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Native grass establishment as a form of weed control - Looking back 25 years later

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We Bring Life Back To Rivers







Restoration in a Critical Decade

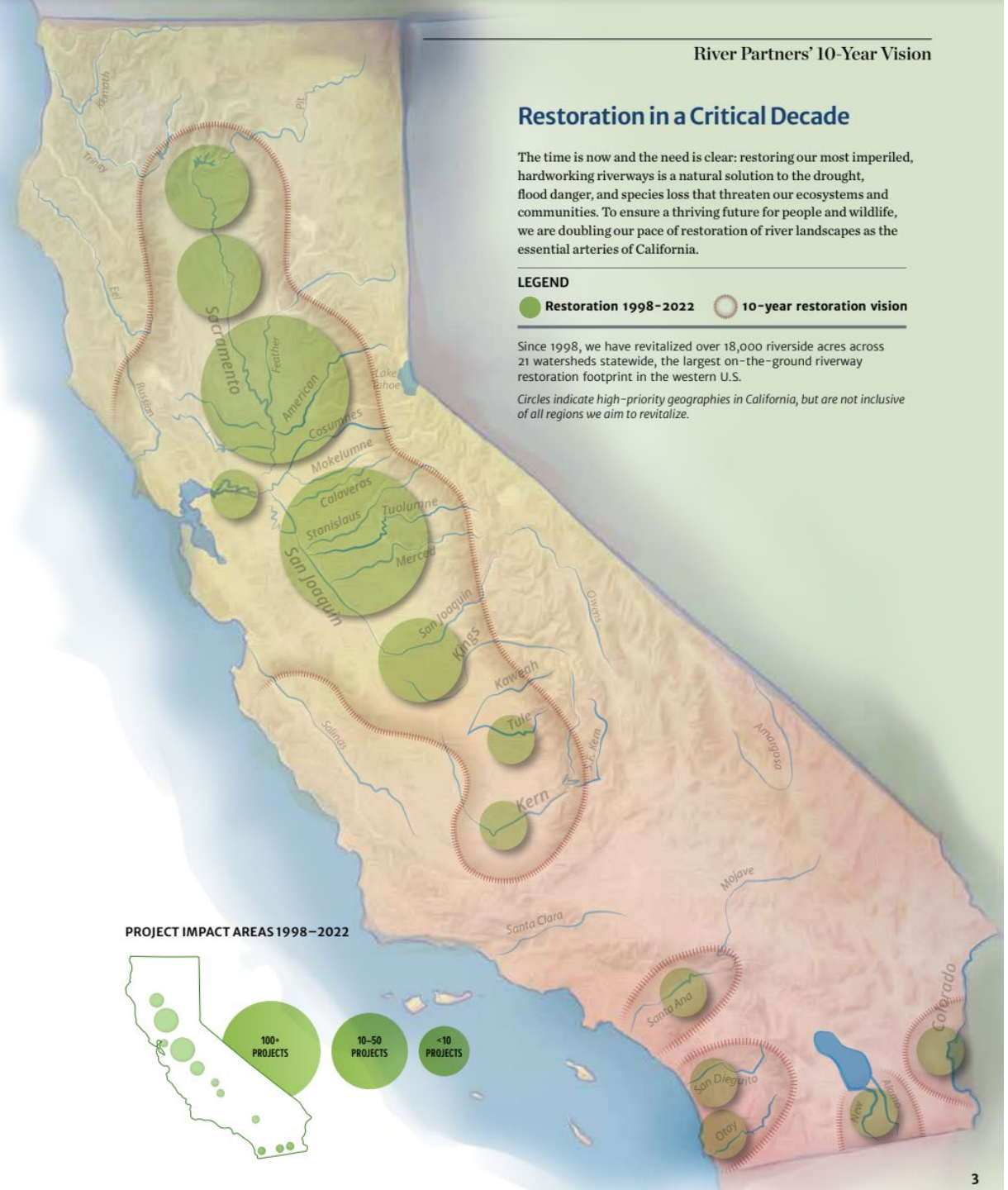
The time is now and the need is clear: restoring our most imperiled, hardworking riverways is a natural solution to the drought, flood danger, and species loss that threaten our ecosystems and communities. To ensure a thriving future for people and wildlife, we are doubling our pace of restoration of river landscapes as the essential arteries of California.

LEGEND

Restoration 1998–2022 **10-year restoration vision**

Since 1998, we have revitalized over 18,000 riverside acres across 21 watersheds statewide, the largest on-the-ground riverway restoration footprint in the western U.S.

Circles indicate high-priority geographies in California, but are not inclusive of all regions we aim to revitalize.



18,000+
Acres of habitat restored for imperiled species

4 million
Native trees planted

1+ million
tons of greenhouse gases captured

58
Imperiled species protected

10+ billion
gallons of fresh water conserved

$150+ million
channeled to the communities we serve

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Native riparian grassland establishment as chemical-free weed control

- Conversion of agricultural land to native floodplain habitat
- IPM approach – mechanical, chemical, cultural, biological
- During implementation - planned, controlled, and limited herbicide intervention
- Goal to reduce long-term use of herbicide on lands

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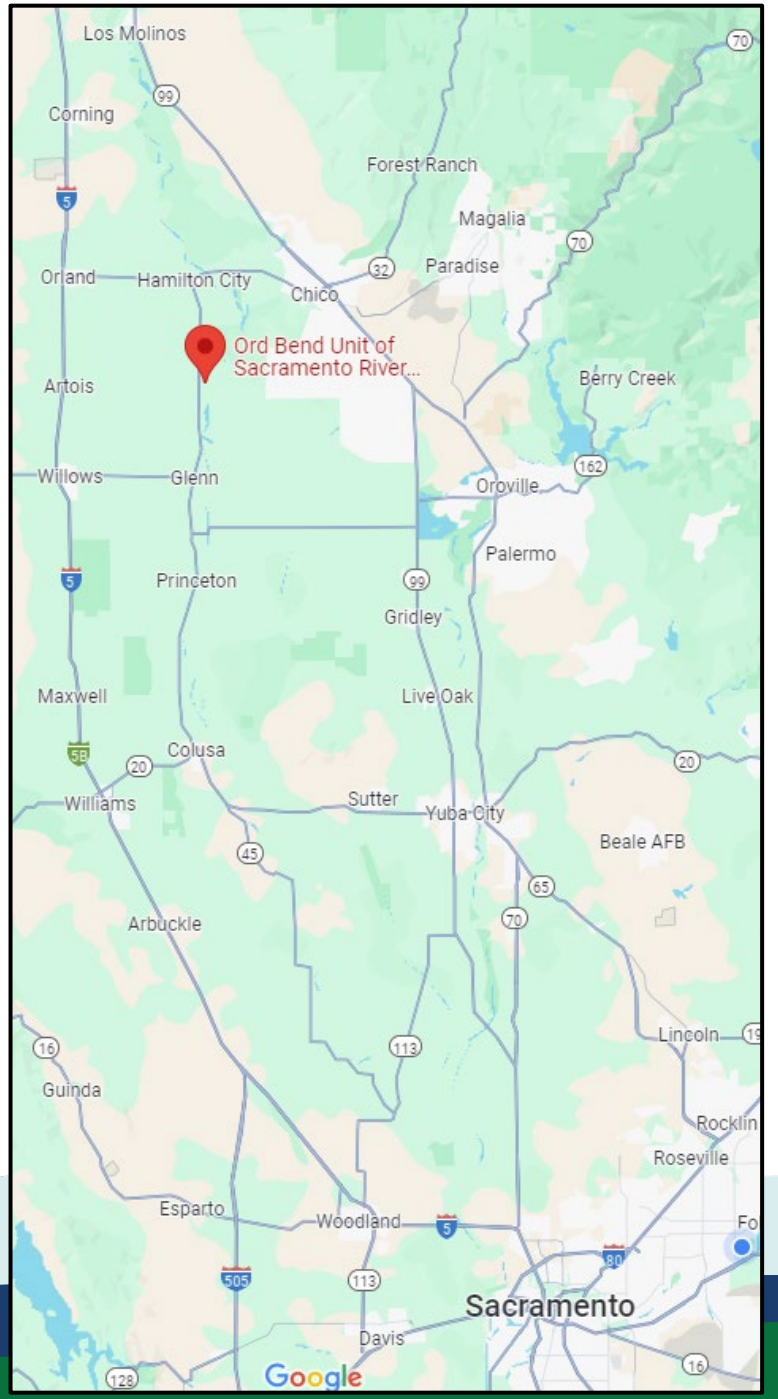
Photo credit: ©Saxon Holt/PhotoBotanic

