Integrity of San Diego Pollinators

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Funding
California Department of Fish and Wildlife
SANDAG

Draft pollinator monitoring plan for western San Diego County

Task 10
SANDAG Contract #: 5005783

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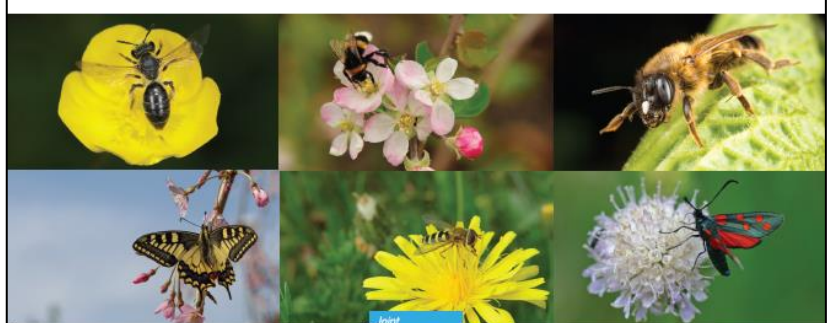
European Commission

JRC TECHNICAL REPORT

Proposal for an EU Pollinator Monitoring Scheme

Simon G. Potts, Jens Dauber, Axel Hochkirch, Bas Oteman, David B. Roy, Karin Ahrné, Koos Biesmeijer, Tom D. Breeze, Claire Carvell, Catarina Ferreira, Úna FitzPatrick, Nick J.B. Isaac, Mikko Kuussaari, Toshko Ljubomirov, Joachim Maes, Hien Ngo, Adara Pardo, Chiara Polce, Marino Quaranta, Josef Settele, Martin Sorg, Constanti Stefanescu, Ante Vujić

2021



Joint Research Centre

EUR 30416 EN

Objectives/Tasks

1) Assessing pollinator assemblages across coastal sage scrub habitats and gradient of habitat conditions in San Diego County.

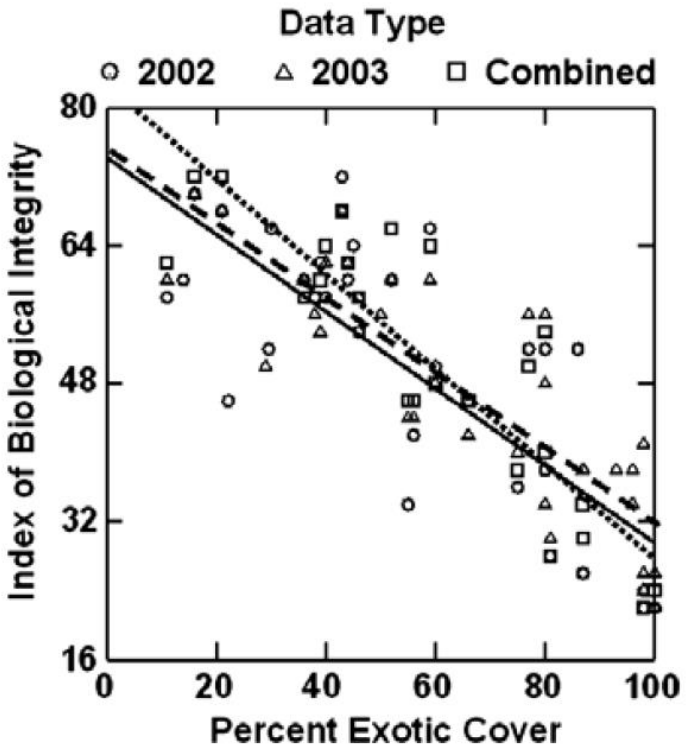
2) Detect changes in pollinator abundance (trends), richness, distribution (status), and assemblages through time.

3) Assess the efficacy of community scientists (volunteers) for a pollinator monitoring program.

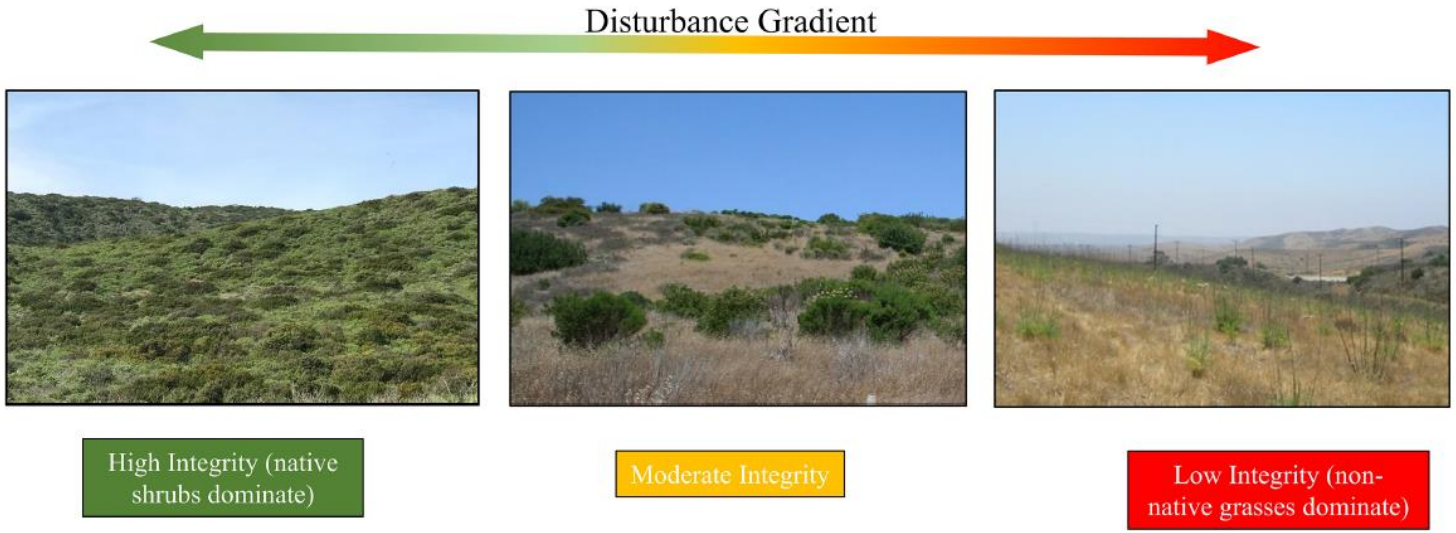
4) Refine the draft pollinator monitoring plan for the coastal sage scrub of western San Diego County.

