Barriers to a summer fire regime in northern prairies

Ecological, physical, and social

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For every season: Burn, burn, burn…

- Conventional R_X fire conducted during primarily dormant season

- Increased interest in burning during non-dormant season
  - Awareness of pre-colonial fire regimes
  - Diversify management

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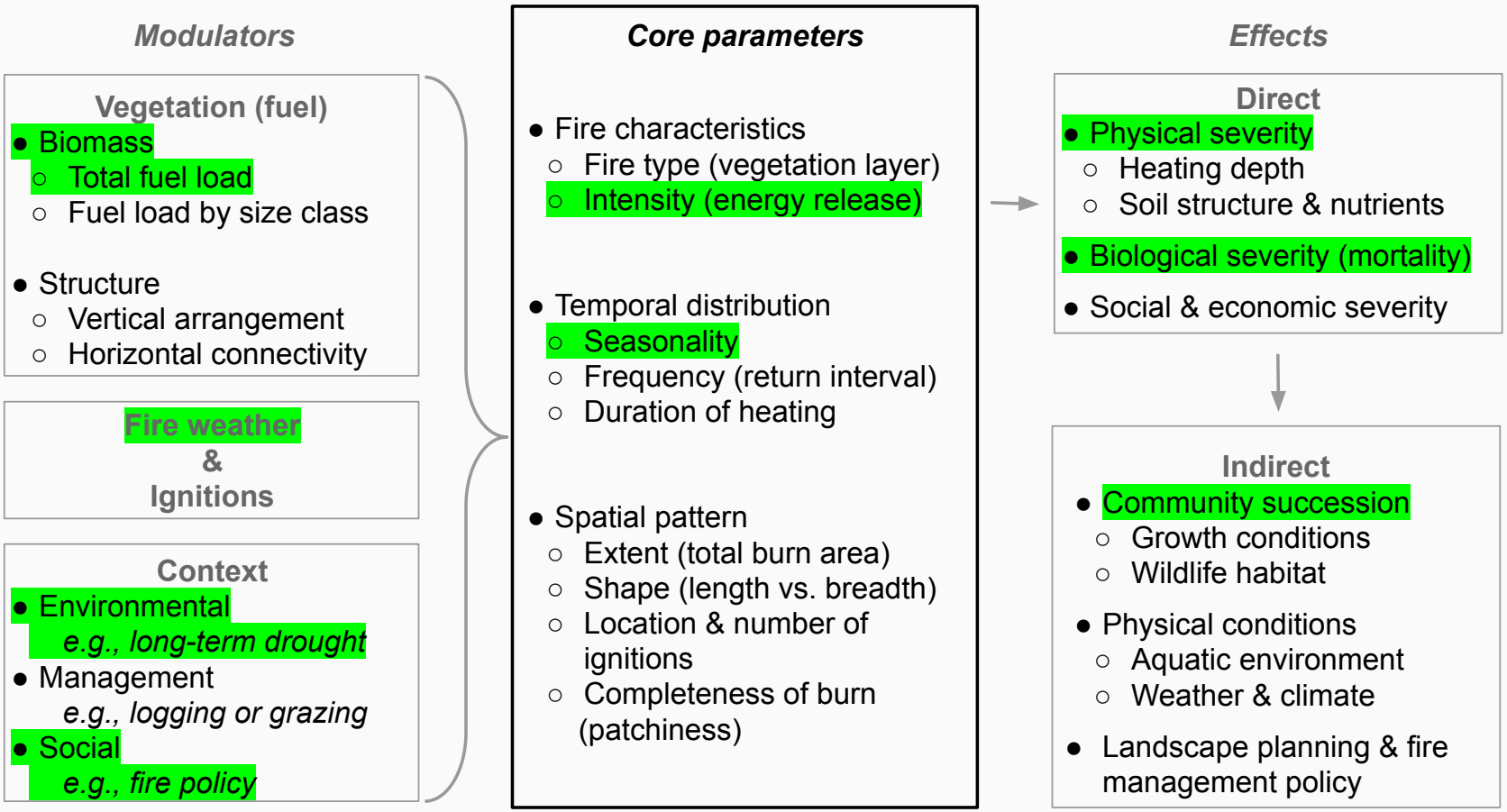
As with most fire regime parameters, **seasonality is a construct**