USFWS Ord Bend Unit

- Sacramento River National Wildlife Refuge, USFWS
- Glenn County, California
- South of Ord Ferry Rd, West of Sacramento River (Mile 184)
- 111 acre unit

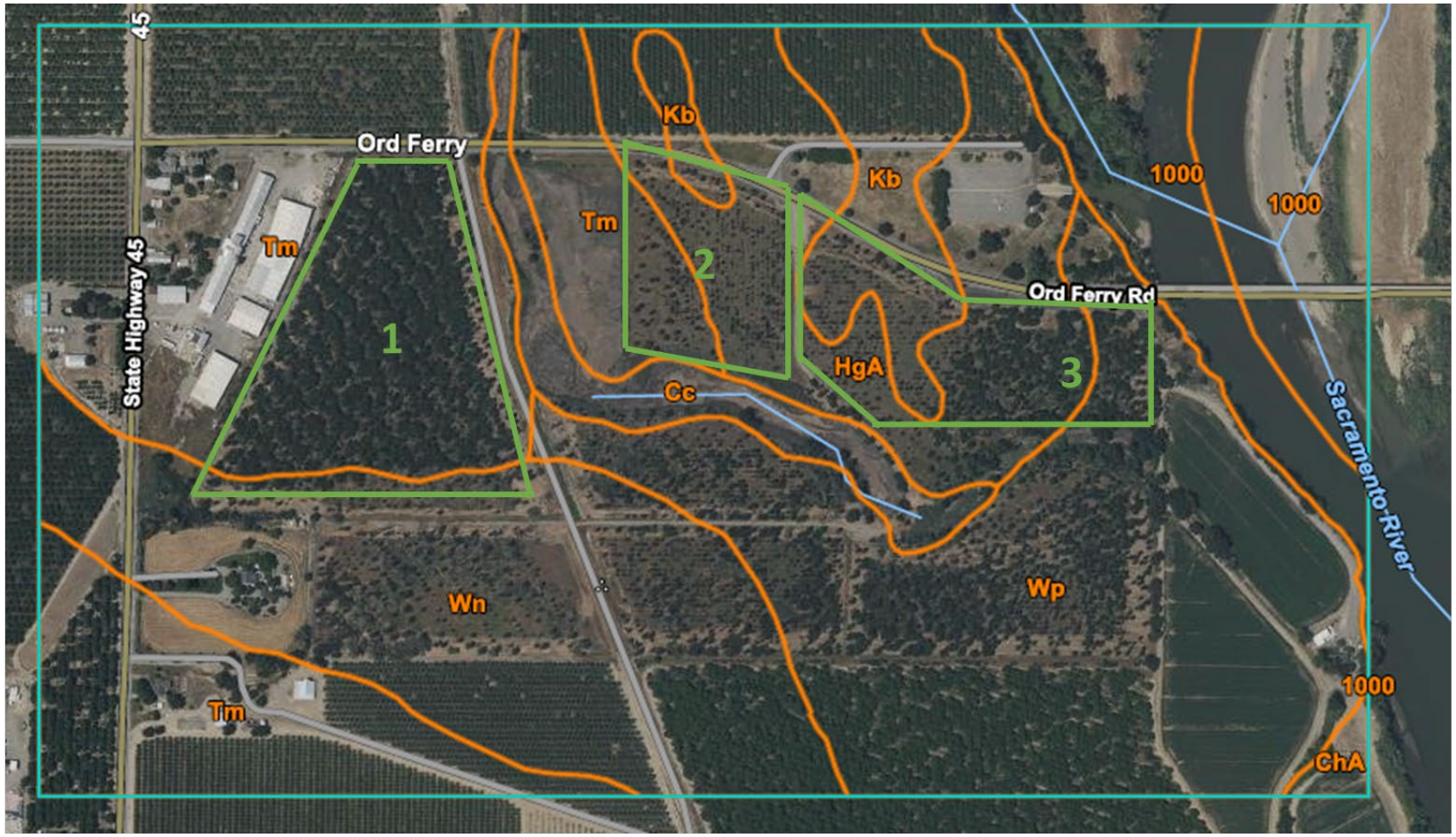


USFWS Ord Bend Unit

- River Partners' first project
- Previously intensive agriculture
- Restoration began **1998**
- 5 year implementation and maintenance period
- **100 acres** of valley oak savannah/woodland & mixed riparian forest habitat

USFWS Ord Bend Unit

- Some soils deposition from Coastal Range – old Stony Creek floodplain
- Interesting mix of soils in small spot
- Highly disturbed soils – excavation to build levee, created wetland
- High elevation above river – only flooded when irrigation water came down slough in summer



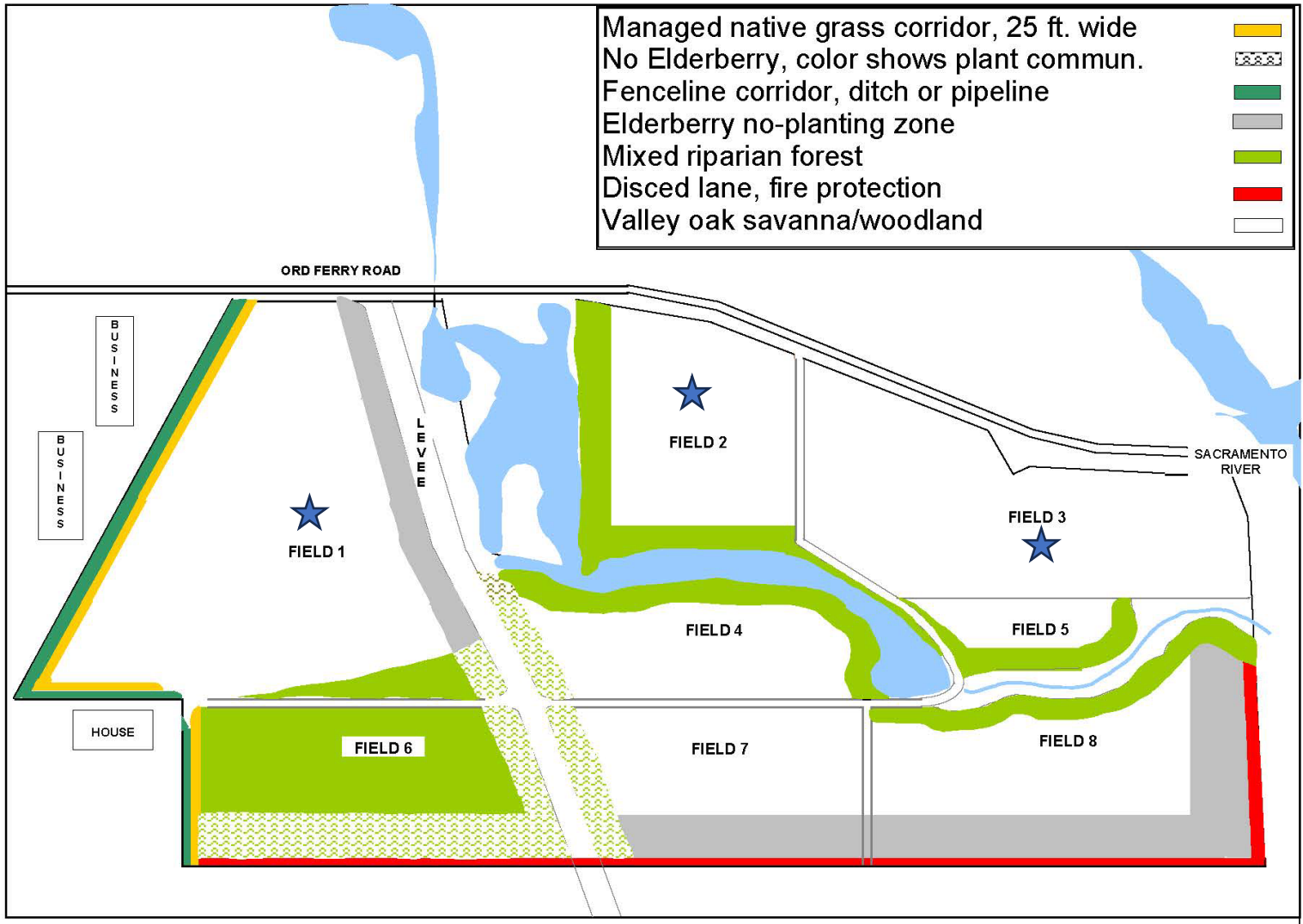
Fall 1999 – Herbaceous understory

- **Field Prep**
  - 1998: Mowed, disked, deep chiseled to reduce compaction and improve drainage, planted cover crop
  - 1999: Mowed cover crop; flushed & sprayed summer weeds with Roundup, mowed & sprayed

