



Community Scientists Help to Map Post-Fire Recovery on California's Central Coast

Presented by Dr. Josie Lesage (jclesage@sbbg.org)

Project work by Stephanie Calloway, Zac Canter, Kylie Etter, Josie Lesage, John Gallo, Denise Knapp, and Steve Windhager

Presentation Outline

1. Project Background
 - Who/What/Where/When/Why
 - How – apps and training
2. Volunteer outcomes
 - Engagement
 - Contributions
3. Lessons learned



Sea of tree tobacco and pride-of-madeira seen by a volunteer in 2020



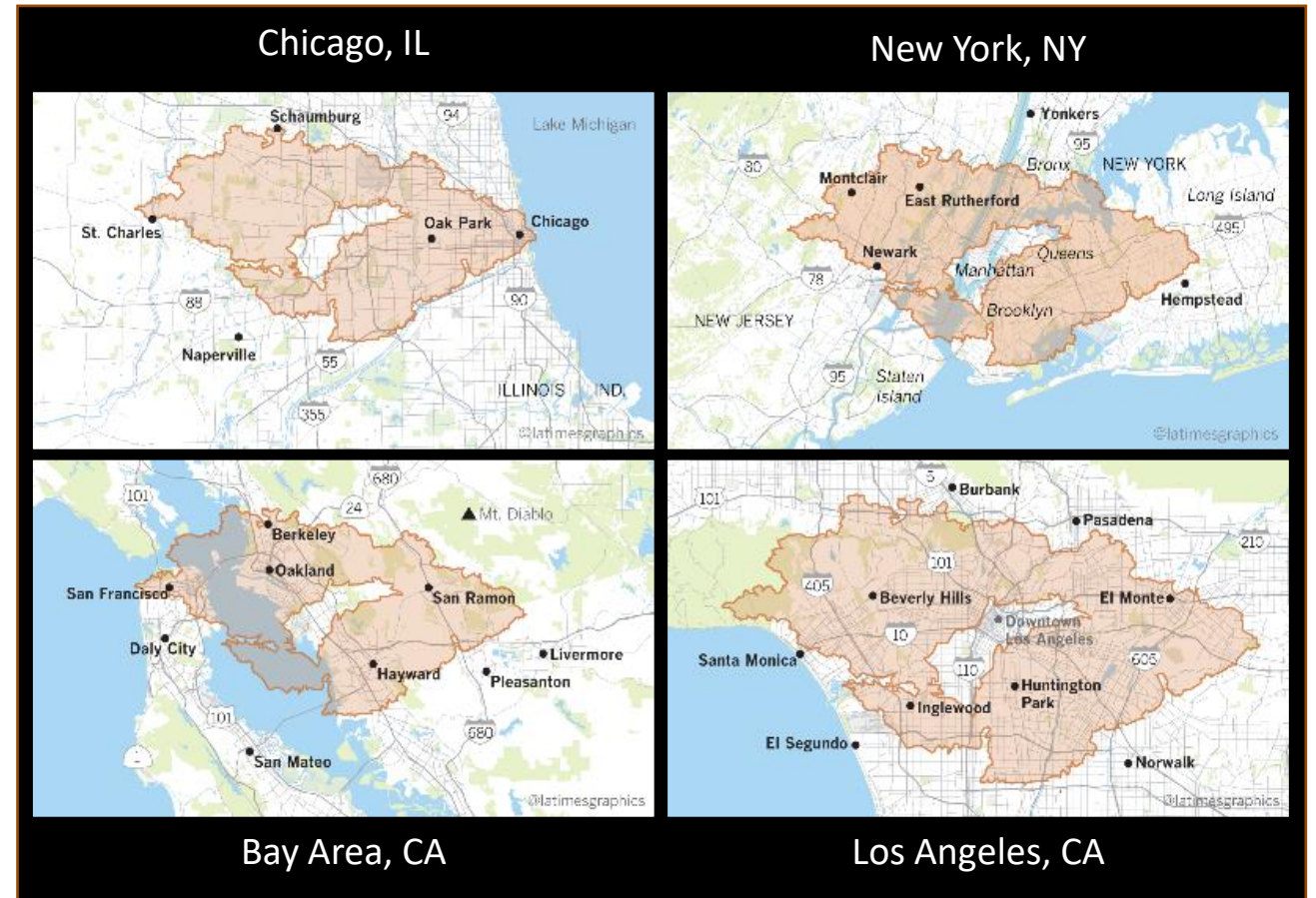
Thomas Fire

Started Dec. 2017
Contained Jan. 2018

At the time: largest recorded fire (281,893 acres) in California

- Now 9th place

Are ecosystems recovering after fire?



Project Goals

1. Survey fire scars to prioritize areas in need of restoration

- a. Map invasive species
- b. Map rare species
- c. Identify areas that need restoration
 - At risk of erosion
 - Native species not recovering
 - Other signs of environmental damage

2. Engage community scientists

- a. Test effectiveness of volunteer community scientists for rapid post-fire assessment
- b. Develop community of volunteer botanists in our “backyard”



*Diplacus
johnstonii*
(CNPS 4.3)

Lion Canyon Trail – May 2020

Project Goals

1. Survey fire scars to prioritize areas in need of restoration

- a. Map invasive species
- b. Map rare species
- c. Identify areas that need restoration
 - At risk of erosion
 - Native species not recovering
 - Other signs of environmental damage

2. Engage community scientists

- a. Test effectiveness of volunteer community scientists for rapid post-fire assessment
- b. Develop community of volunteer botanists in our “backyard”



*Diplacus
johnstonii*
(CNPS 4.3)

Lion Canyon Trail – May 2020

Who: Community scientists

- 200+ people registered in 2020...
... but then COVID-19 pandemic
- **101 total volunteers**
 - 58 participants in 2020
 - 50 participants in 2021
 - 7 repeat participants
- A **range of botanical skill**: newbies to grizzled dichotomous key vets
- Each volunteer was assigned a trail to hike and chose to look for **12 or 24 invasive species**



Community scientists at field and classroom trainings in March 2020 (pre-pandemic!!)



Arundo donax mapped by a community scientist; Spring 2020

Focal invasive species

Example focal species		
Scientific name	Common name	Level
<i>Ageratina adenophora</i>	Sticky snakeroot	Level 1
<i>Arundo donax</i>	Giant reed	Level 1
<i>Asphodelus fistulosus</i>	Onion-leaved-asphodel	Level 1
<i>Cenchrus setaceus</i>	Fountain grass	Level 2
<i>Centaurea melitensis</i>	Maltese star thistle	Level 2
<i>Centaurea solstitialis</i>	Yellow star thistle	Level 2
<i>Cortaderia selloana</i>	Pampas grass	Level 1
<i>Delairea odorata</i>	Cape ivy	Level 1
<i>Foeniculum vulgare</i>	Fennel	Level 1
<i>Nicotiana glauca</i>	Tree tobacco	Level 1

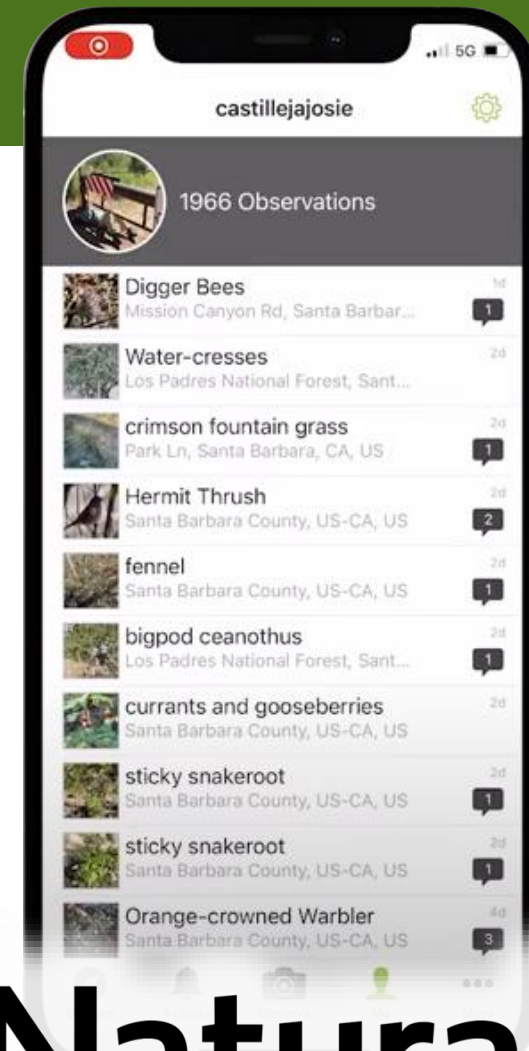
Total of 24 species

Split into two levels of 12 species

Data collection with iNaturalist

- Easy to use
- Beginner-friendly
- Active community of data verifiers
- Data verification easy to implement
- Public data access

