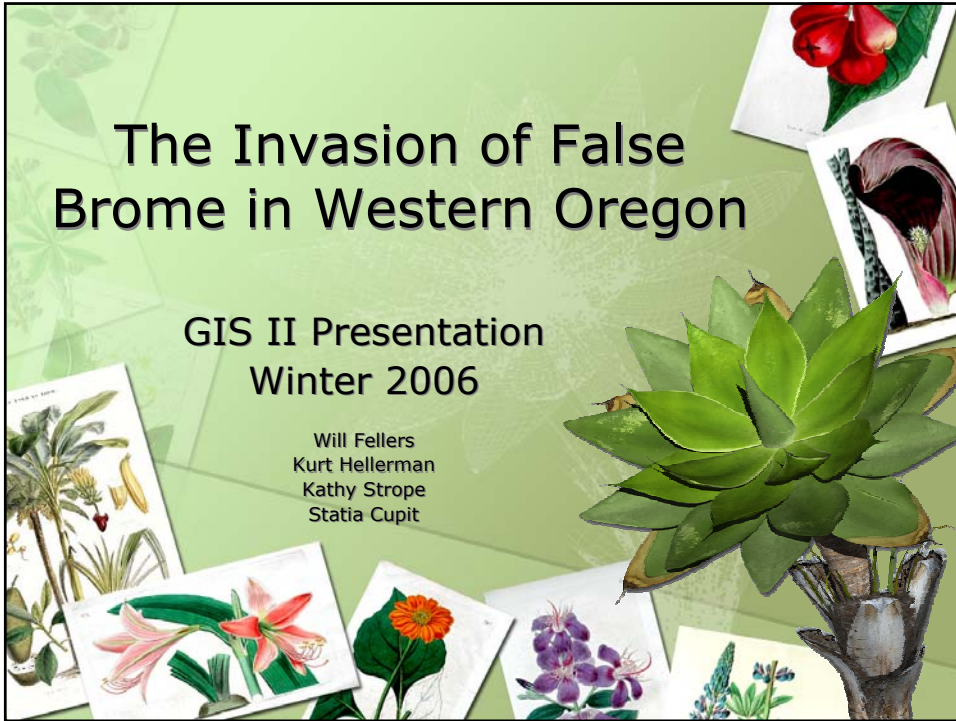


The Invasion of False Brome in Western Oregon

GIS II Presentation
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False Brome (*Brachypodium sylvaticum*)



- Perennial bunchgrass native to North Africa and Eurasia
- First collected near Eugene, Oregon in 1939
- Since then, it has spread throughout the Willamette Valley and into the Cascade foothills



Environmental Impacts

- Once established, false brome can form monospecific stands
- Outcompetes native forbs, grasses, and tree seedlings
 - Little nutritive value – impacts wildlife food supply
 - Extinction of rare species

Kincaid's Lupine



- *Lupinus sulphureus* ssp. *kincaidi*
- Long-lived perennial herb of upland prairies
- Host plant of the Fender's blue butterfly; threatened status

Objectives

- Use GIS to:
 - Analyze environmental conditions contributing to the current distribution of false brome in western Oregon
 - Predict future spread of false brome
 - Assess possible impacts of false brome invasion on Kincaid's lupine
 - Identify places to focus efforts to fight false brome's spread

Process Overview

- Identify false brome environmental preferences
- Find data layers for analysis
- Process data layers
- Create suitability map for false brome establishment
- Determine if Kincaid's lupine is at risk from false brome invasion
- Determine priority recreation sites for fighting the human aided spread

False Brome Dispersal Mechanisms

- Can regenerate from fragments
- Seed is typically wind dispersed
- Seeds can establish over large areas by attaching to animals/humans



Environmental Preferences

- dry and/or warm habitats
- elevational range: 200 to 3,300 ft
 - Prefers lower elevations
- broad environmental amplitude
 - No known preference for:
 - Slope\aspect
 - Light conditions



Data Layers

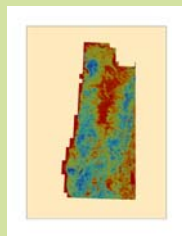
- False brome location shapefile - False Brome Working Group
- Temperature layer - USDA
- County shapefile and publicly owned land shape file - Oregon Geospatial Clearinghouse
- Dem's for Northwest, West, and Southwest Oregon - Geospatial Clearinghouse
- Precipitation layer - NRCS
- Recreation sites - National Forest website
- Road shapefiles for each county - University of Oregon

Methods

- Study Area
 - Western Oregon
- Mosaic of DEMS
 - NW, SW, W
- Used as source extent, cell size, and projection for remaining layers
 - Cell size: 10 sq meters
 - Projection:
 - NAD 83 Lambert Conformal Conic

