Fire Ecology and Invasive Weed Species

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FireSafe COUNCIL Mariposa County

What is Fire

- Rapid Oxidation reaction in which heat and light are produced.
- Three ingredients

- Fuel
- Oxygen
- Heat

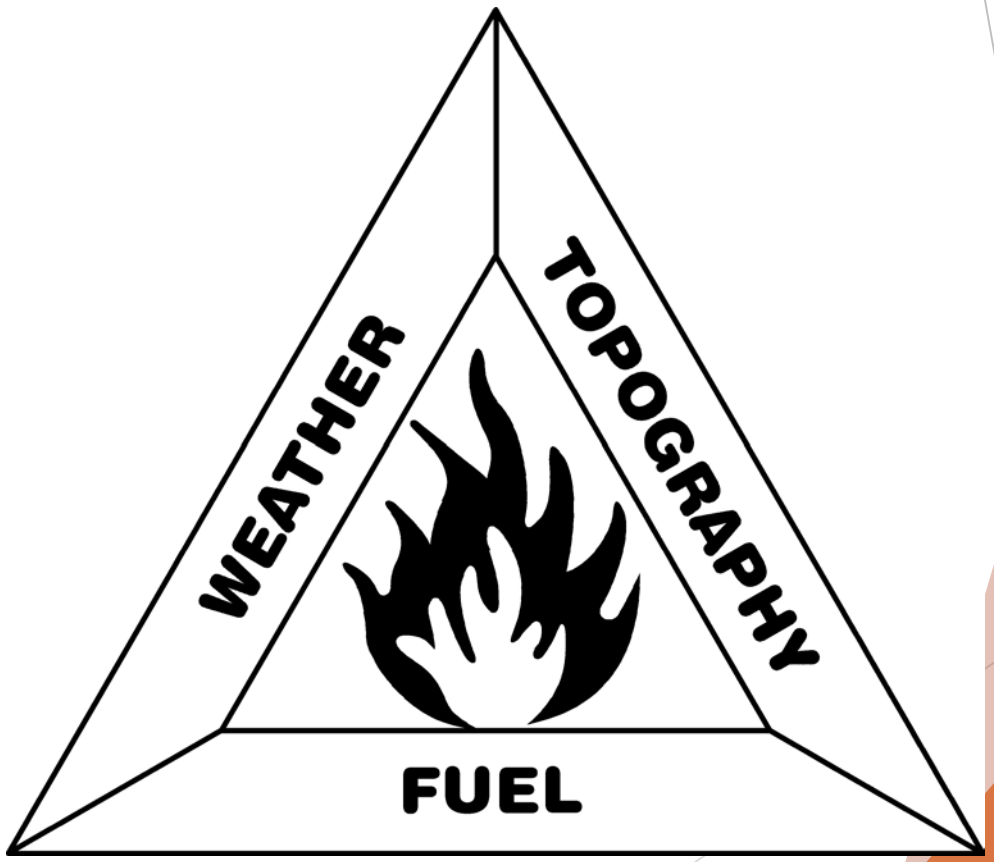
Fire Behavior Triangle

- Wildland Fire behavior depends upon:

-Weather

-Fuel

-Topography



Fire Ecology

- Branch of ecology- “Study of ecosystem dynamics”
- Focuses on origins, cycles, and effects of wildland fire on ecosystems.
- Wild Fire: An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out (NWCG- Definition)

Fire Ecology Concepts

- Basis for Fire Ecology relies on three main concepts:

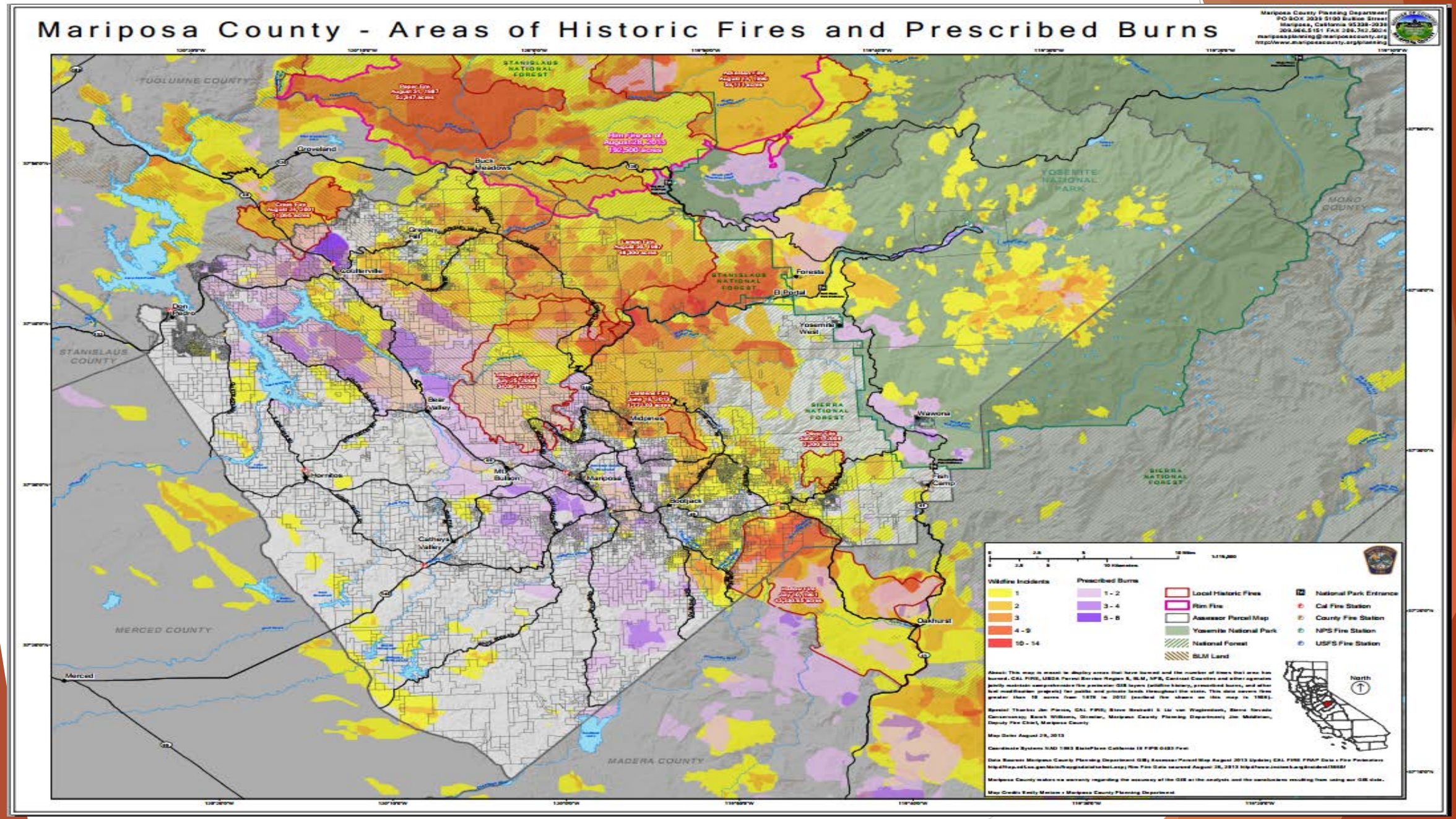
-Fire History

-Fire Regime

-Fire Dependence/ Adaptation

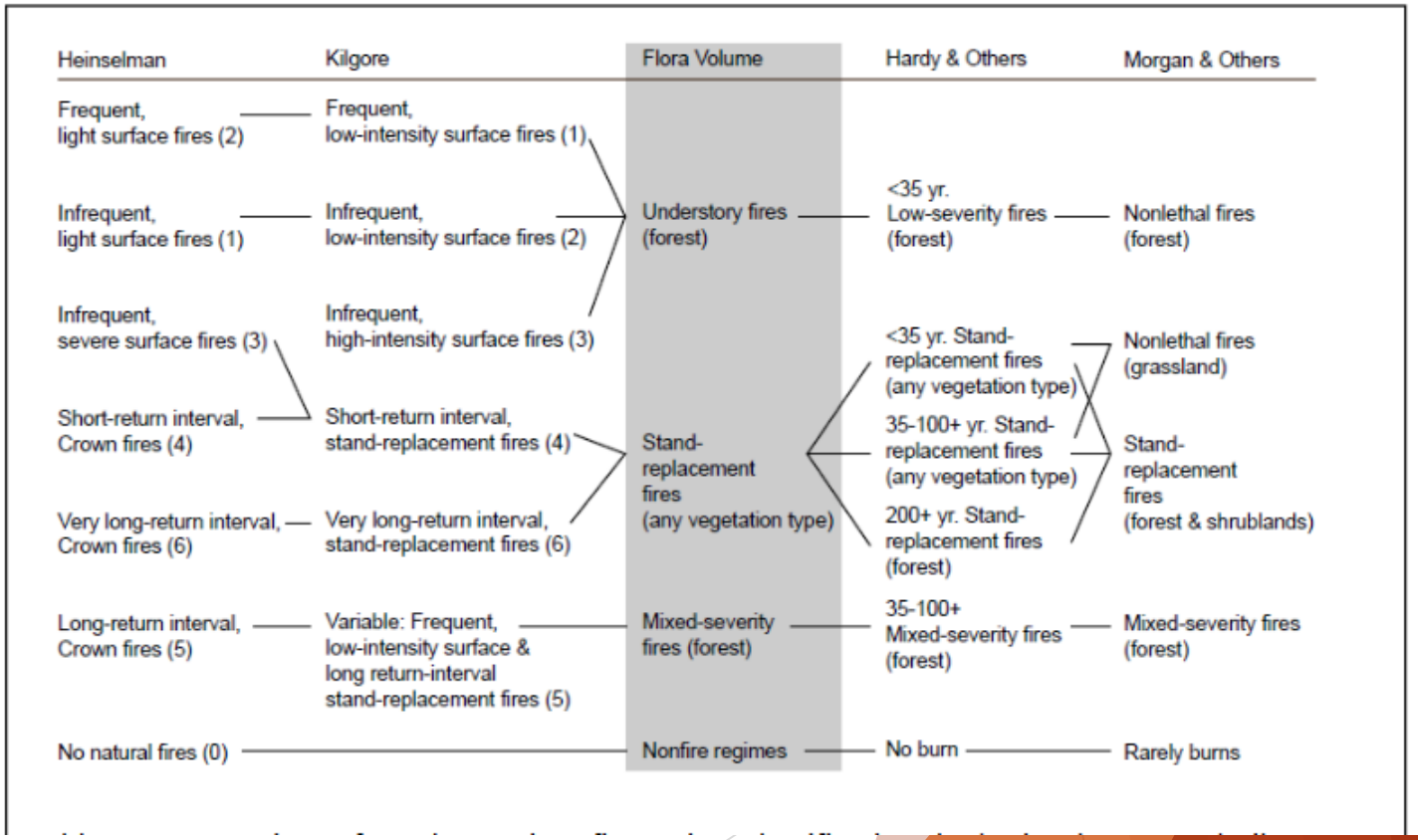
Fire History

- How often a fire occurs in a geographic area.
- Trees, Soil, and succession patterns provide clues to past fire activity.
- Fire scarring in core samples provide evidence of fire history.
- Ash layers in soil can show fire patterns.
- Intense fires can also leave soils hydrophobic.


Mariposa County - Areas of Historic Fires and Prescribed Burns
Mariposa County Planning Department
PO BOX 2039 5100 Bullion Street
Mariposa, California 95338-2039
209.966.5151 FAX 209.742.3604
mariposaplanning@mariposacounty.org
http://www.mariposacounty.org/planning
TUOLUMNE COUNTY
STANISLAUS NATIONAL FOREST
Rim Fire as of August 26, 2013 257,500 acres
Groveland
Buck Meadows
Yosemite National Park
Mono County
Crane Fire August 24, 2001 11,396 acres
Coulterville
Foresta
El Portal
Yosemite West
Don Pedro
STANISLAUS COUNTY
Bear Valley
Midpines
Wawona
SIERRA NATIONAL FOREST
Hornitos
Mt. Bullion
Mariposa
Tish Camp
Coolidge Fire August 1, 2007 197,635 acres
Cathey's Valley
Oakhurst
MERCED COUNTY
Merced
MADERA COUNTY
Wildfire Incidents
1
2
3
4 - 9
10 - 14
Prescribed Burns
1 - 2
3 - 4
5 - 8
Local Historic Fires
Rim Fire
Assessor Parcel Map
Yosemite National Park
National Forest
BLM Land
National Park Entrance
Cal Fire Station
County Fire Station
NPS Fire Station
USFS Fire Station
North