We also collected data using
AnecData.org for landscape-scale data



iNaturalist

Volunteer Training

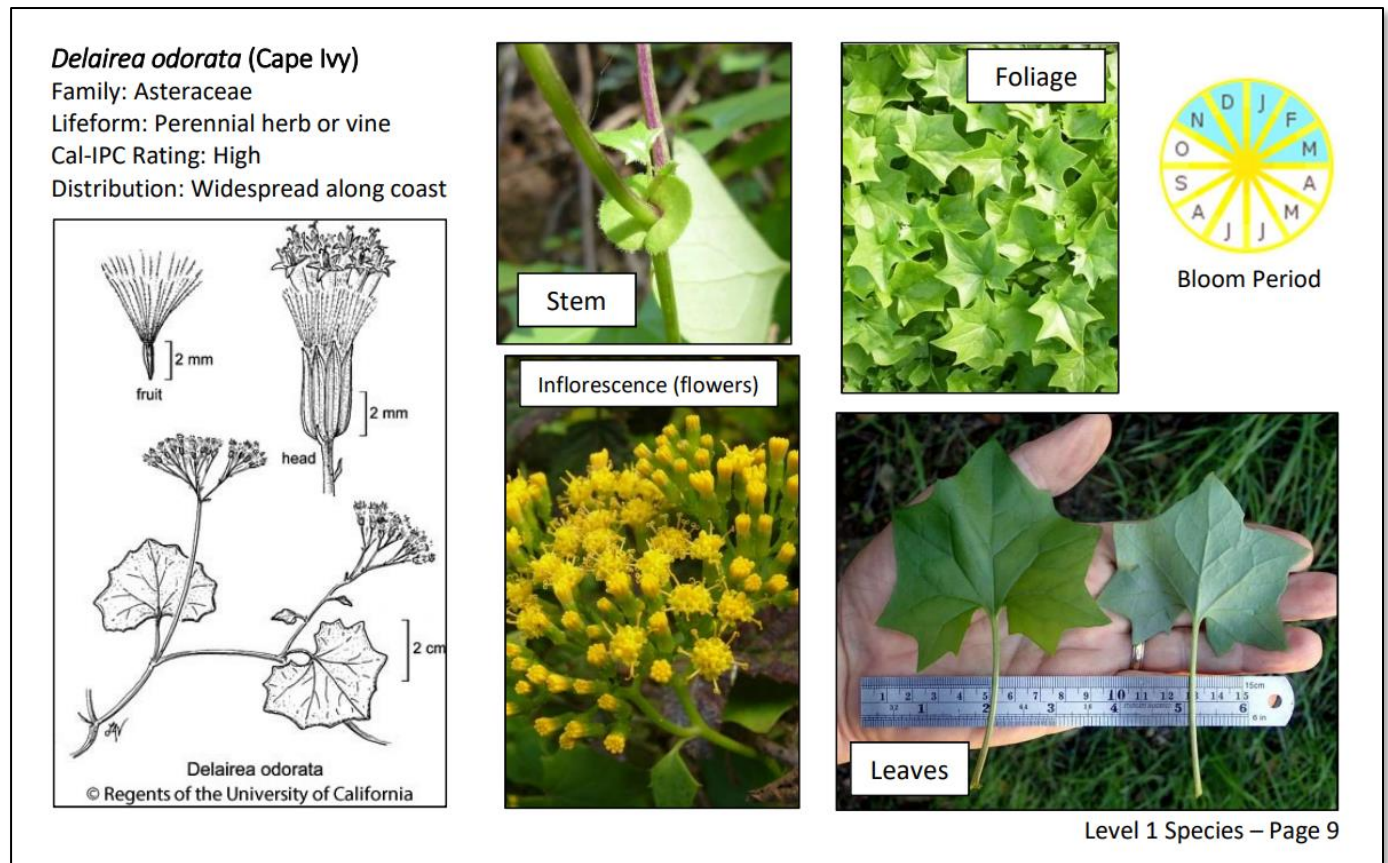
2020:

- Classroom and field training to introduce apps and plants
- Booklets to help with ID

2021:

- Virtual (zoom) training and video to introduce apps and plants
- Booklets to help with ID

Example ID guide page:



Project Area

Surveyed *maintained* and *accessible* routes in the Thomas Fire scar

*surveyed in Whittier Fire scar too; not shown

Focus today on the Santa Barbara front range

Largest volunteer contribution





Project results

Volunteer contributions

Collectively, volunteers contributed **1,337 hours** to the project

Training:

- 990 hours (including those who left project)
- 353 hours (data collectors only)

Surveying:

- 347 hours

At **\$28.54/hour**, this would cost **\$38,158**

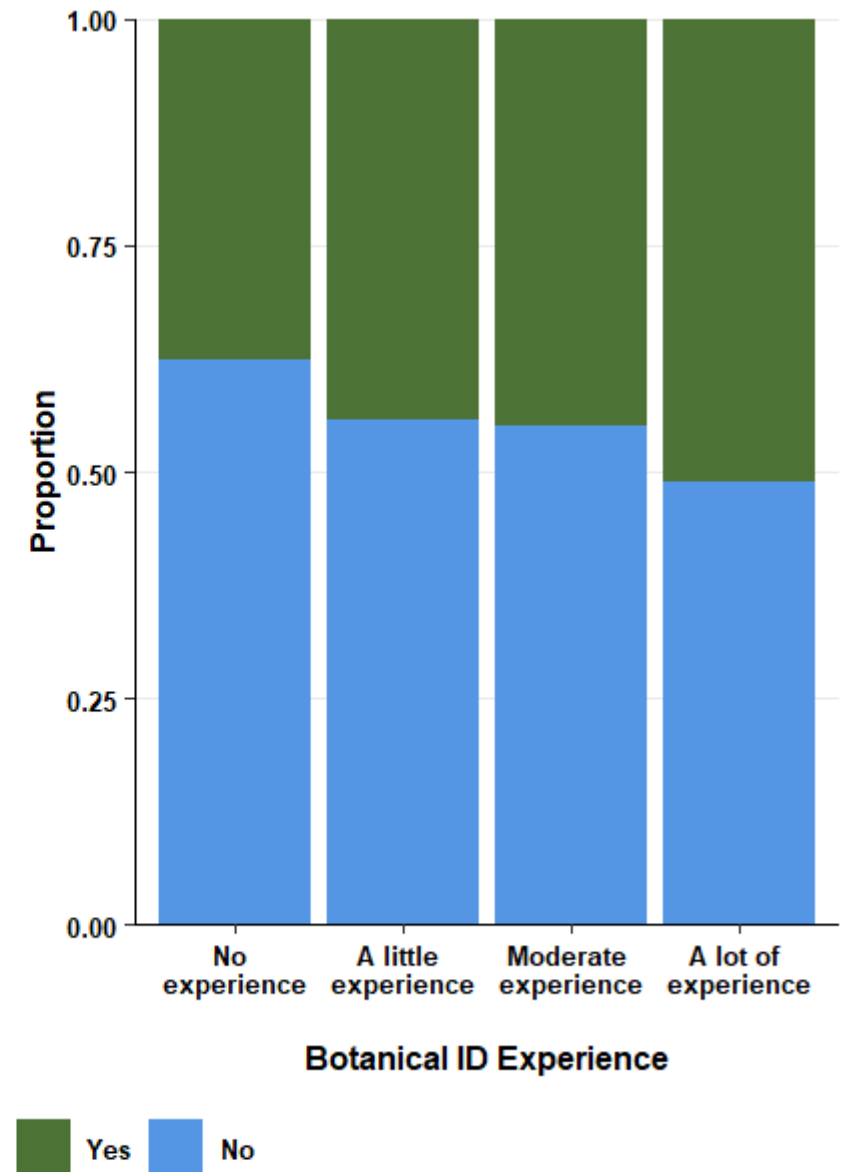
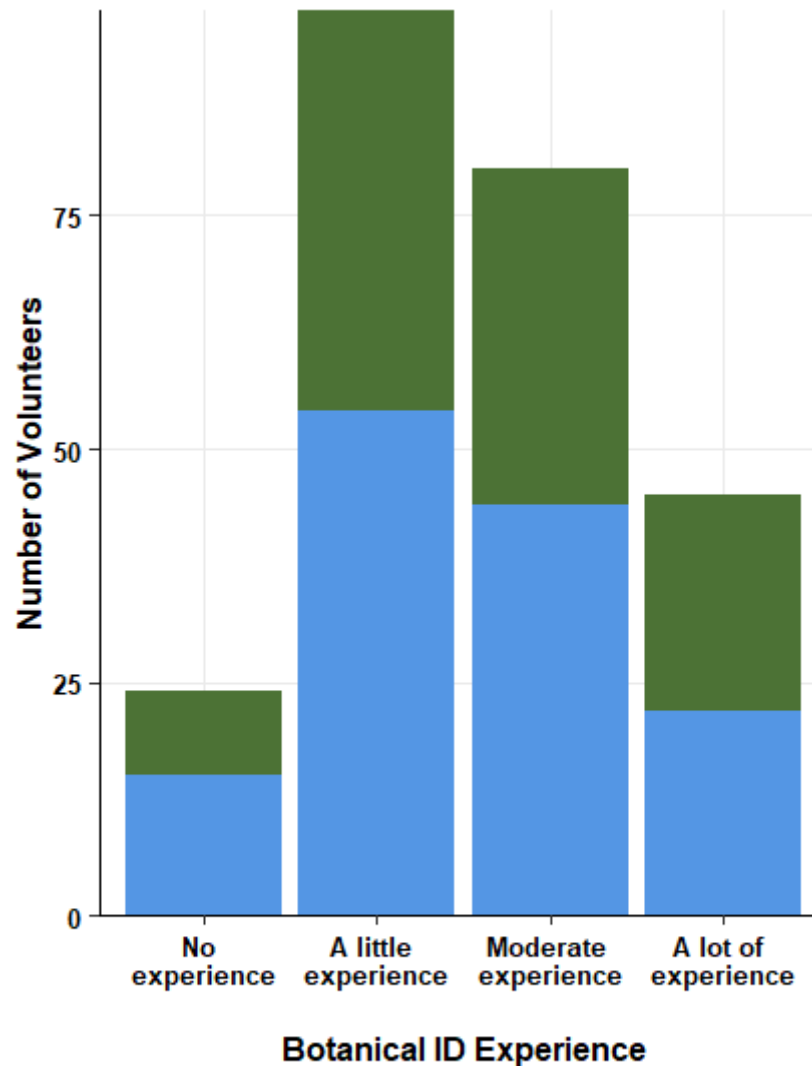