1) Pollinators and Habitat Quality

- Habitat quality/ecological integrity



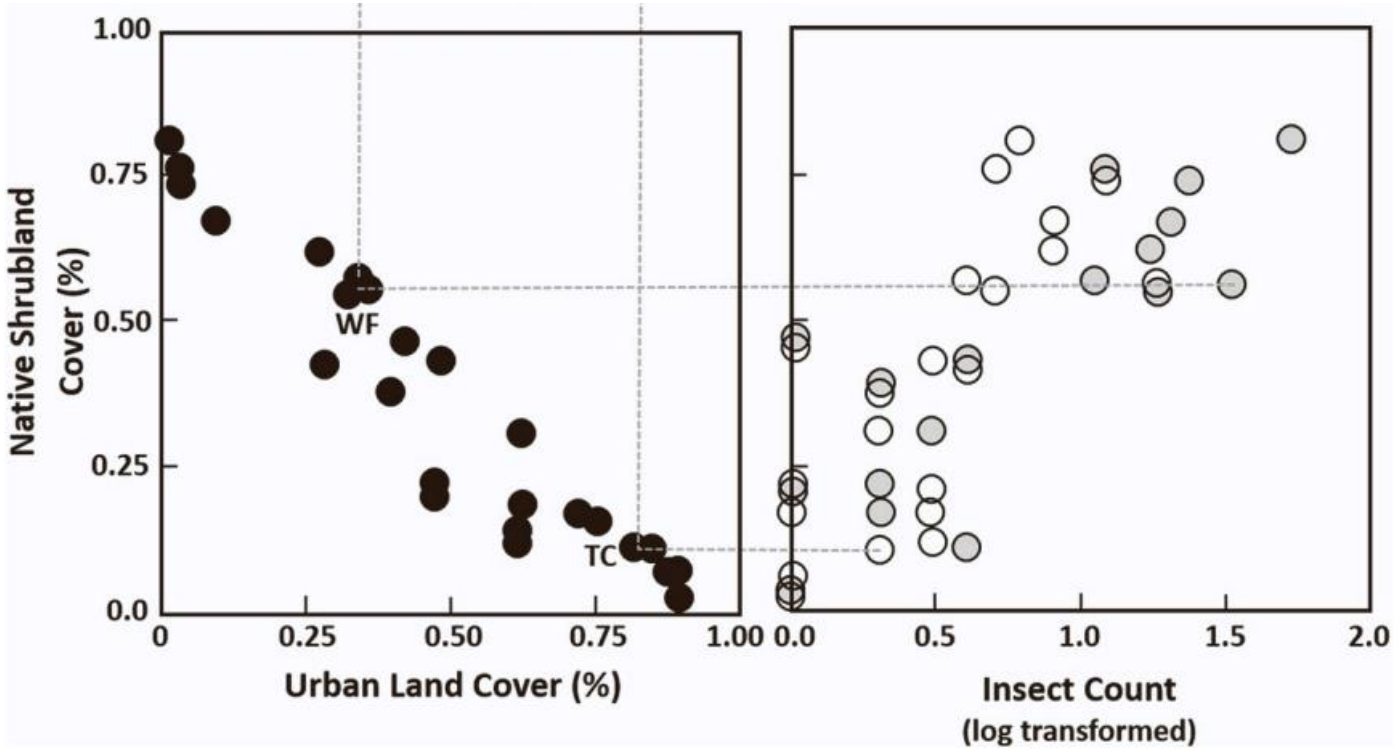
Diffendorfer et al. 2007

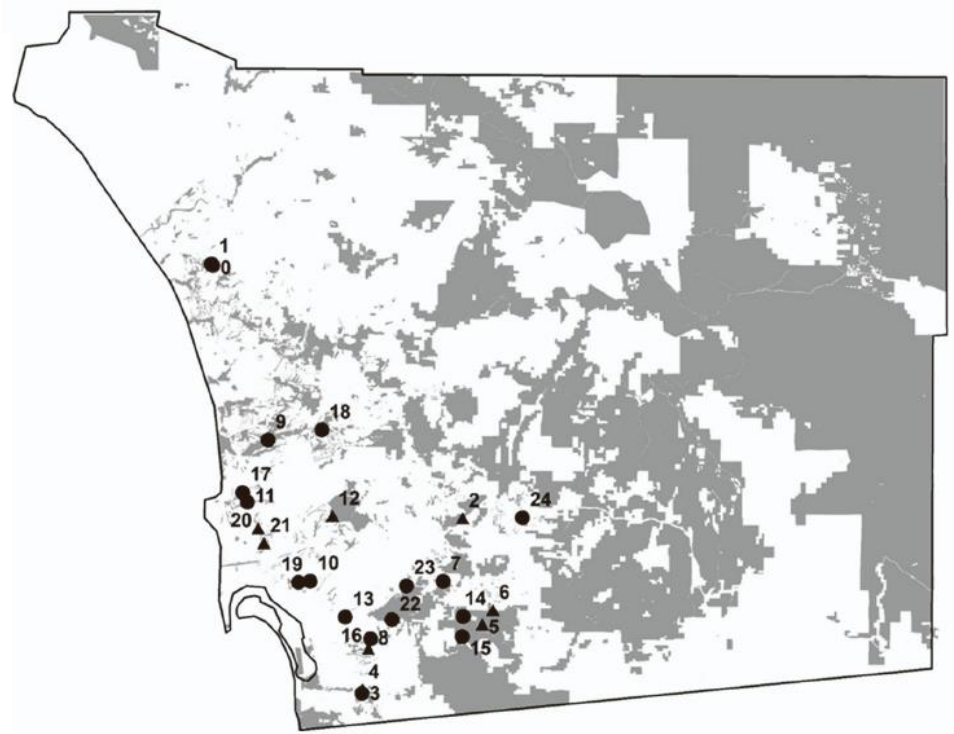


Lawson and Keeley (2019)

1) Pollinators and Habitat Quality

- Habitat quality/ecological integrity - Decomposers

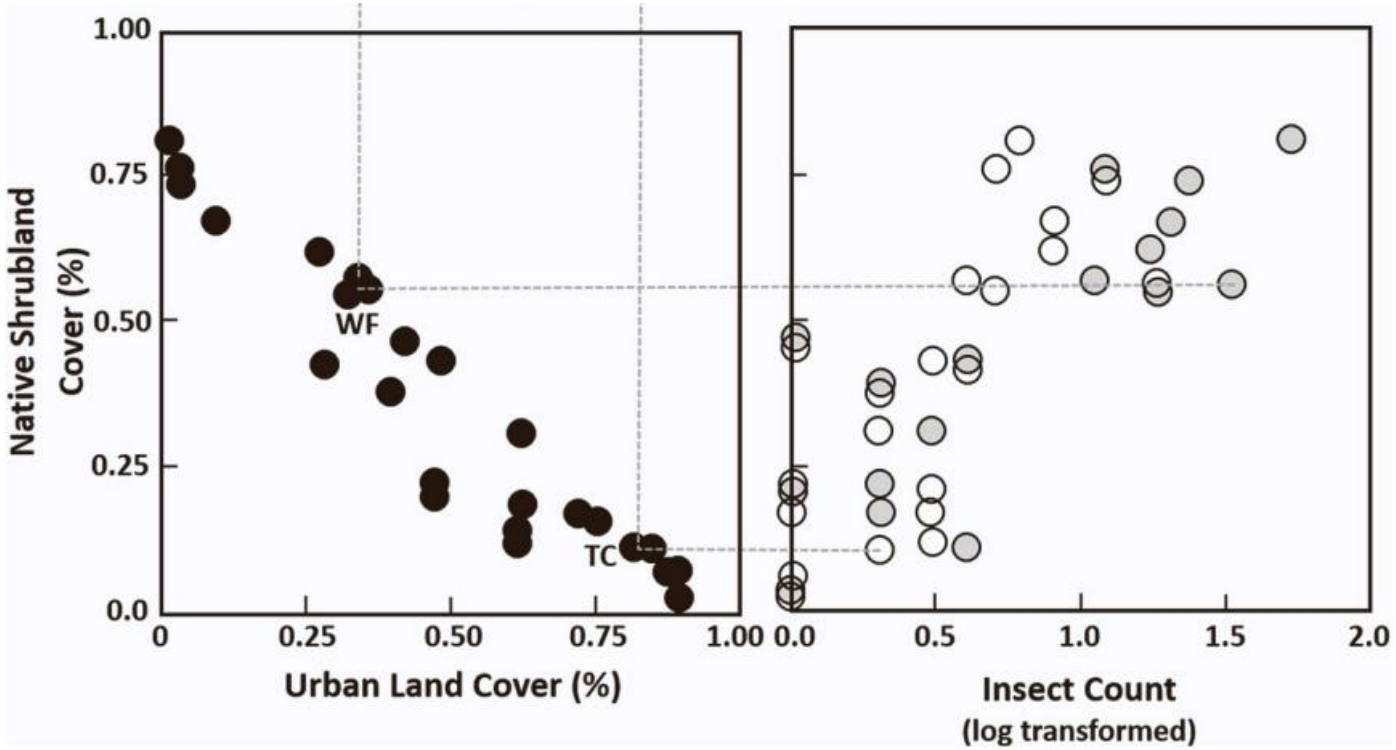


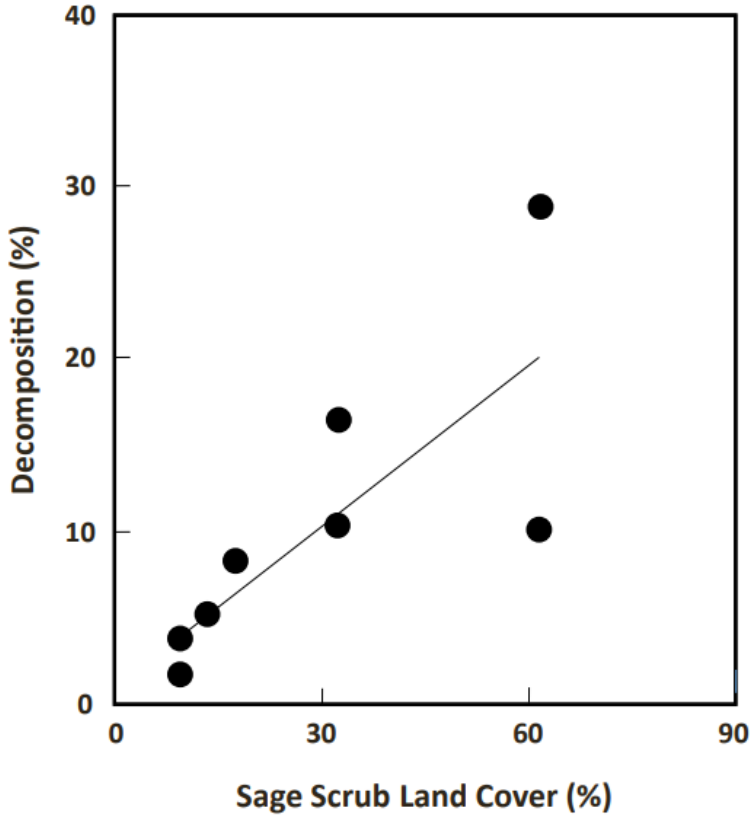


Marschalek and Deutschman (2022)

1) Pollinators and Habitat Quality

- Habitat quality/ecological integrity - Decomposers

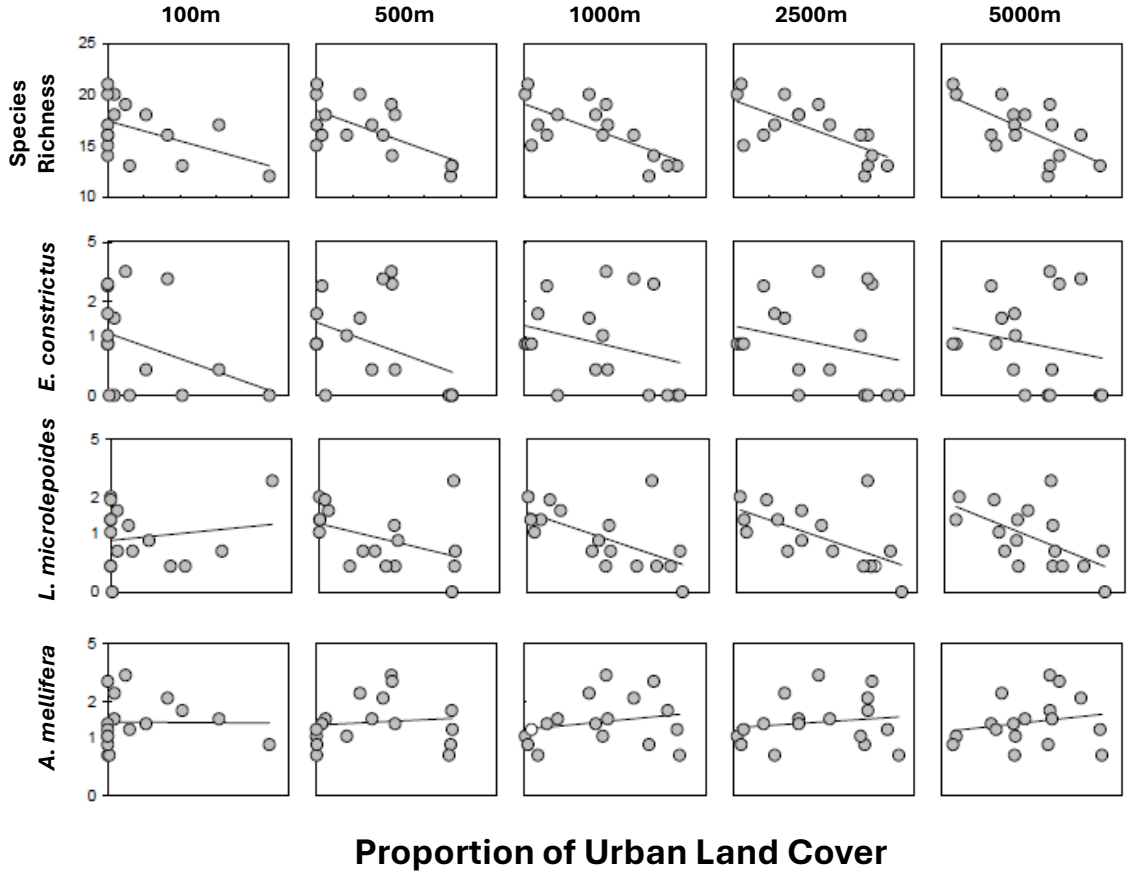




Marschalek and Deutschman (2022)

