



# RIVER PARTNERS

## Adaptive management at Dos Rios Ranch and Willow Bend Preserves:

The effect of seeding timing and irrigation methods on understory establishment and weed control in floodplain restoration

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October 26th, 2023  
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# Who is River Partners?

We bring life back to California's rivers

## BY THE NUMBERS



**18,000+**

Acres of habitat restored for imperiled species



**58**

Imperiled species protected



**4 million**

Native trees planted



**10+ billion**

gallons of fresh water conserved



**1+ million**

tons of greenhouse gases captured



**\$150+ million**

channeled to the communities we serve

# Who is River Partners?

- Nonprofit organization founded in 1998
- Create a thriving and hopeful future for the state's environment and communities
- Scientifically driven riparian habitat restoration using modern farming practices
- The largest on-the-ground restoration footprint of any nonprofit in the western US

## BY THE NUMBERS



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# STATEWIDE RESTORATION 1998-2022

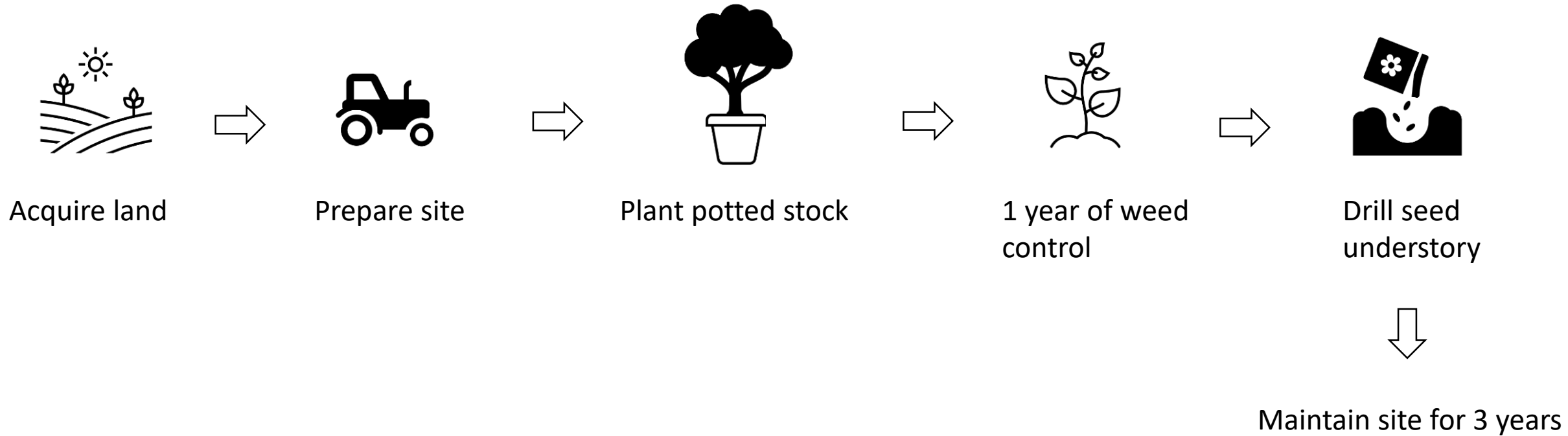


**50+**  
**PROJECTS**

**10-50**  
**PROJECTS**

**< 10**  
**PROJECTS**

# Our timeline





# Always looking to improve...

- How can we increase efficiency and efficacy?
- We use as little herbicide as we can already
  - But how can we use even less and still meet outcomes?



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Acquire land



Prepare site



Plant potted stock



**1 year of  
weed control**



Drill seed  
understorey

- Control annual weeds through discing in 16 ft aisle
  - 1 year of discing depletes top 4 inches of seed bank
- Only actively spray the 2 feet of the berm next to the plant



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**Acquire land**



**Prepare site**



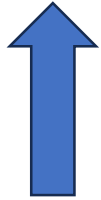
**Plant potted stock**



**1 year of weed control**



**Drill seed understorey**



Keep in agricultural production up until site prep



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Acquire land



Prepare site



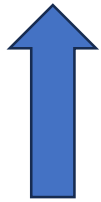
Plant potted stock



1 year of weed control



Drill seed  
understory



Keep in agricultural  
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Acquire land



Prepare site



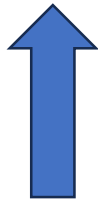
Plant potted stock



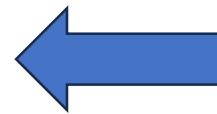
1 year of weed control



Drill seed understorey



Keep in agricultural production up until site prep



Permits, funding all in order, harvest at right time, minimal earthwork



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Same Year



Acquire land



Prepare site



Plant potted stock



Drill seed understory

**Goal:** Competition provided by natives prevents weeds from taking hold

Fewer weeds = less herbicide, less labor



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**Goal:** Increase efficiency and efficacy of restoration...and use as little herbicide as possible

- Question: How does seeding the understory the same year as planting potted stock
  - Impact labor and herbicide use?
  - Impact non-native and native herbaceous cover?



# 2 Sites and 2 Valleys

## **Dos Rios Ranch Preserve**

- 1600 acres in SJ Valley
- Confluence of Tuolumne and San Joaquin Rivers
- Flood irrigation

## **Willow Bend Preserve**

- 175 acres in Sacramento Valley
- Sacramento River
- Drip Irrigation



# Dos Rios Ranch Preserve

- The largest public-private floodplain restoration in California's history
- In the process of becoming California's newest State Park!