November 1999

- **Drill Seeded**: *Elymus triticoides*, *Elymus glaucus*, *Stipa pulchra*, *Hordeum brachyantherum*
- **Plug Planted**: *Elymus triticoides* and *Carex barbarae*

- **Regular maintenance** - mowing and spraying as needed until end of 2003
- **USFWS continued maintenance** - no herbicide use within fields



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Monitoring

- Monitored for 6 years between 2001 and 2008, again in 2024
- 1m^2 quadrat to visually assess percent cover
- Random samples of the planting rows

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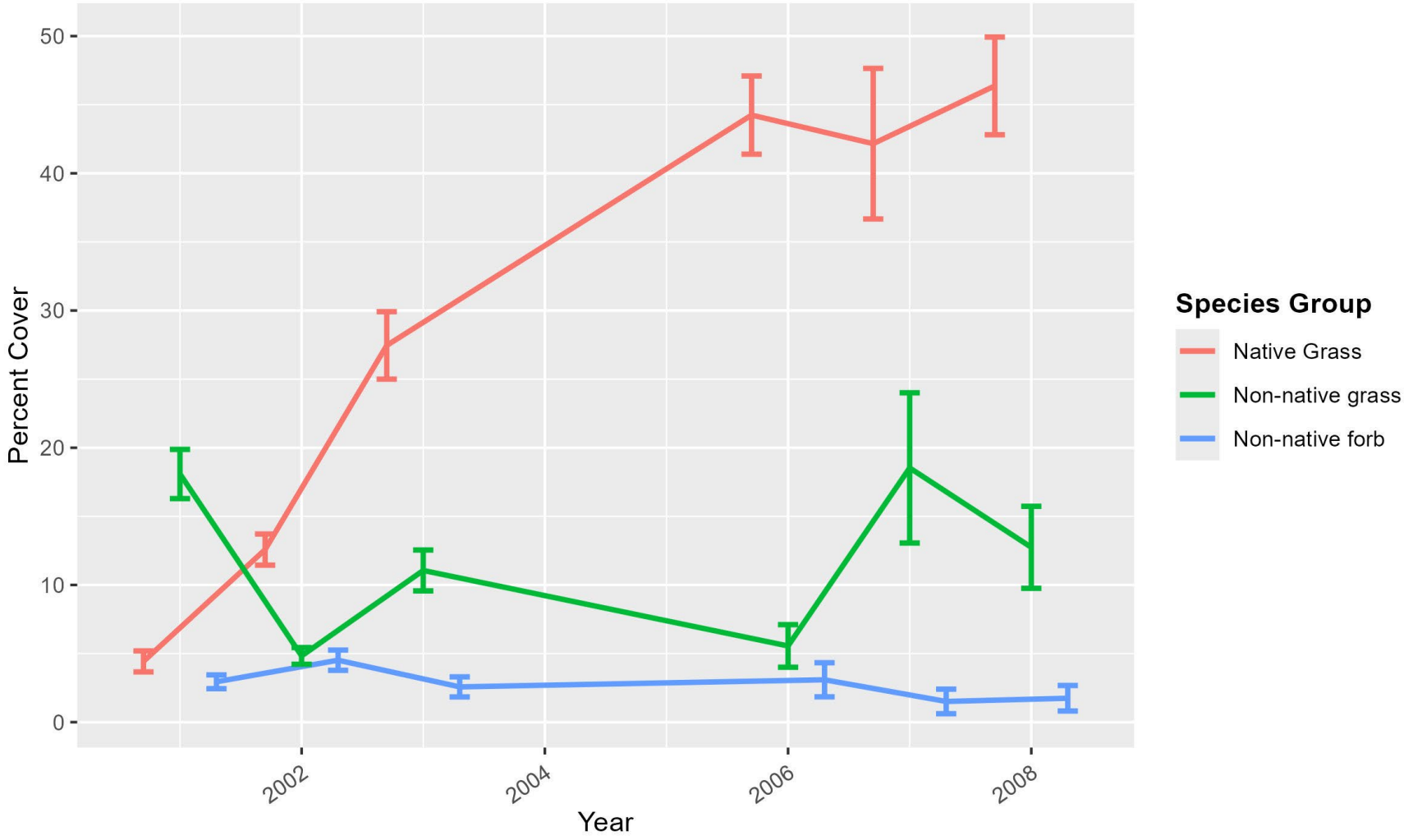
2001-2008 results (years 2 to 9)

Averaged across all 3 fields

Successful native grass establishment

Reaches 45% absolute cover in 2008



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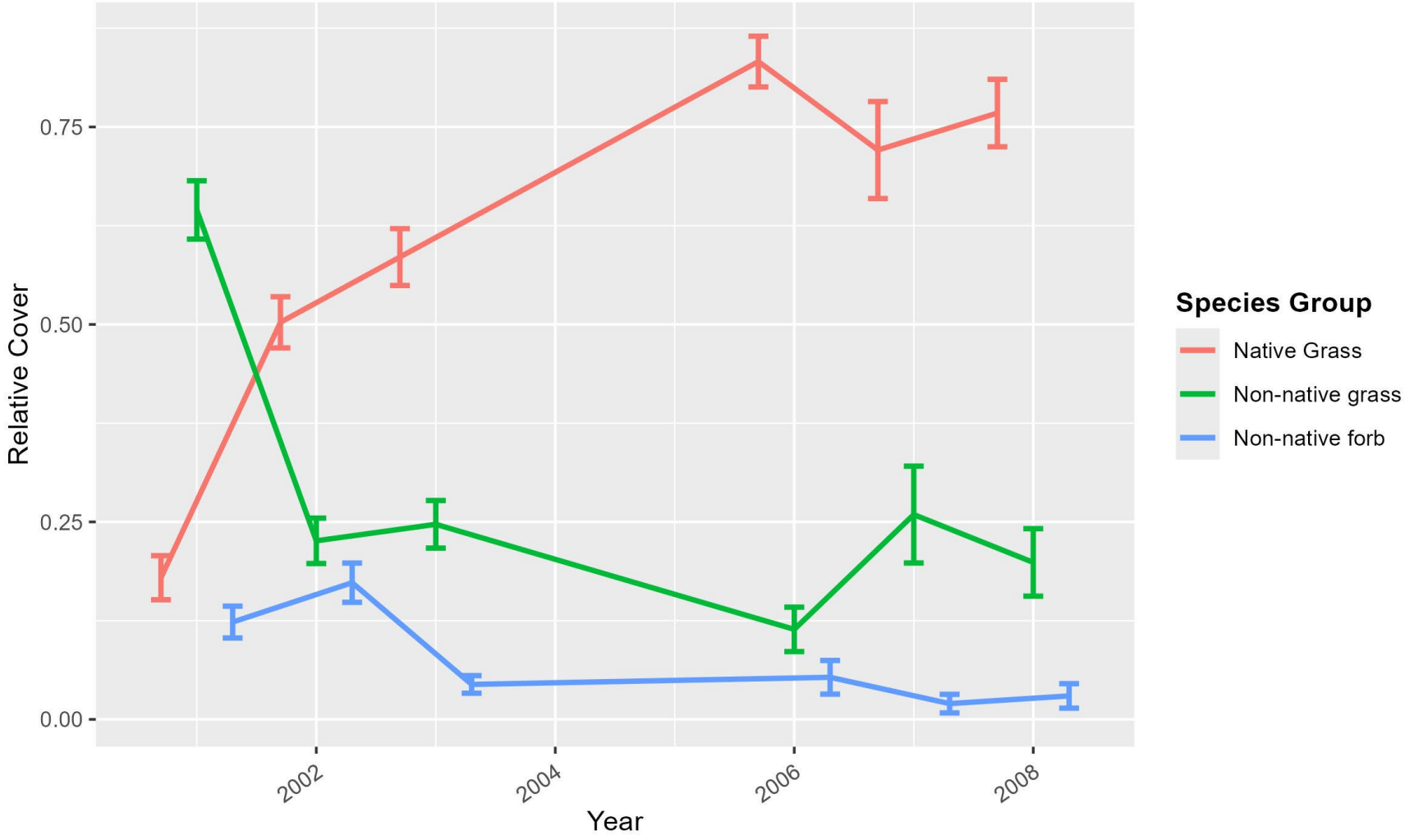
2001-2008 results (years 2 to 9)