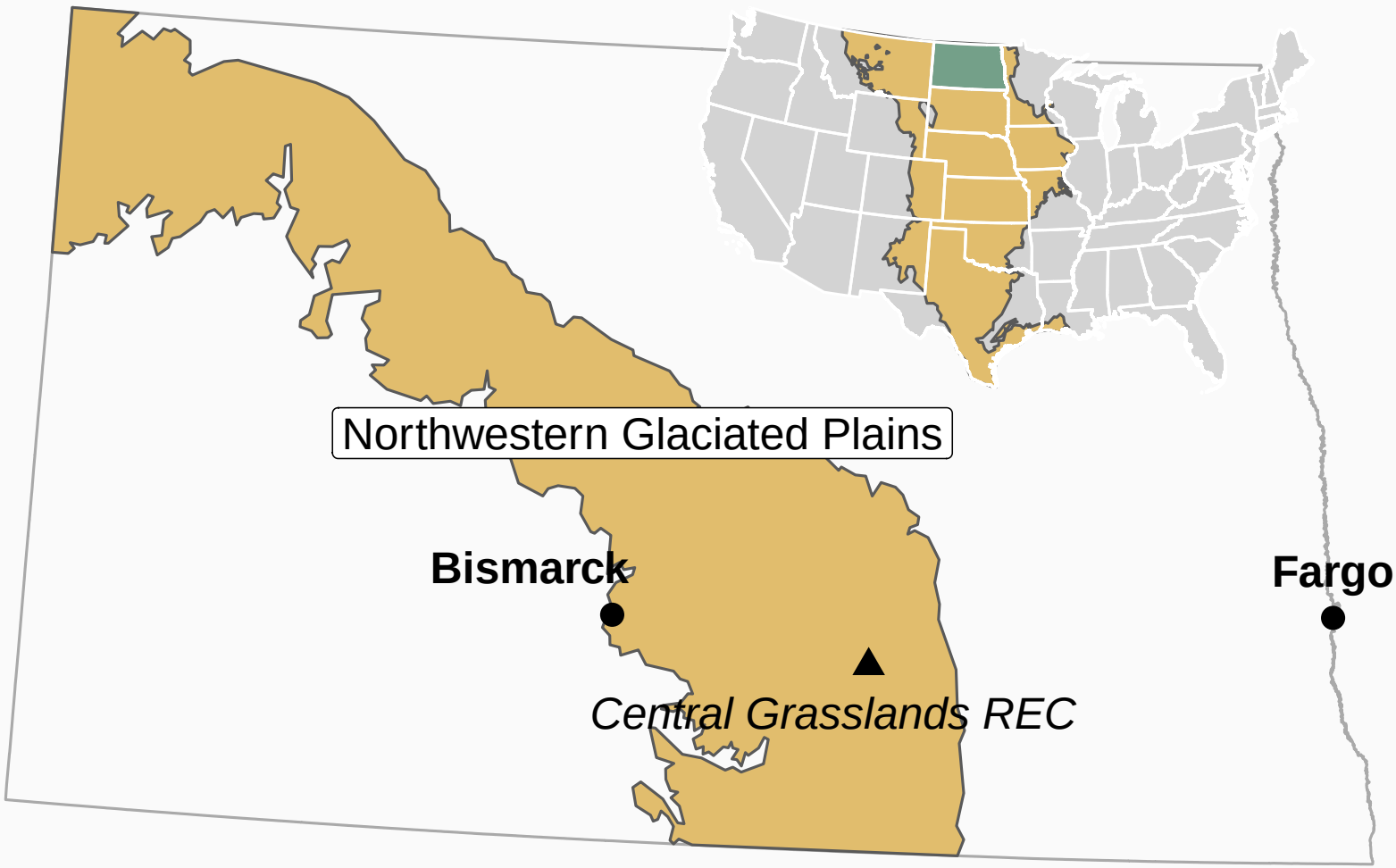
The Western fire regime concept



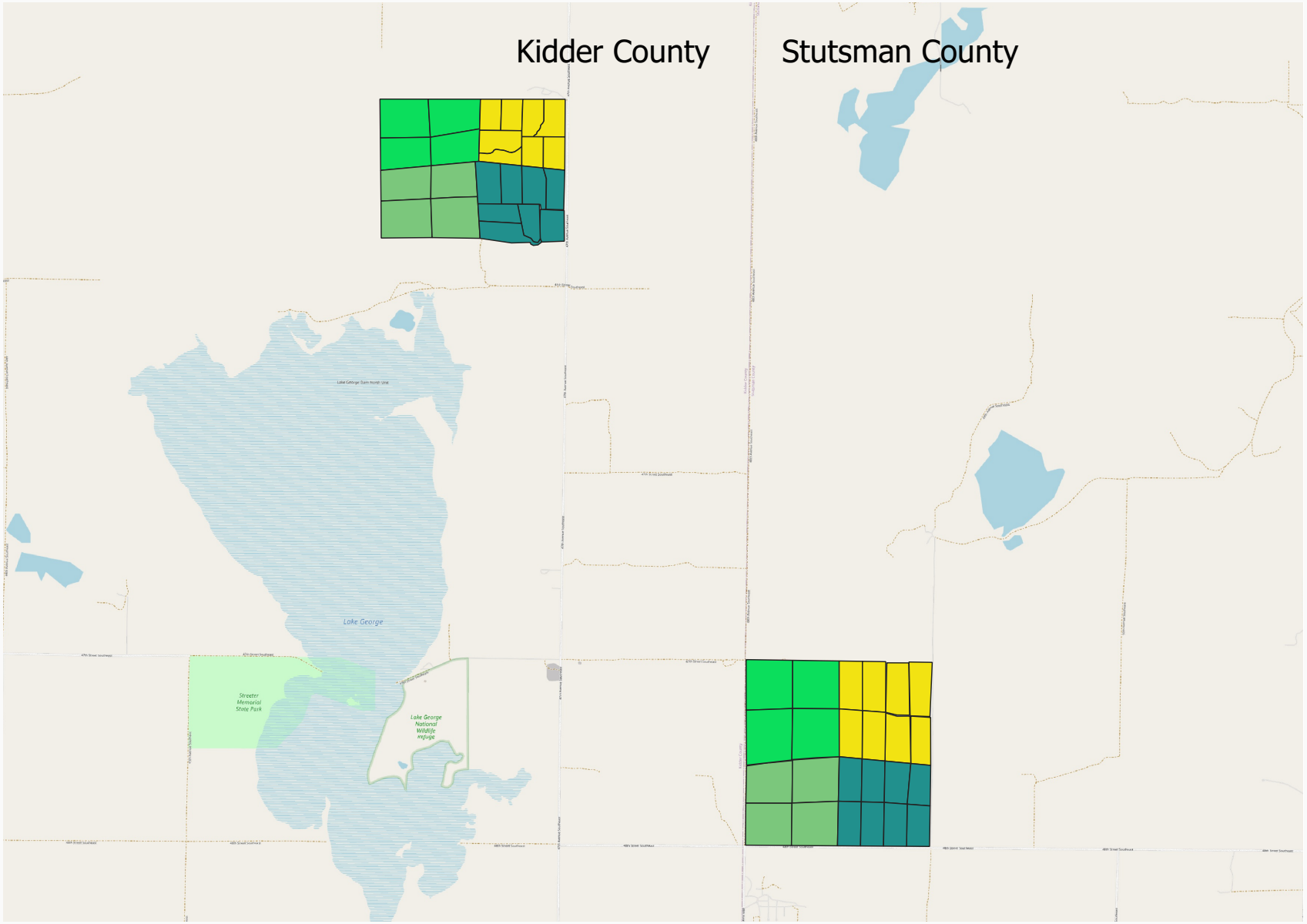
Controls over fire behavior and effects

	Prior to burn	During burn
Biophysical	● Rainfall/drought ○ Soil moisture ○ fuel moisture ● Meteorology *Regional humidity trends*	● Meteorology ○ Fire weather ○ Lightning ● Plant composition ○ Flammability ○ Connectivity
Social	● Management ○ Harvesting ○ Fuel reductions ● Fire use policies ● Anthropogenic ignitions	● Fire suppression policies ○ Wildland fire use *Rx fire, let-it-burn* ○ Defense priorities