1) Pollinators and Habitat Quality

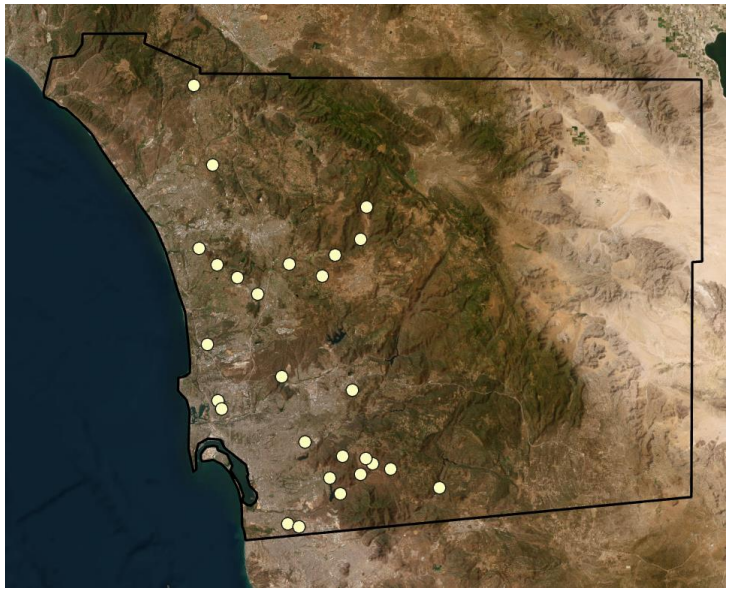
- Habitat quality/ecological integrity - Pollinators



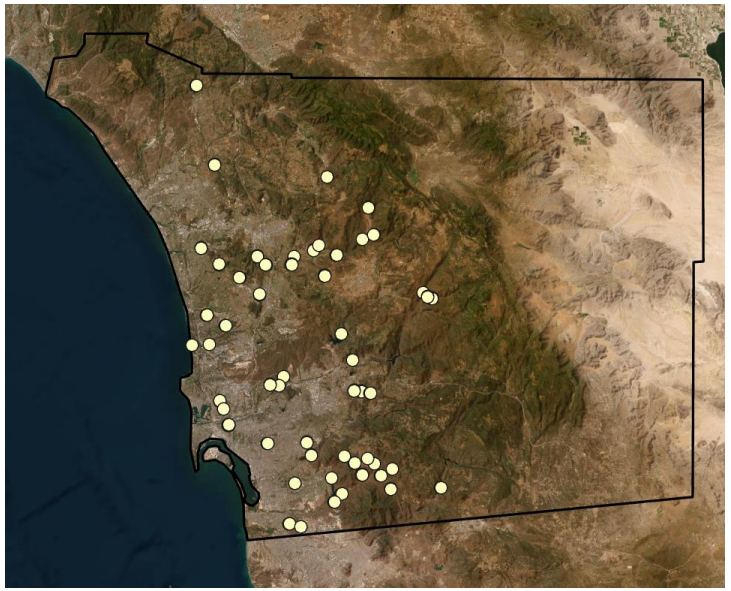
Marschalek, Hung, and Deutschman (unpubl.)

1) Pollinators and Habitat Quality

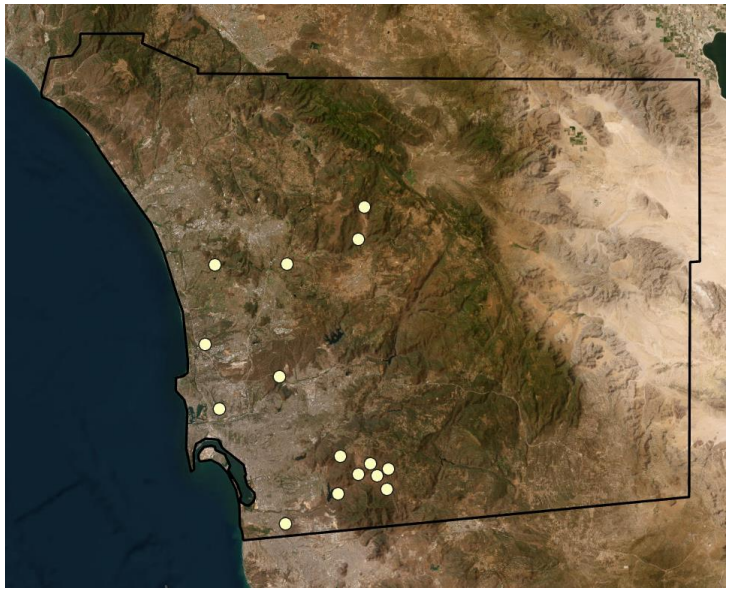
Traps (n = 27 plots)



Transects (n = 31 plots)

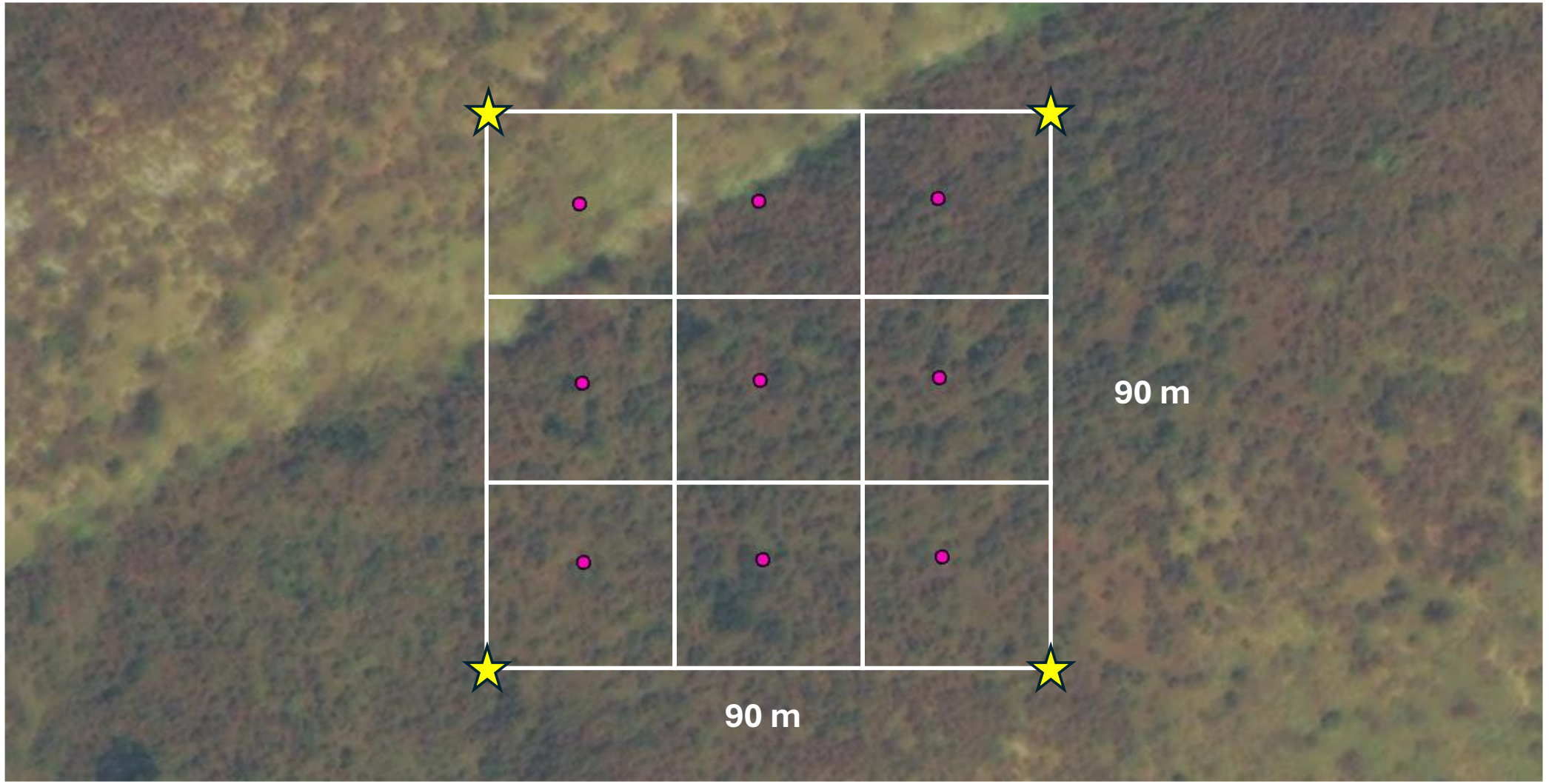


Netting (n = 15 plots)