Averaged across all 3 fields

Successful native grass establishment

Reaches 75% relative cover in 2008



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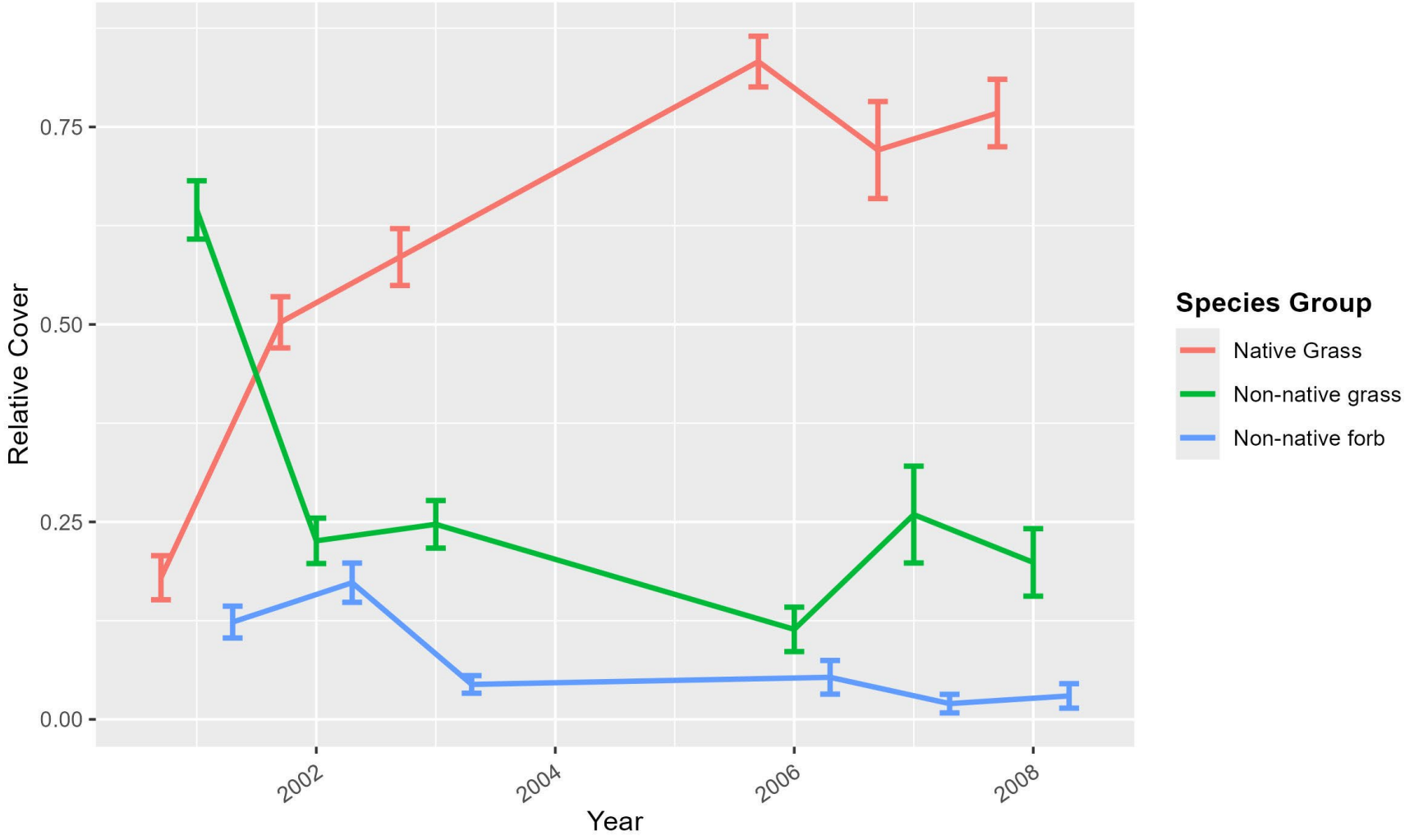
2001-2008 results (years 2 to 9)

Initial couple of years:

- *Hordeum brachyantherum* was dominant.
- *Elymus glaucus* was evident, but to a lesser extent
- *Stipa pulchra* found primarily near the edges of the planted areas
- *Elymus triticoides* was found, but it was not as abundant as the *E. glaucus*



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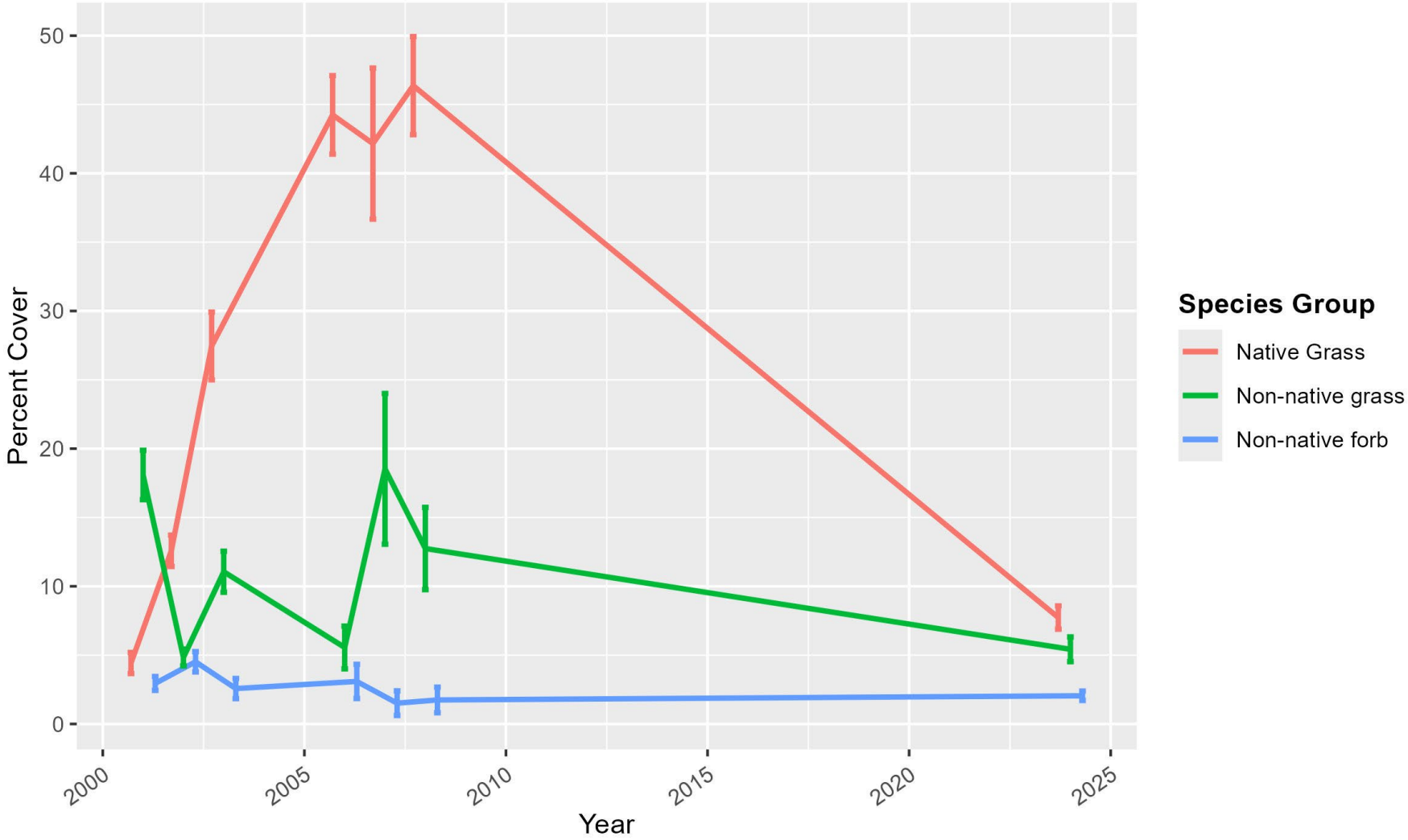
What's happening 25 years later?