## BY THE NUMBERS



**2,100**

Acres Restored



**350,000+**

Trees & Shrubs  
Planted



**8**

River Miles Restored



**9**

Priority Species  
Supported



**7,000**

Acre-Feet of  
Fresh Water Retired



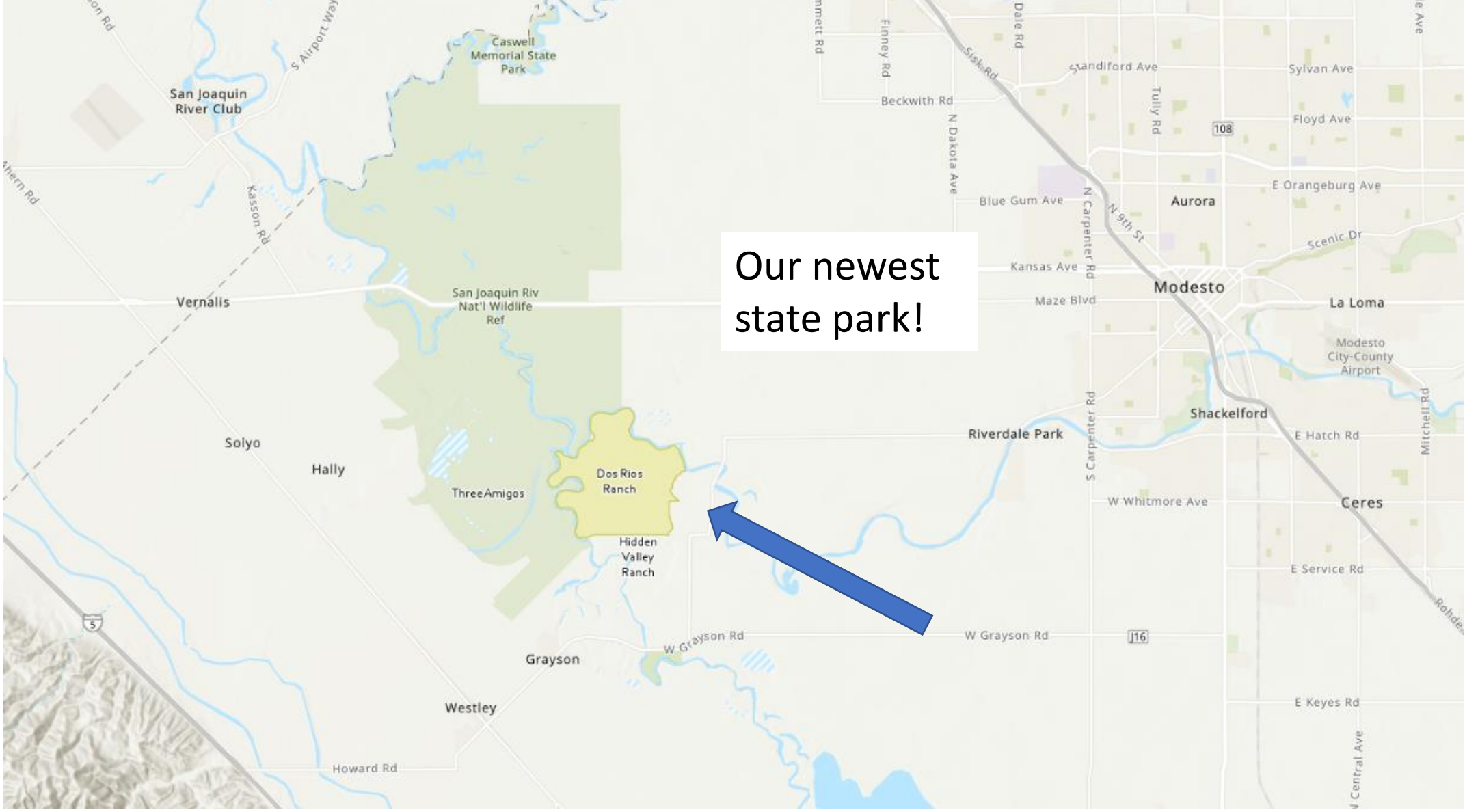
**\$40 M**

Competitive Grants  
Delivered to a Severely  
Disadvantaged  
Community



**250**

Jobs Created



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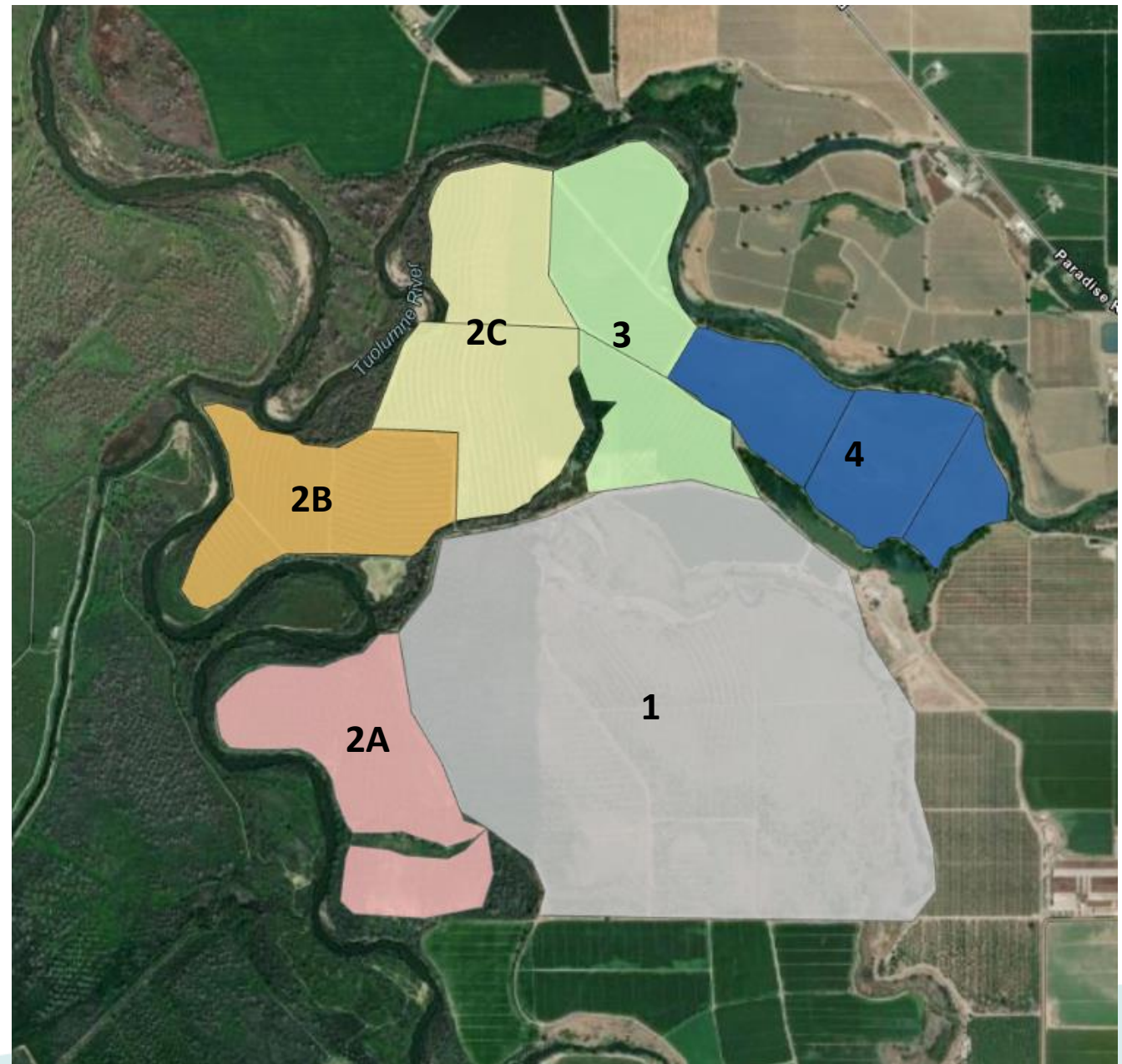