Fire Regime

- Pattern, frequency, and intensity of wildfires over time
- Includes:
- Severity: Ecological Impact
- Intensity: Fire Behavior
- Two most important factors:
- Vegetation type
- Weather patterns



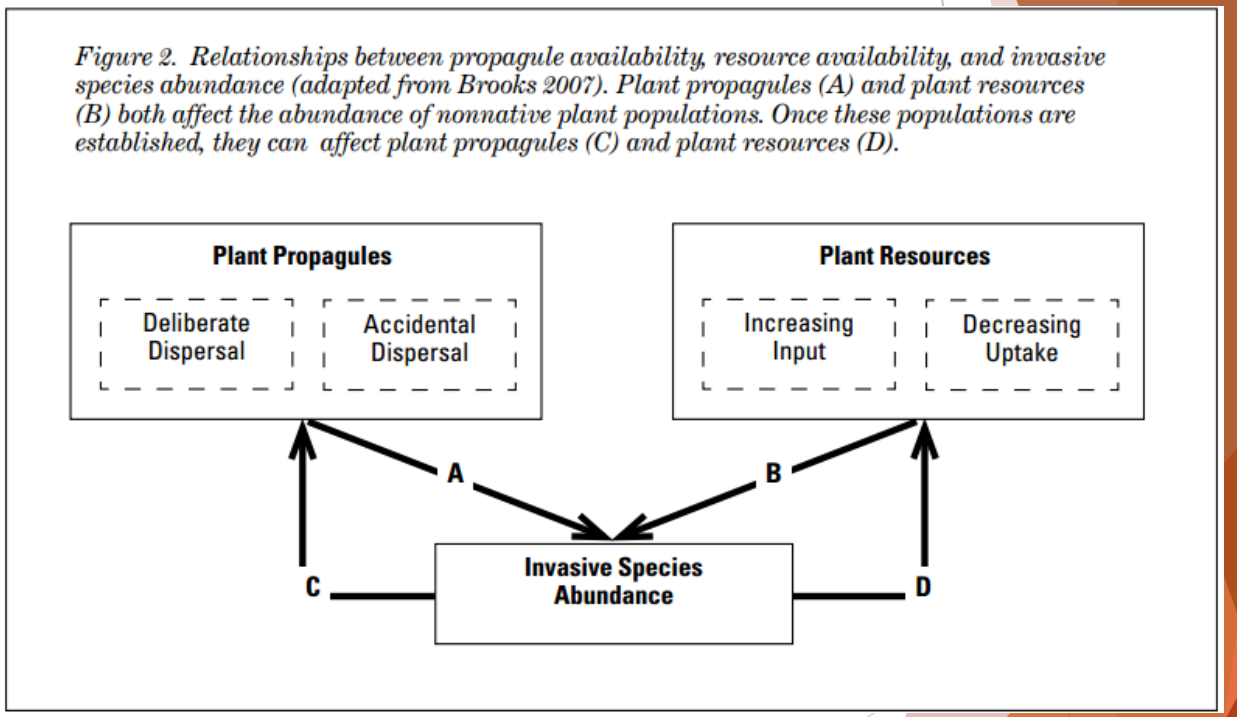
Fire Dependence/ Adaptation

- Plants and animals that rely on disturbances from fire or are adapted to survive in fire prone areas.
- Plant Adaptations: Serontinous Cones (megastrobilus), fire-resistant bark, rapid growth.
- Some Invasive plant species capitalize on fire-induced ecological disturbances.