Native grass cover plummets

Though notice non-native cover stays low too…



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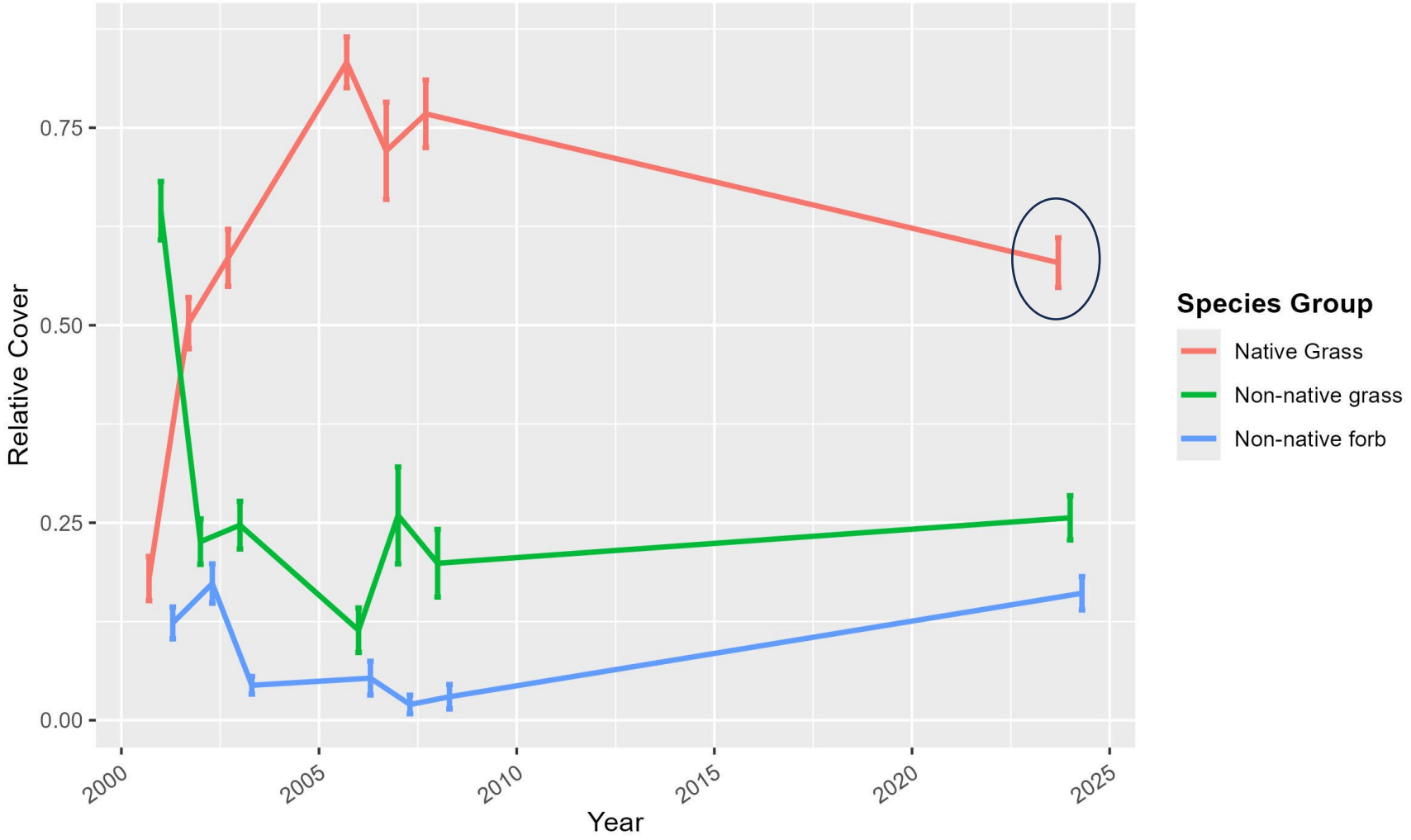
What's happening 25 years later?

Native grasses still have **high relative cover** 25 years later

Majority of understory dominated by native species



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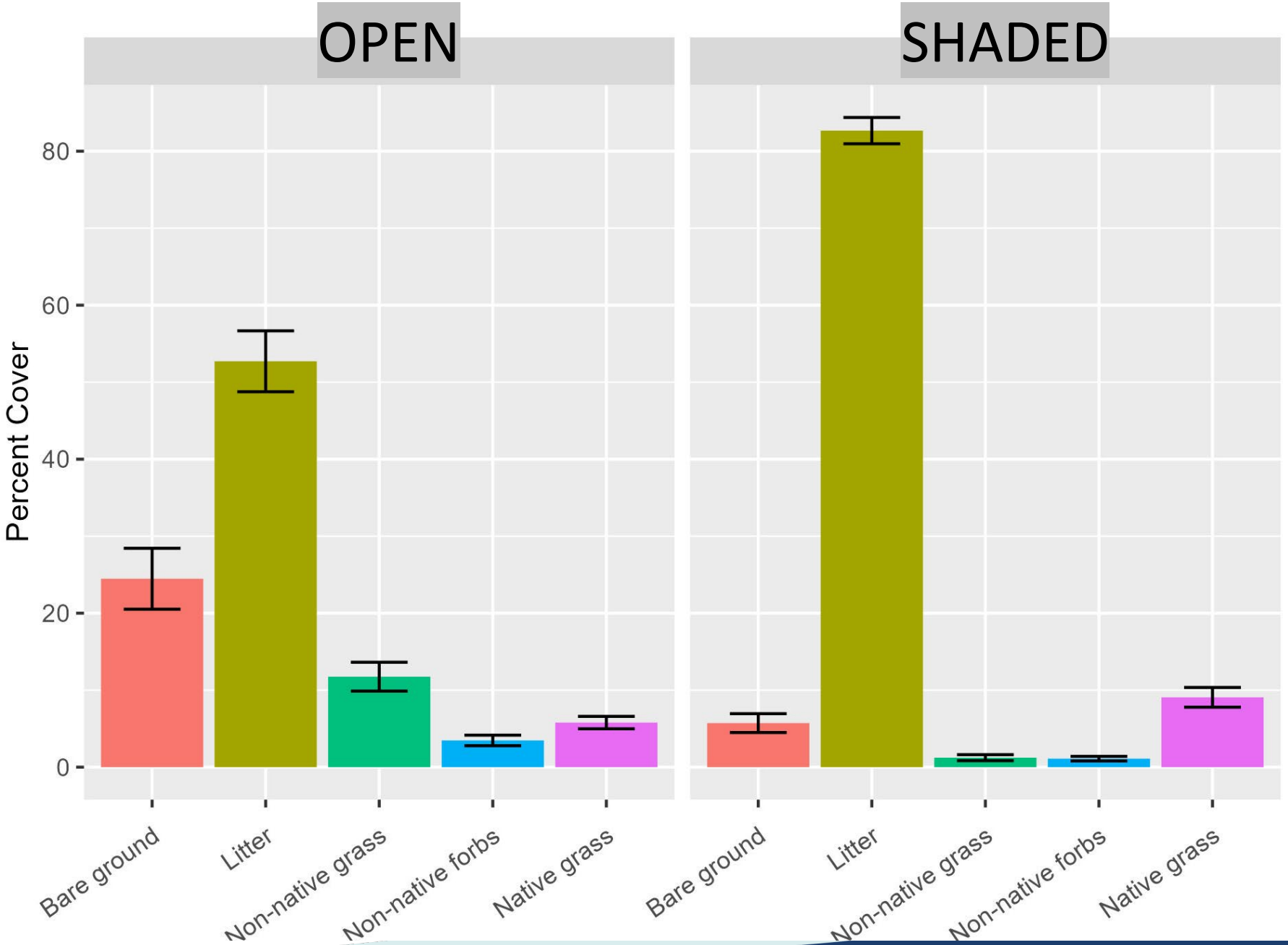
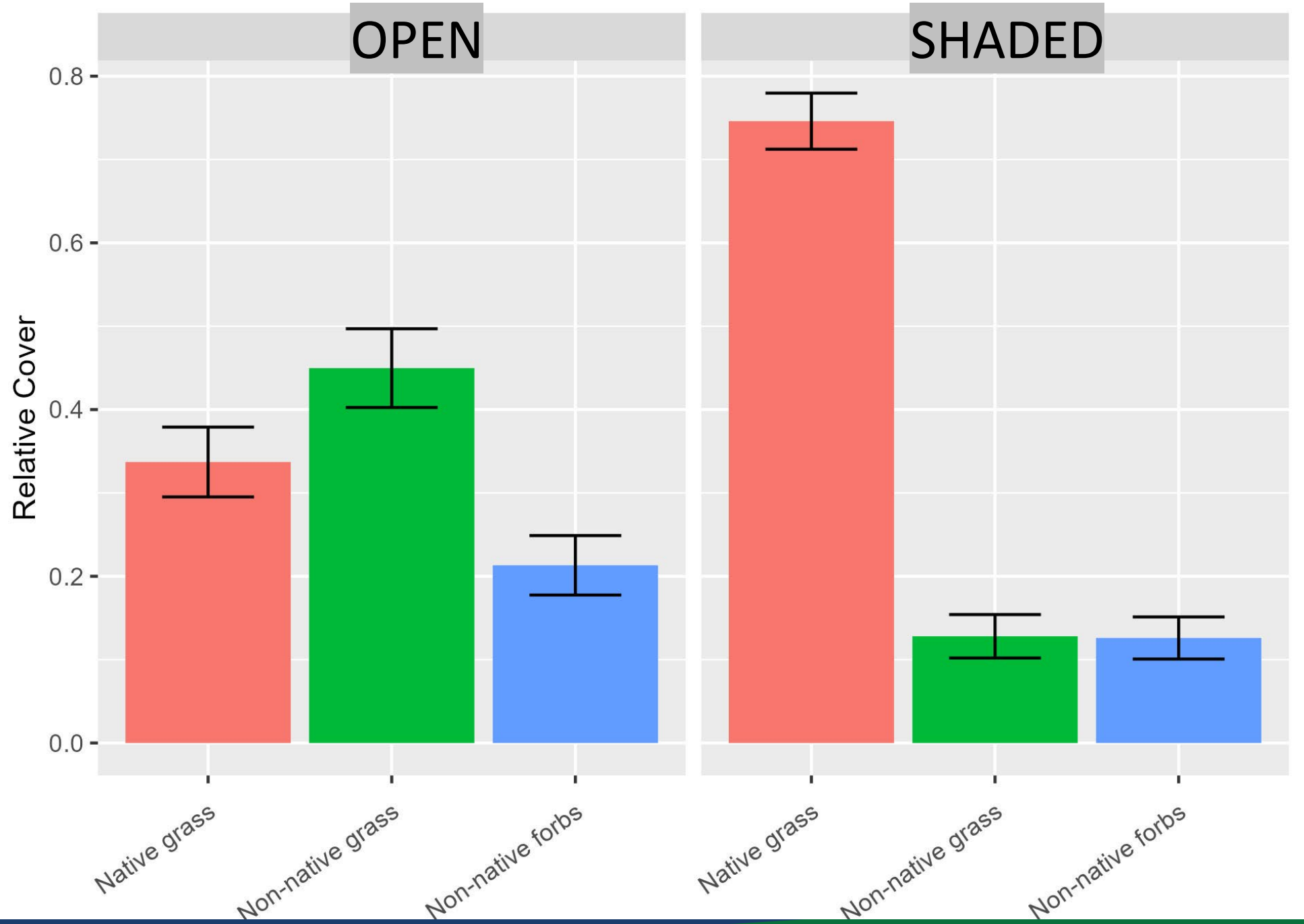
2024 in more depth – impact of overstory

