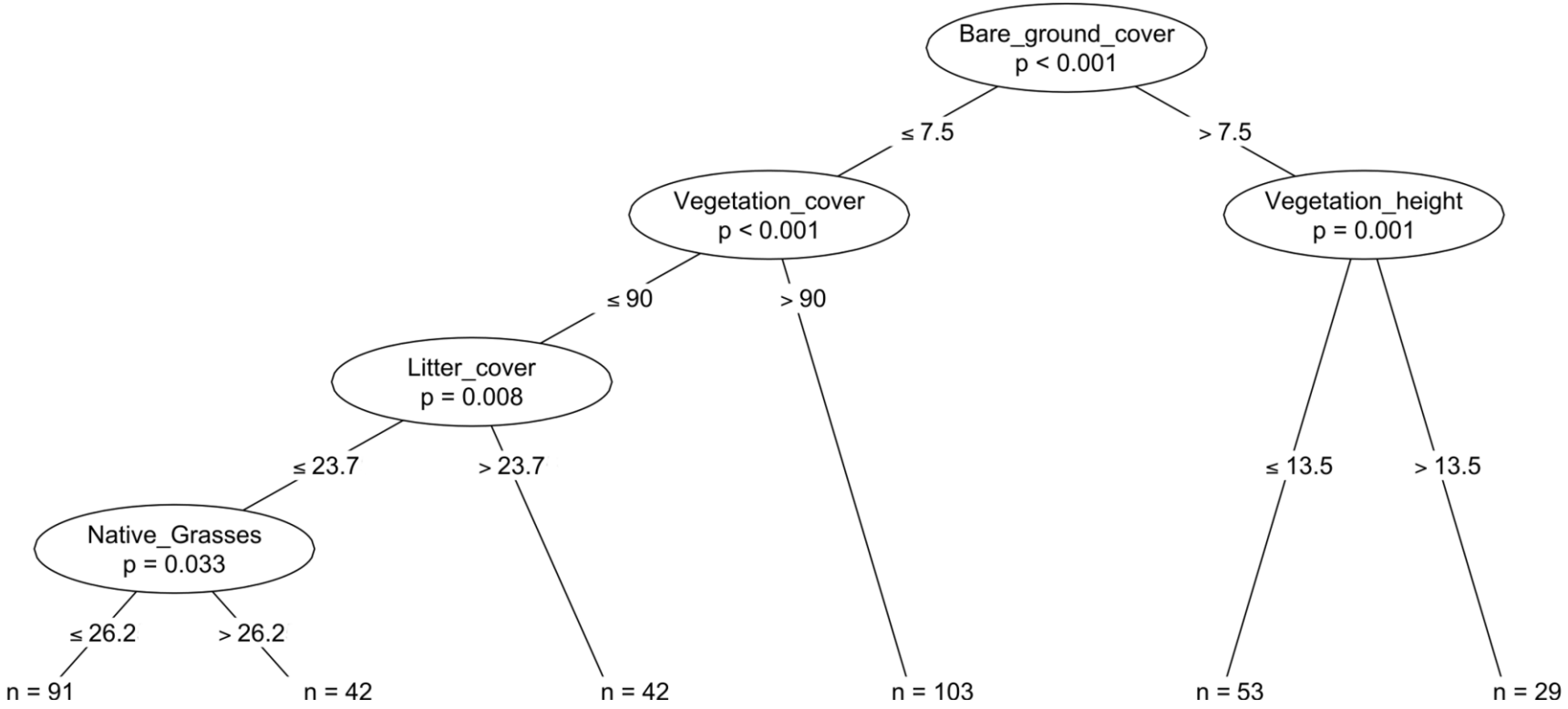
- All sites: 12 plots
  - Veg/litter height
  - Veg species % cover
  - % cover grass/forb
  - % cover bare grd
  - Soil cores (1/plot)
    - Chemical and physical
- Do they classify sites?
  - Plant species and as guilds



Classifying sites with plant species



Classifying- plants as guilds



Summary

- OTB are found in areas with:
  - ~ 10% bare ground per 0.5 m^2
  - higher forb than grass cover
  - lower litter cover and depth

All factors associated with disturbance: grazing, mowing, scraping

- Forb vs. Grass more important than Native vs. Nonnative
- *Brachypodium distachyon*
  - future problem?

Conclusions- what to do

- Improve habitat in extirpated sites
  - South Meder
  - Pogonip
- Consider Absent sites
  - Have tried IAD, keep it up
  - Great Meadow? Now grazing!
- Increase habitat in occupied sites
  - New Moore Creek trail!

How?

Grazing

Mowing

Scrapes- next

Questions?

