Modern Day Wildfire

Regularity ↑

Severity ↑

Intensity ↑

Duration ↑

Prescribed Fire

Ecological Benefits:

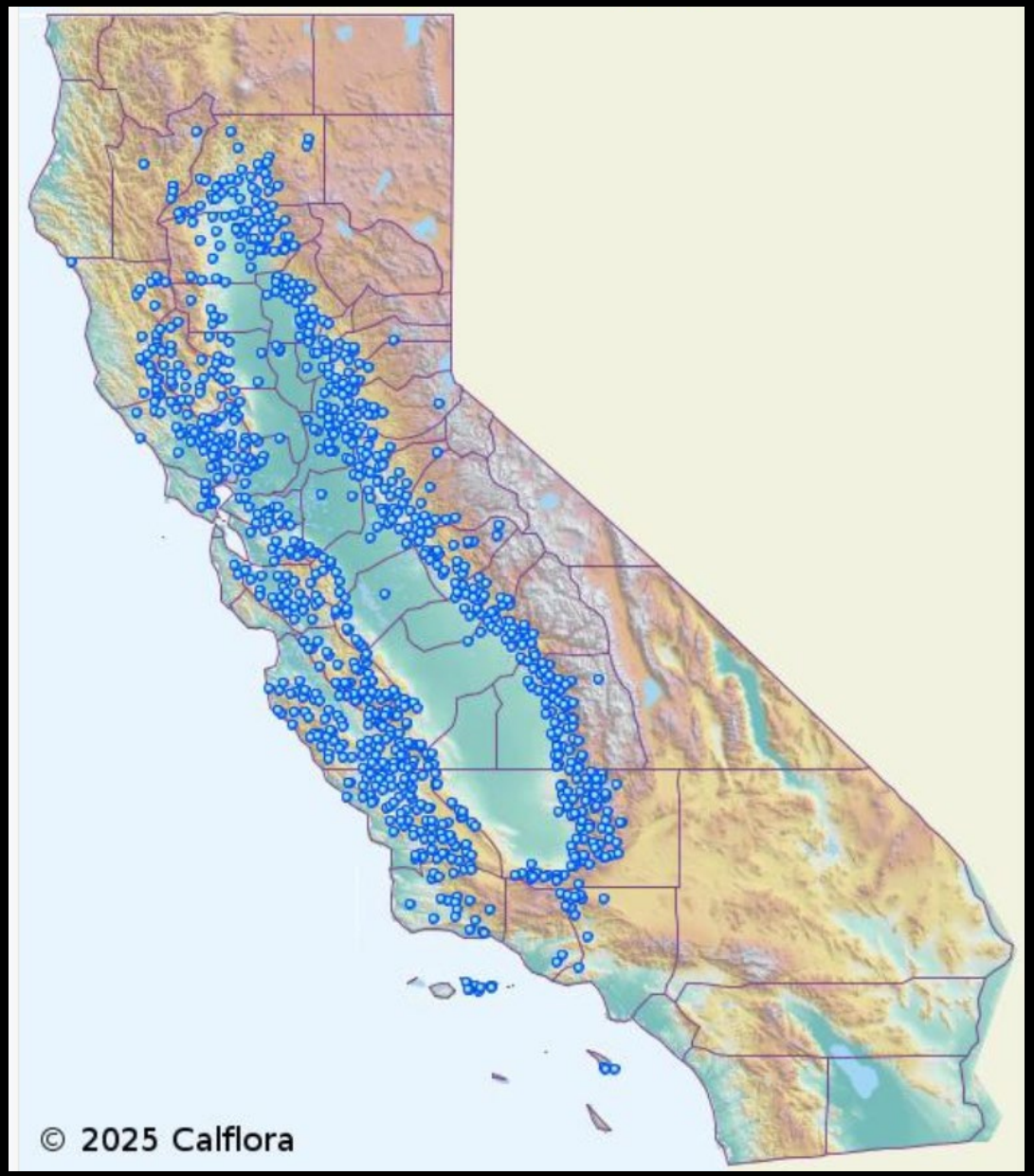
- Wildfire resiliency
- Deter nonnative species establishment
- Opens travel corridors for wildlife

Wildfire Mitigation Benefits:

- Dead biomass reduction
- Promotes open canopy structure
- Creation of containment holding features