Open

Shaded

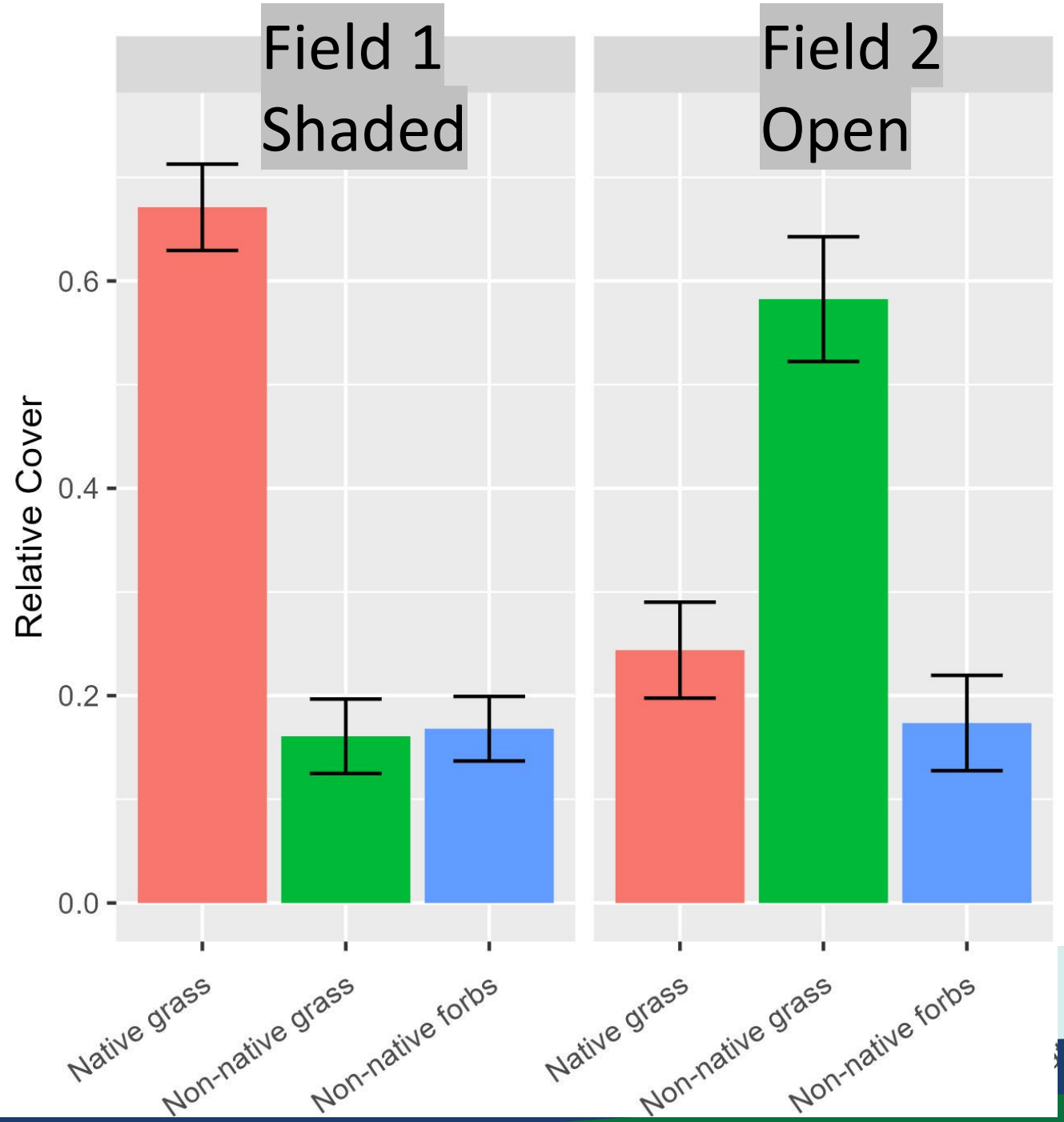

OPEN
SHADED
Percent Cover
80
60
40
20
0
Bare ground
Litter
Non-native grass
Non-native forbs
Native grass
Bare ground
Litter
Non-native grass
Non-native forbs
Native grass



Linear model – anova + tukey test

Relative Cover ~ Canopy *Species group

- Native grass higher in shaded fields ($p < 0.001$)
- Non-natives higher in open fields ($p < 0.001$)
- Native grass higher than Non-natives in Shaded ($p < 0.001$)
- Non-native higher than Native in Open ($p < 0.001$)


Field 1
Shaded
Field 2
Open
Relative Cover
0.0
0.2
0.4
0.6
Native grass
Non-native grass
Non-native forbs
Native grass
Non-native grass
Non-native forbs