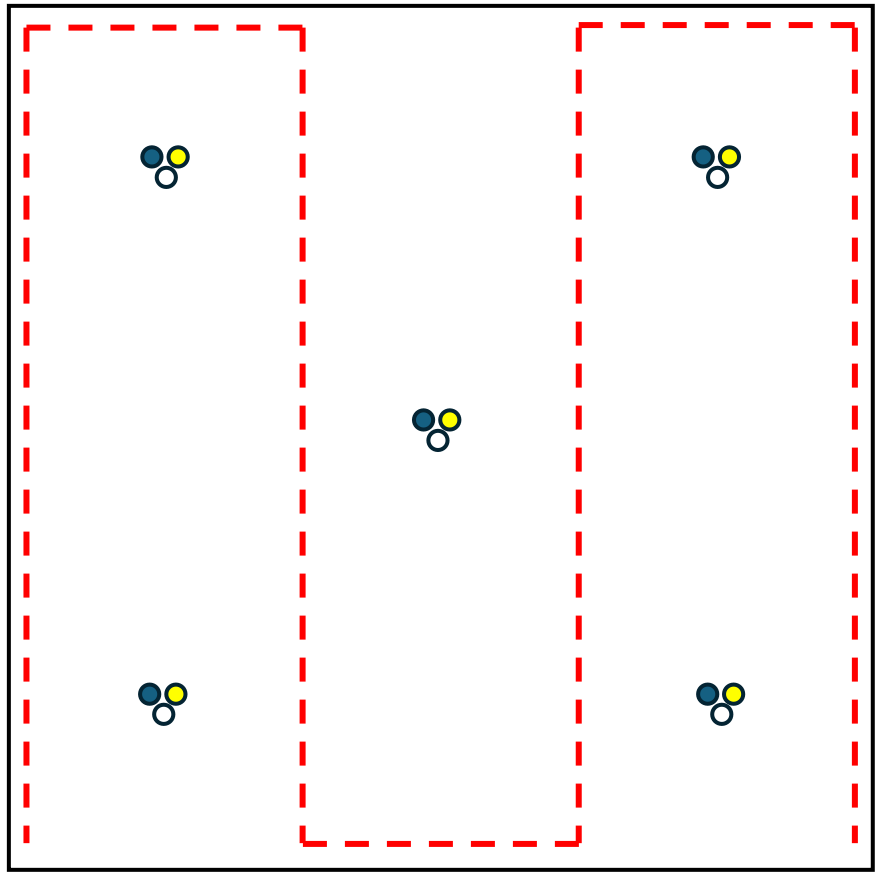
32 different plots

1) Pollinators and Habitat Quality



1) Pollinators and Habitat Quality

- Sampling
  - Pan traps – all species
  - Transects – butterflies, bumble bees
  - Netting – all except butterflies, bumble bees

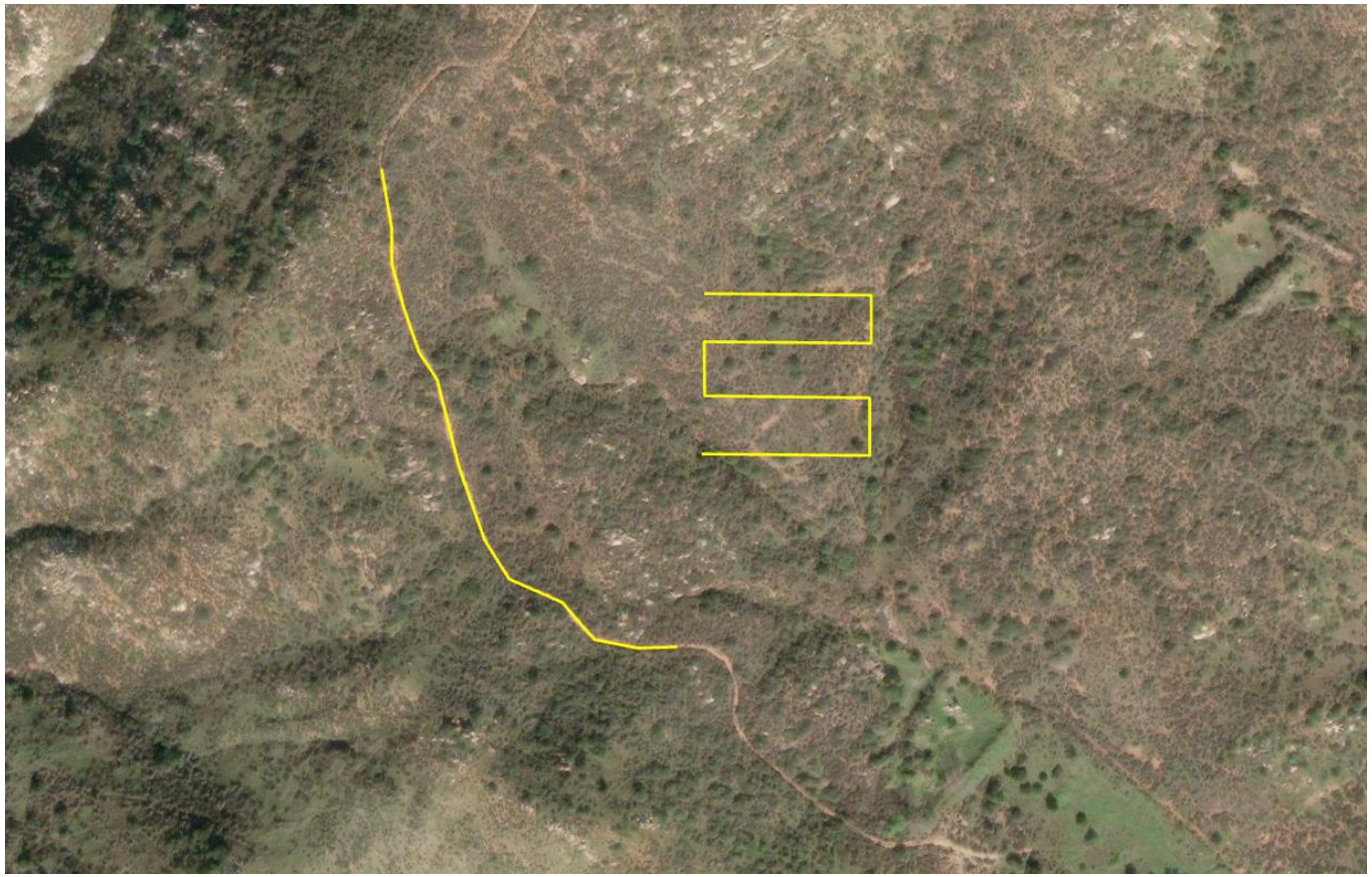


1) Pollinators and Habitat Quality

Figure 4.4. An example of coloured pan traps used to survey foraging insects. Pictures by Úna FitzPatrick (left) and Saorla Kavanagh (right).

1) Pollinators and Habitat Quality

- Road/trail transect added if convenient



1) Pollinators and Habitat Quality

- Challenges for site selection
  - Vegetation change (CSS → Chaparral)
  - Steep/slippery terrain

1) Pollinators and Habitat Quality

- Preliminary butterfly counts (n =3331, 46 species)

Species	Count	Prop	Comments
Marine Blue	635	0.200	
Behr's Metalmark	482	0.152	
Bernardino Blue	389	0.122	
Common Buckeye	322	0.101	
Cabbage White	215	0.068	Non-native
Acmon/Lupine Blue	207	0.065	
Checkered White	204	0.064	Mustards
California Ringlet	195	0.061	
Orange Sulphur	121	0.038	
Harford's Sulphur	63	0.020	
Comstock Fritillary	60	0.019	
Gray Hairstreak	40	0.013	
Funereal Duskywing	34	0.011	
American Lady	33	0.010	
Brown Elfin	13	0.004	
White Checkered Skipper	12	0.004	Disturbed habitats
Monarch	11	0.003	Conservation concern

Marine Blue

Behr’s Metalmark

1) Pollinators and Habitat Quality

- Preliminary butterfly counts

Species	# Plots	Prop	Comments
Common Buckeye	28	0.875	
Checkered White	28	0.875	Mustards
Cabbage White	27	0.844	Non-native
Marine Blue	26	0.813	
Behr's Metalmark	25	0.781	
Bernardino Blue	24	0.750	
Harford's Sulphur	20	0.625	
Orange Sulphur	18	0.563	
Gray Hairstreak	16	0.500	
Acmon/Lupine Blue	14	0.438	
Funereal Duskywing	14	0.438	
Monarch	10	0.313	Conservation concern
California Ringlet	9	0.281	
Comstock Fritillary	9	0.281	

Common Buckeye

Checkered White

1) Pollinators and Habitat Quality

- Preliminary bumble bee counts

Species	Count
B. vosnesenskii	54
B. californicus	51
B. melanopygus	10
B. crotchii	7
Unknown	274
Total	396

Yellow-faced Bumble Bee (*Bombus vosnesenskii*)