Who participated?

Most of our volunteers had some botanical ID experience

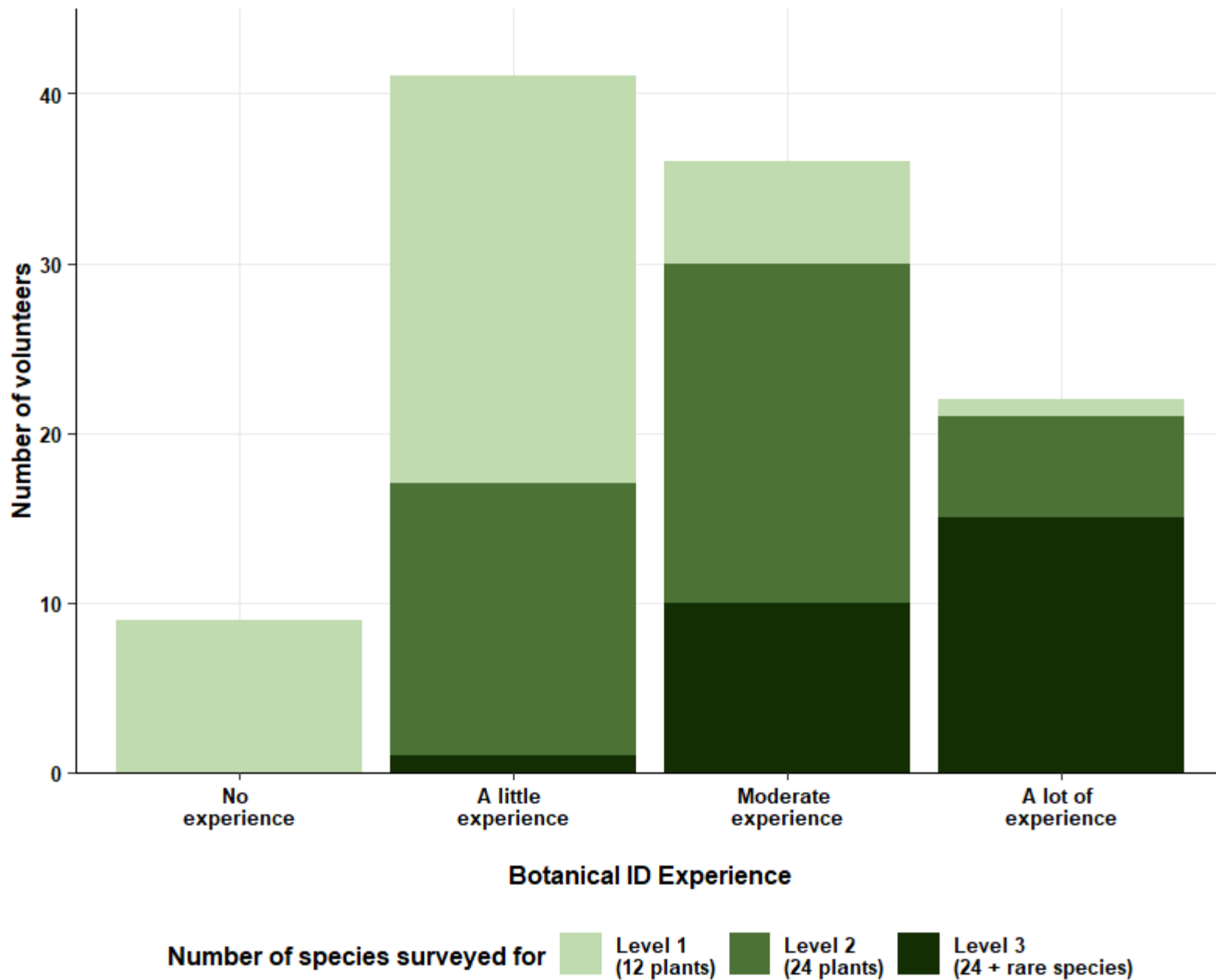
No statistical difference in the ID experience of those who collected data vs. who did not

(chi-square test, $p = 0.778$)



Who participated?

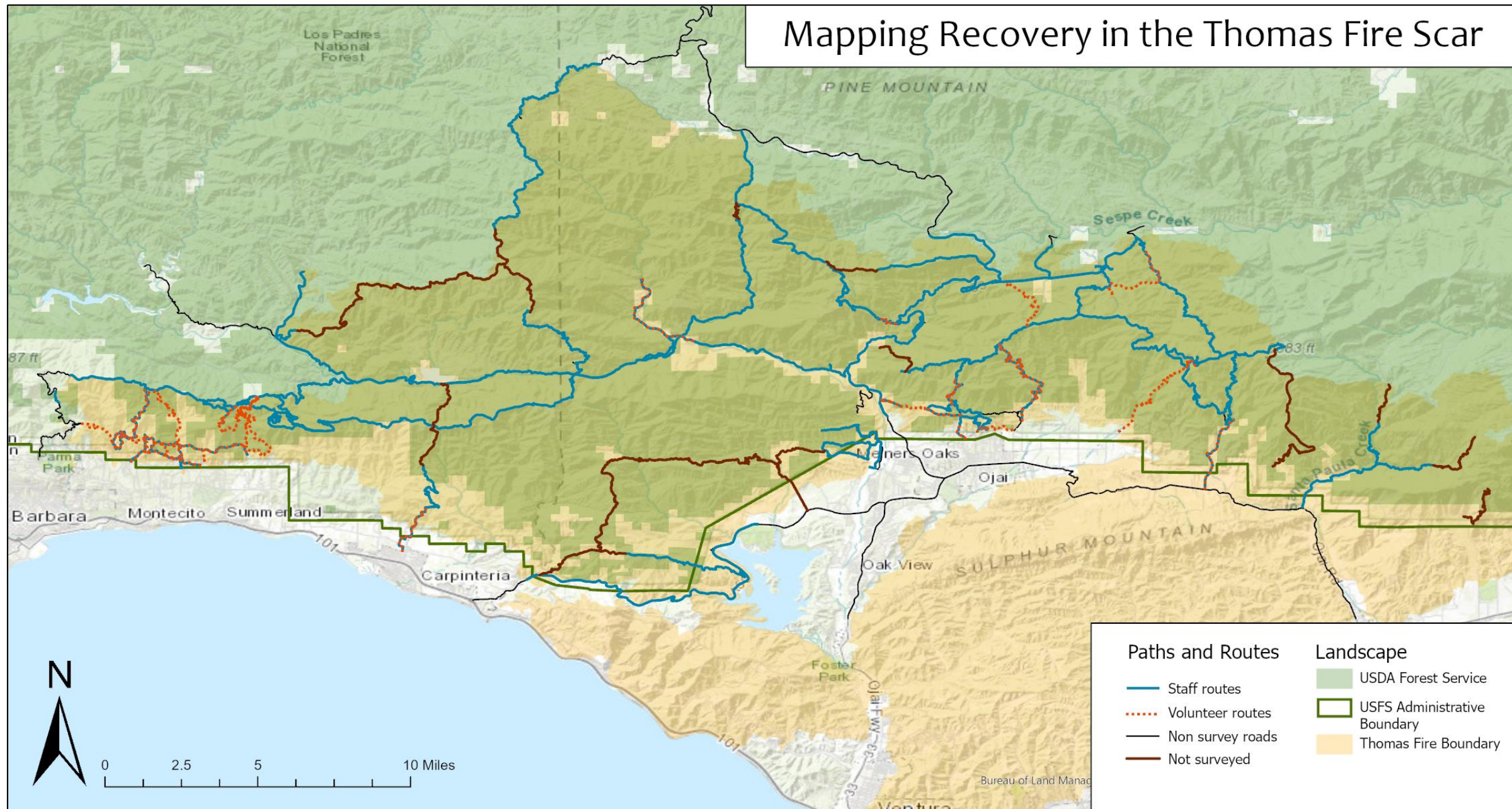
Volunteers who self-identified with higher botanical ID experience chose to look for more species