Case study: R_x fire in the Northern Great Plains

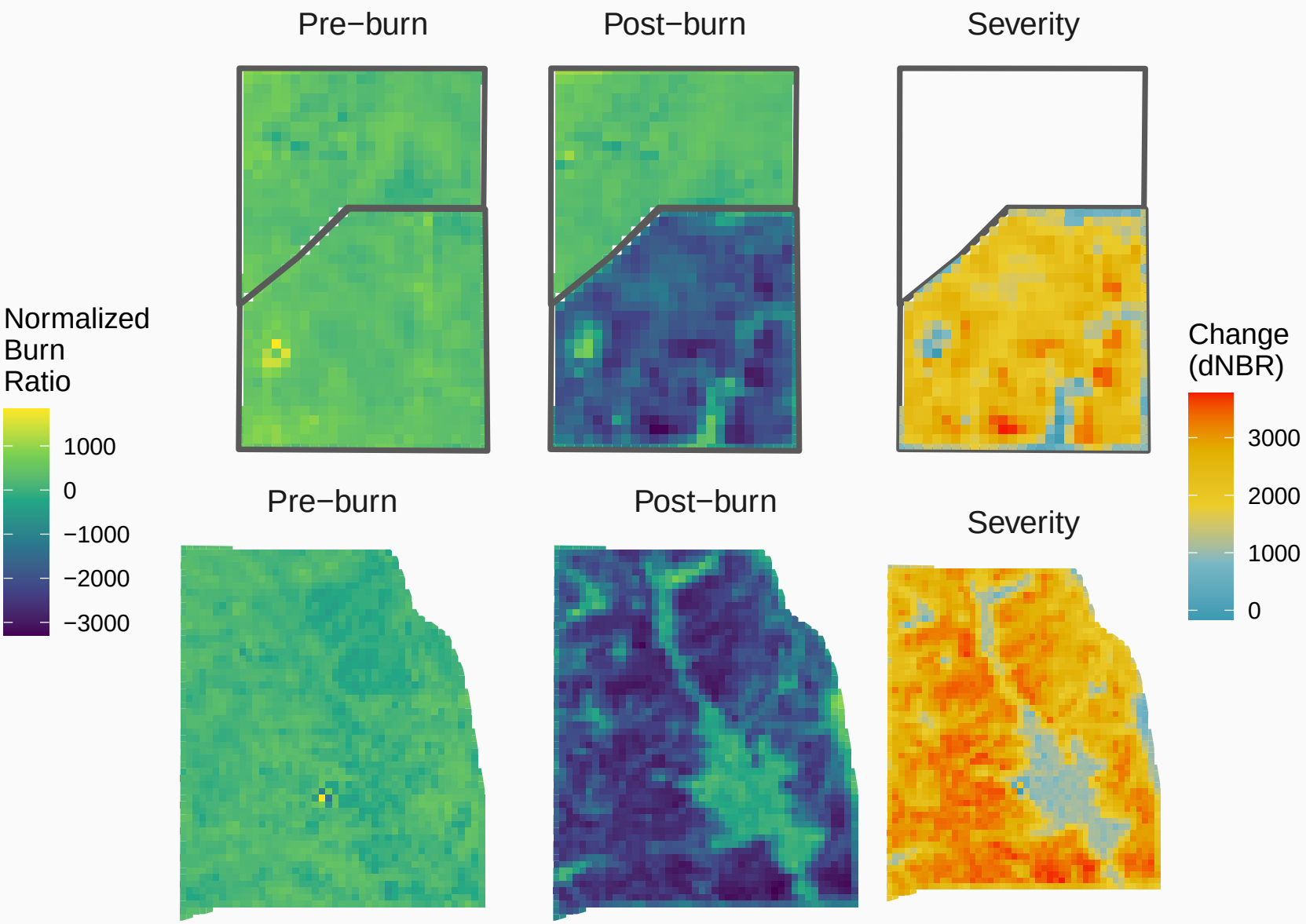


R_x fire in the Northern Great Plains



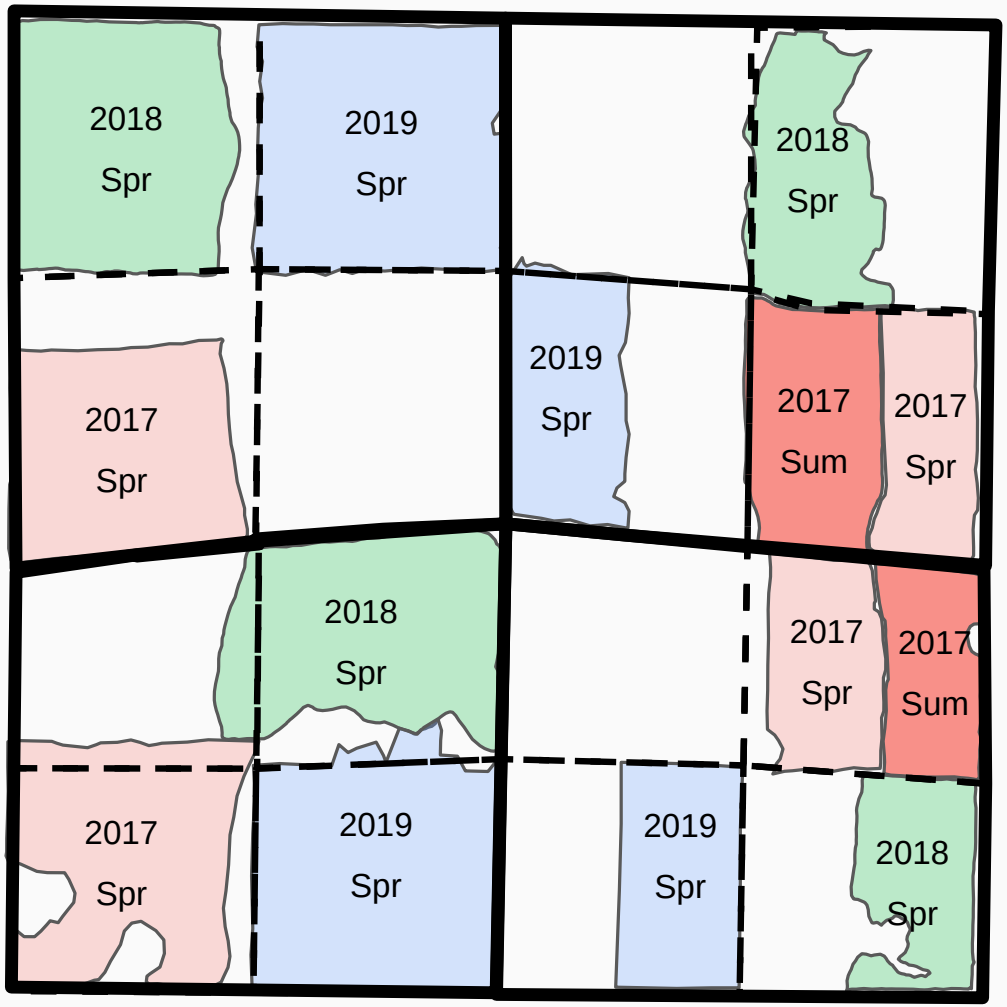
Burns visible from space

Remotely-sensed burn severity products



An example from Dunn Ranch Prairie (McGranahan et al. 2022 *Land*)

Spotty success in completing summer burns



2019 burn map for southern study block

Barriers to summer R_x fire

All opportunities and limitations fit within fire regime concept

- Biophysical

  mostly, too wet

  - High live moisture fuel content (*photosynthesis*)
  - High dead moisture fuel content (*humidity*)
  - Poor convection/smoke dispersal (*humidity*)

- Social

  mostly, too dry

  - Local burn restrictions
  - Control issues

A tale of two fires

What a difference a few days make!