Wildland Fire Management and Invasive Plant Species

- Post and Pre-fire activities can aid in spread of invasive weeds.
- Growth and spread depends upon two factors:

1. Plant propagule availability
2. Plant resource availability



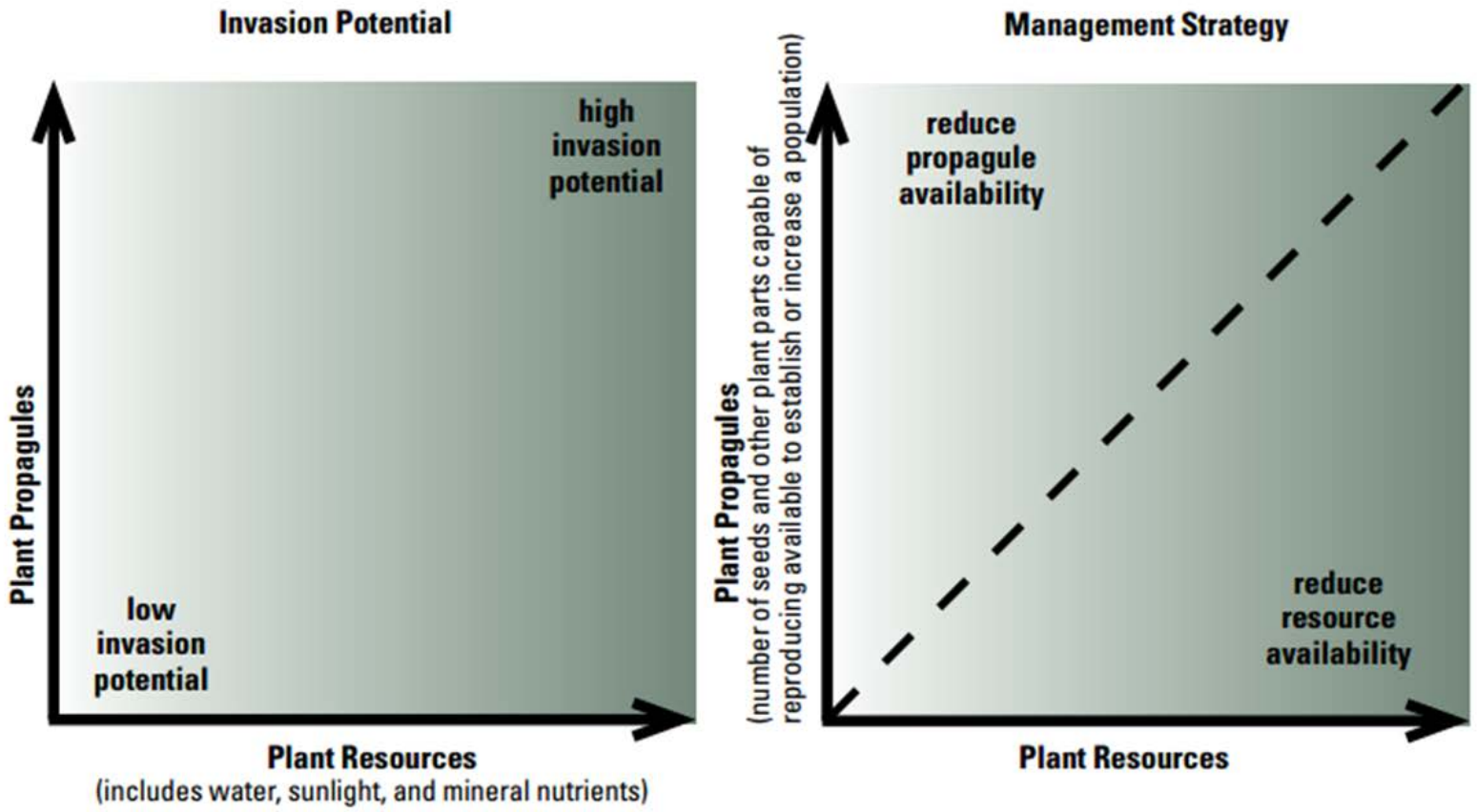
Characteristics of Invasive Weeds

- Abundant Seed Producers
- Germination stimulated by ecological disturbances
- Rapid population establishment
- Long-term seed survival
- Highly competitive

Combining IWMP and Fire Management

- Wildland Fires can promote invasive plant establishment
- Fires can be used as a tool to control invasive plants
- Invasive plant species can directly influence fire behavior

Figure 1. Main factors affecting plant invasions (adapted from Brooks 2007)



A Recipe for Trouble

Invasive potential is highest when propagules of invasive plants are likely to reach new areas that offer the combination of resources (soil nutrients, sunlight and moisture) necessary to establish and compete with native plants for these resources.