Blue Oak Woodlands

Quercus douglasii



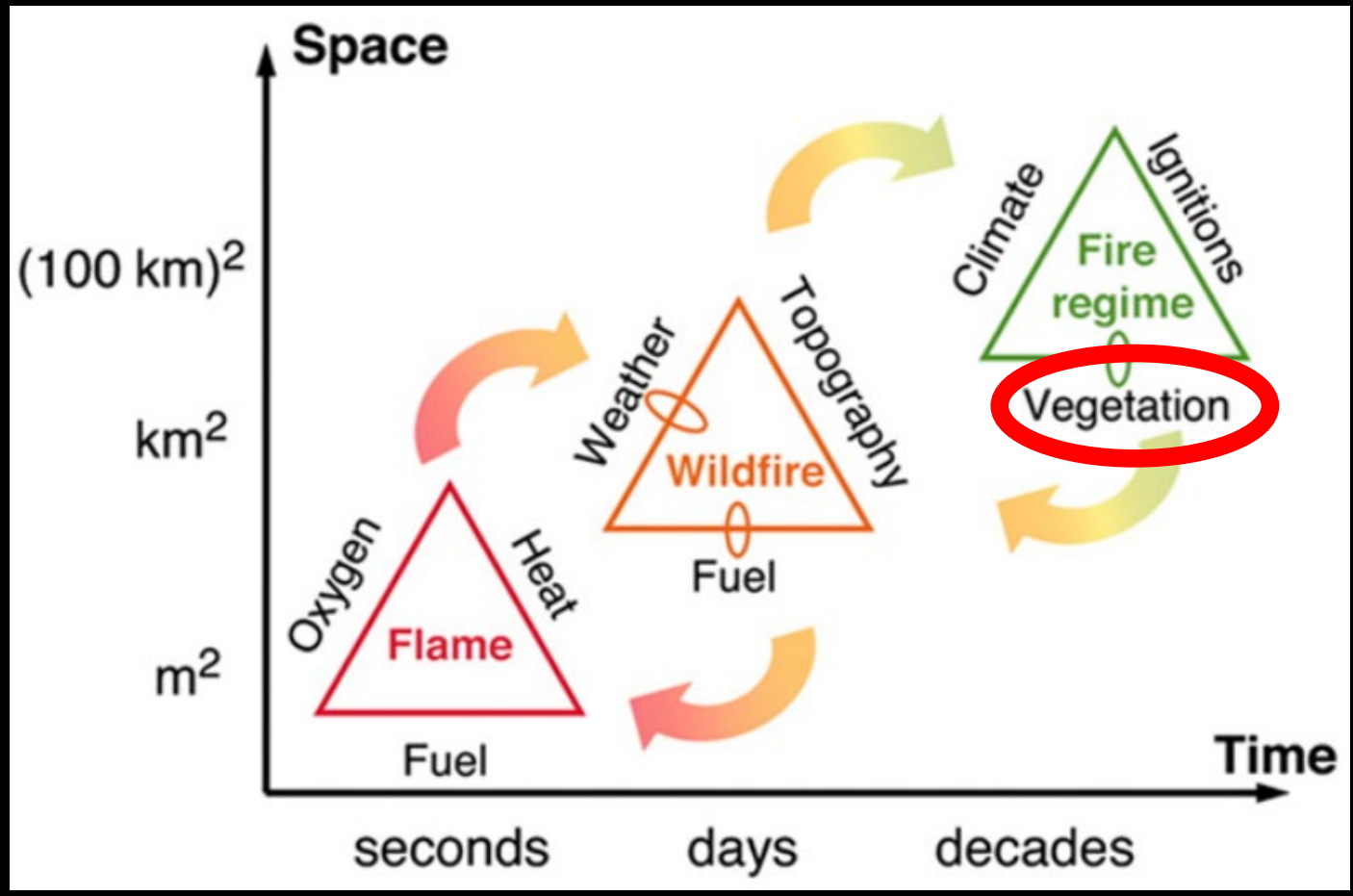
Fire Regime

Spatiotemporal expression of multiple fires

Native Fire Regime

=

Native Plants



(Moritz et al., 2005)

Post-wildfire conditions: prescribed fire influence on invasive species in blue oak woodlands

Claire Monahan
Big Chico Creek Ecological Reserve
CSU Chico, Earth and Environmental Sciences Department

Does pre-wildfire prescribed fire influence post-wildfire nonnative species abundance in blue oak woodlands?

Big Chico Creek Ecological Reserve

BCCER Property:

Elevation Range: 223 – 562m

Total Property Area: 7835 acres

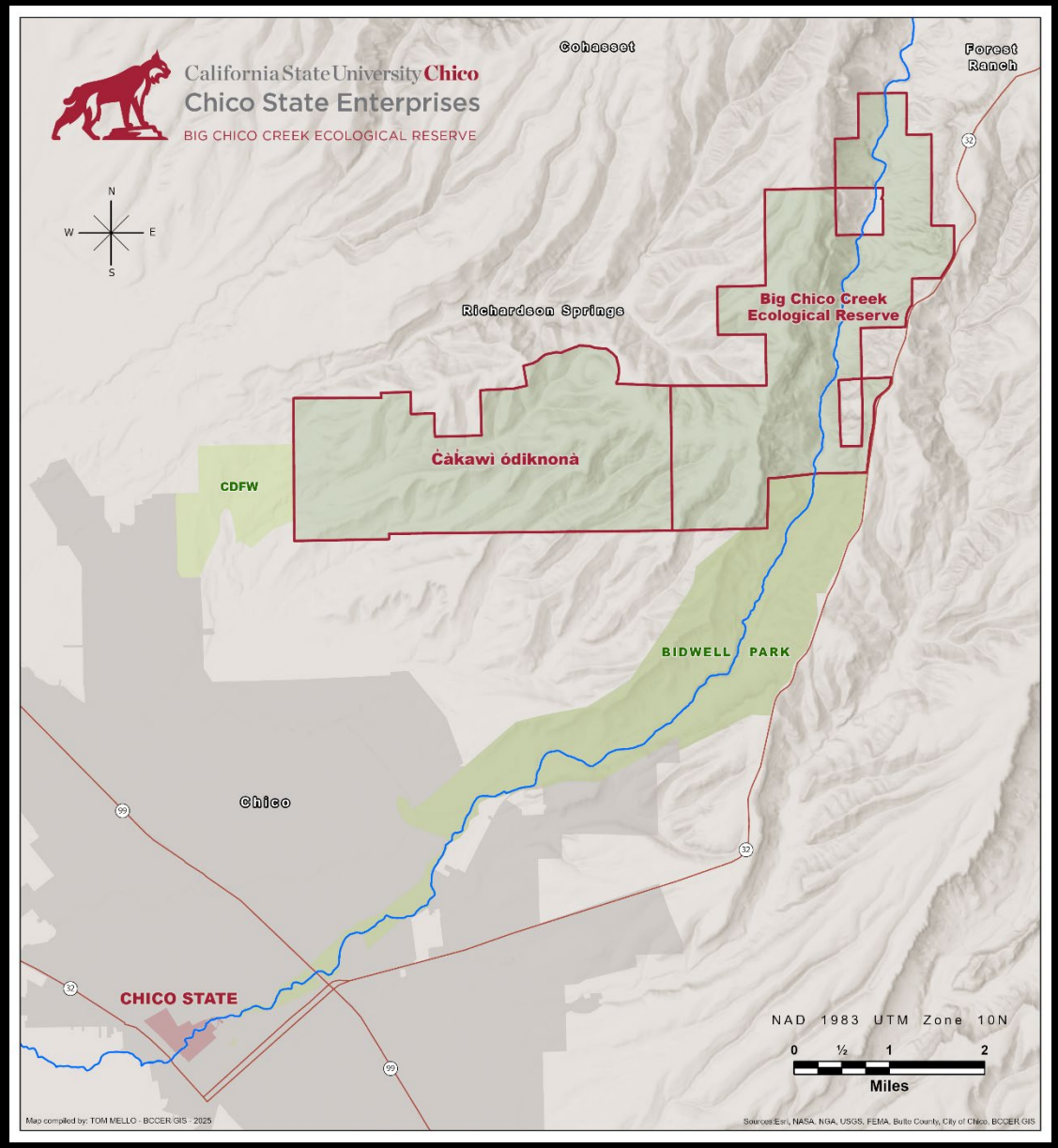
Eastern Property area: 3950 acres

~20% Blue Oak Woodland

2024 Park Fire: total 429,603 acres

Start Date: July 24, 2024

98% Total BCCER Property Burned



Study Plots

Established in <u>2011</u> and <u>Spring 2024</u> based on the CNPS Relevé Protocol

Plot selection:

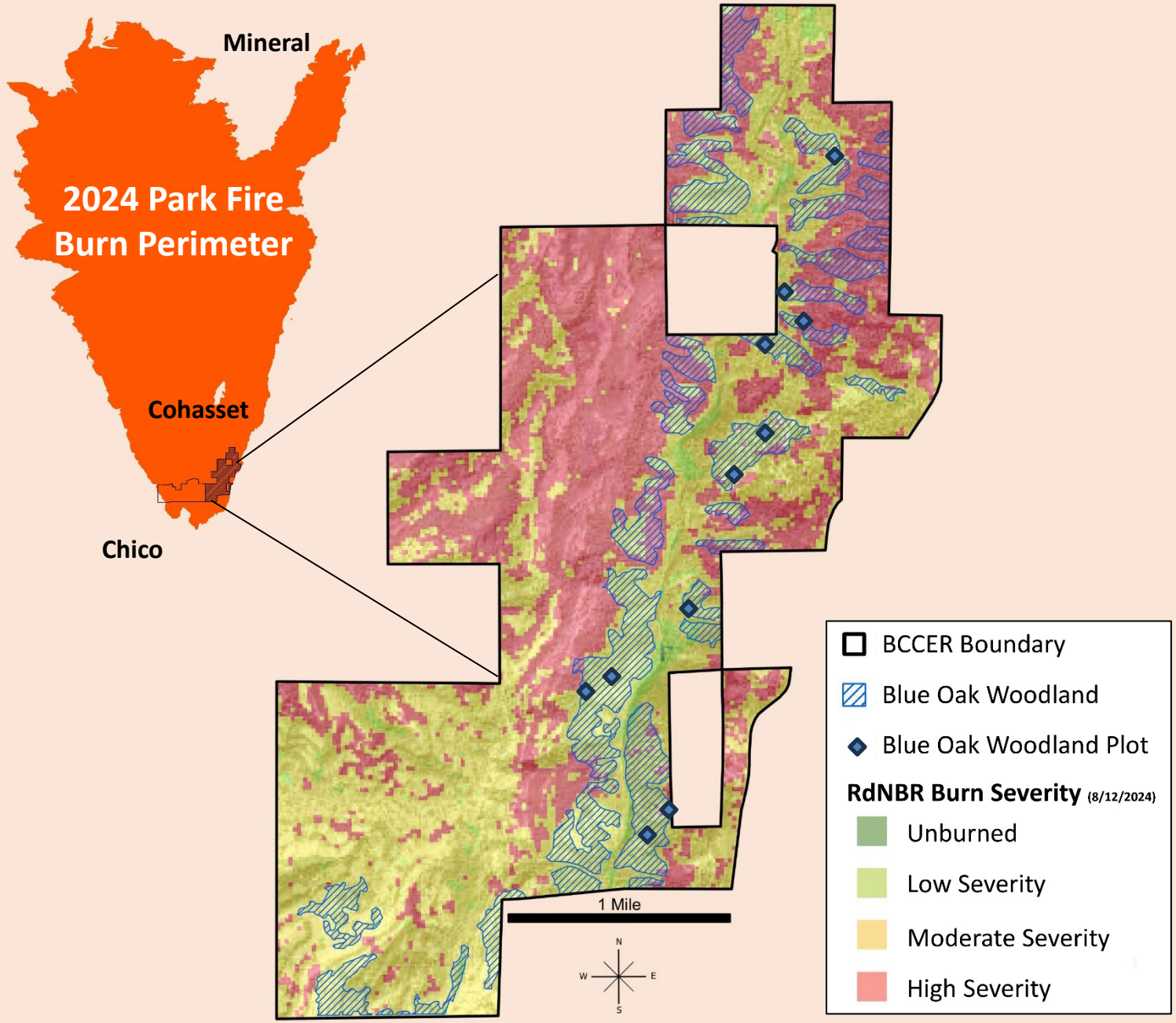
Representative stand type & likelihood of prescribed fire treatment