# Dos Rios Ranch Project Phases

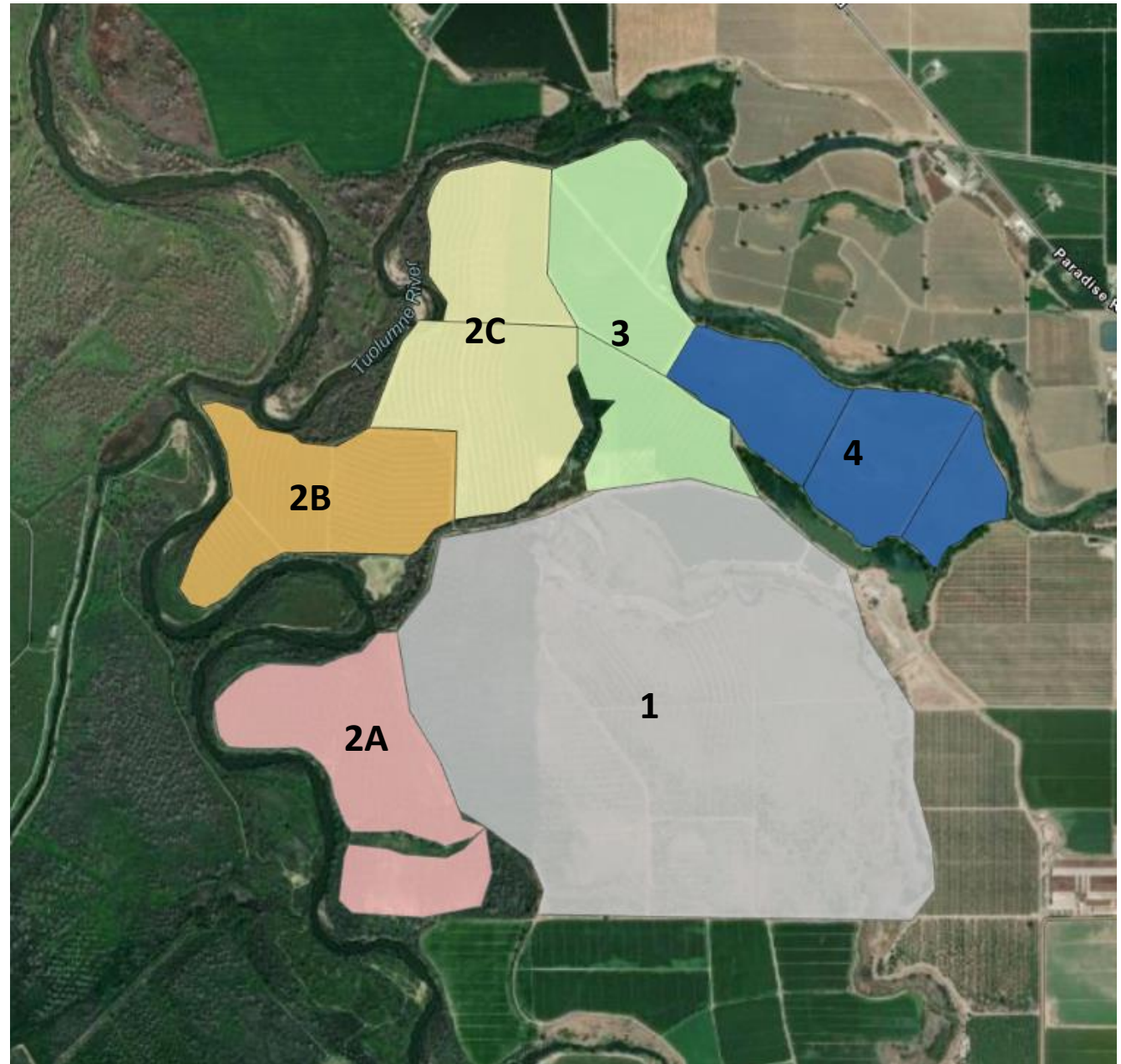
	Project Phase	Acres	Potted Stock Planting Year
	2A	175	2018
	2B	159	2018
	2C	187	2018
	3	207	2018
	4	155	2021





# Restoration timing

	Project Phase	Acres	
	2A	175	Fallow before restoration
	2B	159	
	2C	187	
	3	207	
	4	155	In ag. right up until restoration





# Phases 2a-3

- Fallow before restoration → lots of weeds
  - Need to control before seeding understory
  - Flood irrigation → constant weed germination
  - Weed control
    - Disking – annual weeds
    - Herbicide – perennial weeds





# Phases 2a-3

- Fallow before restoration → lots of weeds
  - Need to control before seeding understory
  - Flood irrigation → constant weed germination
  - Weed control
    - Disking – annual weeds
    - Herbicide – perennial weeds



Potted stock planted first

Understory seeded 1 year later  
in winter

Understory:

Creeping wildrye

Mugwort

Gumplant



# Phase 4

- Restore straight out of agriculture
  - As good as we're going to get weed wise



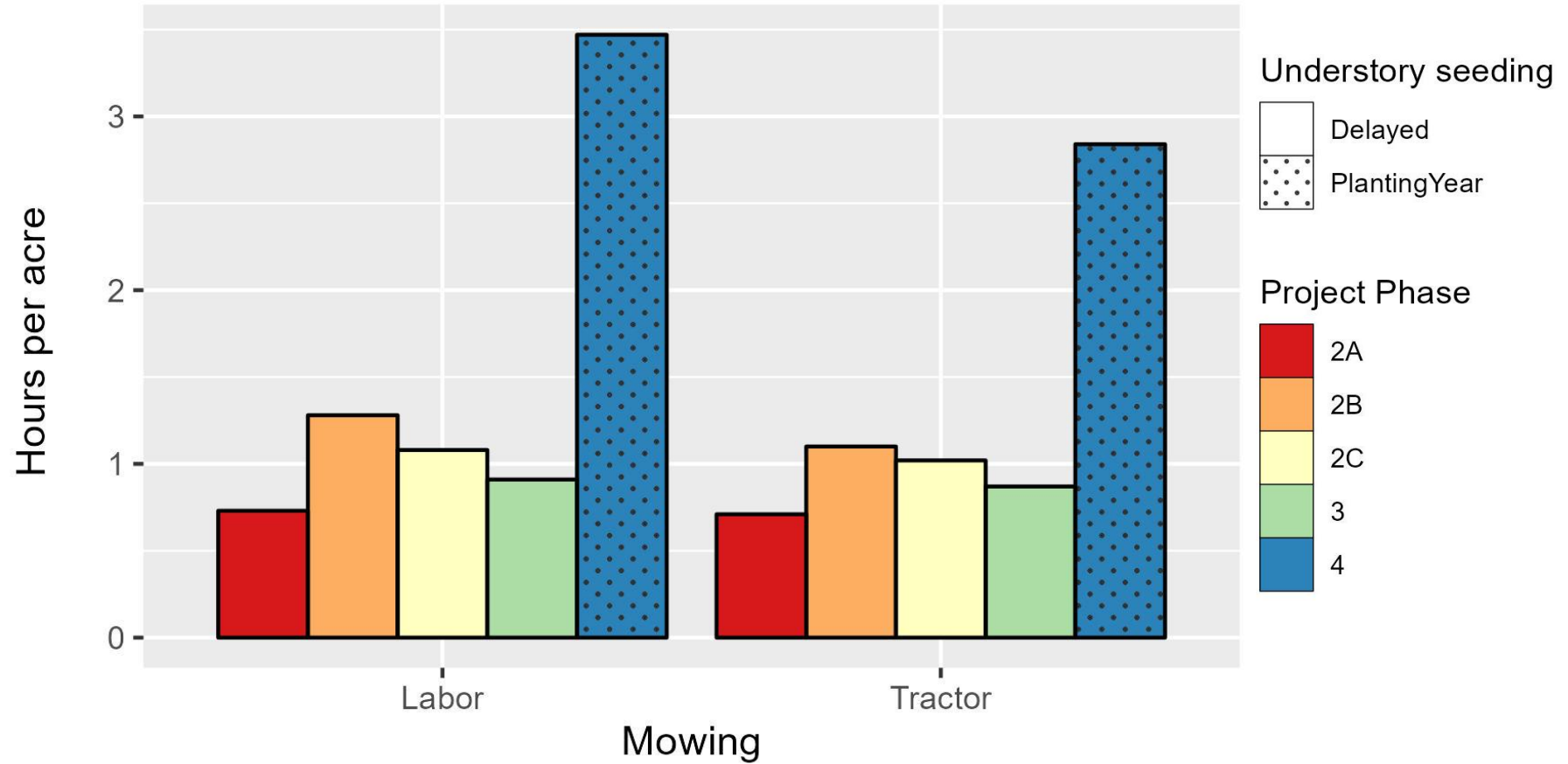
Potted stock planted &  
Understory seeded  
in the same year