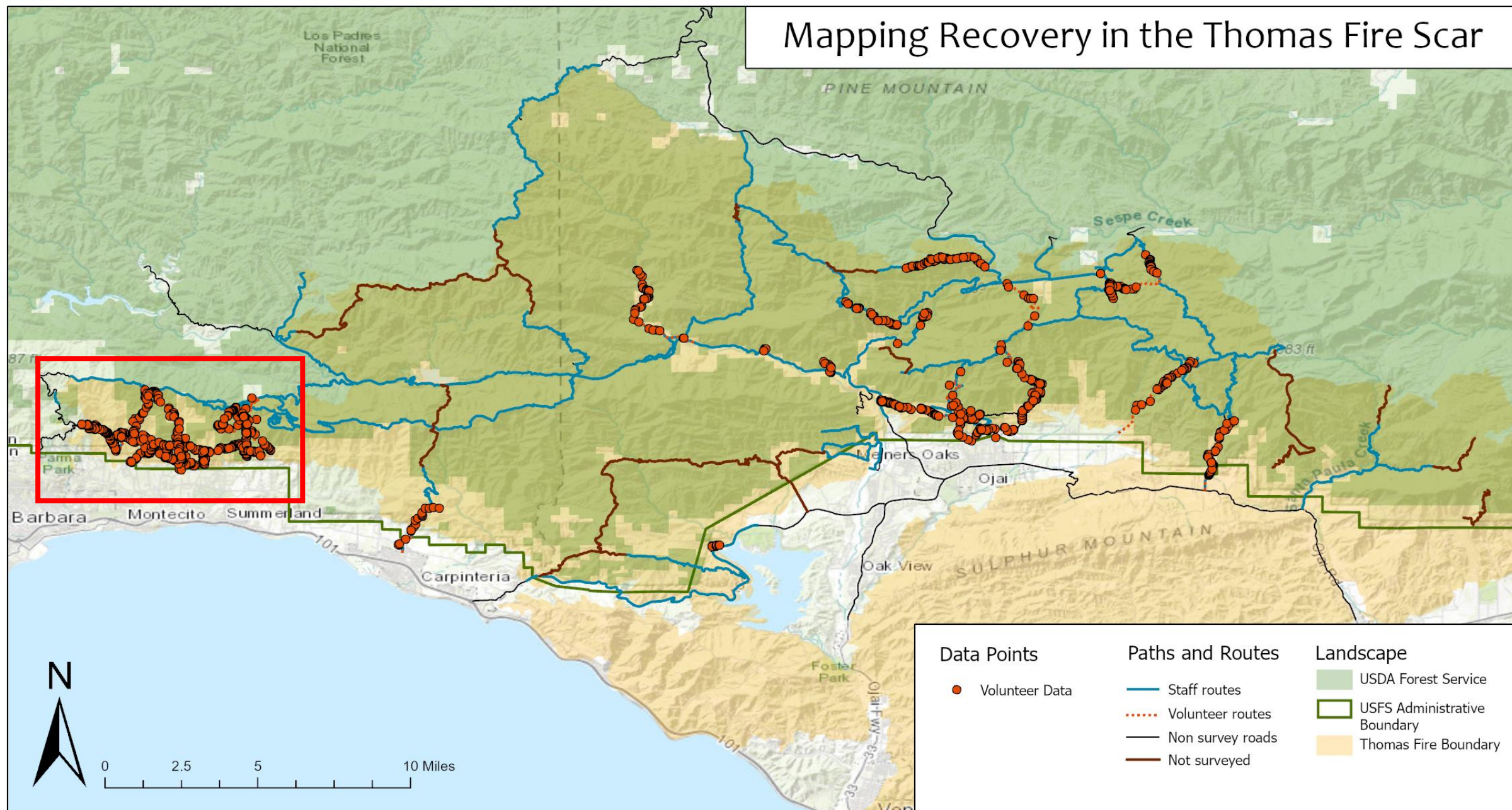
A collage of various desert plants and flowers, each shown in a circular frame. The plants include yellow bell-shaped flowers, purple spiky flowers, orange lilies, yellow daisies, pink flowers, and various other desert flora. The central text reads: "Staff and volunteers collected over 4,000 plant observations".

Staff and volunteers collected over 4,000 plant observations

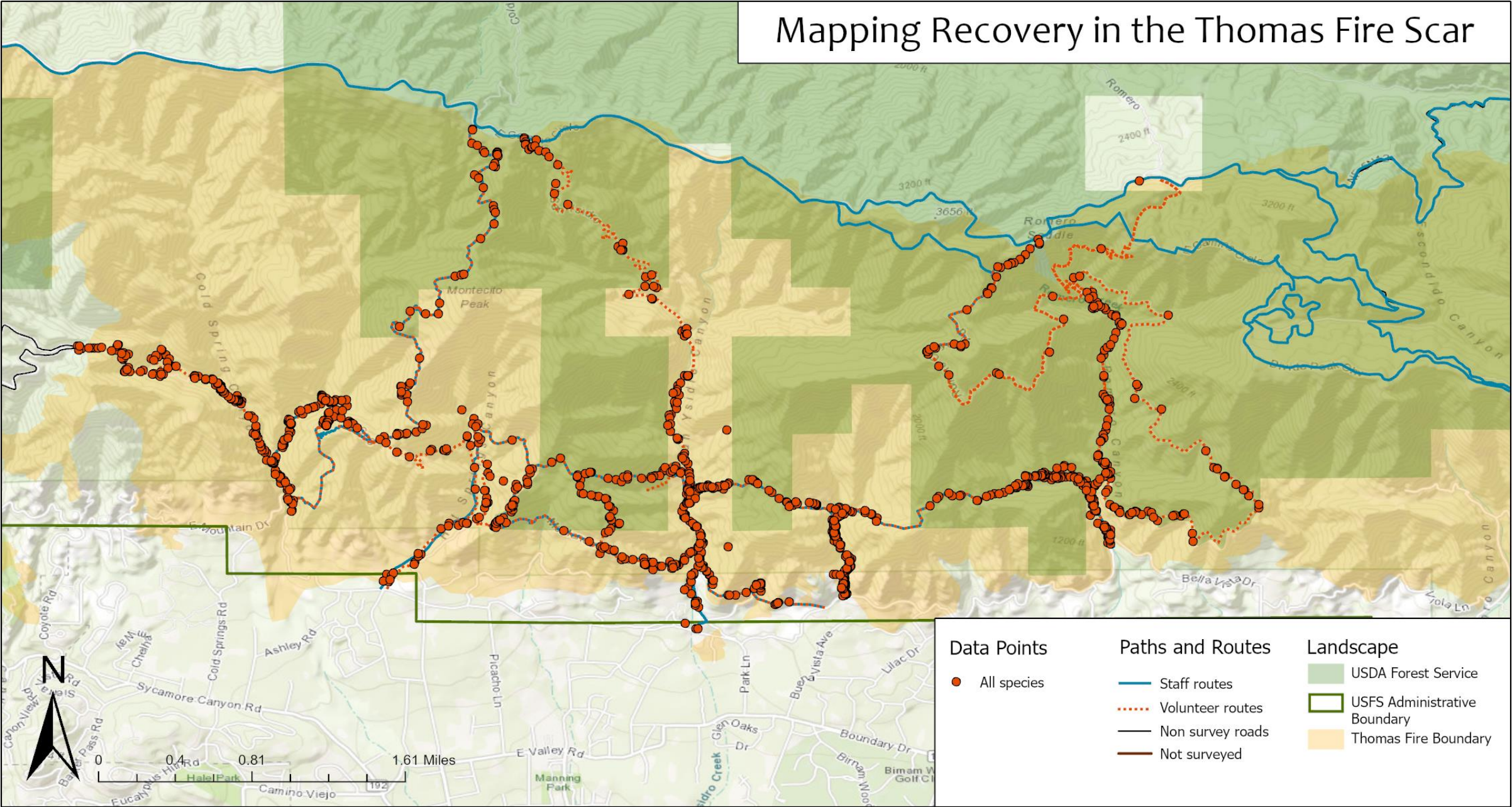
Mapping Recovery in the Thomas Fire Scar