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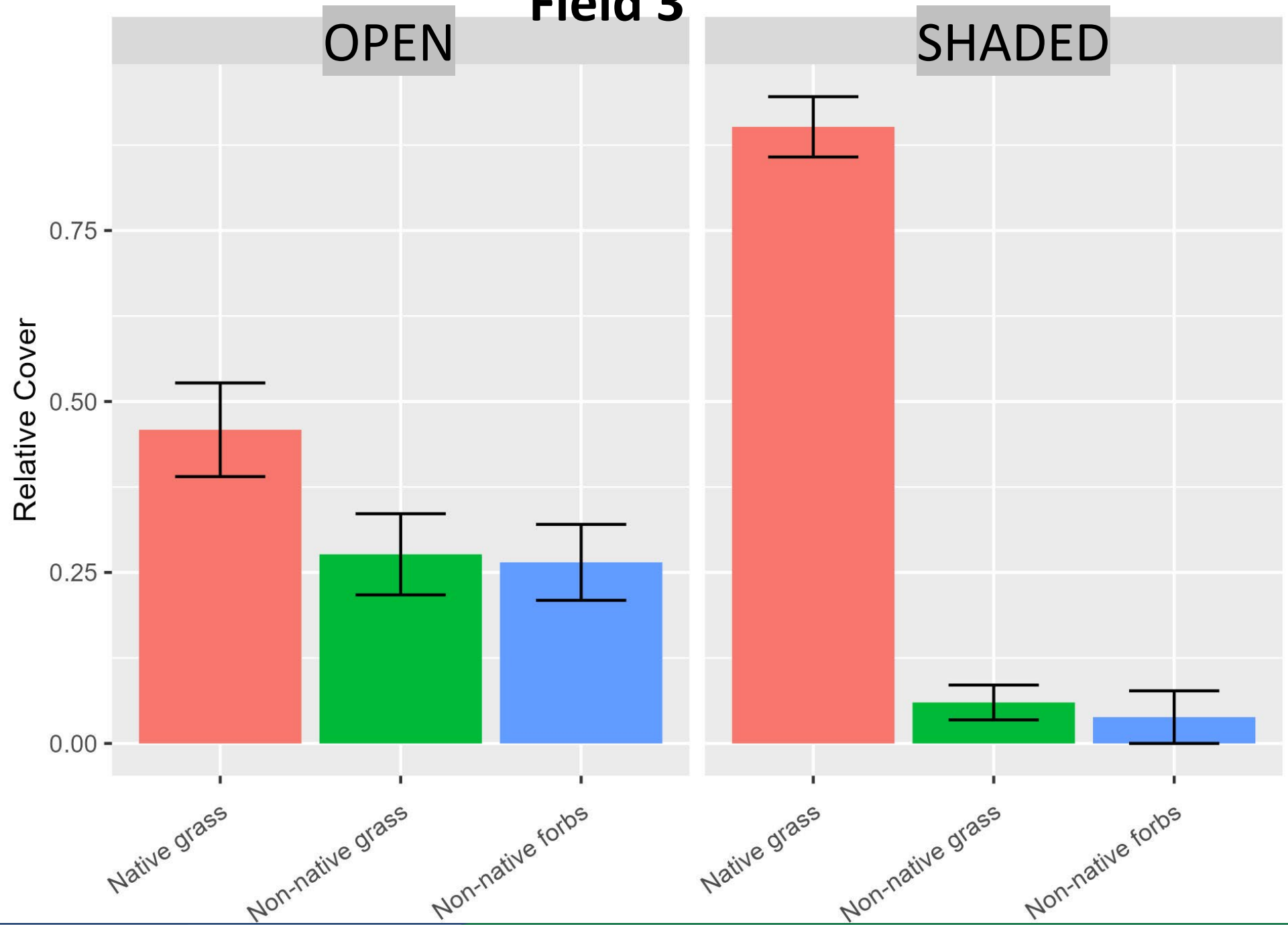
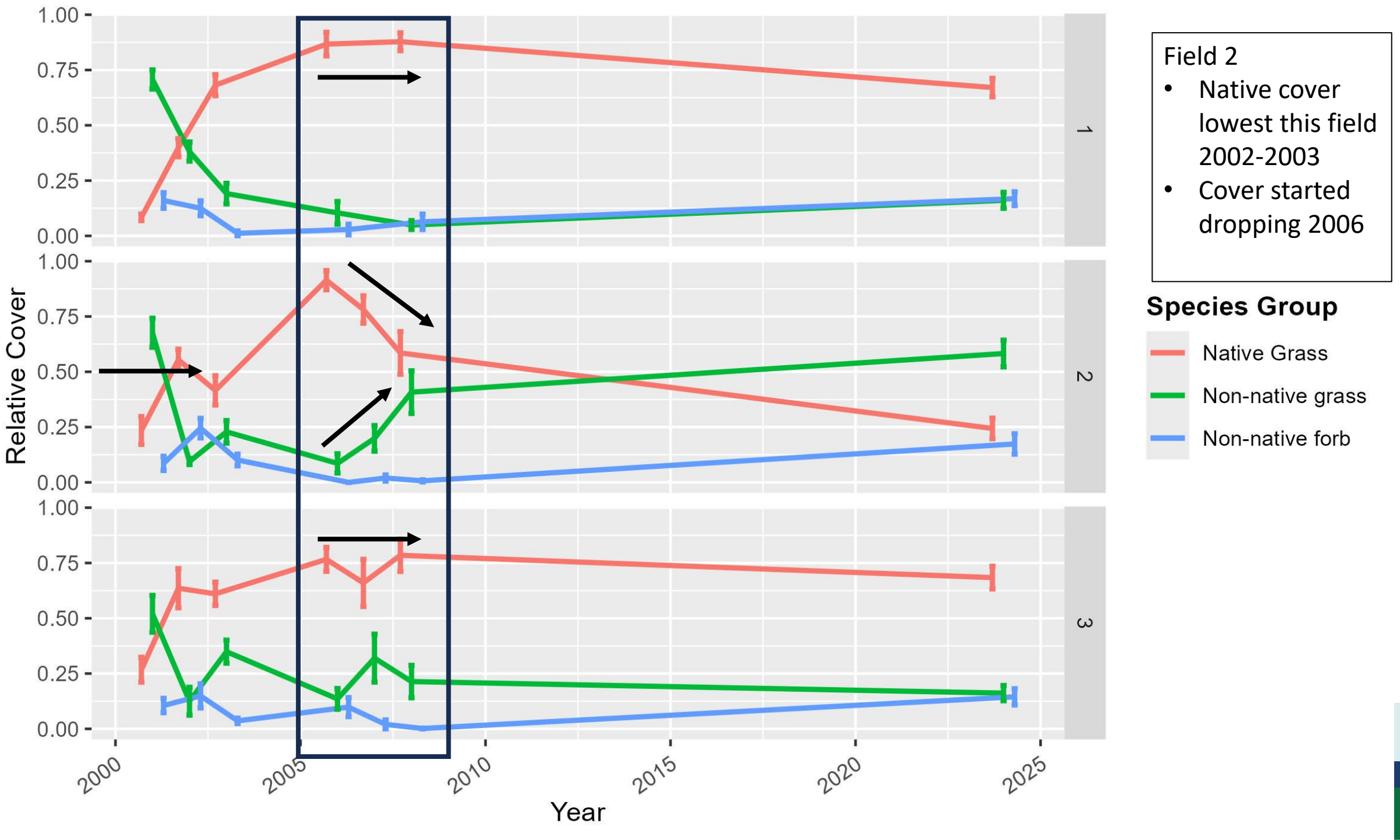
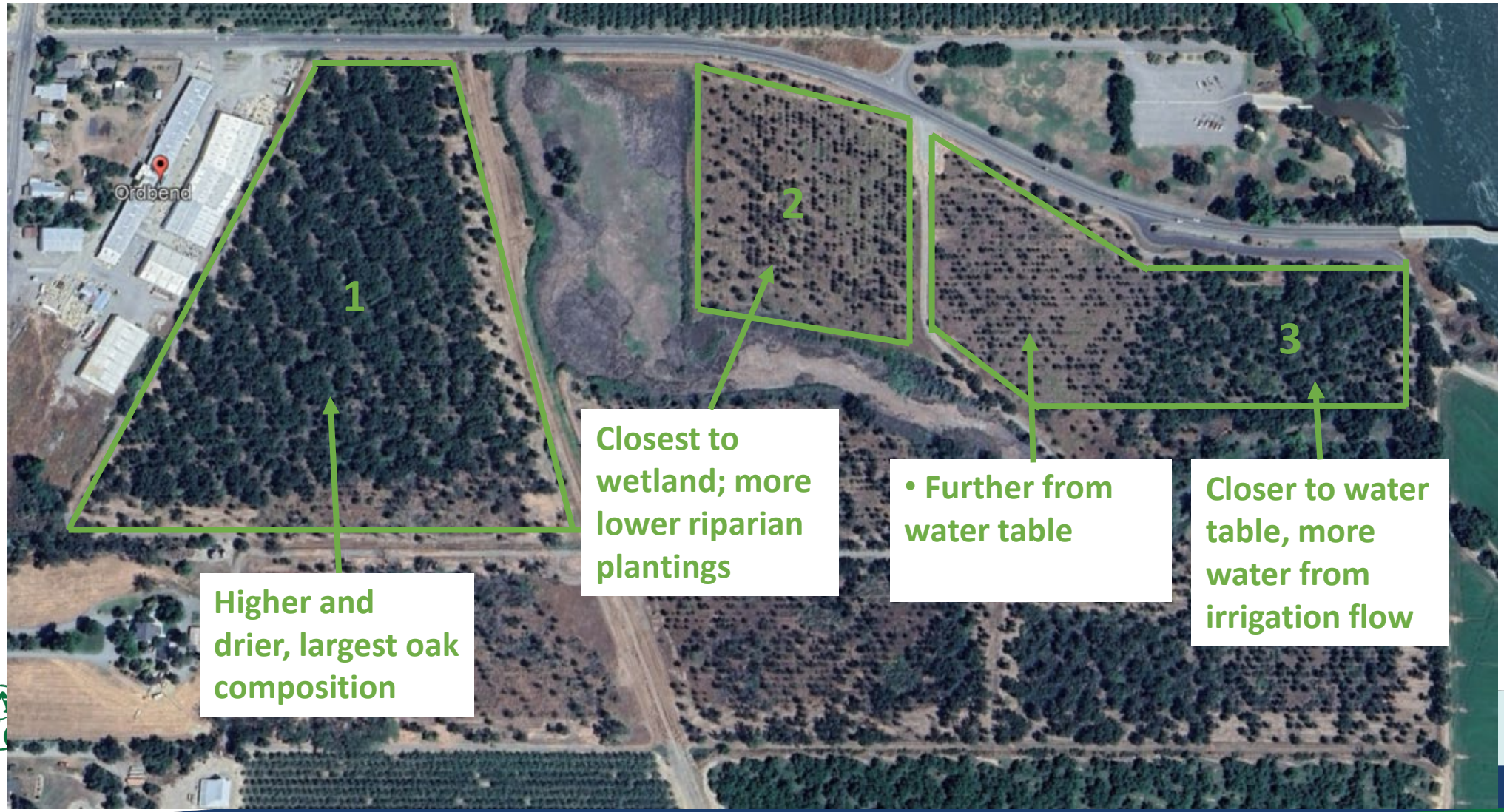
Field 3