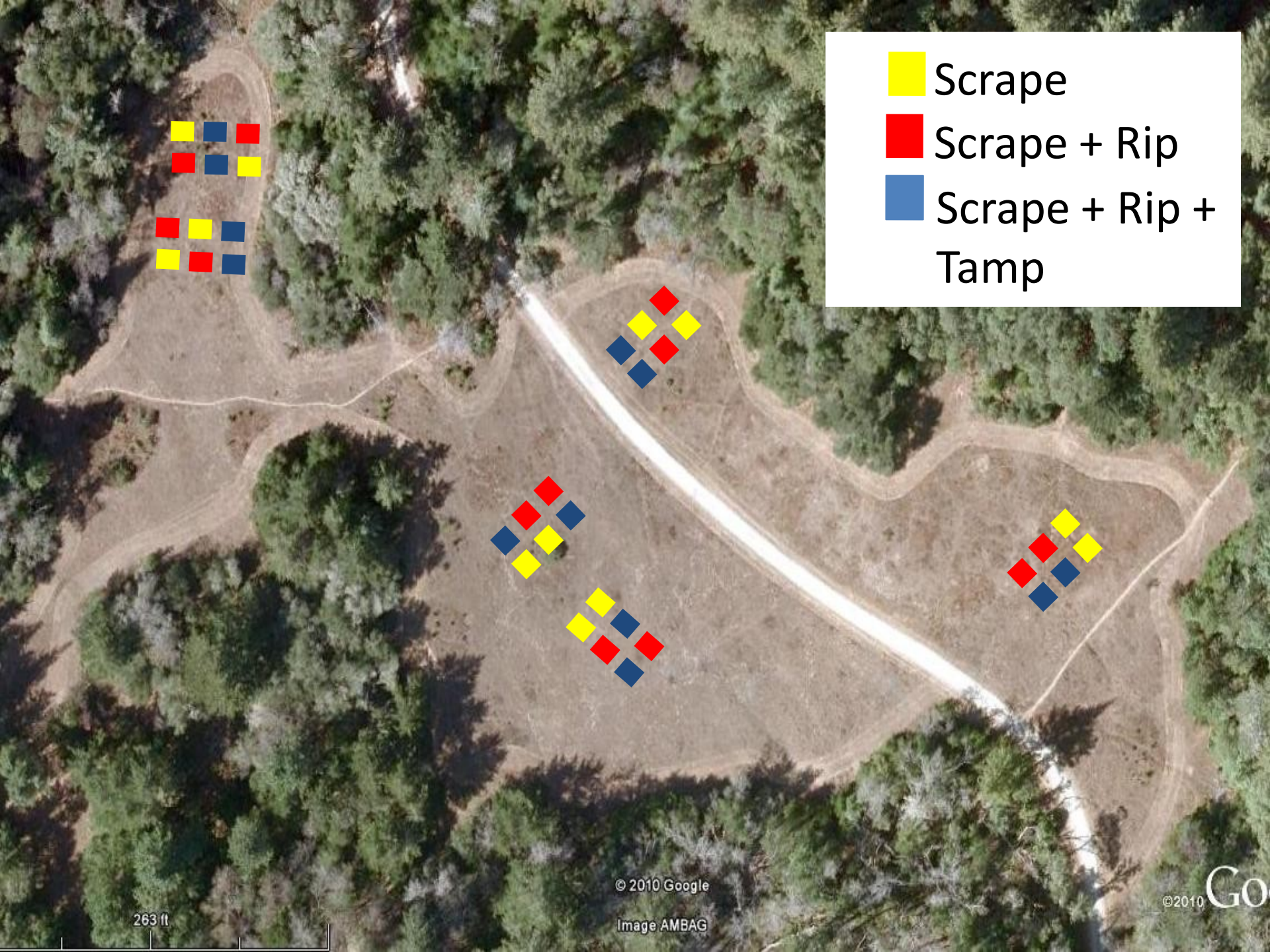
OTB Habitat Creation

Tara Cornelisse

OTB Recovery Workshop 2013

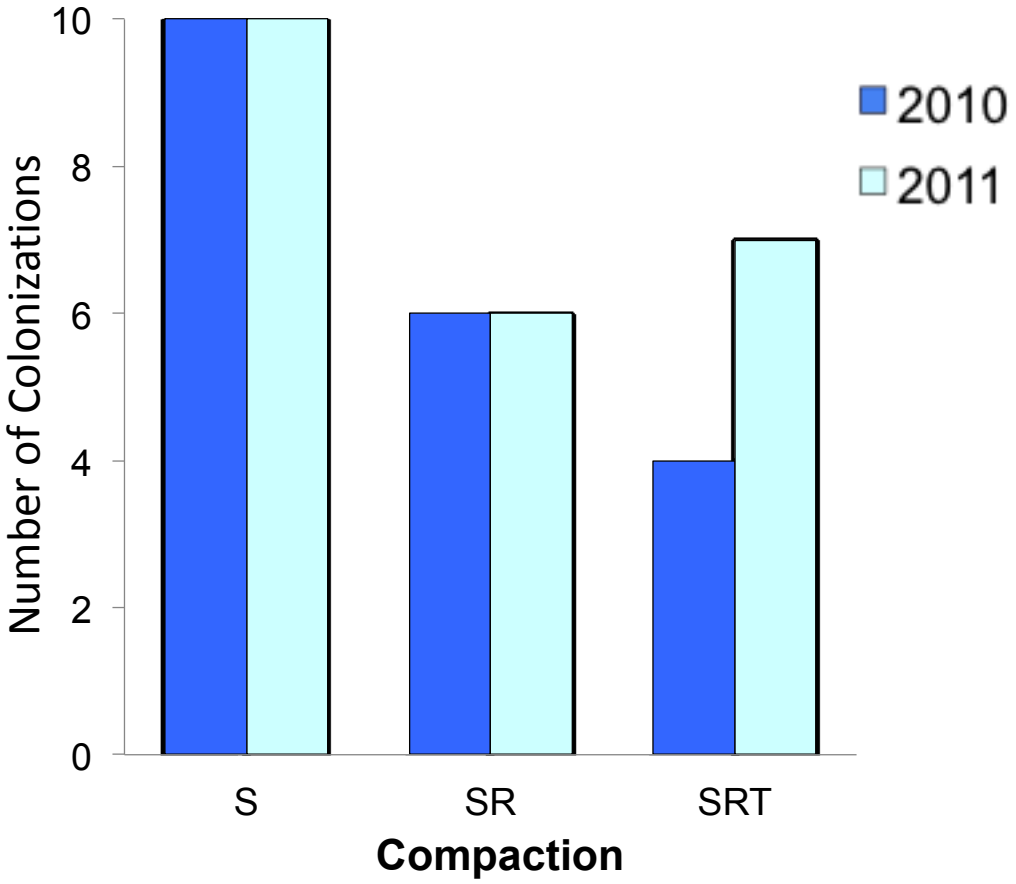
Just Any Scrape?

- Does compaction matter?
- Does distance from main beetle area matter?


Scrape