5 May 2018	**Date**	16 May 2018
79	**Air temp (F)**	82
5.9	**Wind (m s^{-1})**	2.4
22	**min RH (%)**	24
37	**Dew Point (F)**	46

Biophysical barriers

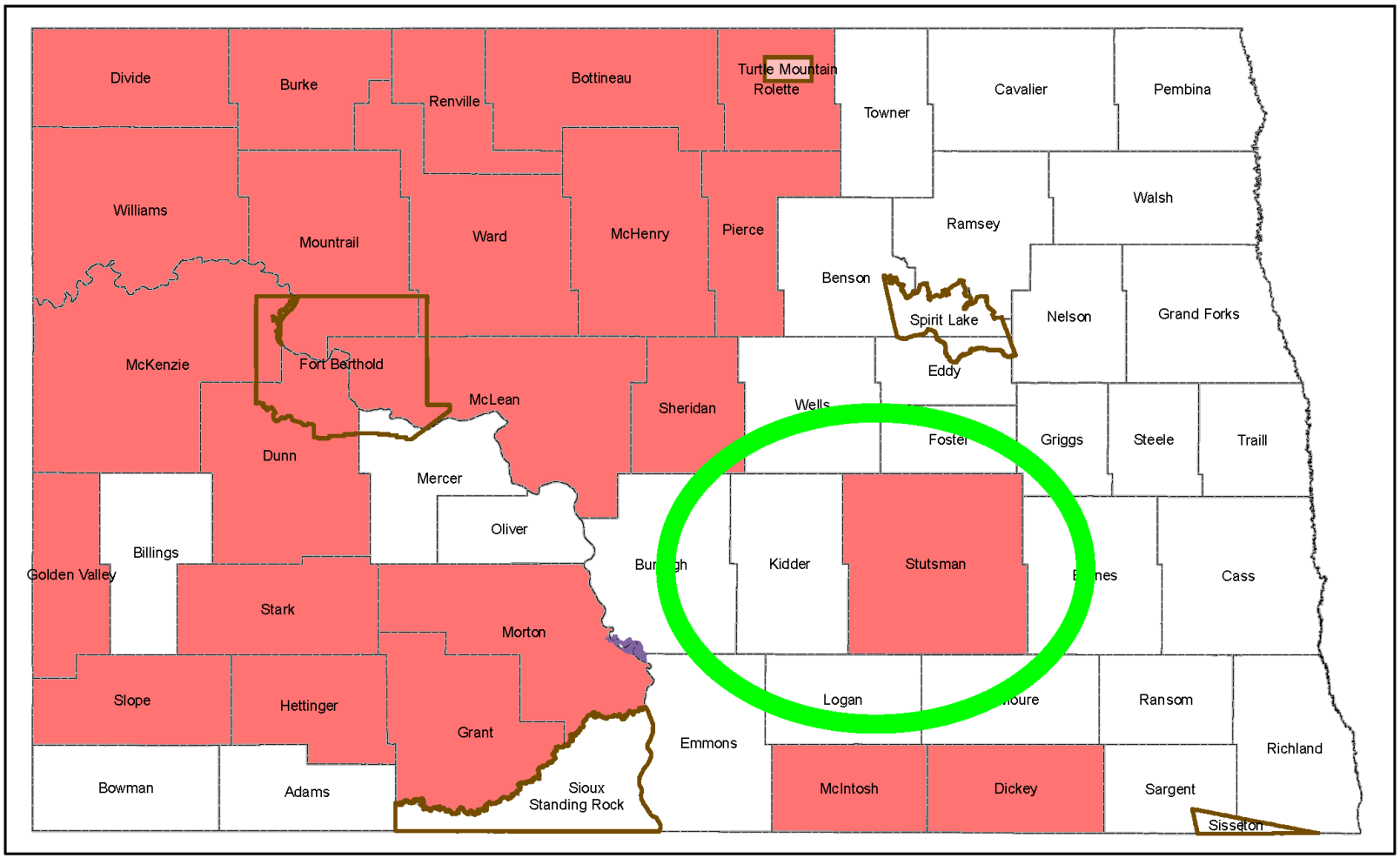
The terrible, humid, green, no-good day

13 August 2018

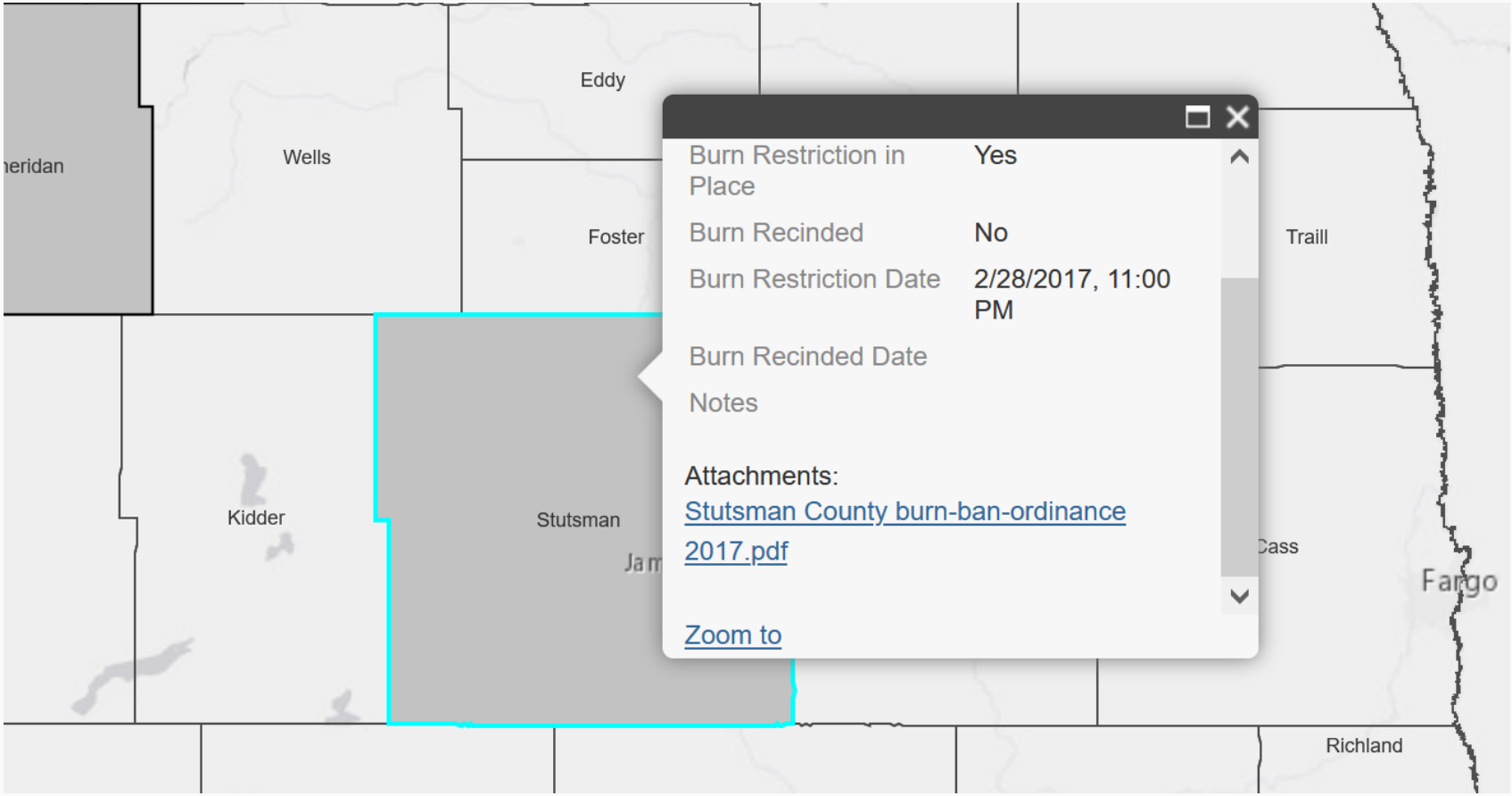
- Forecast called for $<$ 40% RH by noon, but...
  - 54% at 1200
  - 50% at 1500
- Modeled historical data (gridMET) says RH reached 28%
- Local factors constrain ignition and spread
  - Transpiration by green plants
  - Humid air resists heating, lift