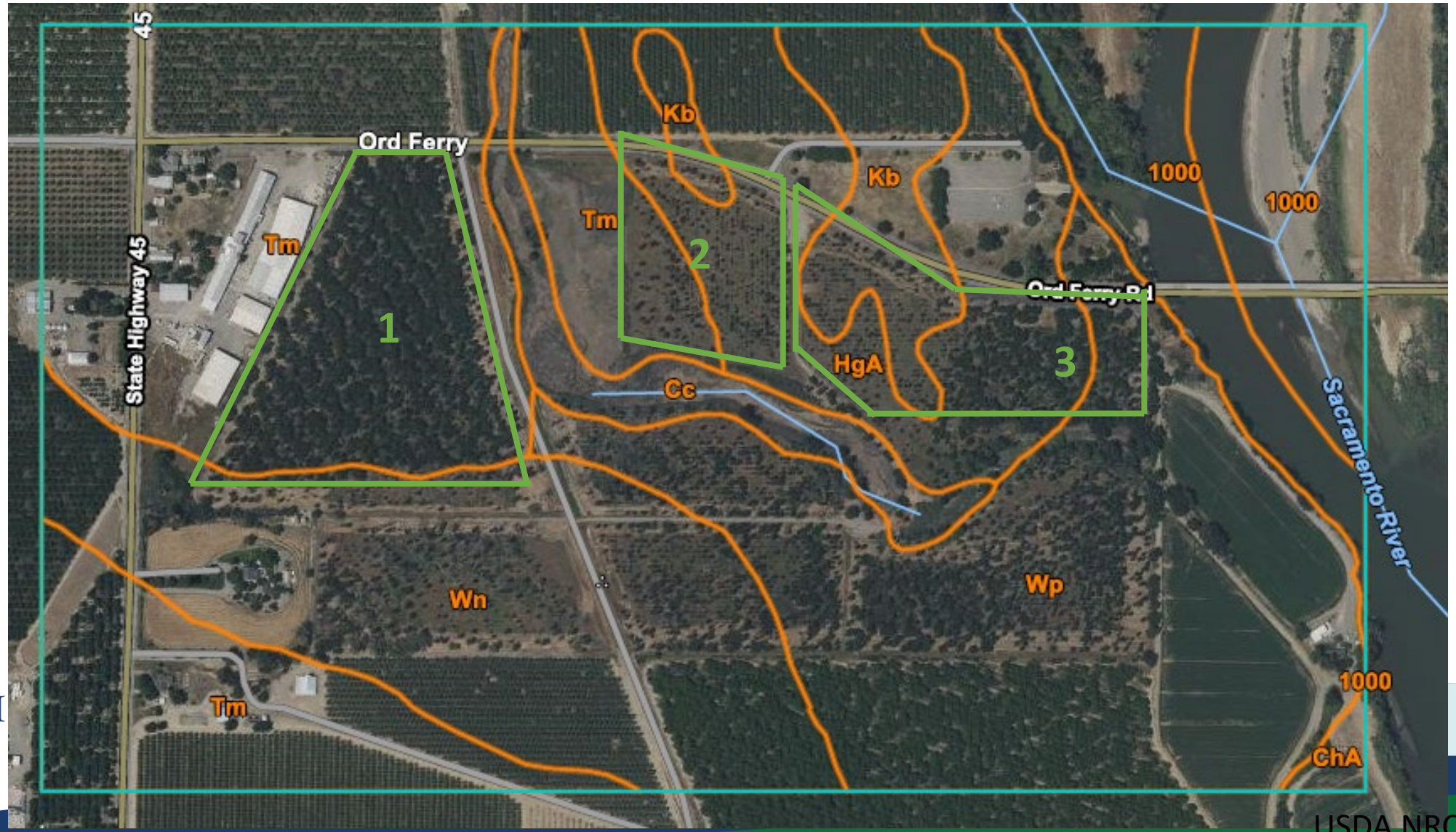

OPEN
SHADED
Relative Cover
0.75
0.50
0.25
0.00
Native grass
Non-native grass
Non-native forbs
Native grass
Non-native grass
Non-native forbs


Relative Cover
1.00
0.75
0.50
0.25
0.00
1
2
3
2000
2005
2010
2015
2020
2025
Year
Field 2
• Native cover lowest this field 2002-2003
• Cover started dropping 2006
Species Group
Native Grass
Non-native grass
Non-native forb

2024 in more depth – impact of overstory



Soils not very explanatory – at least not with our current dataset



Field 2 issues

- Cover crop & *Festuca perennis* grew thicker and taller
  - More thatch
  - More competition
- Field Drainage in 2000
  - Standing water 3-4 inches for months
  - Negatively impacted elderberry, valley oak, coyote bush
  - *Hordeum brachyantheum* took off here + open canopy half of Field 3
- Field 2 Planting Plan –
  - Higher percentage of cottonwoods and willows, fewer oaks
  - Most cottonwoods and willows have now died off – light gaps for weeds?

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Native restoration leads to long-term weed control and reduction in herbicide usage

- Ord Bend has high relative native grass cover
  - 25 years after seeding
  - 21 years after herbicide sprayed inside fields

- Even in open canopy/weedier areas, native grasses are still present – possibly burns and mowing could change dominance

- **Full use of weed management tool-box can lead to successful native grass establishment and no herbicide years later**

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Thank you!

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