Mapping Recovery in the Thomas Fire Scar

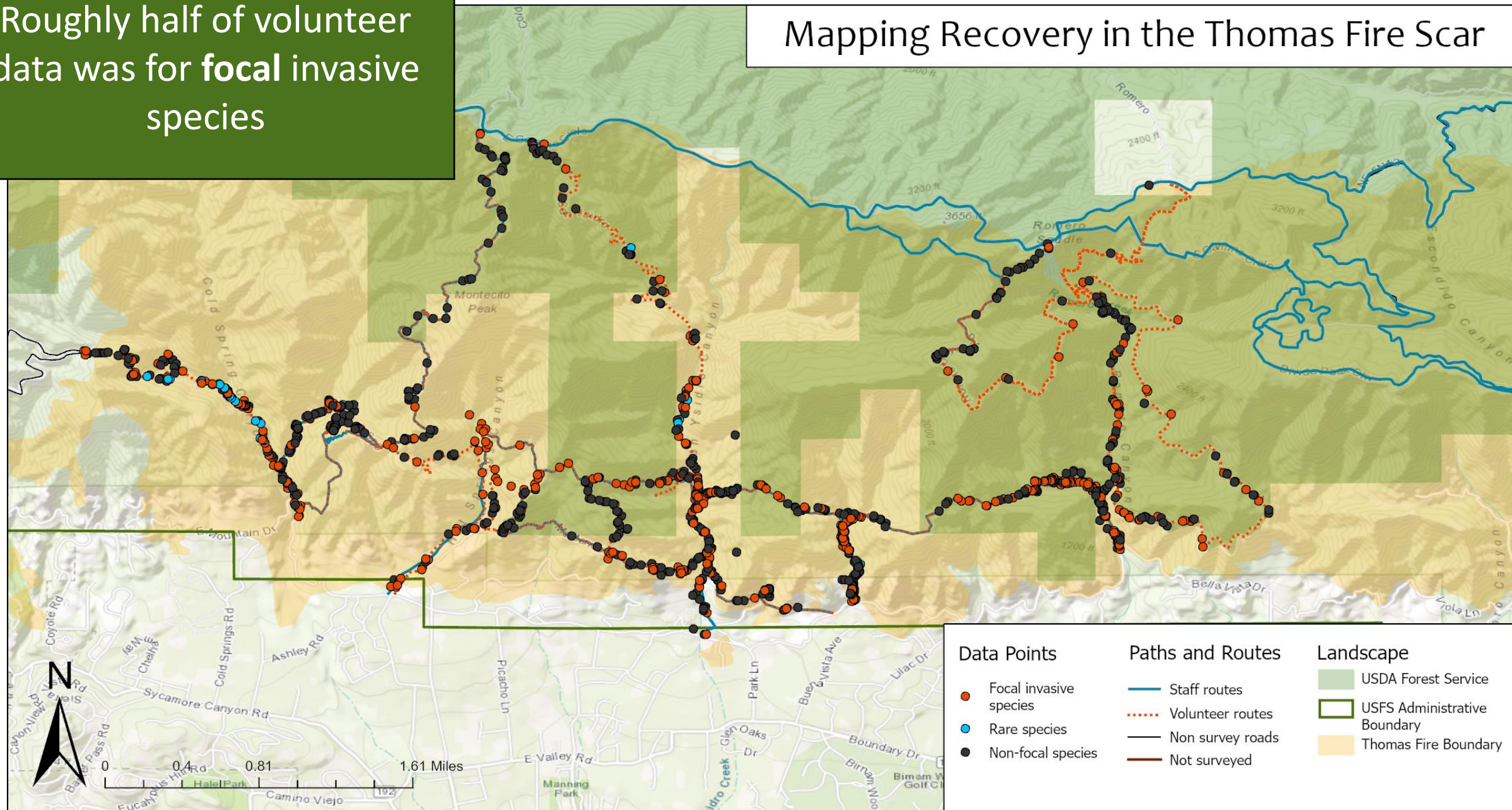


Mapping Recovery in the Thomas Fire Scar

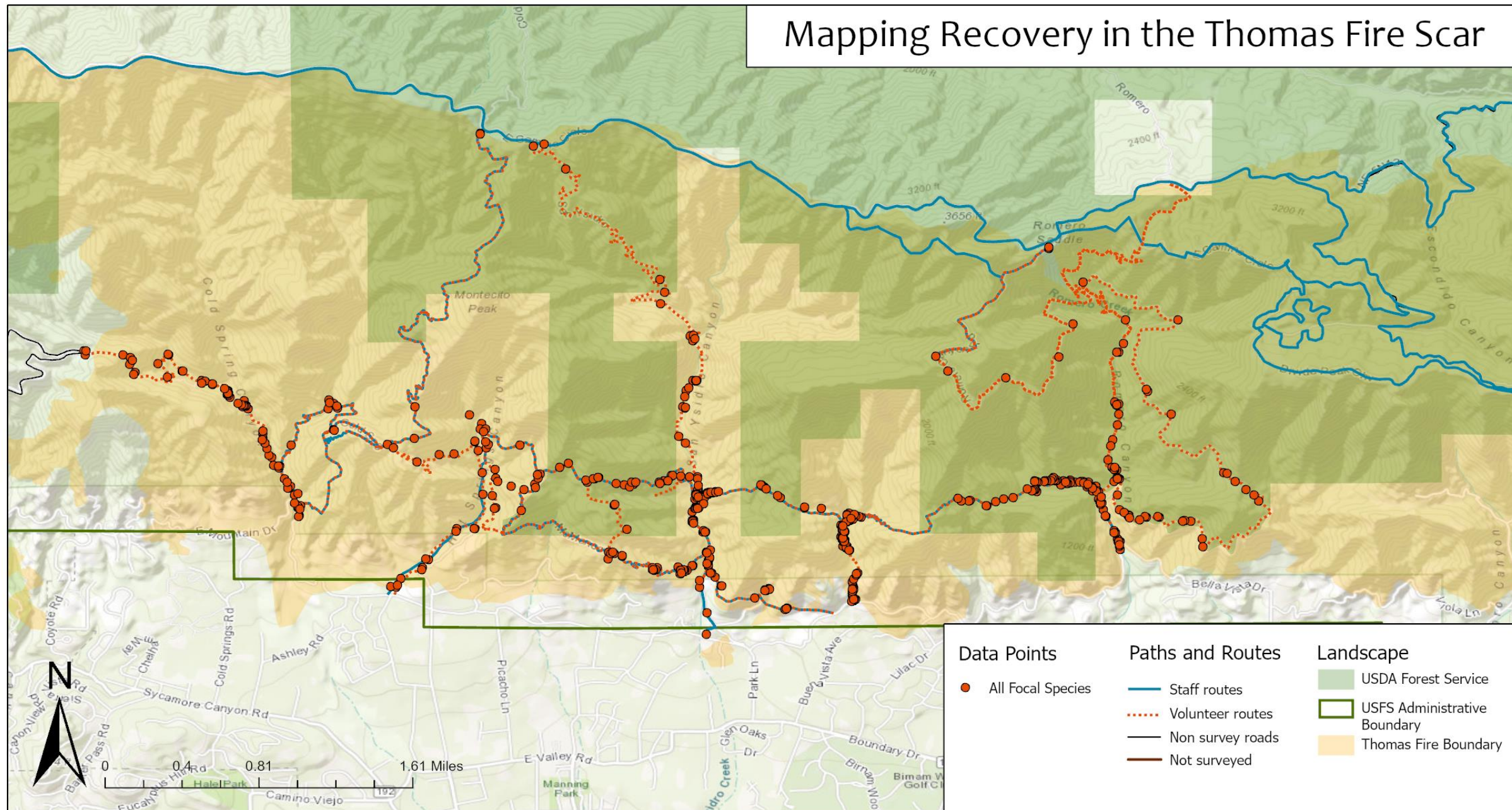


Roughly half of volunteer data was