20m by 20m square plots

Plot ID	1999	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BOW01															
BOW03															
BOW04															
BOW07															
BOW08															
BOW09															
BOW10															
BOW11															

BCCER Blue Oak Woodland Monitoring Plots

Map by Tom Mello, BCCER Cartography and GIS Specialist Sources: CalFire, CDFW, USGS, NASA, ESA, Esri, BCCER, and GIS




BOW09
May 2024
November 2024
May 2025


BOW11
May 2024


November 2024


May 2025

Sampling Methods

Understory Herbaceous Species Abundance

Pre-wildfire Sampling **(Spring 2024)**

Post-wildfire Sampling **(Spring 2025)**

Pre-wildfire Species Abundance

2024	Native Species	Nonnative Species
Pre-wildfire prescribed burned N = 5[1]	53% (±18%)	47% (±18%)
Not pre-wildfire prescribed burned N = 3[1]	62% (±21%)	38% (±21%)

Average 29 species per plot (SD = ±12)

Post-wildfire Species Abundance

2025	Native Species	Nonnative Species
Pre-wildfire prescribed burned N = 5[1]	**33%** (±14%)	67% (±14%)
Not pre-wildfire prescribed burned N = 3[1]	**44%** (±32%)	56% (±32%)

p-value < 0.001

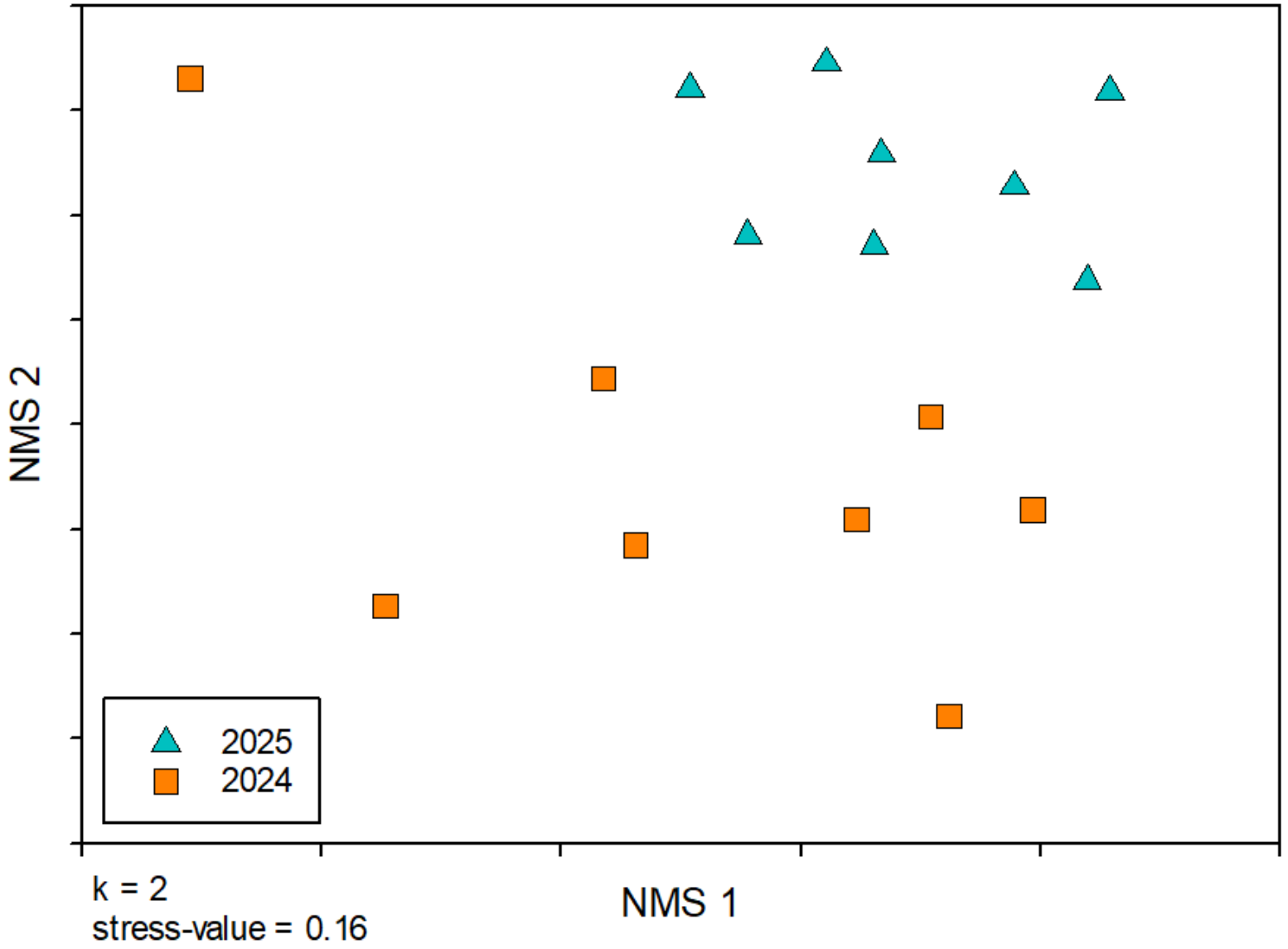
Average 43 species per plot (SD = ±7; p-value < 0.001)