Social barriers

County-level burn restrictions



County-level burn restrictions



Tying burn restrictions to real-time conditions

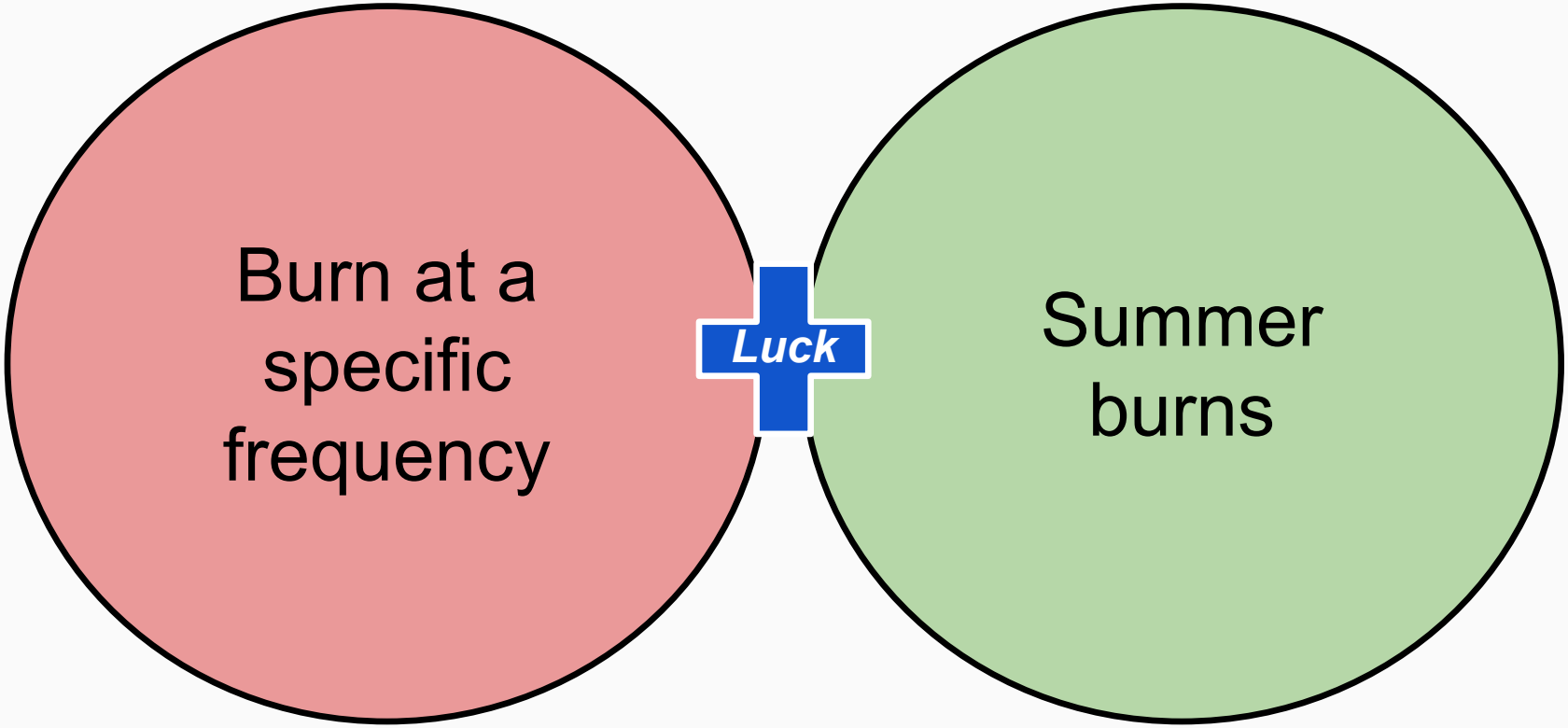
STUTSMAN COUNTY ORDINANCE 2017-01
PROHIBITIONS ON OPEN BURNING DURING A RED FLAG WARNING OR WHILE THE STUTSMAN COUNTY FIRE DANGER RATING IS VERY HIGH OR EXTREME – PENALTY

1. **Definitions**

   A. "Fire danger rating" is the risk categorization for open burning that Stutsman County publishes on the county's web site. The categories are low, moderate, high, very high, and extreme.