for **focal** invasive species

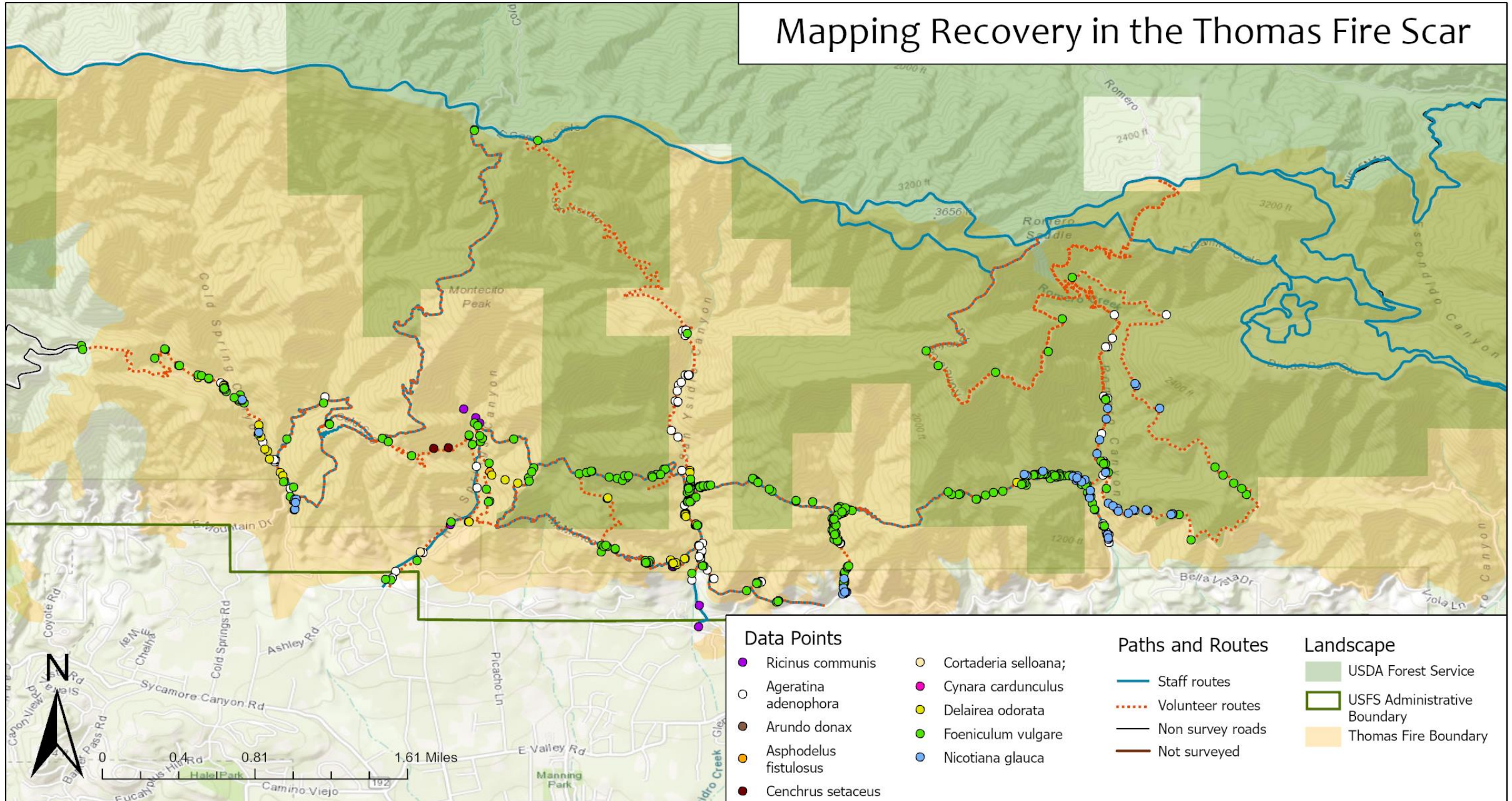
Mapping Recovery in the Thomas Fire Scar



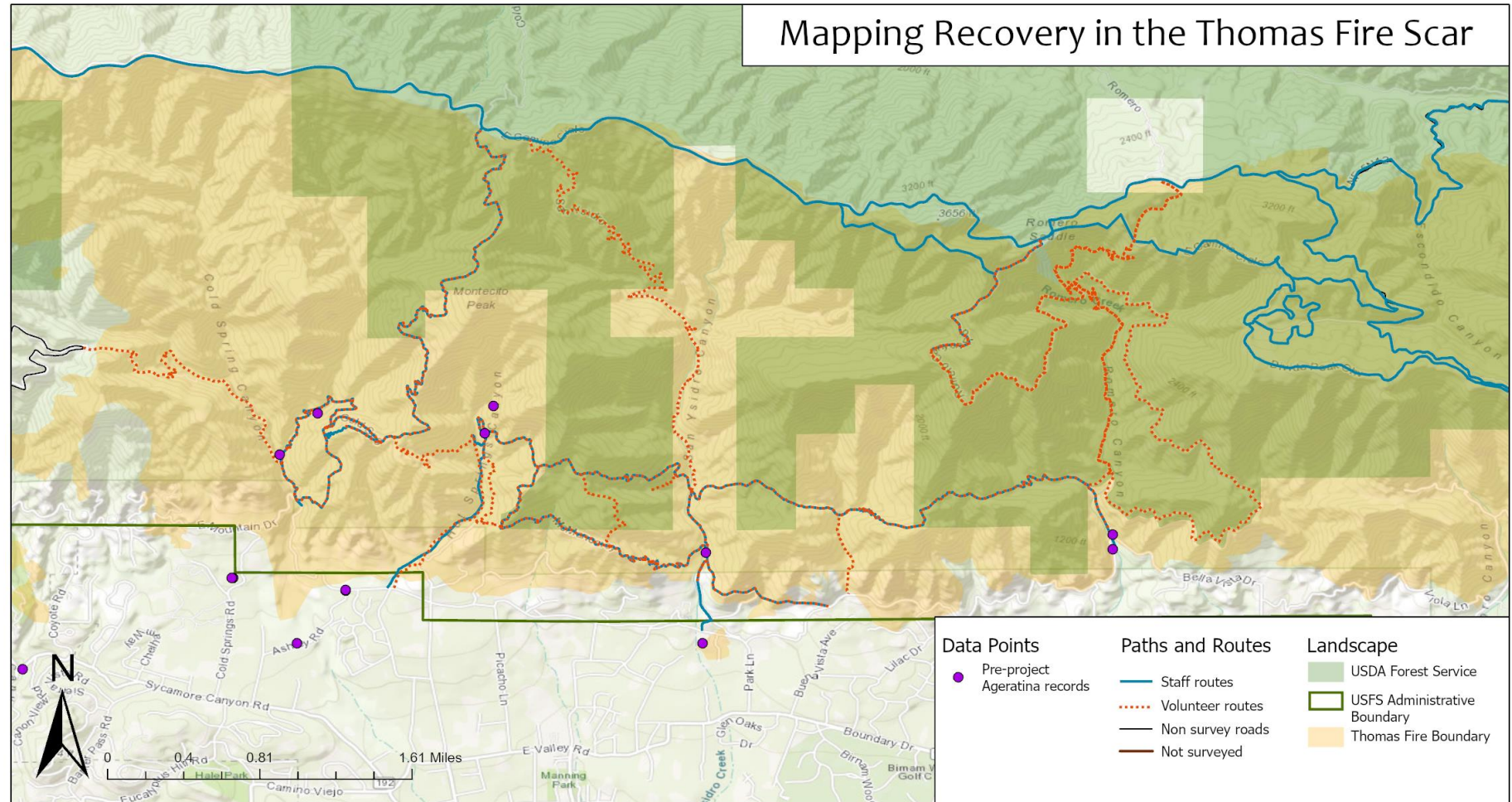
Mapping Recovery in the Thomas Fire Scar