Cal-IPC **high and moderate** rated invasive species abundance:

Pre-wildfire prescribed fire treated plots **30%** (SD = 17%)

Pre-wildfire untreated **25%** (SD = 19%)

Change in vegetation community composition 2024 → 2025



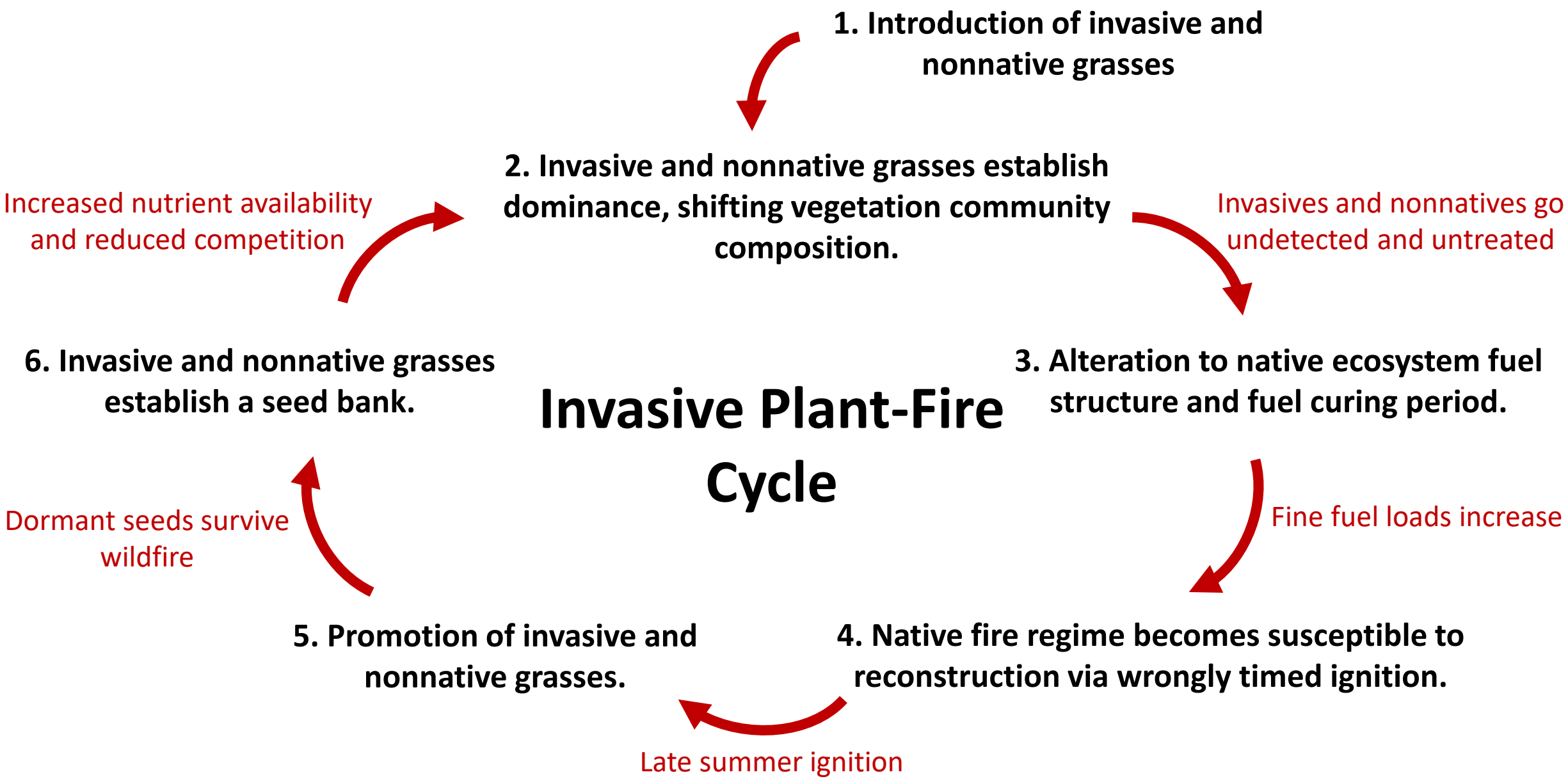
Why is there an increase in nonnative species abundance?