Scrape + Rip
Scrape + Rip + Tamp
© 2010 Google
Image AMBAG
263 ft
©2010

Scrapes 2009
IAA and IAD

Surveyed for larval burrows

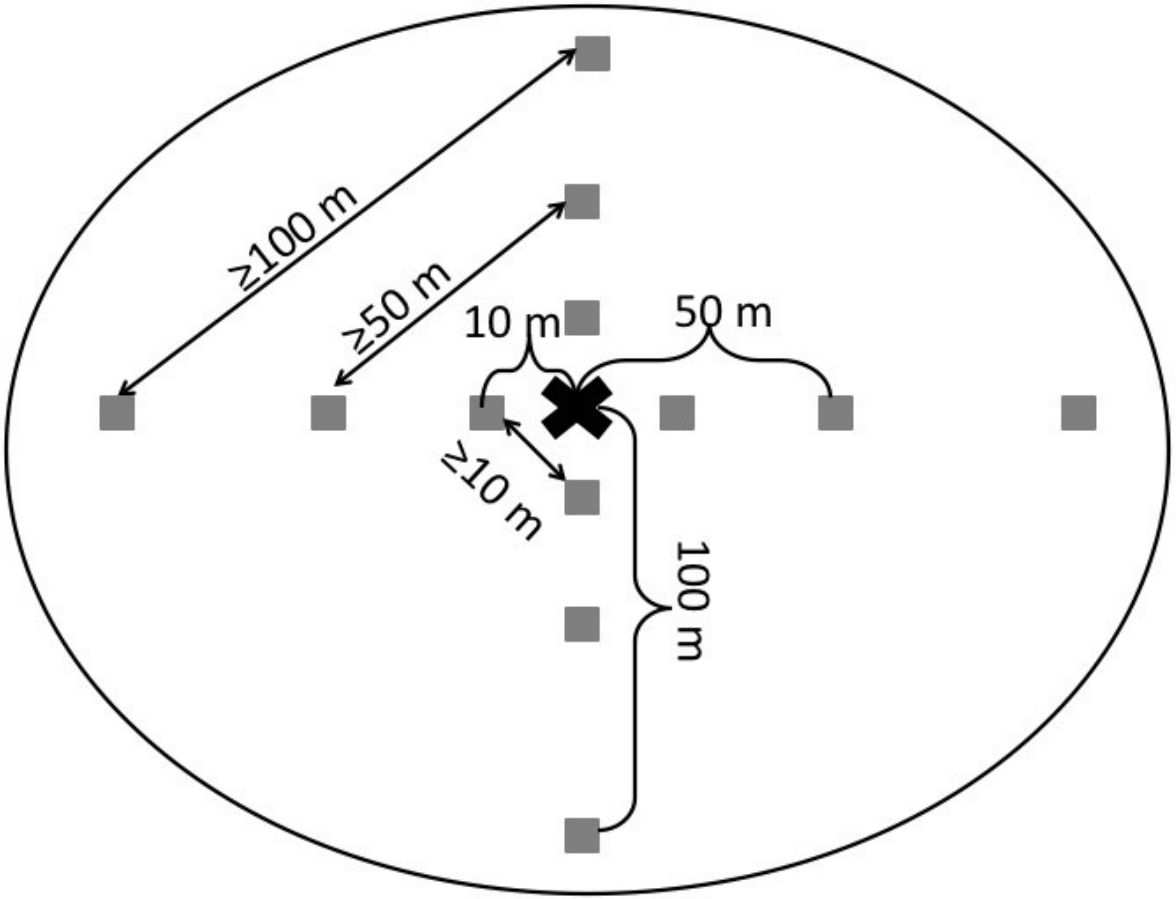

10
8
6
4
2
0
Number of Colonizations
2010
2011
S
SR
SRT
Compaction

Just Any Scrape?