Invasive Weed Management During Fire Management Activities

- Wildland Fire suppression
- Rehabilitation/ Restoration
- Post-Fire Land-use
- Fuels Management Techniques
  -BMPs include:
    - Implementing a monitoring plan
    - Stopping the spread of propagules
    - Re-veg with less flammable native species
    - Reduce fuel continuity

Fuel Breaks and Invasive Weeds

- Designed to break-up the fuels aspect of the fire triangle.
- Several Options that help control Invasives:

-Brown Strips

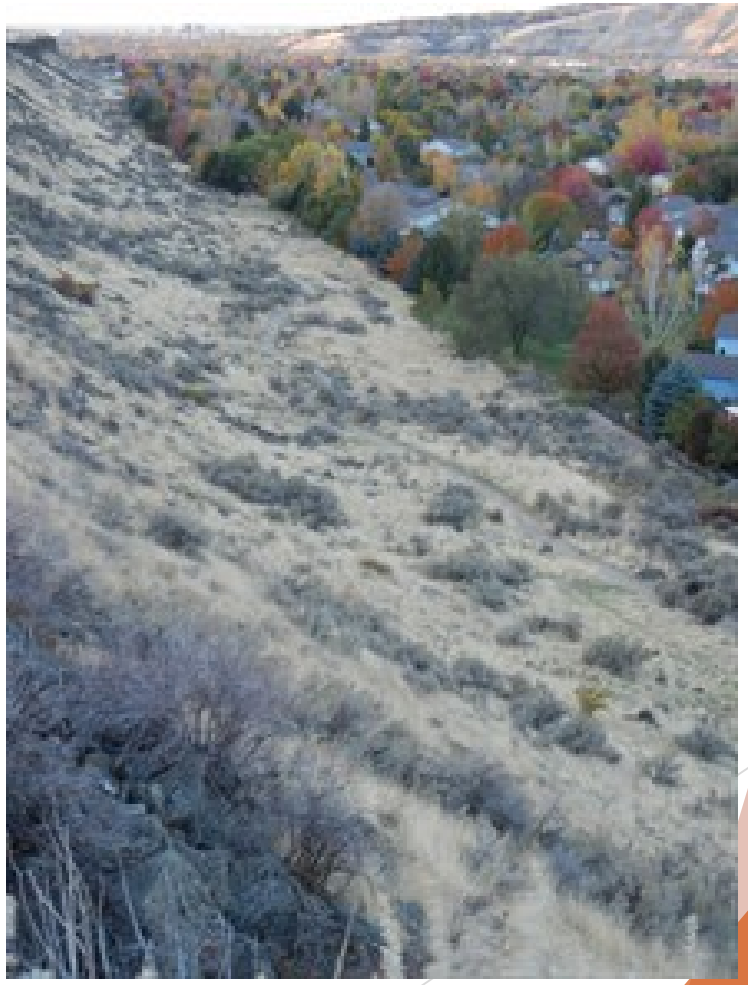
-Green Strips

-Mowed Fuel Breaks

- Shaded

Case Study: Boise, Idaho WUI

- Fuel mitigation within the Wildland Urban Interface.
- High-desert Sagebrush (Artemisia) communities
- Target Species: Medusahead Rye and Cheatgrass
- Fire Regime Shift
- Control Methods?



Case Study: Boise, Idaho WUI Cont.

- Oregon Trail Preserve
- Wildfire Mitigation/Noxious Weed Control Program
- Multi-Year, Multi-Input Approach
- Brushing
- Flash Grazing
- Herbicide Application
- Results

Questions?