# Seeding in the planting year



Mowing hours



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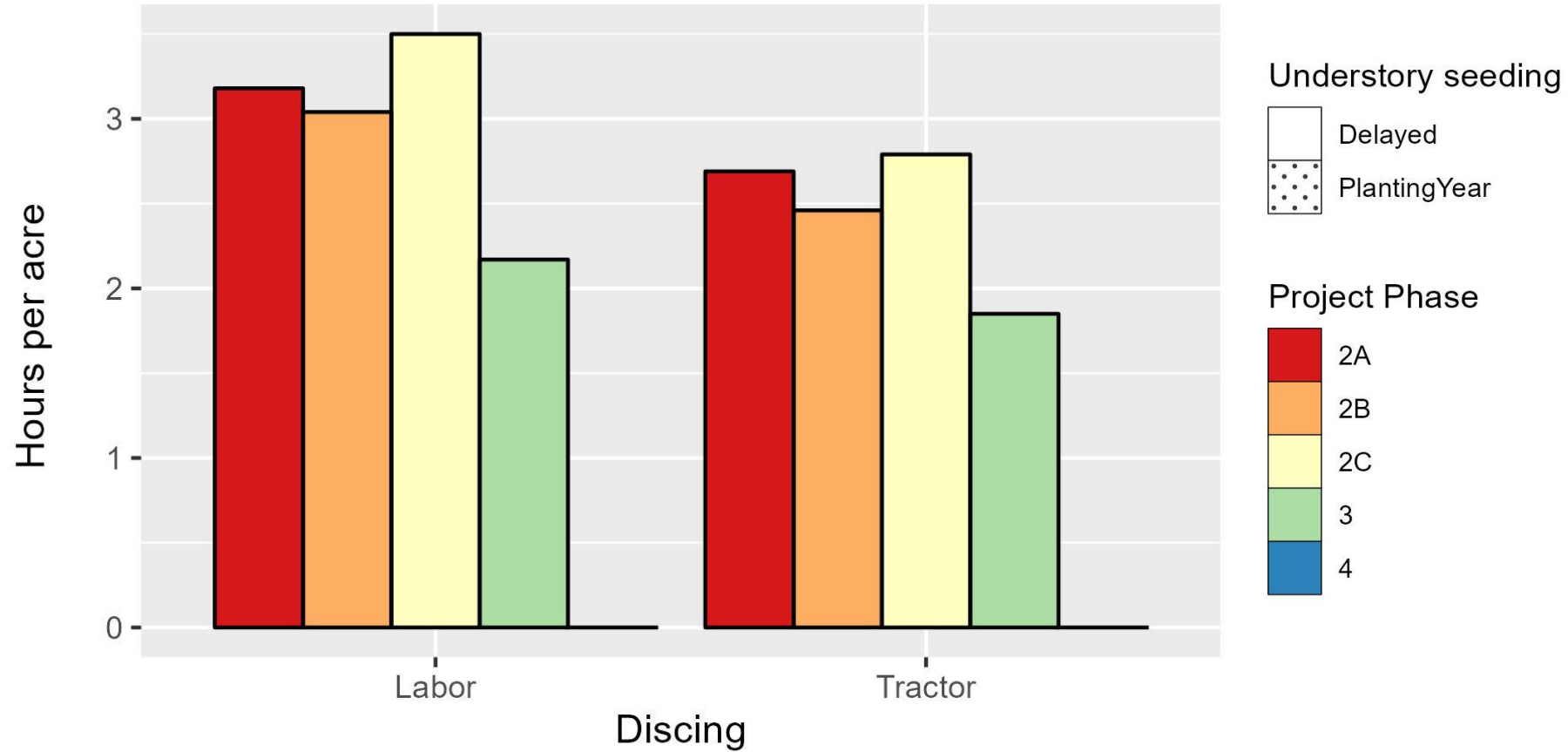
# Seeding in the planting year