- Does compaction matter?

- Does distance from main beetle area matter?

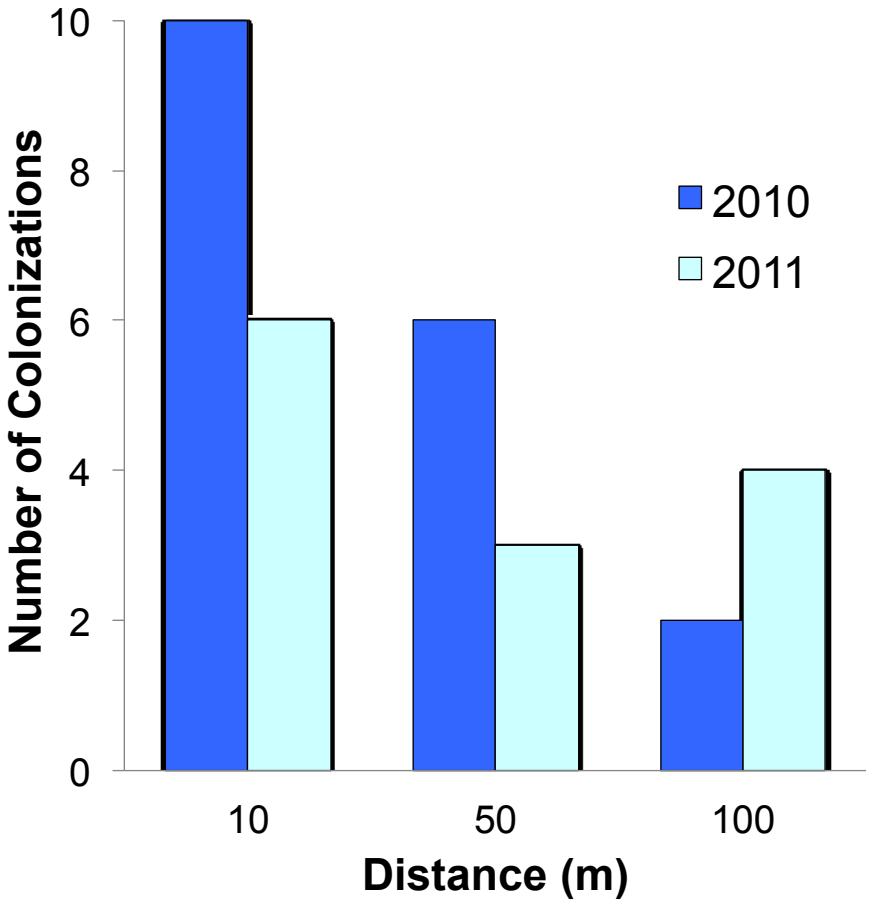
Study design



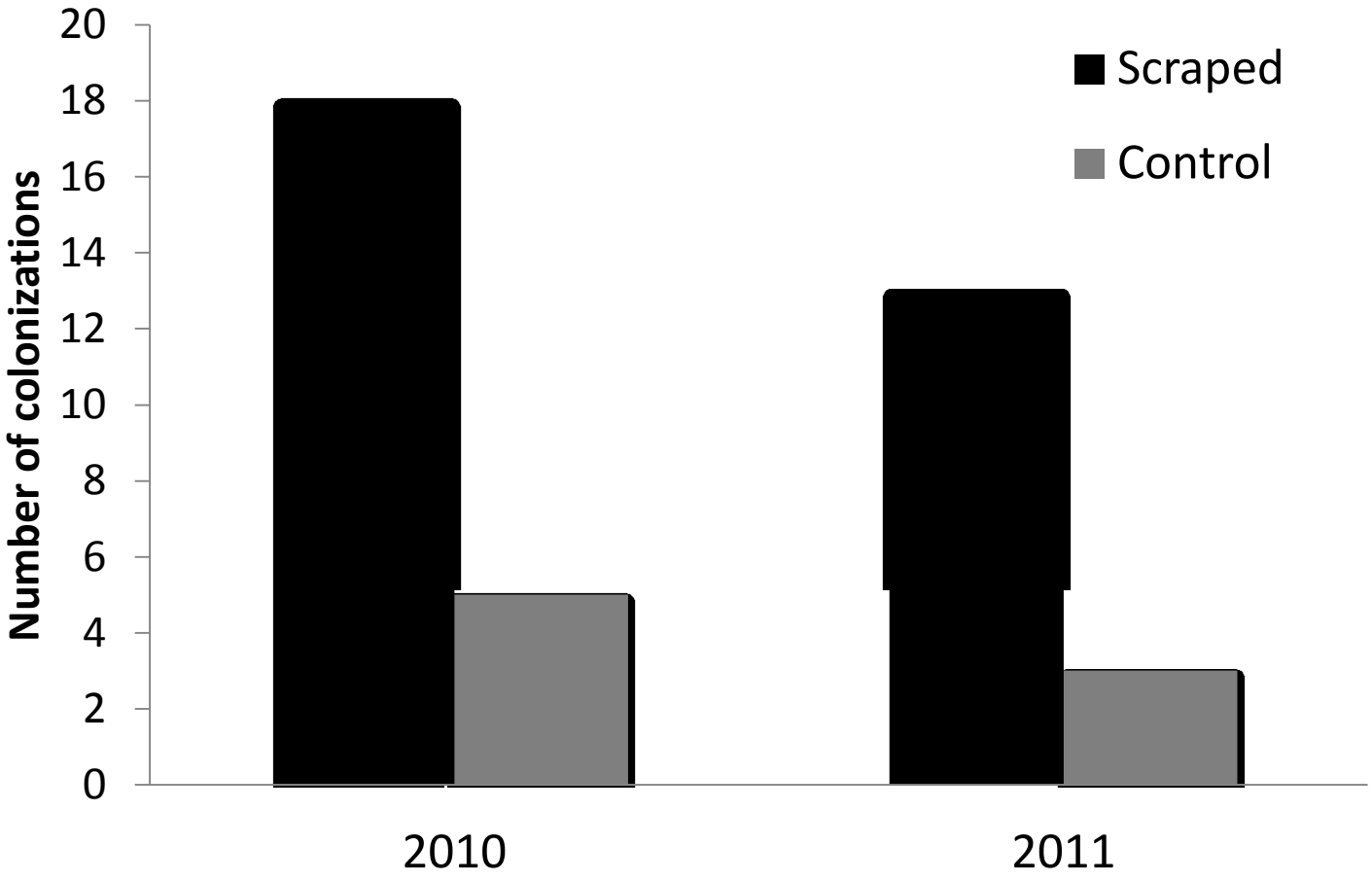

100I
100H
100G
50I
50H
Glenwood
50G
10I
10G
10H
100F
50F
10F
258 ft
© 2010 Google
©2009 Google
Imagery Date: May 23, 2009
37°04'09.39" N 122°00'00.52" W elev 0 ft
Eye alt 894 ft

Scrapin’

Distance from core habitat



Scrapes work!



Scrape Recommendations

- Just surface vegetation
- No need to decompact or tamp
- **Re-**scrape every 3rd year (2009 & 2012)
- New scrapes when possible
- When: October to February
  - Pupating 20 cm below surface
- *NOT between March to September*
  - Larvae active in burrows at this time

Questions?

Managing recreation for OTB conservation:

Tara Cornelisse

OTB Recovery Workshop 2013


OHLONE TIGER BEETLE HABITAT
Please Help Protect This Federally Listed Endangered Species.
The trails in this meadow serve as important breeding grounds, you can help by not biking on trails especially when they are fenced off.
UCSC
CAMPUS NATURAL RESERVE
Please Help Protect These Lands
• Keep bicycles and horses on fire roads
• Stay on designated trails
• No collecting
• No pets

But don’t bikers harm the OTB?

- *Create* habitat
  - OTB hunt and find mates on trails
- Deaths by direct impact: ~0.5-2% of adults, all in flight

More than just direct death

Endangered Species Act "Take"

- broadly defined- "harm"
- Recreation 2nd cause of ES decline on public land
  - Physiological reasons