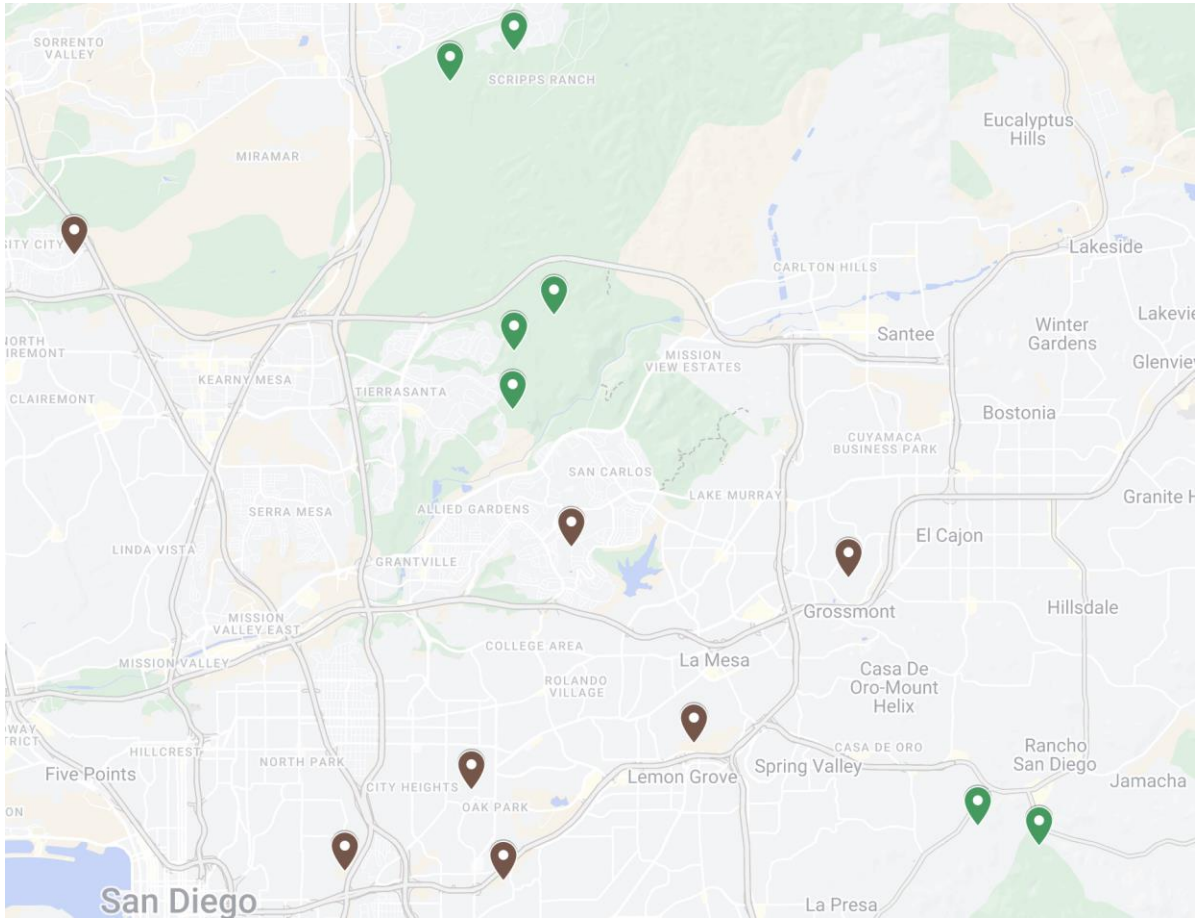
California Bumble Bee (*Bombus californicus*)

1) Pollinators and Habitat Quality

- Preliminary insect counts from traps

NAT is “up to their ears in specimens”

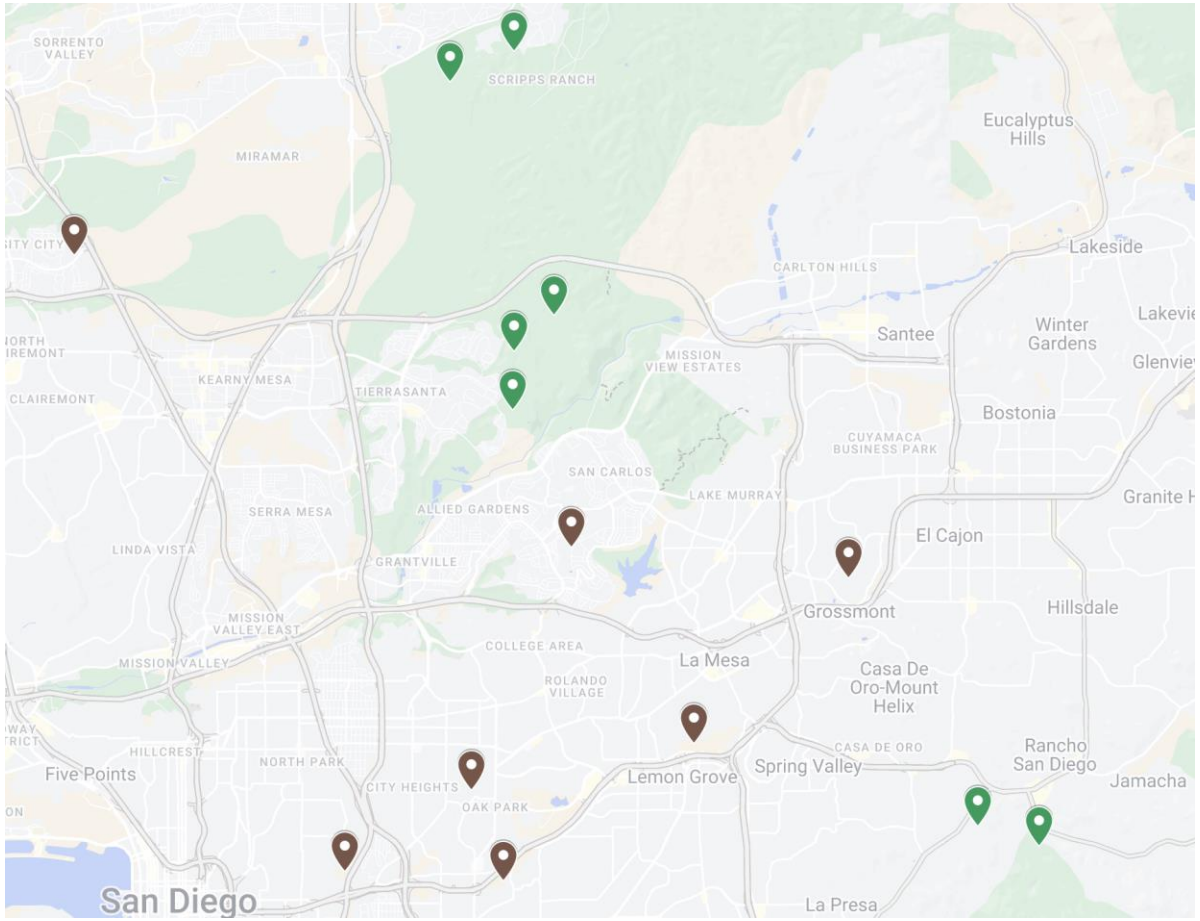
2) Changes Over Time



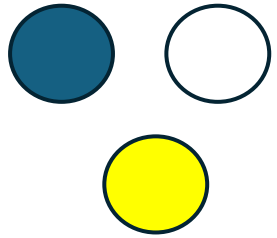
14 sites that are visited every 3 weeks March - August

- Fragments (n = 7) in brown
- Reserves (n = 7) in green

2) Changes Over Time

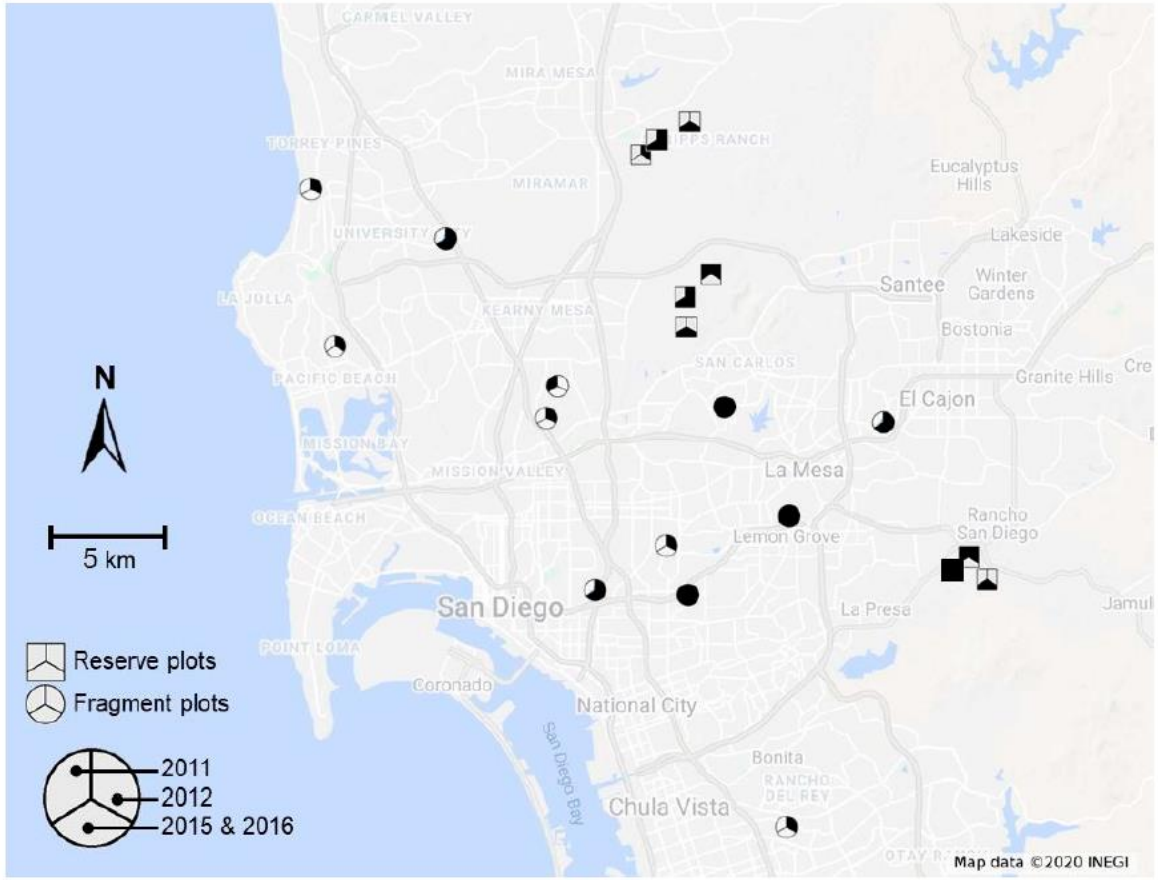


Pan traps: Triplets set out every 3 weeks at ground level evenly throughout plot 08:00-15:00