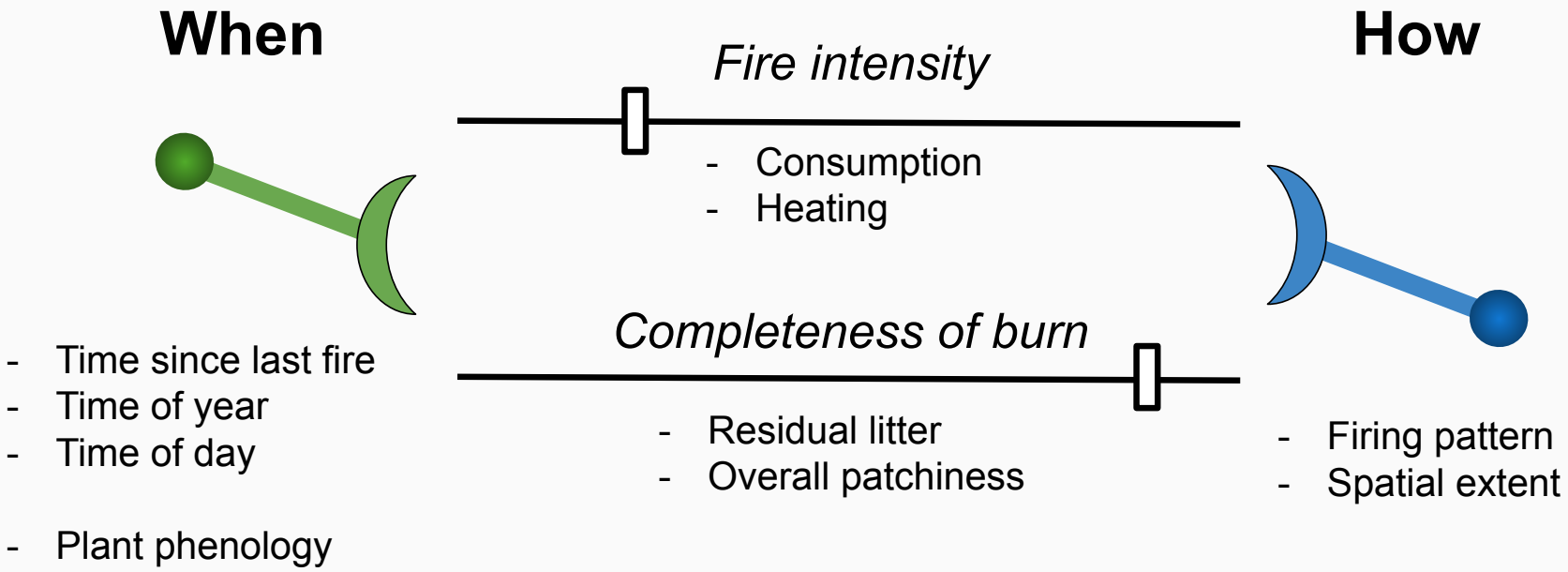
Fire regime management

Difficult to satisfy multiple socially-constructed parameters (e.g. *force patterns*)



Fire regime management

Better to tweak controllable components towards desired objectives (e.g. *support processes*)



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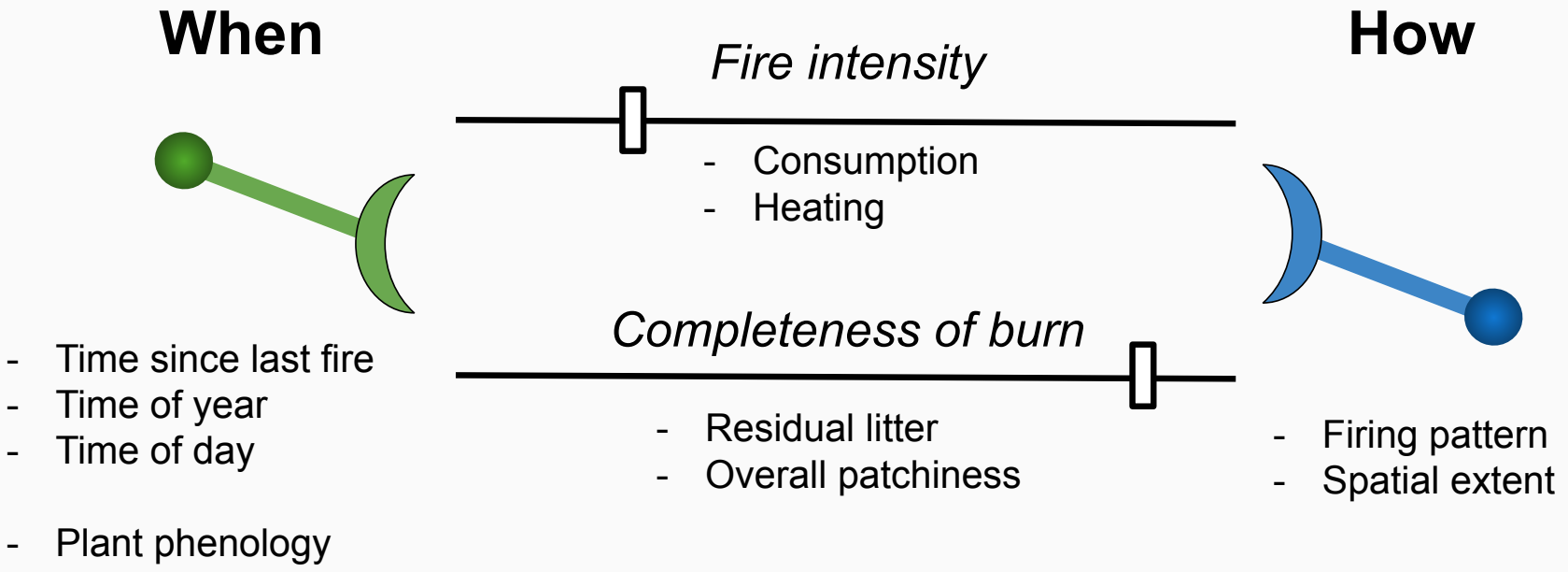

Great Plains are in a **fire deficit** and management is best focused on **burning new acres**

Mopping up

- Fight the deficit: Burn what you can, when you can, but try to add new acres
- Focus on fine-scale levers to accomplish objectives regardless of season
- Consider emphasis on burn completeness: *defend desired refugia*

Thank you!

Any questions before you all run away?