Tiger beetle take

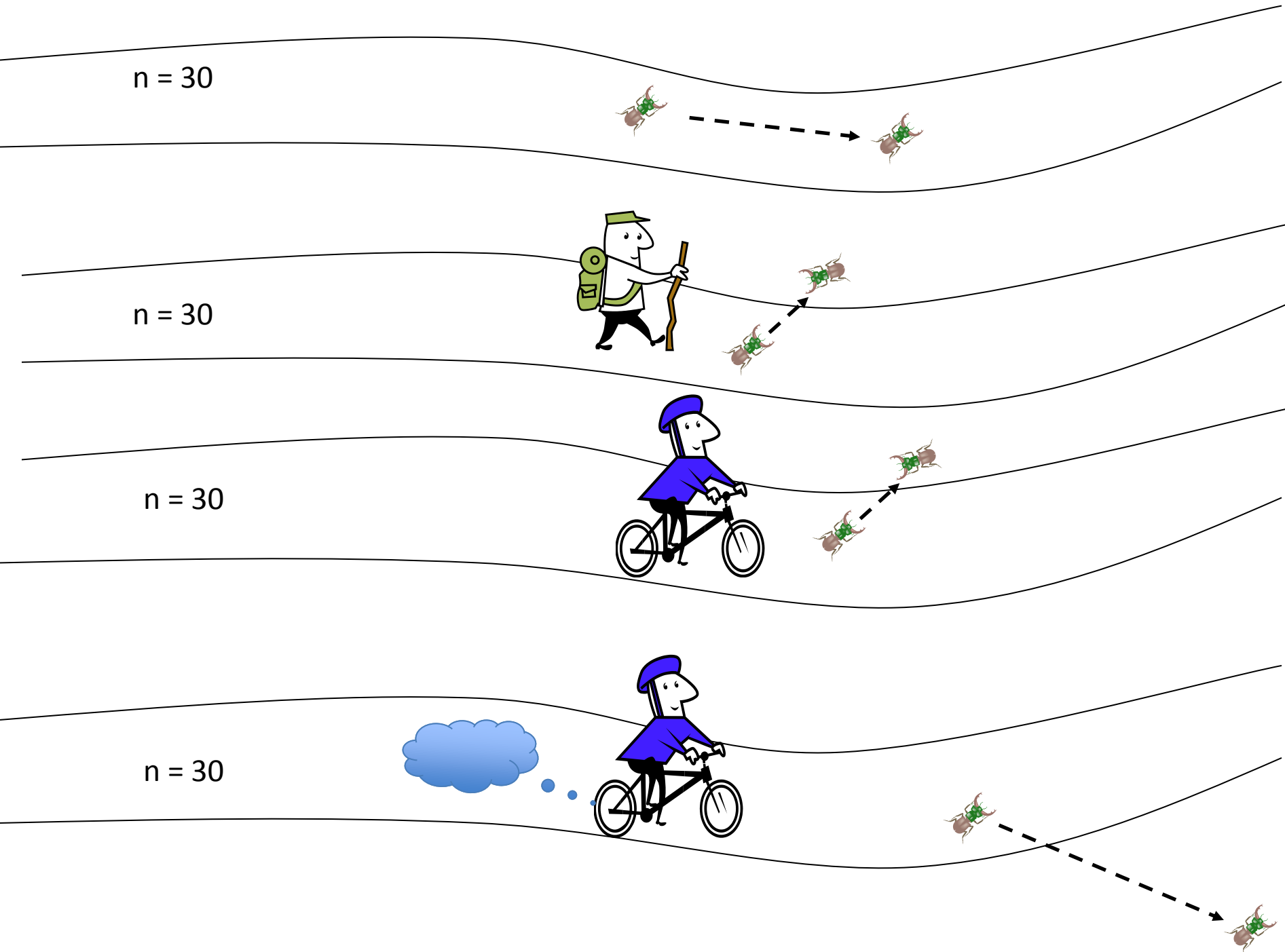
- Tiger beetles sensitive
  - Fastest hunters
  - Narrow thermal limits
- Flying = large energy expenditure

  =reduced fecundity (less eggs)

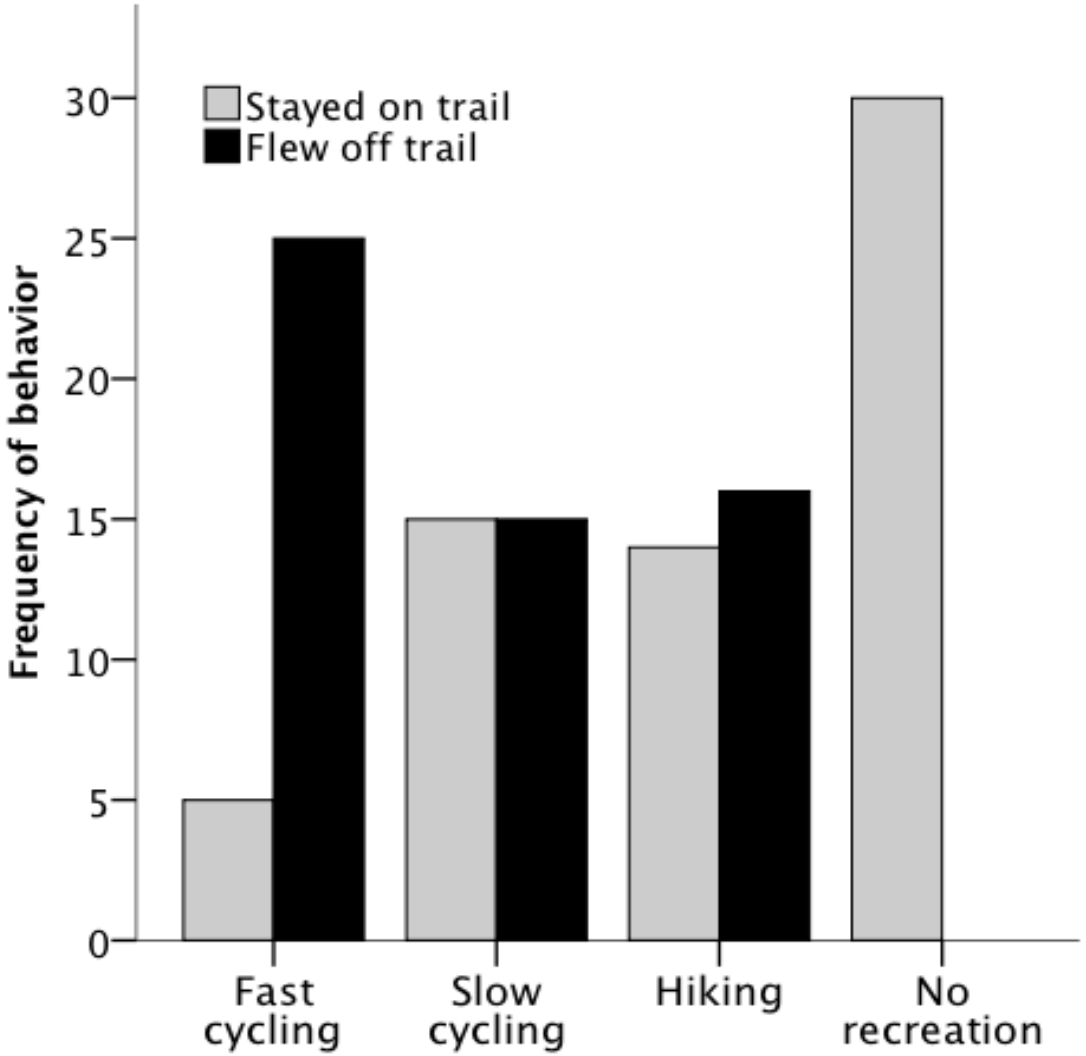
How does recreation affect the OTB behavior?