Wild Oats (*Avena* spp.)

Foxtail Brome
(*Bromus madritensis* ssp. *rubens*)

Ripgut Brome
(*Bromus diandrus*)

Invasive Plant-Fire Cycle



Adapted from: Fusco et al., 2022; Brooks, 2008; DiTomaso, 2007)

Breaking the Invasive Plant-Fire Cycle

1. Introduction of invasive and nonnative grasses

2. Invasive and nonnative grasses establish dominance, shifting vegetation community composition.

Invasives and nonnatives go undetected and untreated

3. Alteration to native ecosystem fuel structure and fuel curing period.

Fine fuel loads increase

4. Native fire regime becomes susceptible to reconstruction via wrongly timed ignition.

Post-green up prescribed fire

5. Extirpation of developing invasive and nonnative grasses.

Less individuals complete life cycle

6. Reduction of invasive and nonnative grass seed bank.

Increased nutrient availability and reduced competition

7. Promotion of native grasses and forbs

Adapted from: Fusco et al., 2022; Brooks, 2008; DiTomaso, 2007)

Fire after Fire in BCCER Meadows

October 21, 2025

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Bri Nielsen,
Daisy Cruz,
Douglas Armour,
Lauren Hall,
Liam Gruber-Bregman,
Noah Sorenson, and
John Kent

Questions?