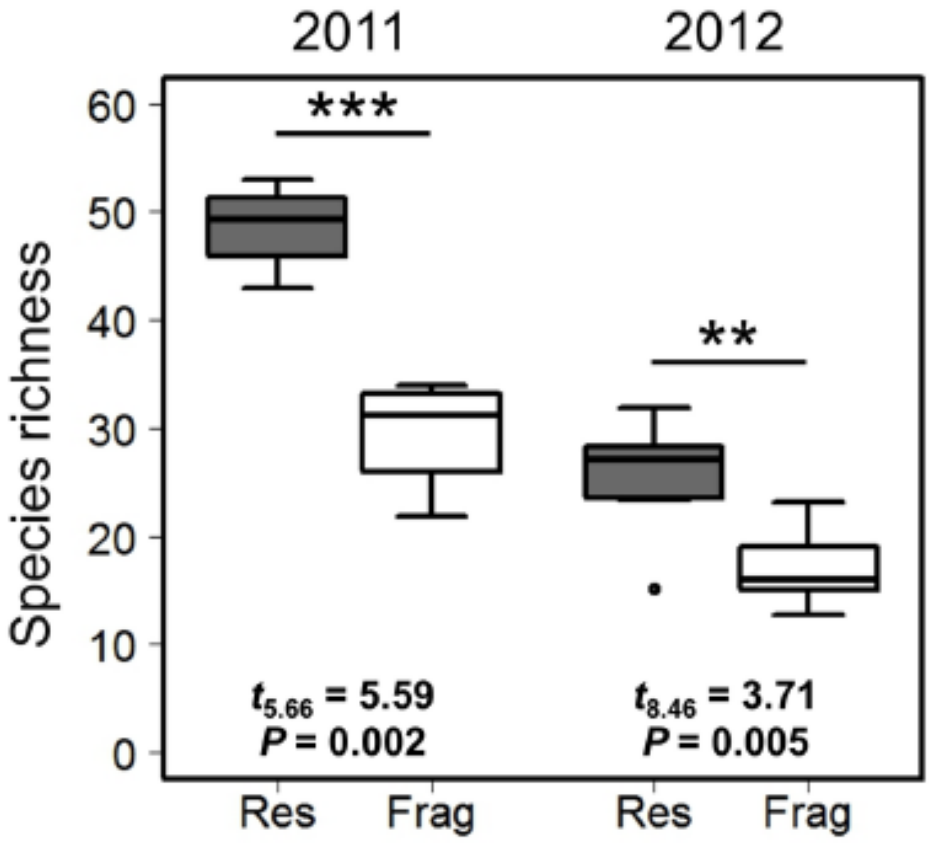


Netting: Timed 1-hour survey while traps are set

2) Changes Over Time



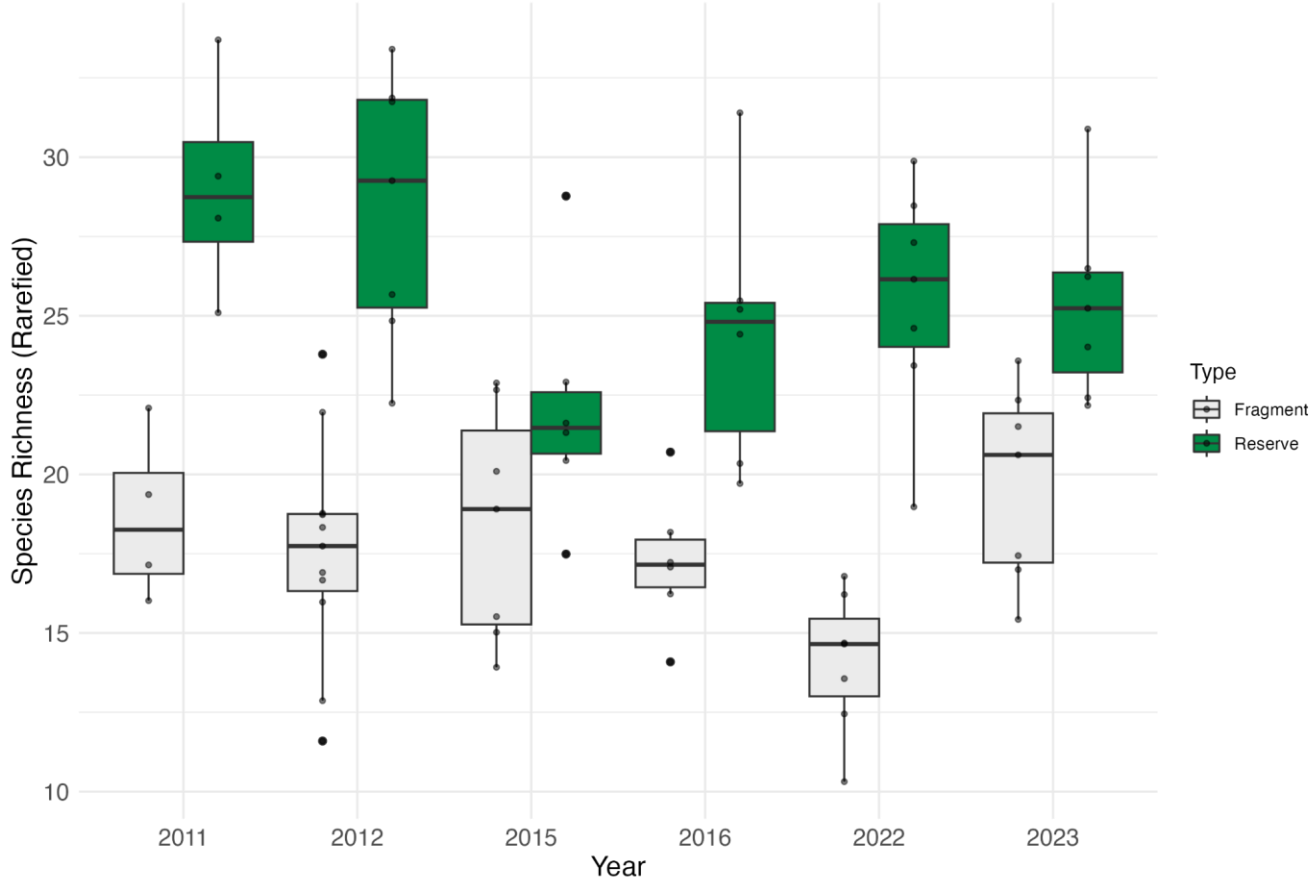
Hung et al. 2021



Hung et al. 2017

2) Changes Over Time

Species richness in **Fragments** vs. **Reserves**



GLMM

Richness ~ Type + (1 | Year)

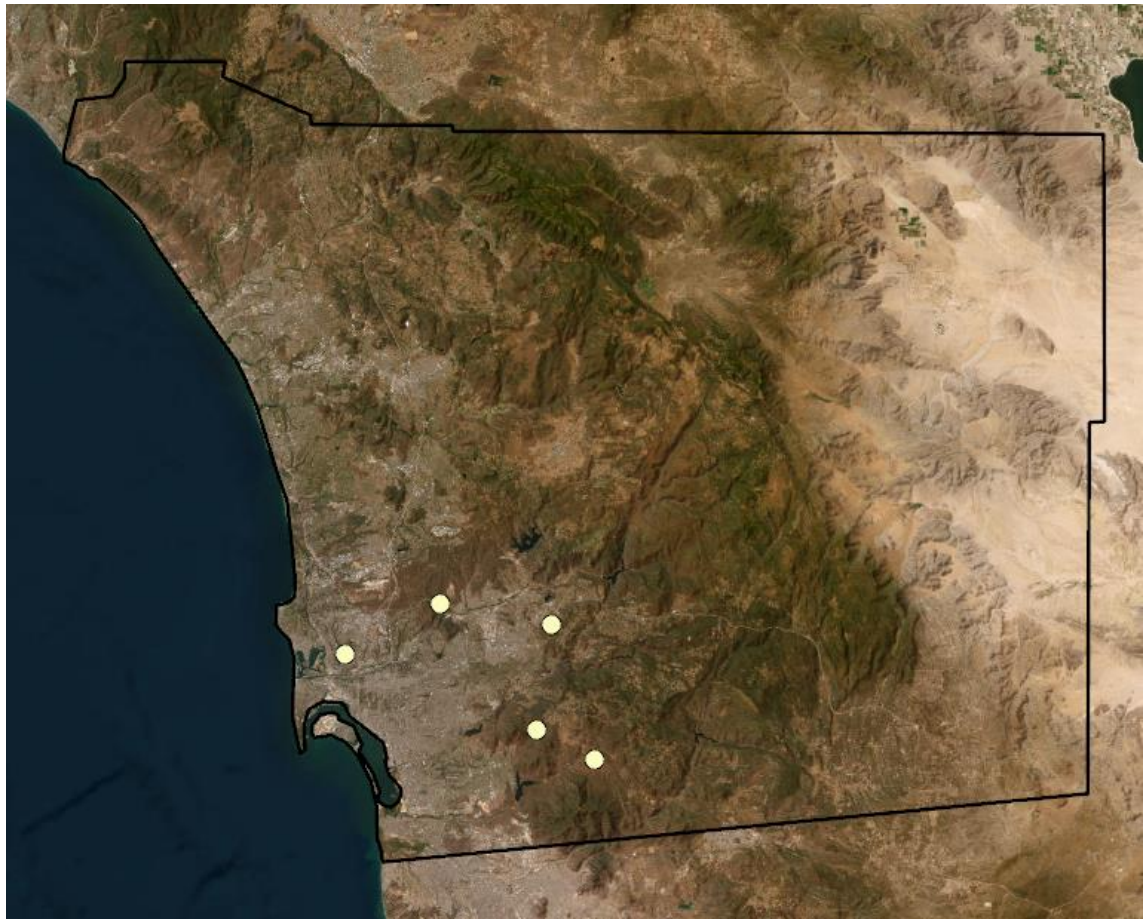
Z = 7.6

SE = 0.05

P < 0.001***

3) Community Scientists

- Sites (n = 4)
  - Tecolote Canyon
  - Mission Trails
  - Crestridge ER
  - Rancho Jamul ER
  - Sycamore Canyon (BLM)
- Developed protocol
- Optional trainings