Methods

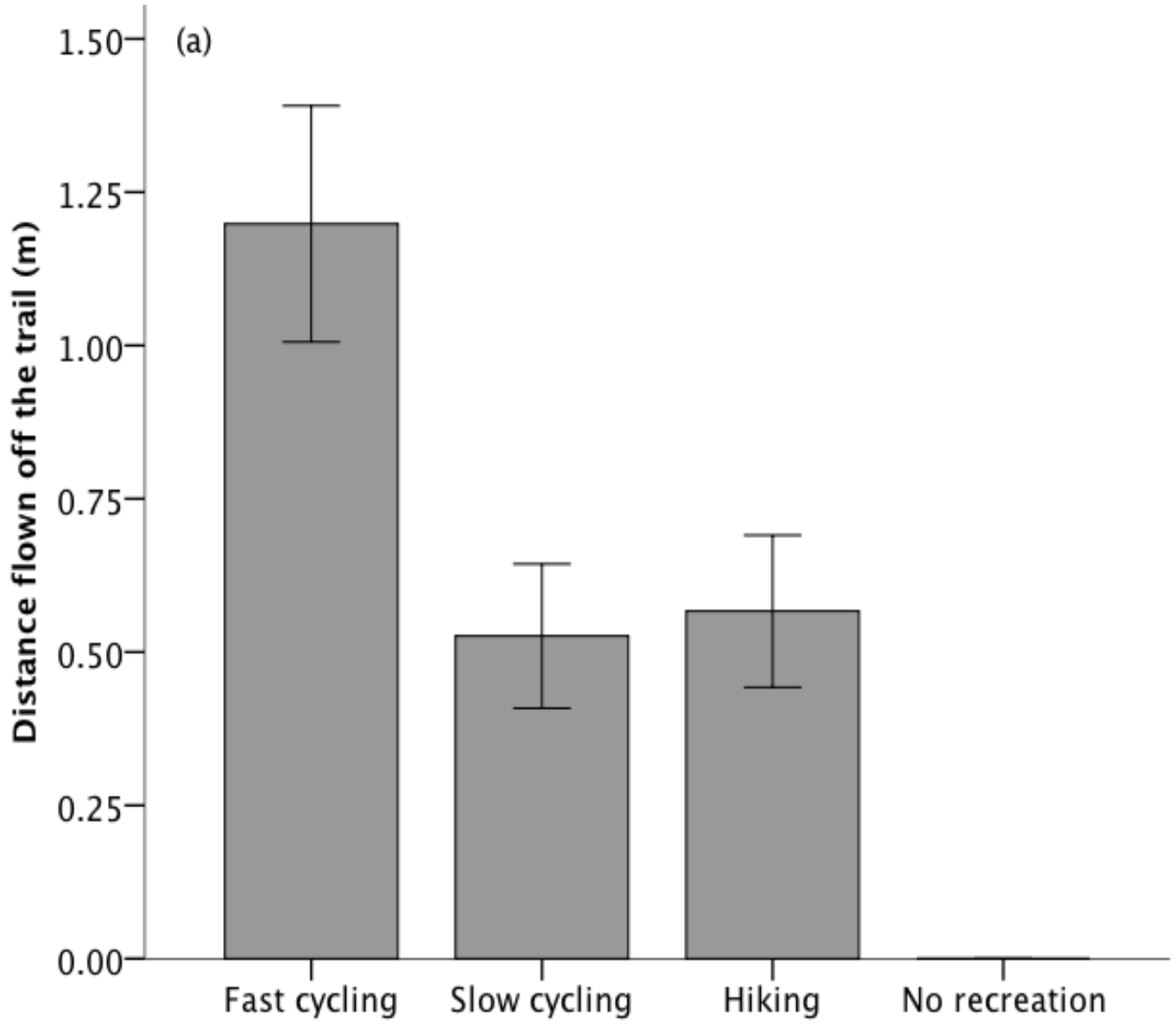
- 30 trials each of hiking, slow bike (5-7 mph), fast bike (18-20 mph) and control (total n = 120 trials)
  - 2 mins -> Recreation -> 2 mins
  - Controls: no recreation for 4 minutes
- Record whether flew off the trail
- Record total distance moved/flew