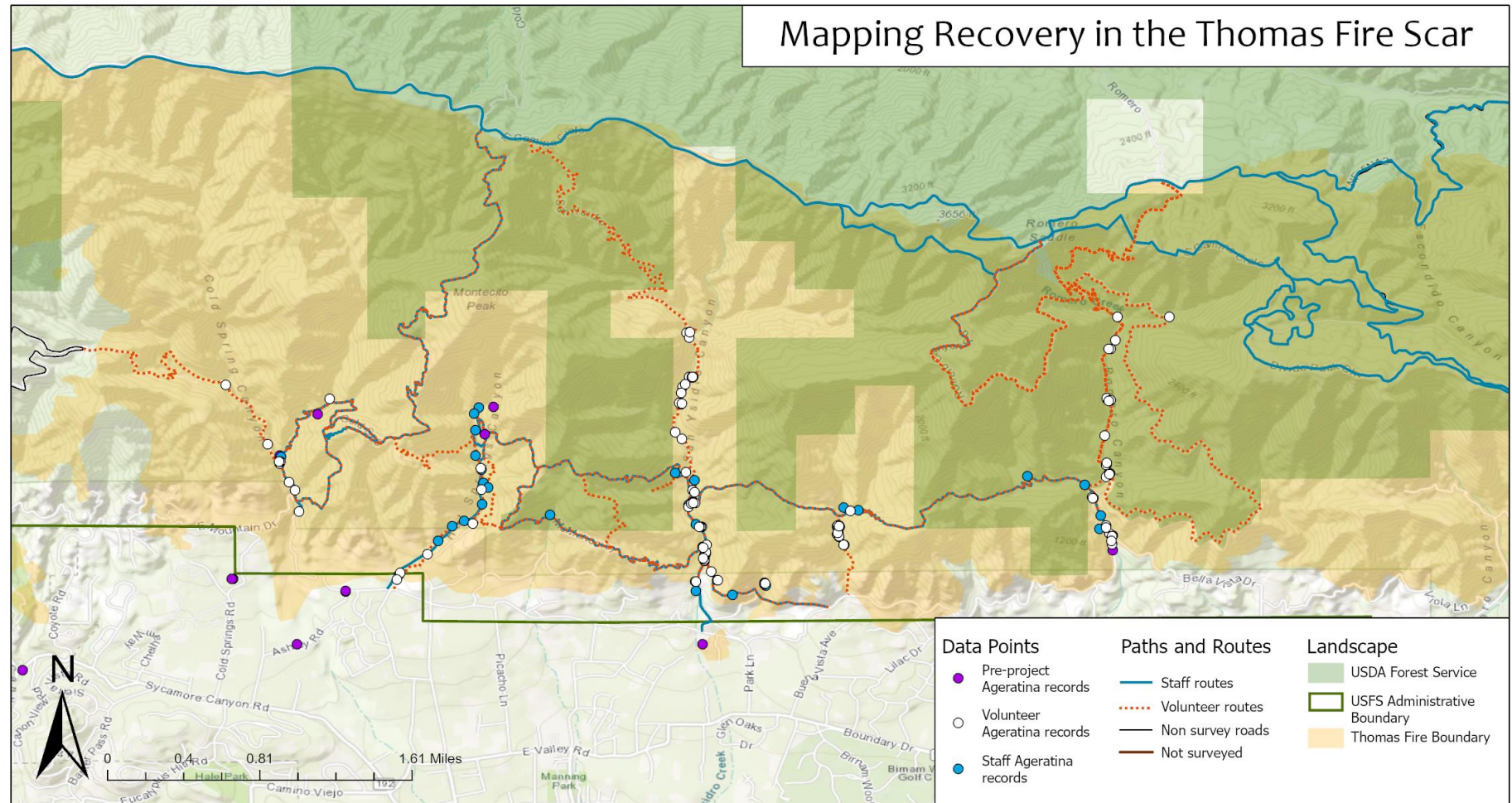
Mapping Recovery in the Thomas Fire Scar



Example of knowledge gained: *Ageratina adenophora*



Example of knowledge gained: *Ageratina adenophora*



Challenges to working with volunteers and iNaturalist

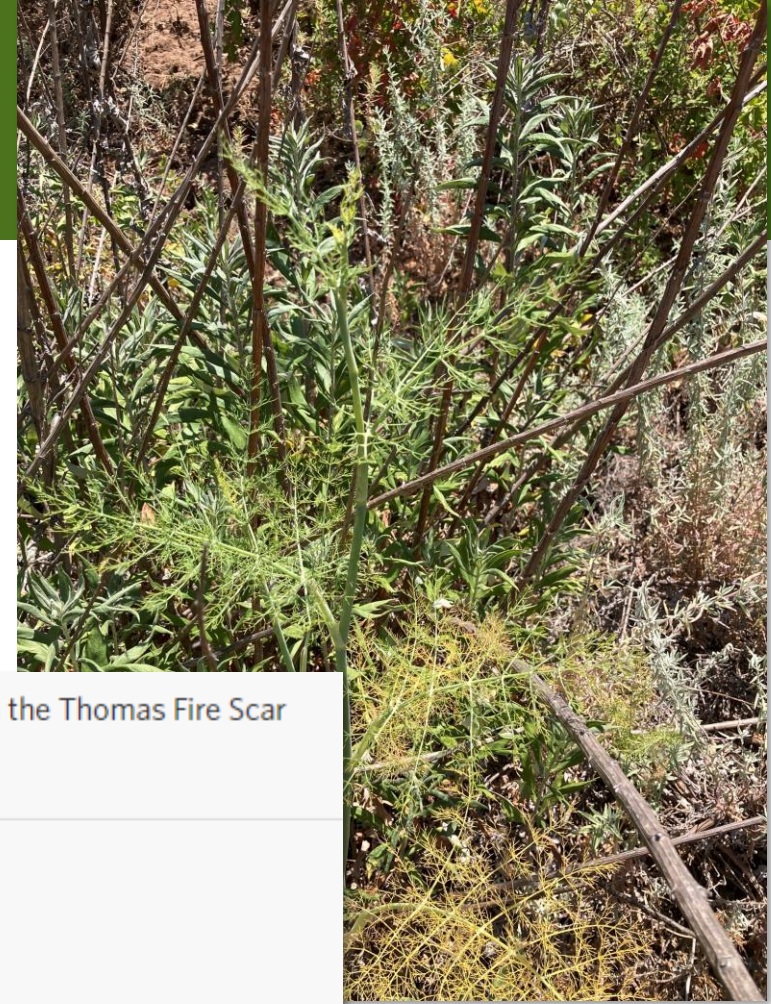
- Volunteers can only possibly cover **the weeds they know to look for**
 - Potential to miss new and incoming weeds
- Volunteers have different skill levels, attention to detail – **data quality varies**
 - Redundancy is helpful – build it in
 - Some plants have common look-alikes: *Arundo* vs. *Leymus condensatus*



Which is *Leymus* and which is *Arundo*?

Challenges to working with volunteers and iNaturalist

- Expect a **high falloff rate** – only $\frac{1}{4}$ to $\frac{1}{2}$ of volunteers will contribute
- iNaturalist is good for **point data**, but additional data (area, density, # of plants) are difficult to capture
 - No **polygon** or **line data** options



 Mapping Recovery in the Thomas Fire Scar
[Observation Fields](#) ▾

 Observation Fields (3)

Area of extent:
4-9

Number of individual plants:
1 to 20

Percent vegetation cover:
under 5%

Successes and lessons learned

- Provide specific **locations** and **timeframes** for data collection
 - We provided maps and suggested hiking between April and June
 - Gritty detail could be even better
 - Not all weeds are IDable at the same time – time hikes for peak ID
- Focus on **specific weeds**
 - 24 was probably too many
 - Only search for species of concern or that need info



Successes and lessons learned

- Provide **thorough training in app use and ID skills**
 - We trained on how to take **good photos** of plants and advised **taking multiple photos**
 - Spend more time on botanical ID skills training
 - Flower parts, morphology, life stages
- **Test your materials** before giving to volunteers!





Our wonderful
community
scientists ♡



Thank you!