Mowing hours



Disking hours



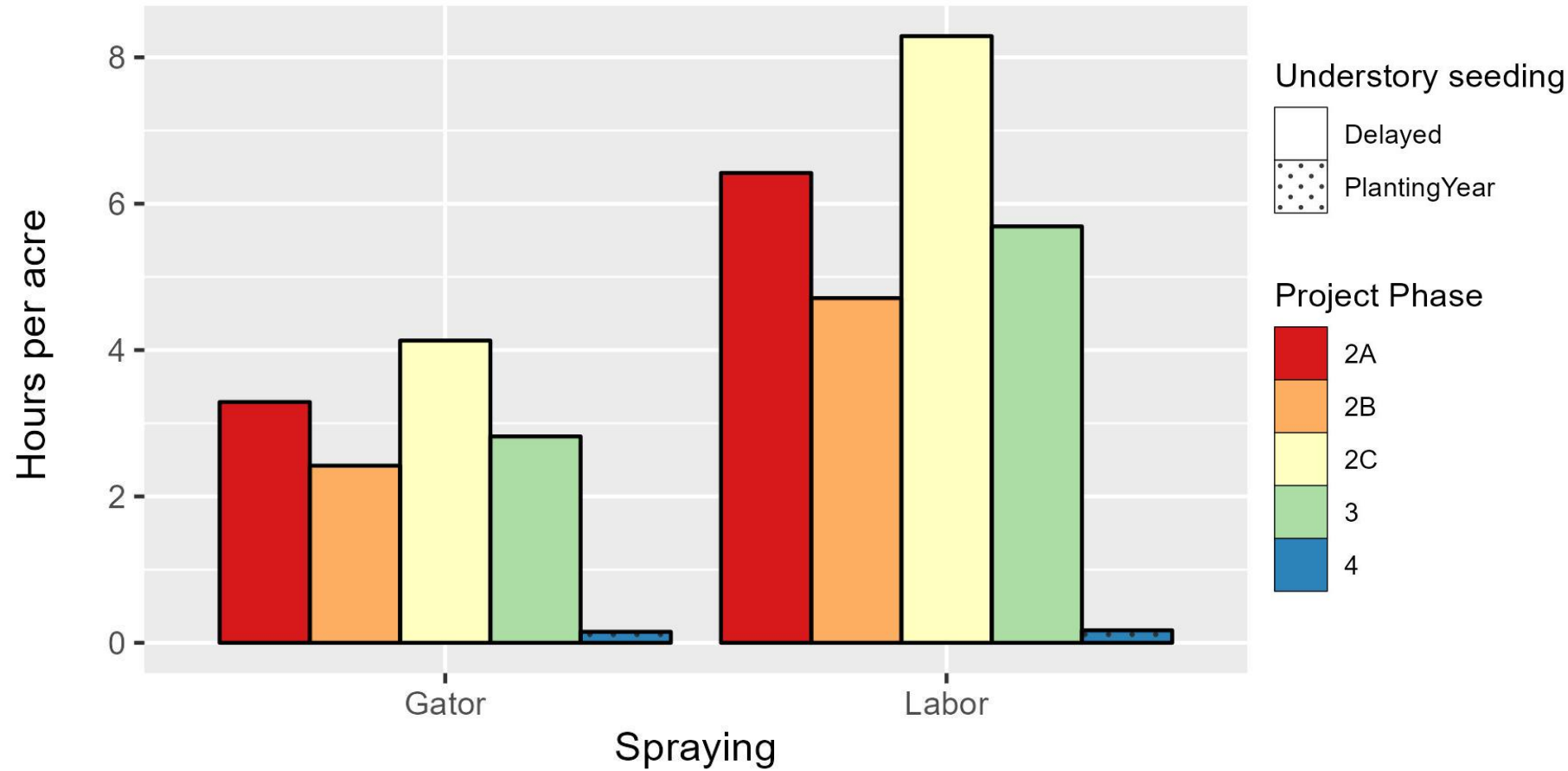
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# Seeding in the planting year