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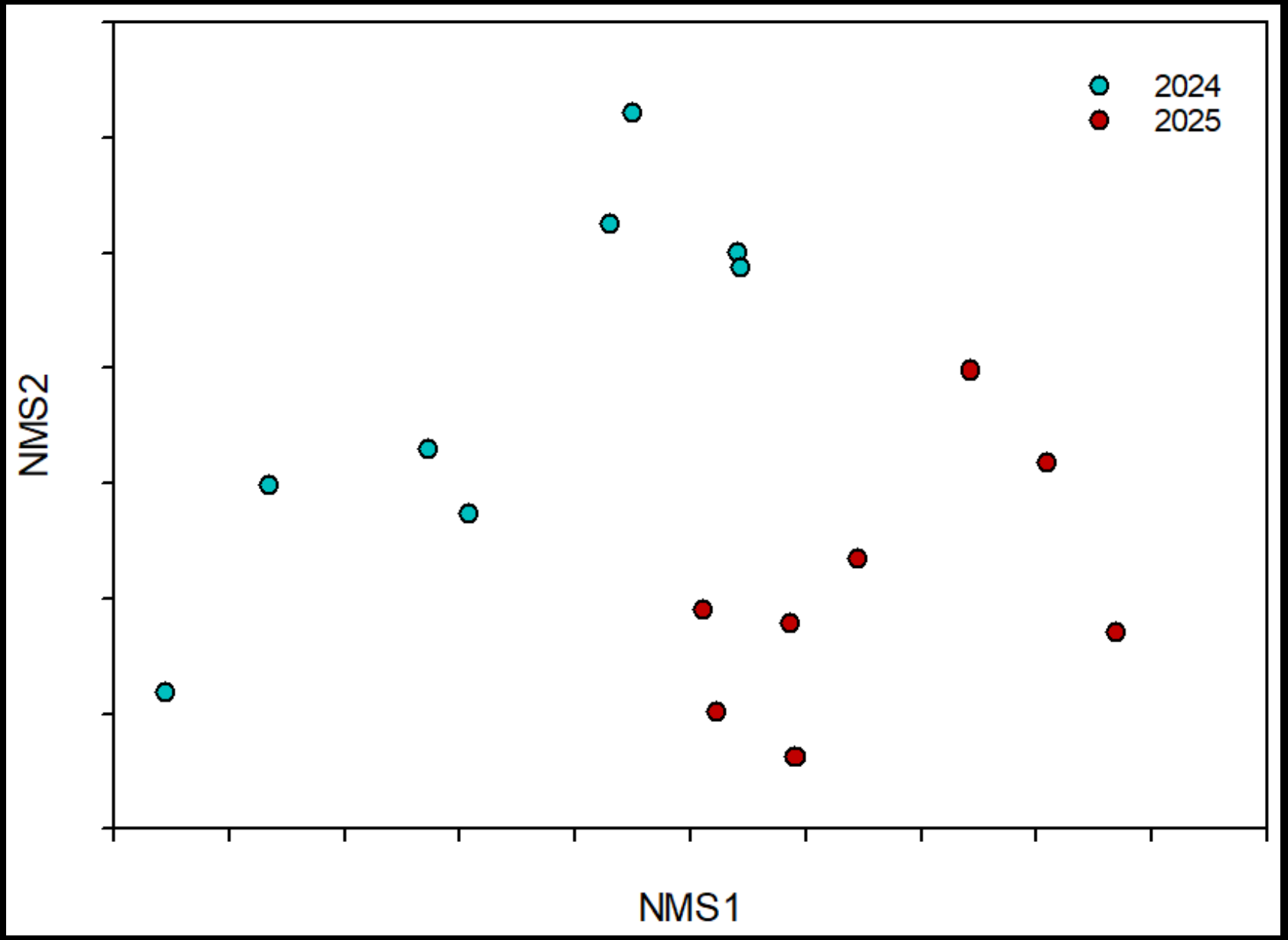
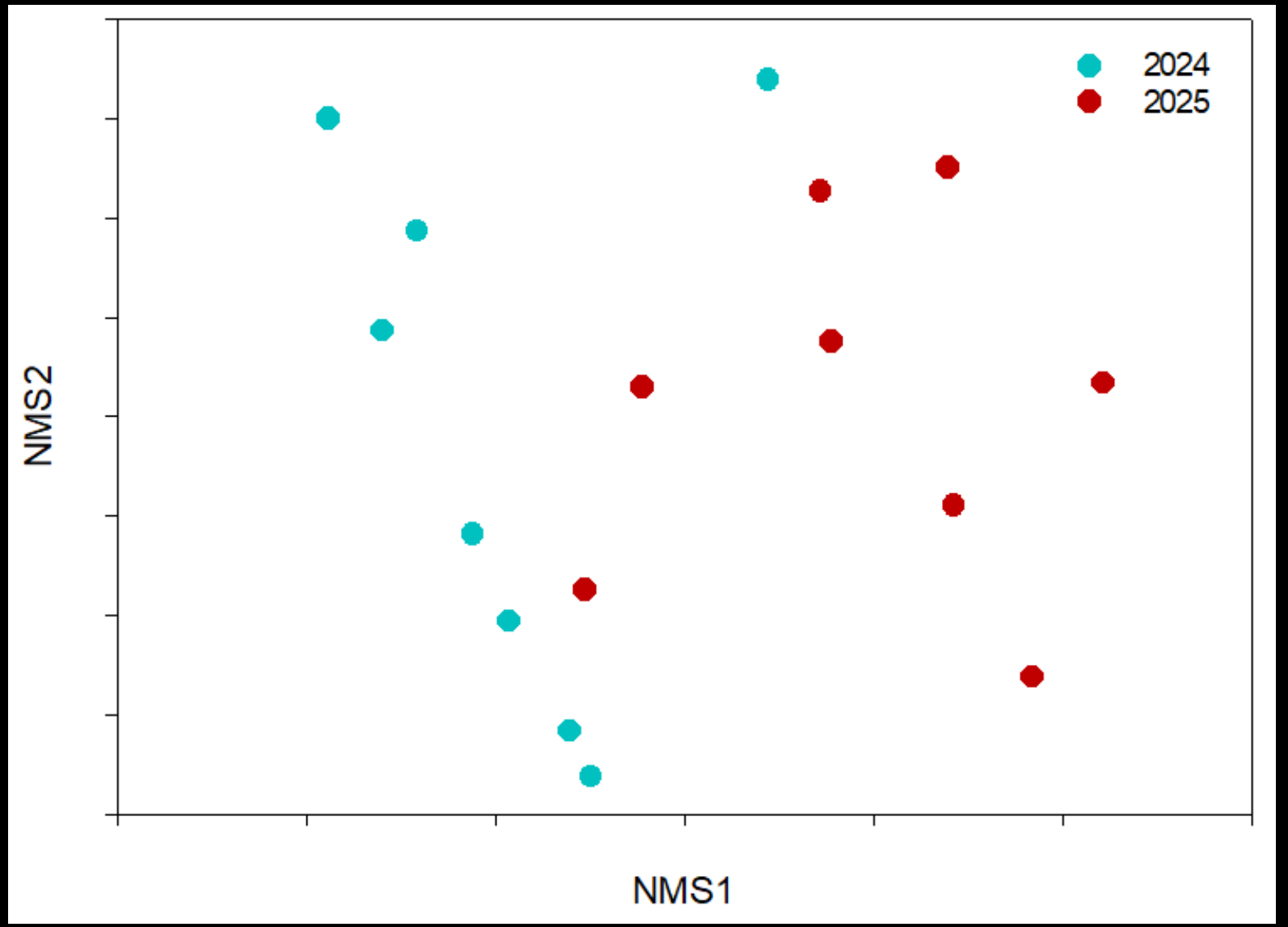

2024
2025
NMS2
NMS1


2024
2025
NMS2
NMS1

Wild Oats (*Avena* spp.)

Foxtail Brome
(*Bromus madritensis* ssp. *rubens*)

Ripgut Brome
(*Bromus diandrus*)