3) Community Scientists

5 trainers
8 training sessions

→

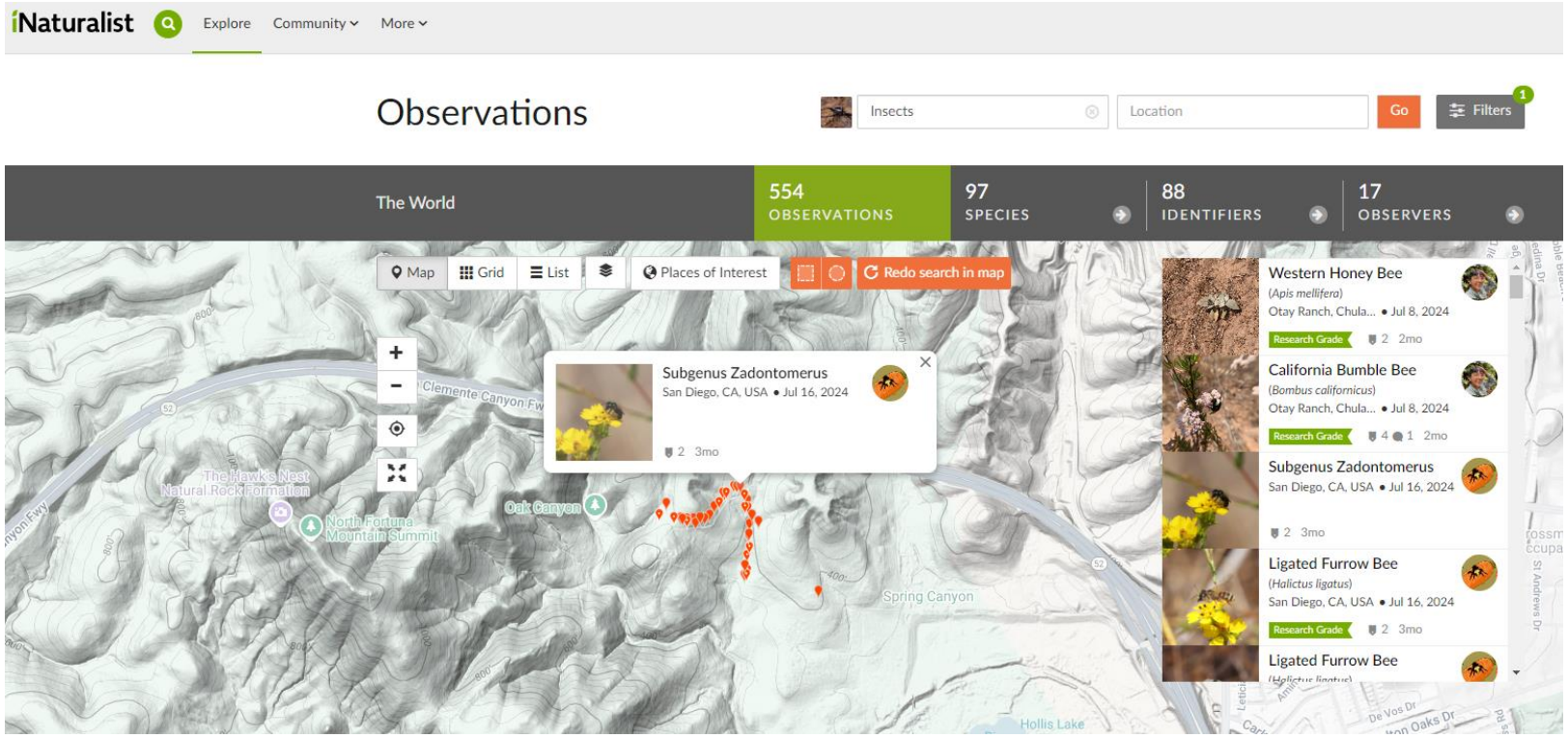
50 inquires
regarding training

→

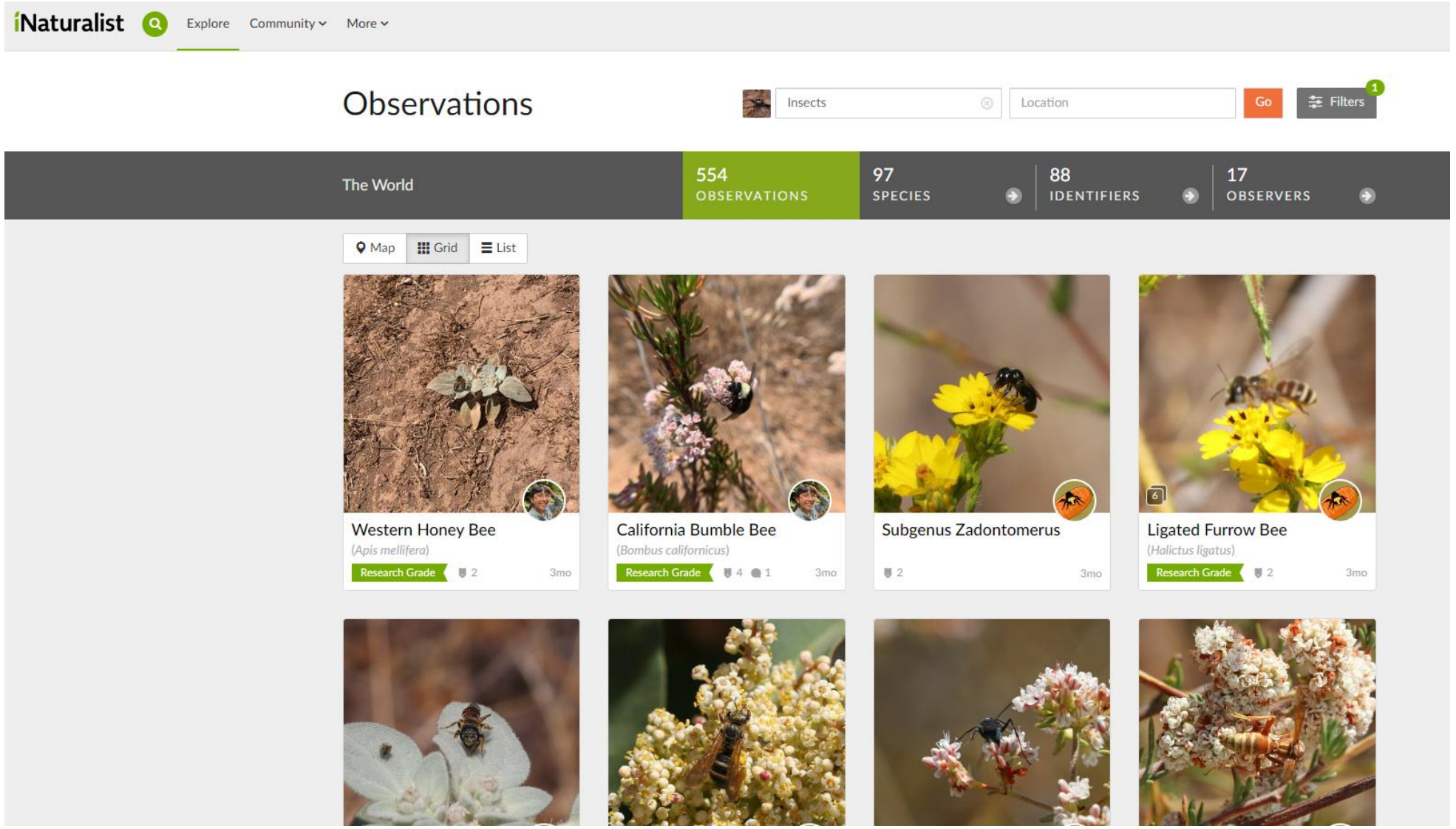
30 surveys
17 iNat users

→

554 observations
97 species
88 identifiers



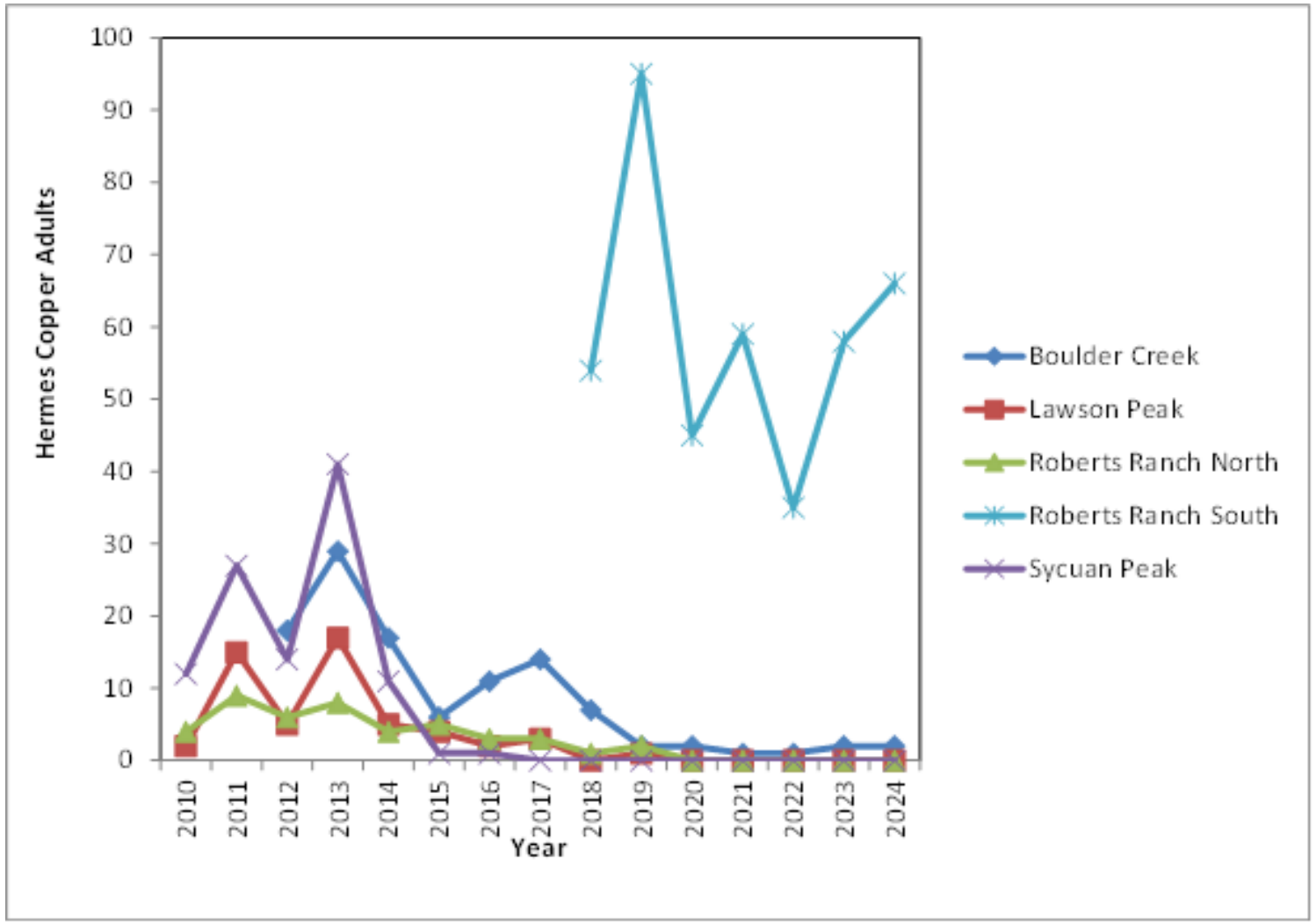
3) Community Scientists



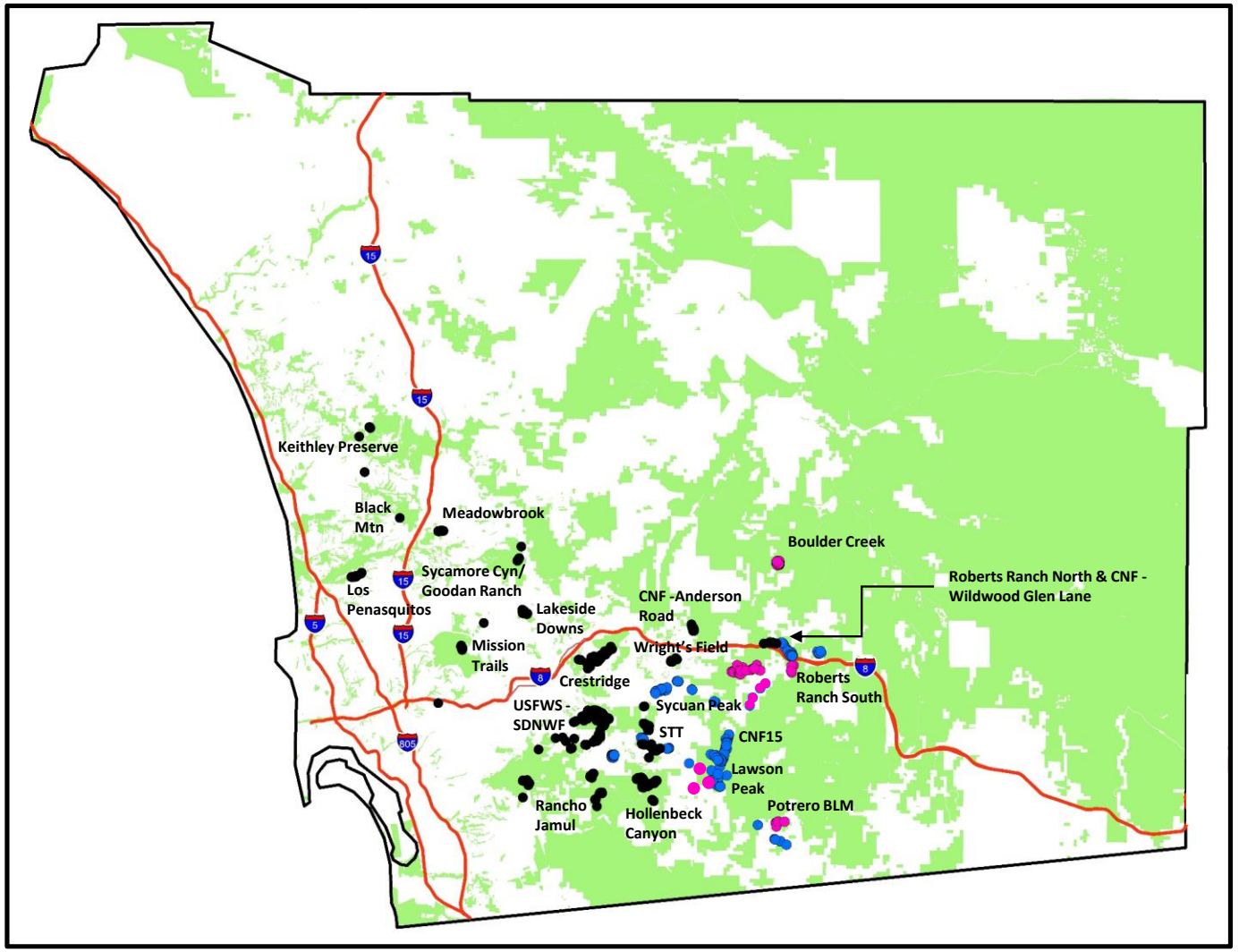
Next Steps

- January 2025 – Combine vegetation and insect data sets
- Summer 2025 – Focused sampling
- March 2026 – Revised monitoring plan

Hermes Copper



Hermes Copper

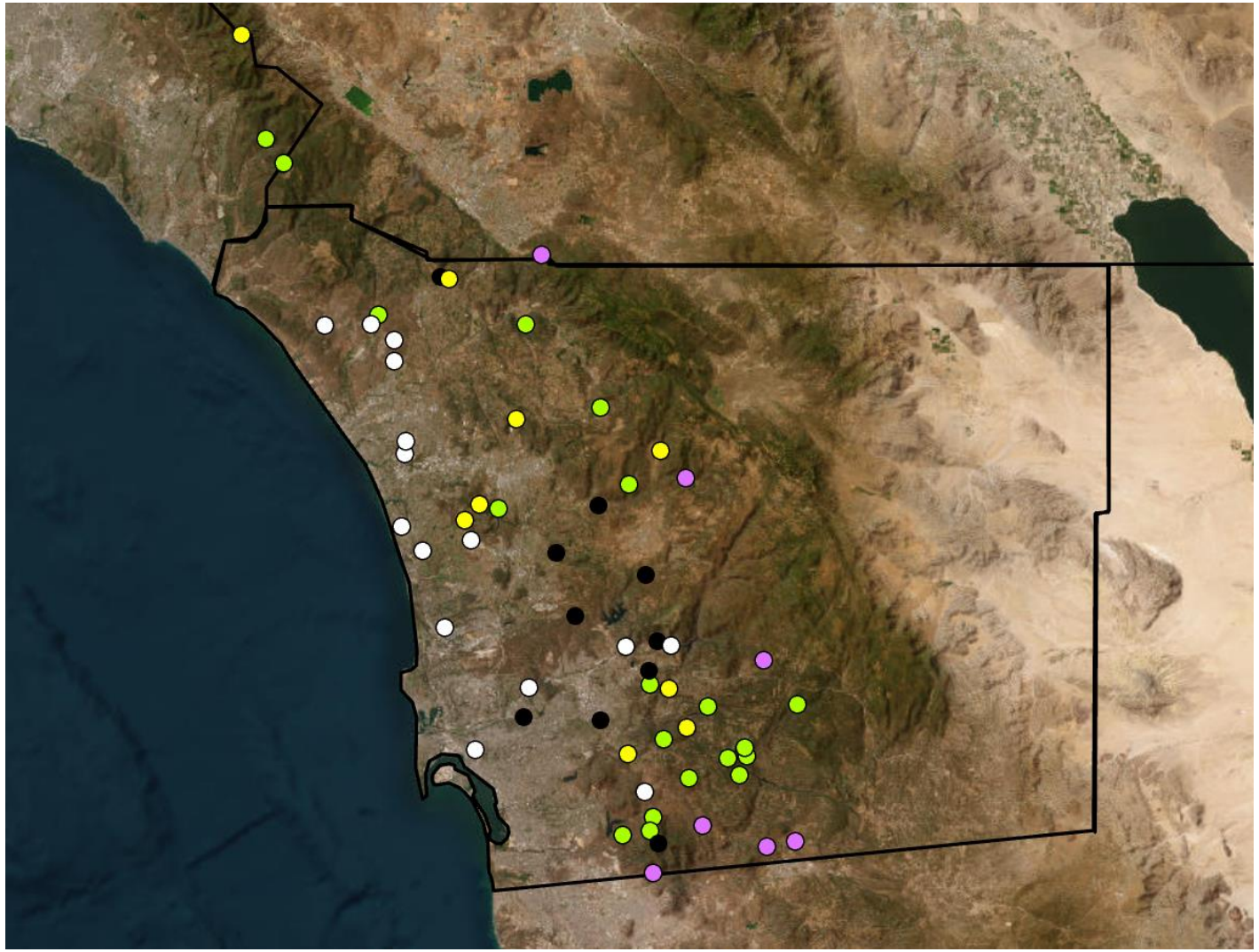


- Extirpated
- Uncertain
- Extant

Harbison’s Dun Skipper

Site	HDS Maximum Count
Barrett Lake	0
Barrett Lake North	2
Blue Sky Ecological Reserve	0
Crestridge Ecological Reserve	7
Elfin Forest (Visitor's Center)	0
Hellhole Canyon County Park	4
Hollenbeck Canyon Wildlife Area (NE)	1
Keithley Preserve (Elfin Forest)	0
Lake Hodges	1 - 2
Old Ironside County Park	0
Pamo Valley (Cleveland National Forest)	2
Red Mountain	0
Santa Margarita River Trail	0
SDNWR - Beaver Hollow	0
SDNWR - Las Montanas South	0
Skye Valley Road (Cleveland National Forest)	2
Sycamore Canyon/Goodan Ranch County Park	0
Sycuan Peak Ecological Reserve	1

Harbison’s Dun Skipper



- Extirpated
- Unoccupied
- Likely extant
- Extant
- Not surveyed

Questions