↑ Mowing hours

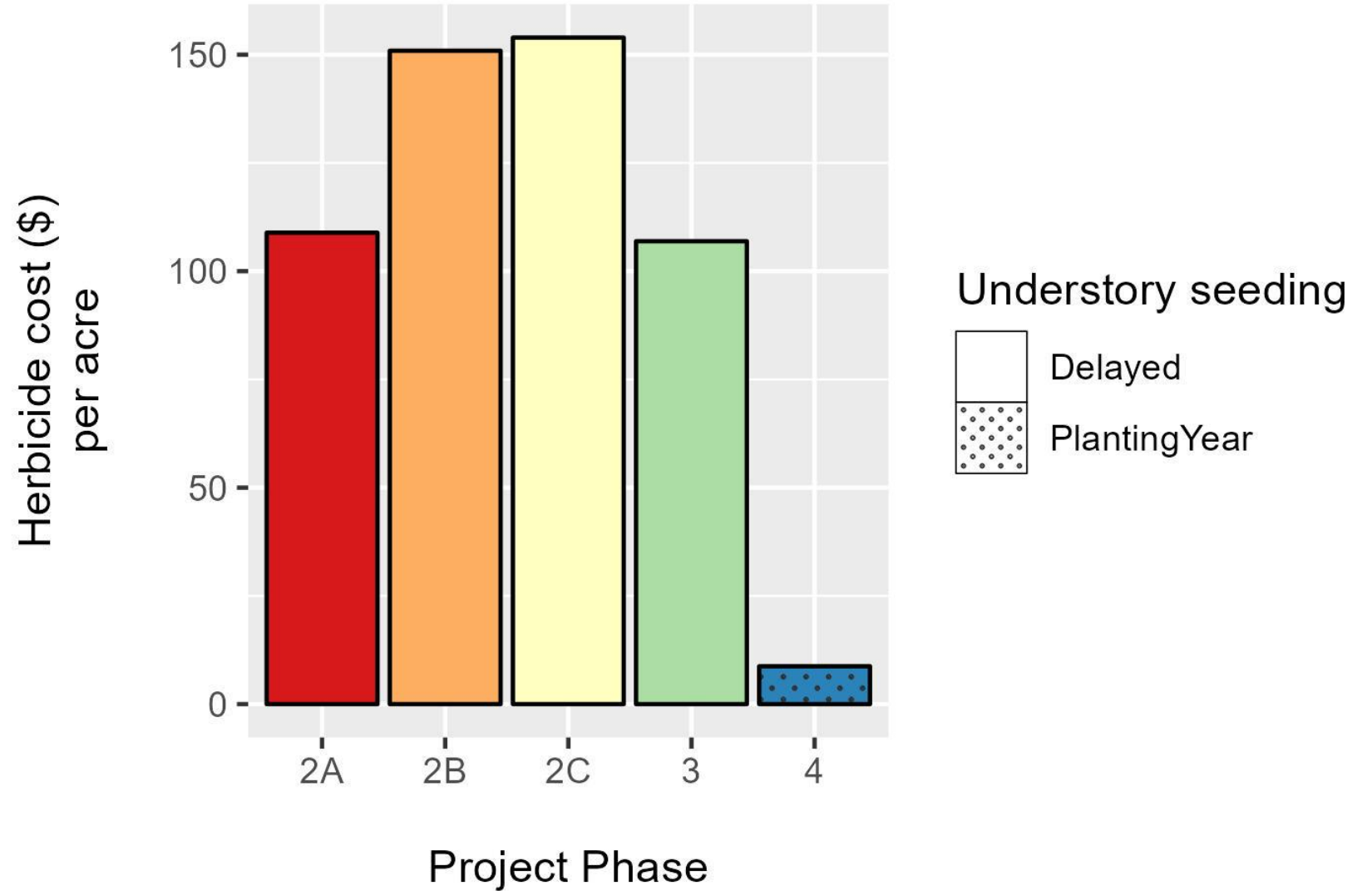
↓ Disking hours

↓ Spraying hours








# Seeding in the planting year

- ↑ Mowing hours
- ↓ Disking hours
- ↓ Spraying hours
- ↓ Herbicide cost

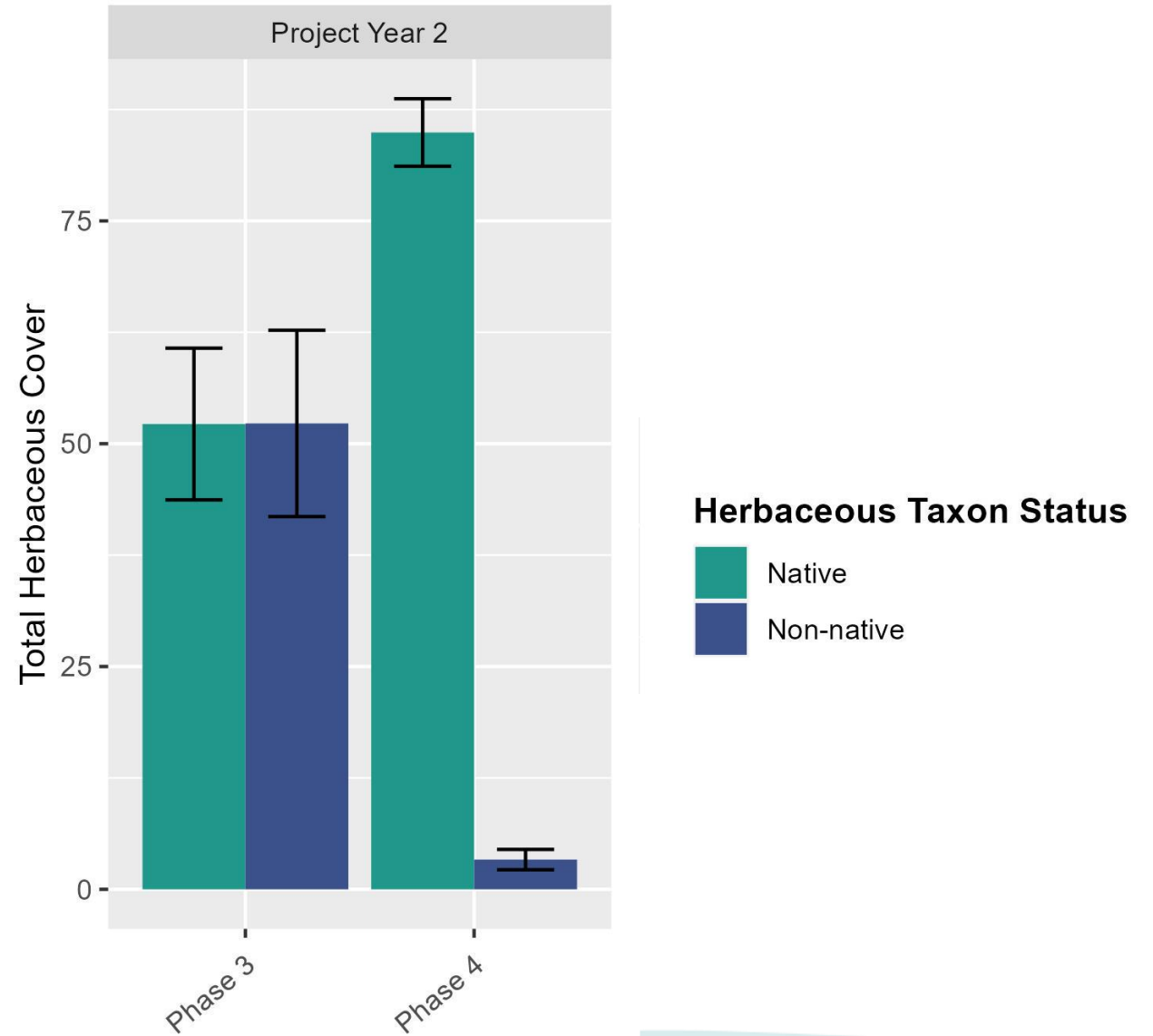


# Potted stock survival not negatively impacted

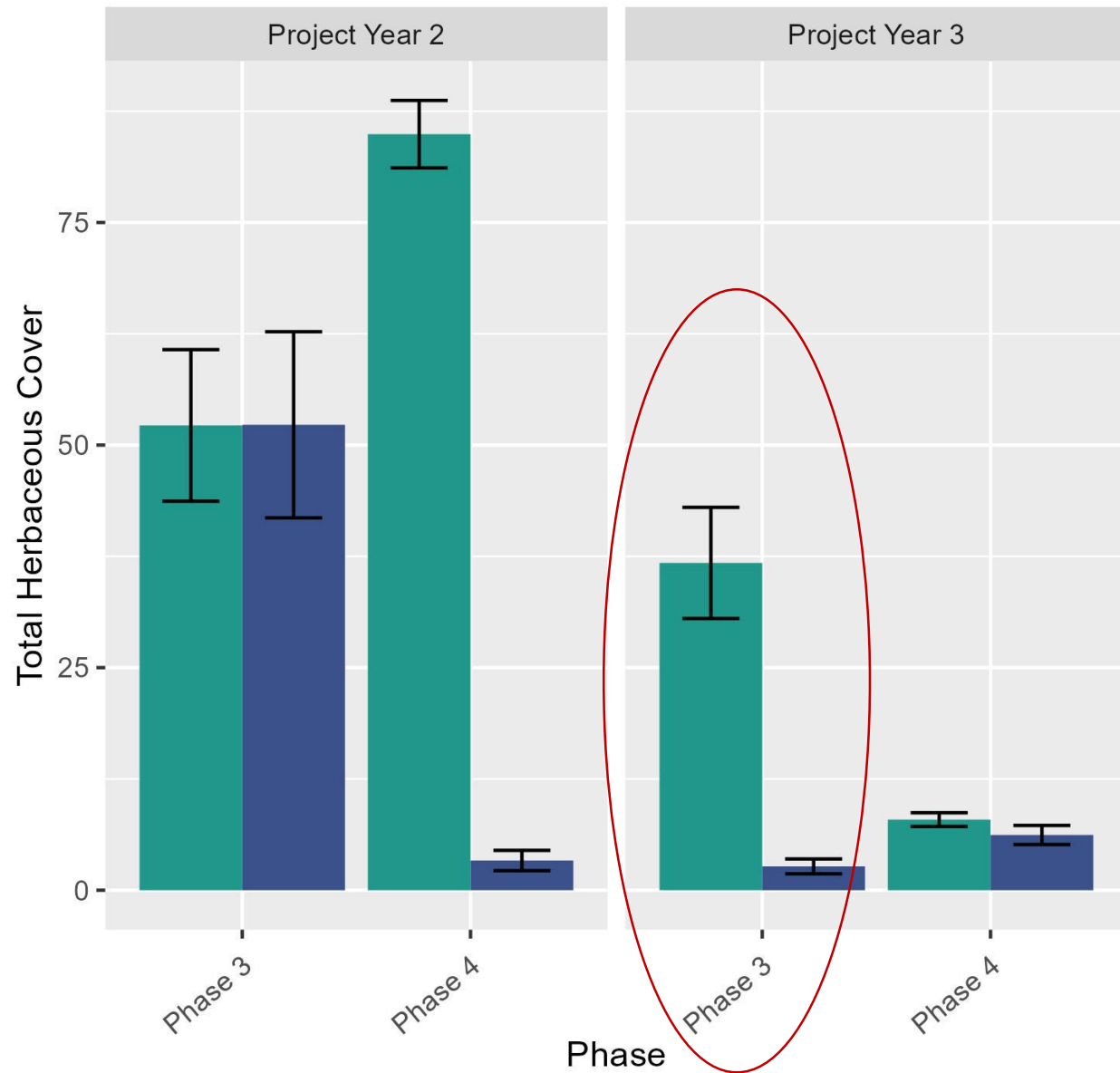
	Project Phase	% Survival at year 1
	2A	73%
	2B	75%
	2C	62%
	3	83%
	4	94%