High and Moderate Invasives Reestablishing

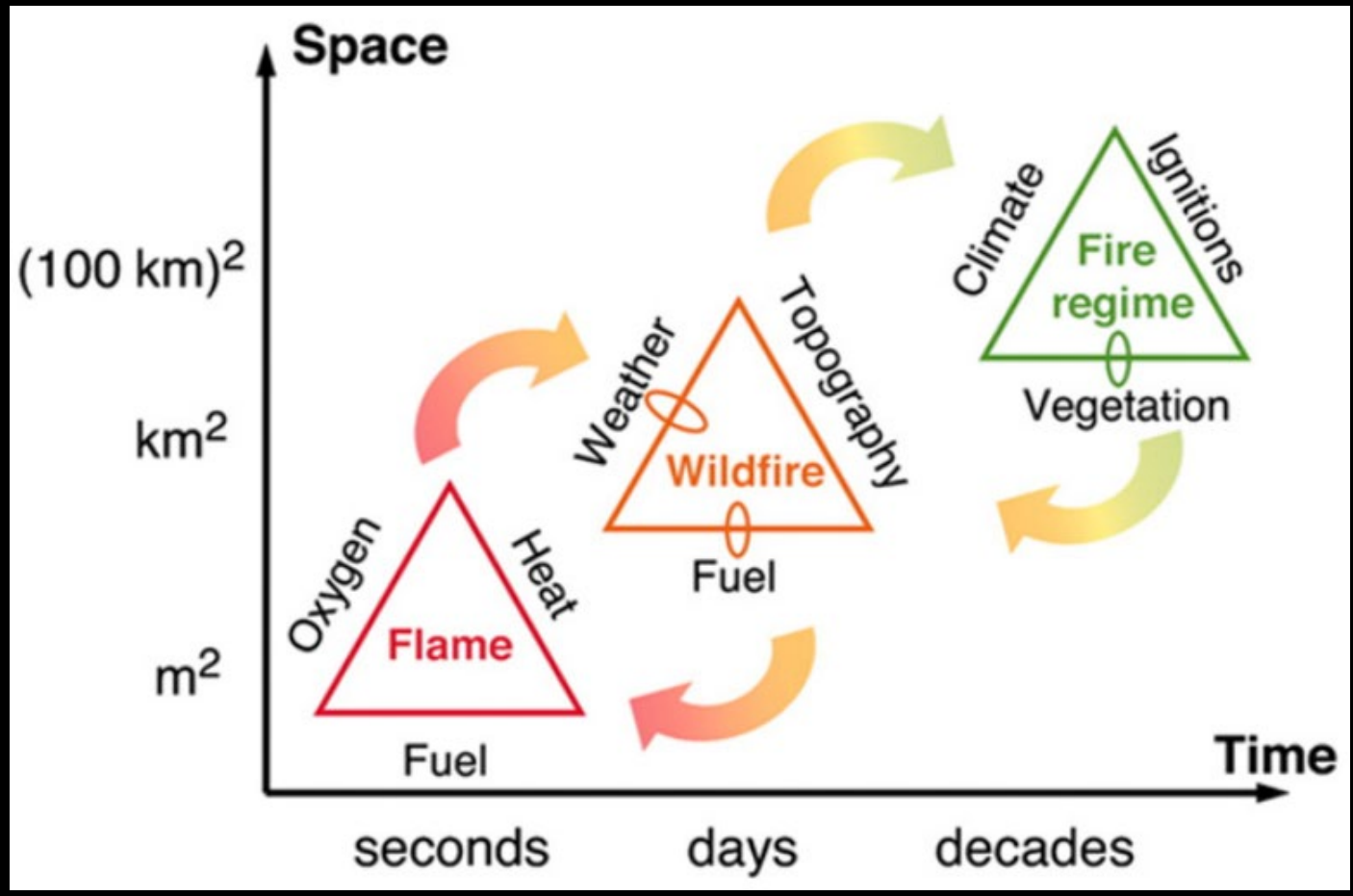
- Grasses went into dormancy in early summer
- Multiple untreated years allows for invasive seedbank to establish
- Late summer wildfire creates nutrient availability and reduce competition for early winter germination of nonnatives

Resulting habitat following wildfire: competition free and nutrient rich environment

Fire Regime

Spatiotemporal expression of multiple fires

1. Climate
2. Fuel properties
3. Ignition frequency



(Moritz et al., 2005)

Number of plant species per plot

2024		native	nonnative
	BOW01	15	18
	BOW03	23	15
	BOW04	30	16
	BOW07	5	7
	BOW08	13	12
	BOW09	8	7
	BOW10	12	15
	BOW11	30	7

2025		native	nonnative
	BOW01	19	22
	BOW03	18	18
	BOW04	32	25
	BOW07	19	18
	BOW08	16	23
	BOW09	15	21
	BOW10	23	26
	BOW11	24	19

Green = unchanged

Blue = reduced

Yellow = new to plot

		LIFEFORM TYPE	BOW01 ★	BOW03 ★	BOW04 ★	BOW07 ★	BOW08	BOW09 ★	BOW10	BOW11
AETR	barbed goat gras	GR	0	0	0	0	0	0	1	0
AVBA	wild oats	GR	0	1	1	1	1	1	1	1
AVFA	wild oats	GR	1	0	0	0	0	1	1	0
BRDI2	false brome	GR	1	1	0	1	0	1	1	0
BRDI3	ripgut brome	GR	1	1	1	1	0	1	1	0
BRRU2	red brome	GR	0	1	1	1	0	0	0	0
CEME2	maltese thistle	fo	0	1	1	0	0	0	0	1
CESO3	yellow starthistle	fo	1	1	1	0	0	0	0	0
CYEC	hedgehog dogtai	gr	1	1	1	1	1	1	1	1
HOMUL	wild barely	GR	0	0	0	0	1	0	0	0
LOPEM2	itilian rye	gr	1	0	0	1	1	1	0	0
TACA8	medusa head	GR	0	0	0	0	1	0	0	0
VUMY	rattail festuca	gr	0	0	0	1	0	1	1	1