n = 30
n = 30
n = 30
n = 30

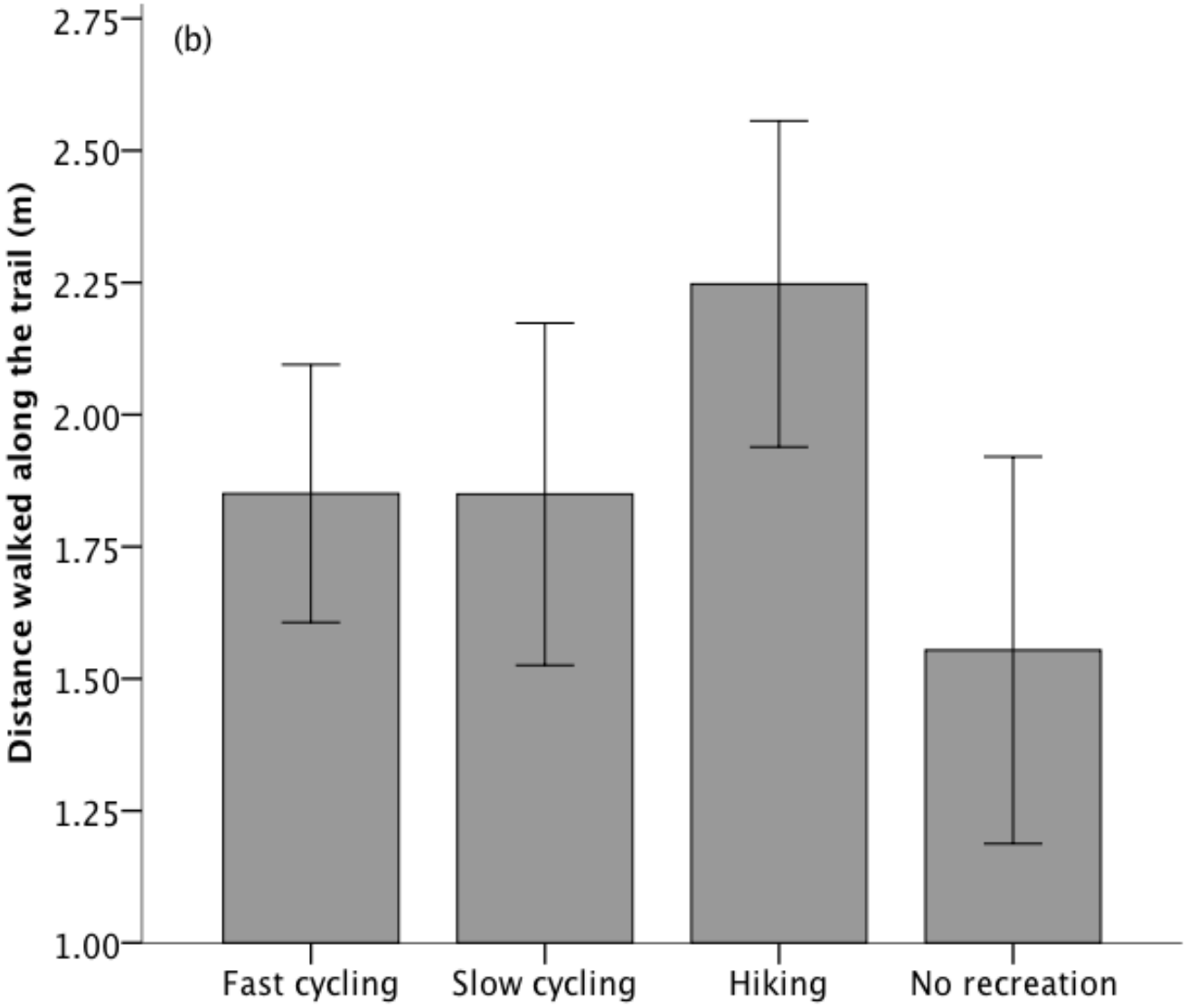
Beetles flew off the trail significantly more:
during each recreation trial type compared to no recreation ($p<0.0001$)
during fast cycling more than slow cycling or hiking ($p=0.014$)



Fast cycling caused beetles to fly significantly further off of the trial than other recreation types (p = 0.002, control not included in analysis)



Beetles did not differ in total distance walked between trial types (p=0.484)



Conclusions

- Fast bikes cause the beetle to fly off the trail significantly more often and further
- Beetles that stay on the trail do not move any more than if there was no disturbance
- Take home: bikes need to SLOW down!

What we should do

- Signs!
- Education
  - Trails have positive impact

Questions?

Top Predator