Phase 4 (seeding in planting year) = Fewer non-native weeds

\*note PROJECT year not calendar year







We still control weeds by end of project for phase 3 (delayed seeding)

**Herbaceous Taxon Status**

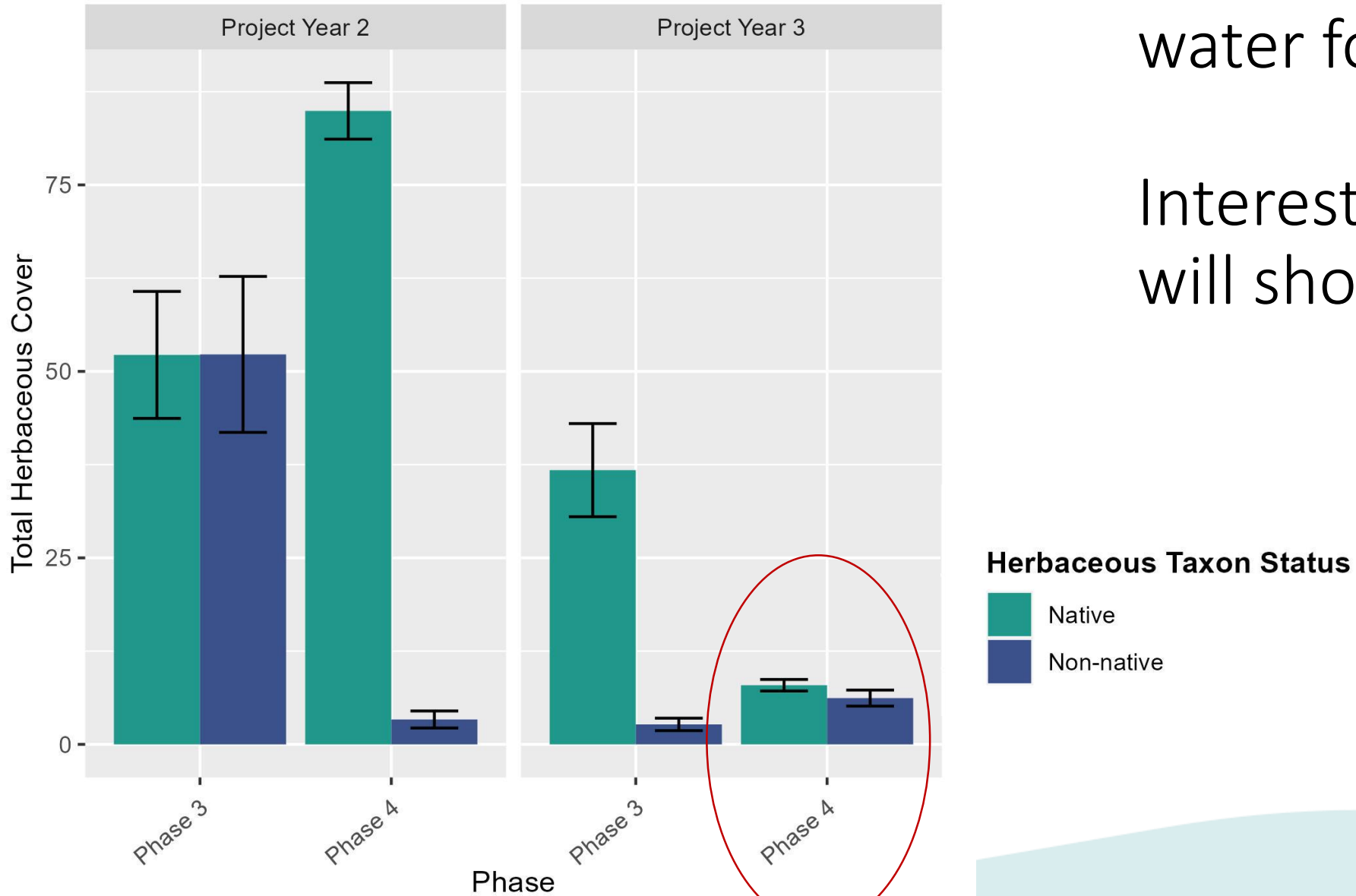
- Native
- Non-native

\*note PROJECT year not calendar year



2023 – Phase 4 under water for 7 months

Interested in what 2024 will show

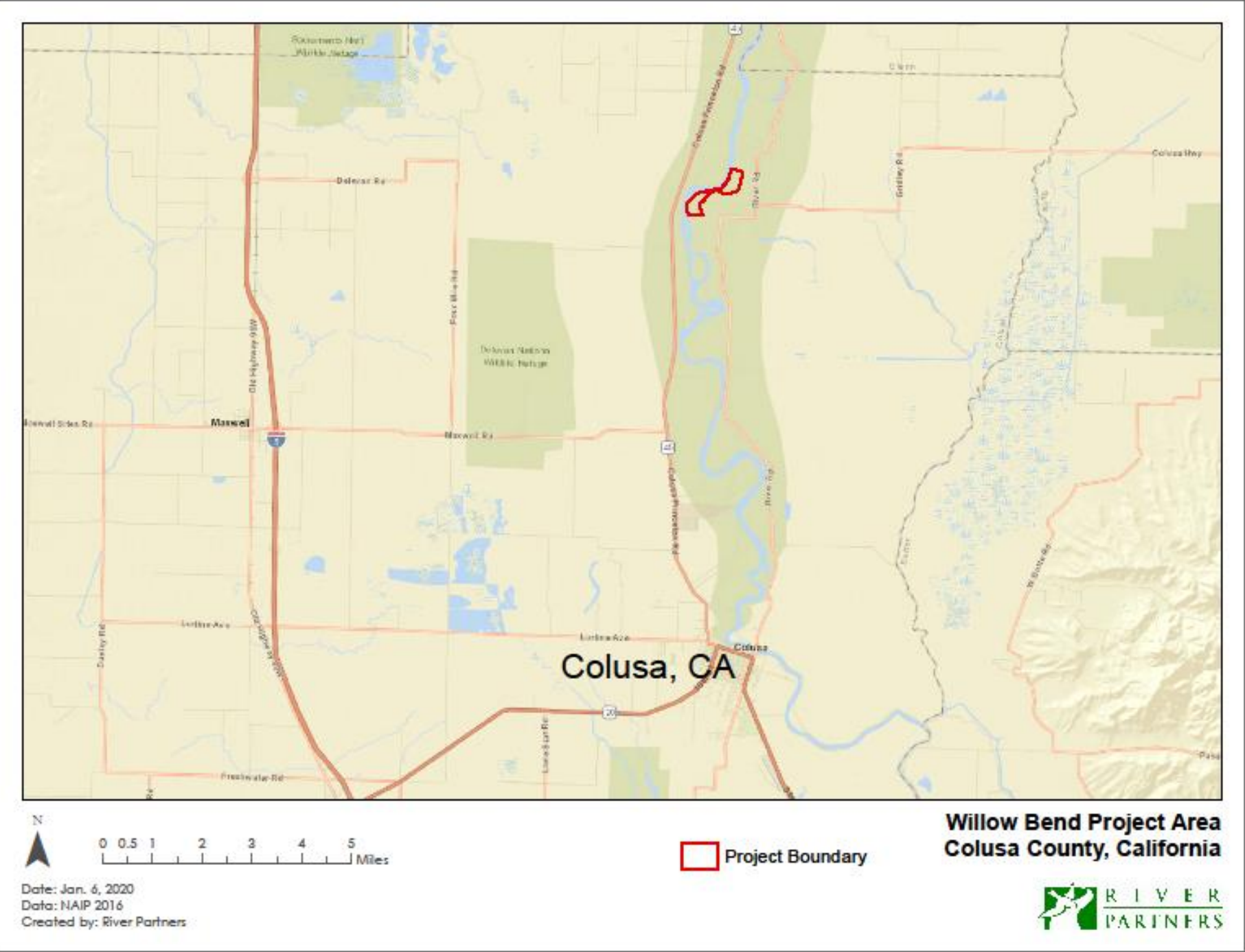


\*note PROJECT year not calendar year



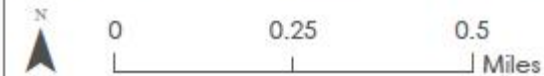
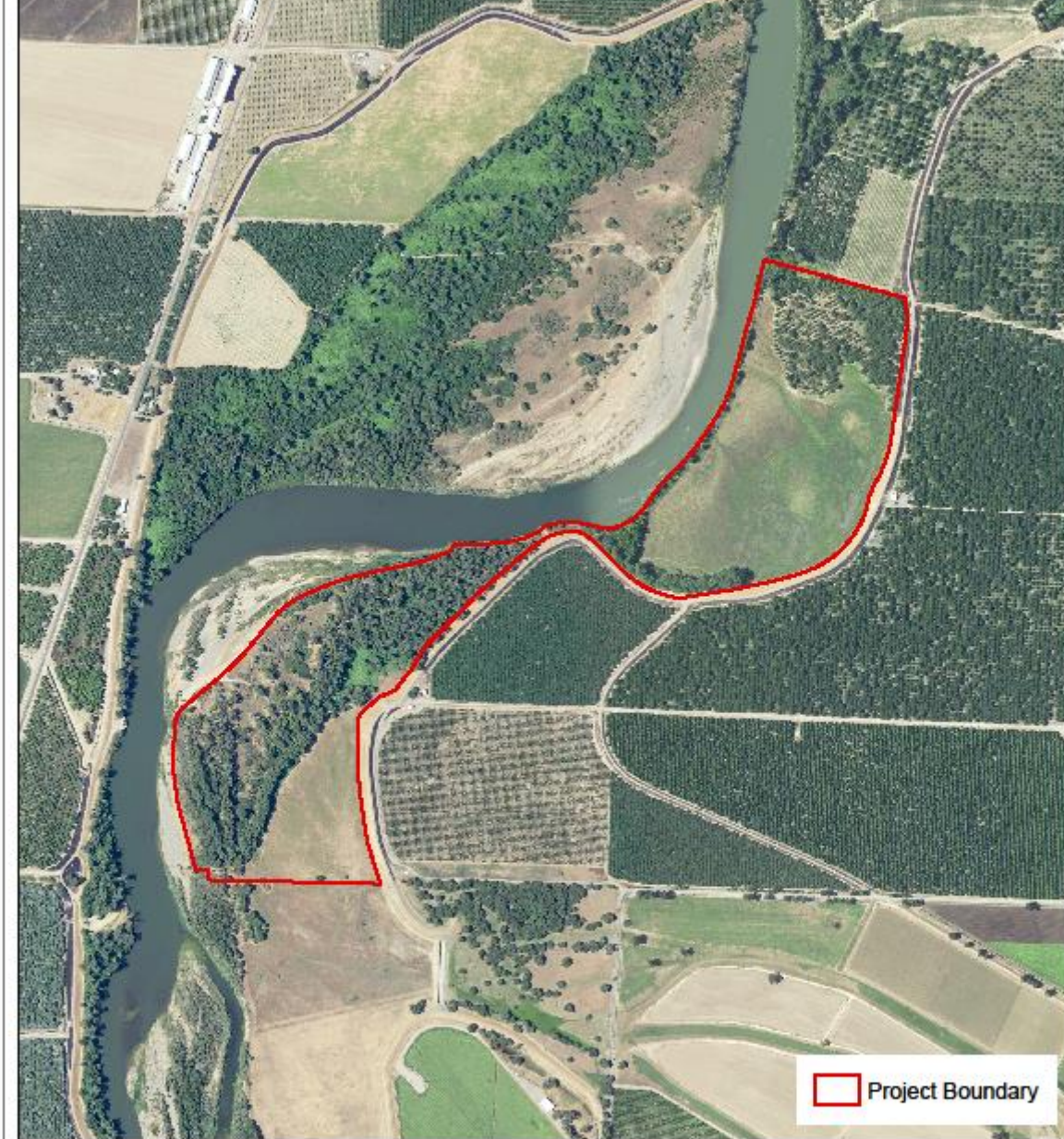
# Willow Bend

- 175 Acres
- Restore 87 acres riparian habitat
- Drip irrigation



# Willow Bend

- Fallow field that was mowed/disc'd regularly over years
- Orchard removal
- Earthwork to create swale (for fish gate)
- Planted by June 2022 & Drill seeded November 2022
- Observations: fewer weeds came up by time of seeding, overall not a weedy site but not as low as Dos Rios Phase 4
  - Flooded 25 days in January = killed weeds, native grasses came back thriving
- Cover data & labor/herbicide coming in 2024



Date: Apr 24, 2018  
Created by: River Partners

**Project Boundary**  
**Willow Bend Restoration Area**  
**Colusa County, California**





# Thank you!

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