Questions?

jlesage@sbbg.org

Focal Non-native Species

Full focal invasive species list (47 species)

Araujia sericifera (cruel vine)
Arundo donax (giant reed)
Asphodelus fistulosus (onionweed)
Carthamus lanatus (woolly distaff thistle)
Centaurea maculosa (spotted knapweed)
Chondrilla juncea (skeletonweed)
Delairea odorata (Cape Ivy)
Foeniculum vulgare (wild fennel)
Nicotiana glauca (tree tobacco)
Pennisetum setaceum (fountaingrass)
Ricinus communis (castor bean)
Stipa (Nasella) tenuissima (feather grass)

Ageratina adenophora (sticky snakeroot)
Ailanthus altissima (tree of heaven)
Brassica tournefortii (Saharan Mustard)
Centaurea melitensis (tocalote)
Centaurea solstitialis (yellow star thistle)
Cistus incanus (hairy rockrose)
Cortaderia spp. (pampas grasses)
Cynara cardunculus (artichoke thistle)
Cytisus scoparius (Scotch broom)
Euphorbia terracina (carnation weed)
Genista monspessulana (French broom)
Spartium junceum (Spanish broom)

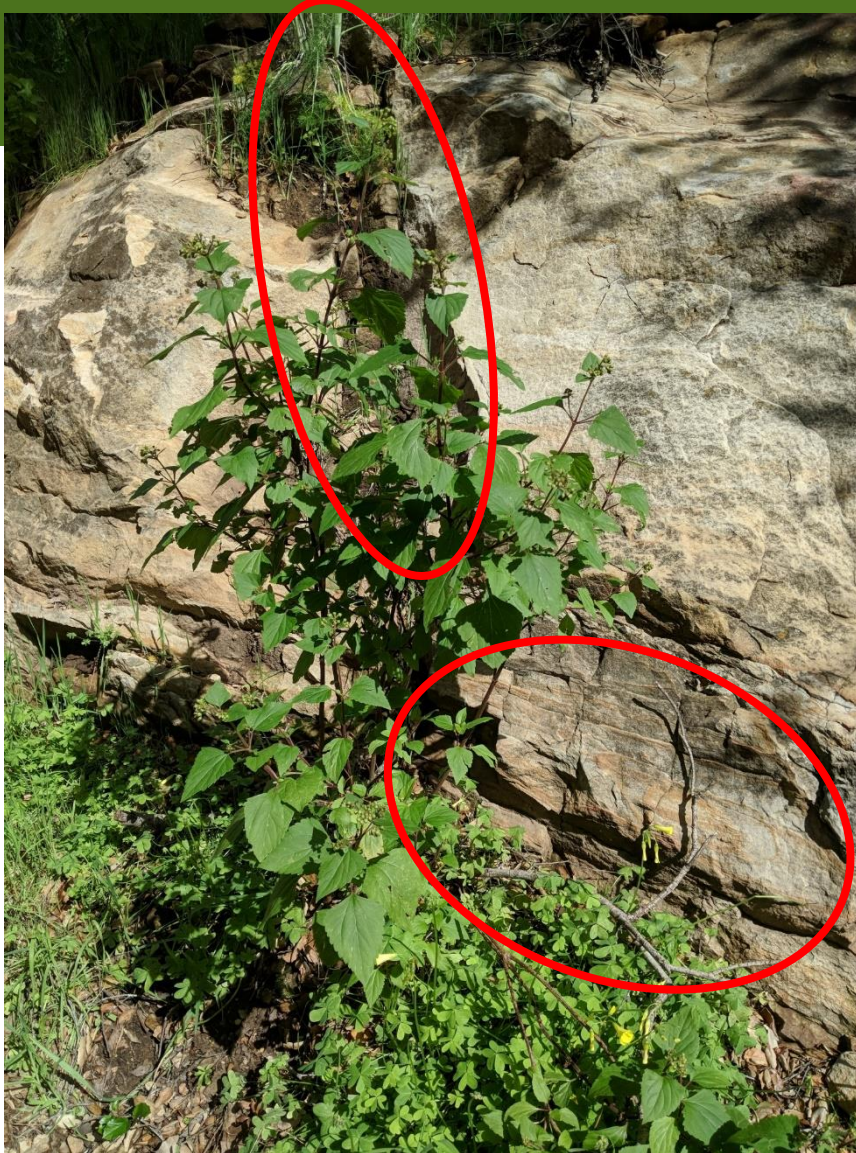
Acacia baileyana (cootamundra wattle)
Acacia paradoxa (kangaroo thorn)
Acaena novae-zelandiae (biddy biddy)
Bromus tectorum (cheatgrass)
Carpobrotus edulis (ice plant)
Cucumis melo (cantaloupe melon)
Echium plantagineum (salvation echium)
Ehrharta calycina (veldt grass)
Eichhornia crassipes (water hyacinth)
Elymus caput-medusae (medusa head)
Hedera canariensis (Canary ivy)
Hedera helix (English ivy)
Lepidium latifolium (perennial pepperweed)
Ludwigia hexapetala (water primrose)
Ludwigia peploides (marsh purslane)
Onopordum acanthium (Scotch cottonthistle)
Rubus armeniacus (Himalayan blackberry)
Tagetes minuta (little marigold)
3 *Tamarix* spp. (Tamarisk)

Green: beginner species (12)

Orange: intermediate species (24+)

Black: staff-level species (47)

Staff and Community Scientists saw the same plants!



Observed by community
scientist

March 19, 2020



Observed by staff

April 23, 2020



Ageratina adenophora
(Sticky snakeroot)



Staff and Community Scientists saw the same plants!



Observed by community
scientist

March 21, 2021



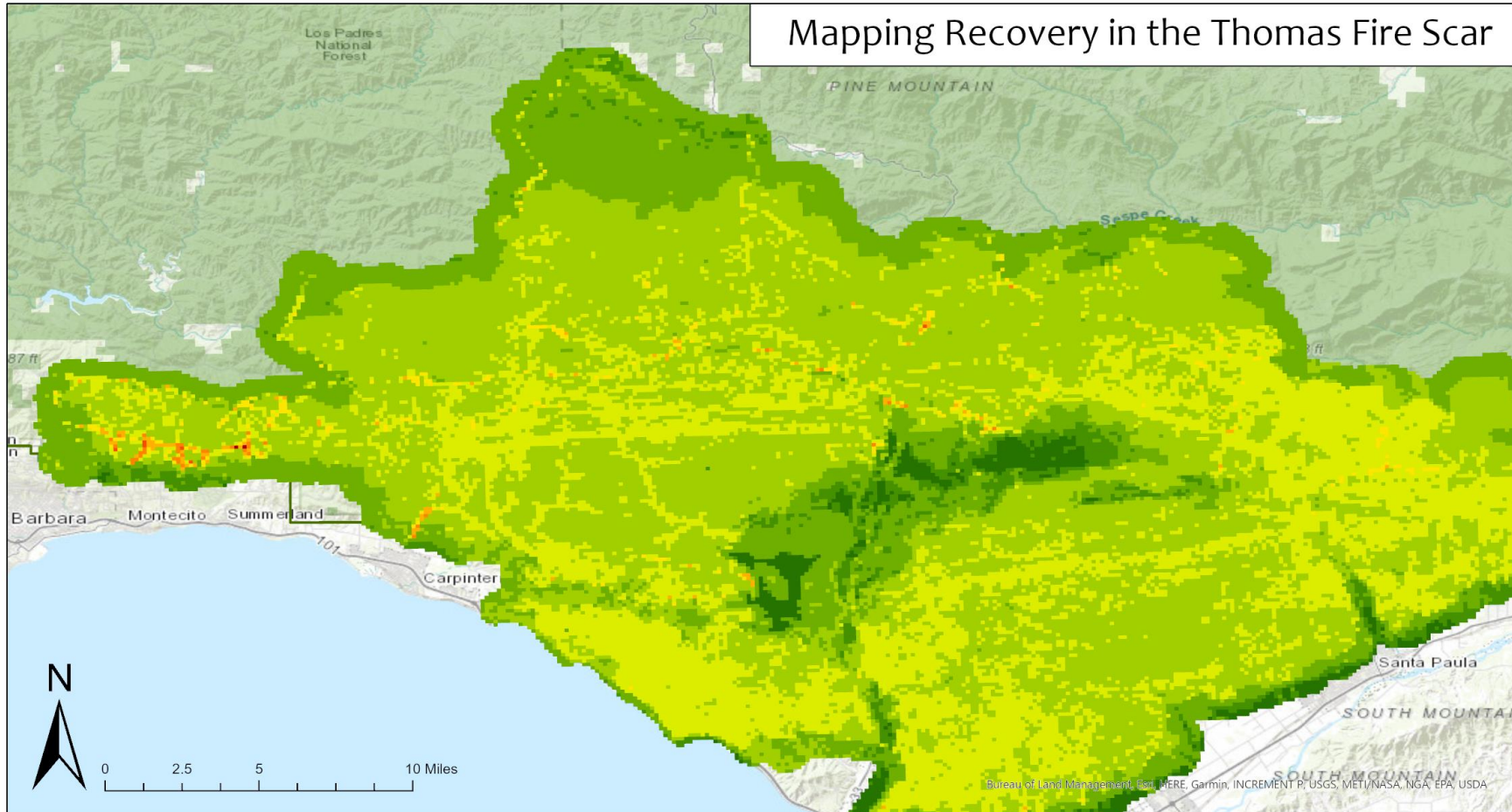
Observed by staff

June 28, 2021

Foeniculum vulgare
(Fennel)



Spatial prioritization model



Conservation
Biology Institute

Using both
our collected data
and pre-existing
spatial information,
we will identify key
areas for restoration

Early model of intervention areas (dark red) based on satellite and collected data