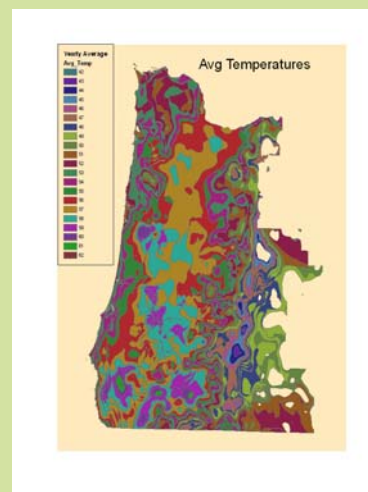
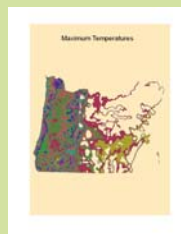


Slope & Aspect

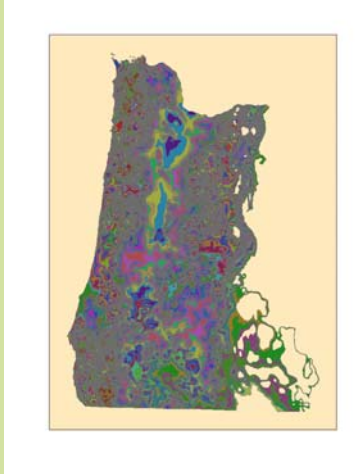


- Compared to point data of false brome infestation
- Based on literature and analysis, slope & aspect do not play an important role in spread

Mean Annual Temperature



Precipitation



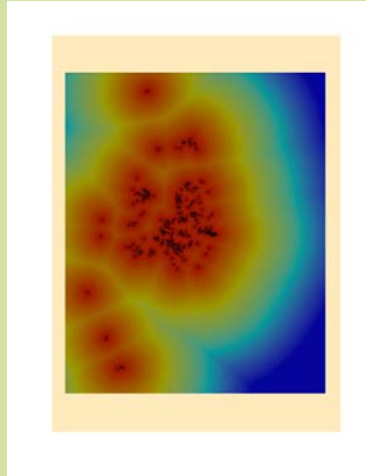
Roads

- Roads play an important role in site suitability
- False Brome often becomes established along road sides.
- Mosaic all roads in western Oregon.



Distance to Established Points

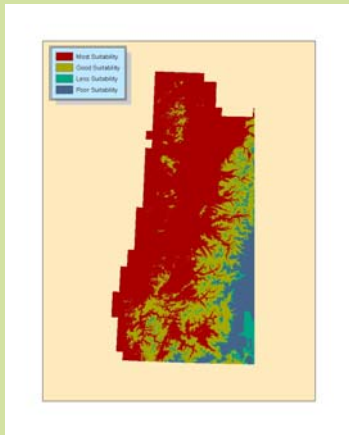
- The source of all infestation is obviously seeds
- Generated a distance raster from established false brome points



Suitability Maps

- Five suitability maps were generated
 - Elevation
 - Temperature
 - Precipitation
 - Proximity to roads
 - Proximity to established sites
- Based on 4 suitability values
 - 1- Best Suitability
 - 2- Good Suitability
 - 3- Less Suitability
 - 4- Poor Suitability

Elevation Suitability



- Suitability Values
Based on literature
and observation

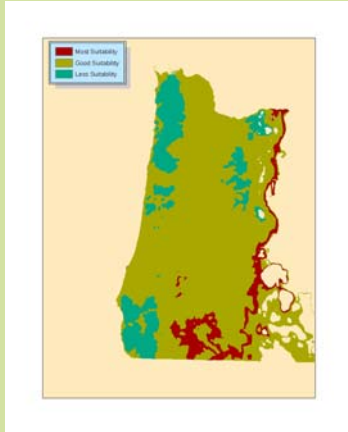
- 1: 0-1999ft
- 2: 2000-3999ft
- 3: 3999-4500ft
- 4: >4500

Temperature Suitability

- False Brome can live in a wide variety of temperature ranges.
- In its native range, it prospers between 43-46°F
- Suitability Values
 - 1: 43-46°F
 - 2: All other Values



Precipitation Suitability



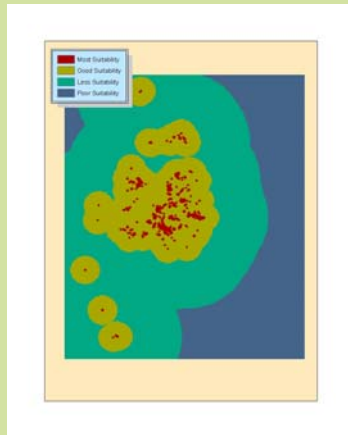
- Native Range: Found in areas between 24-34 inches annual precipitation.
- Prefers slightly drier sites but no bounding limits
- Suitability Values
 - 1: 24-34"
 - 2: <24" and 35-89"
 - 3: >89"

Proximity To Roads

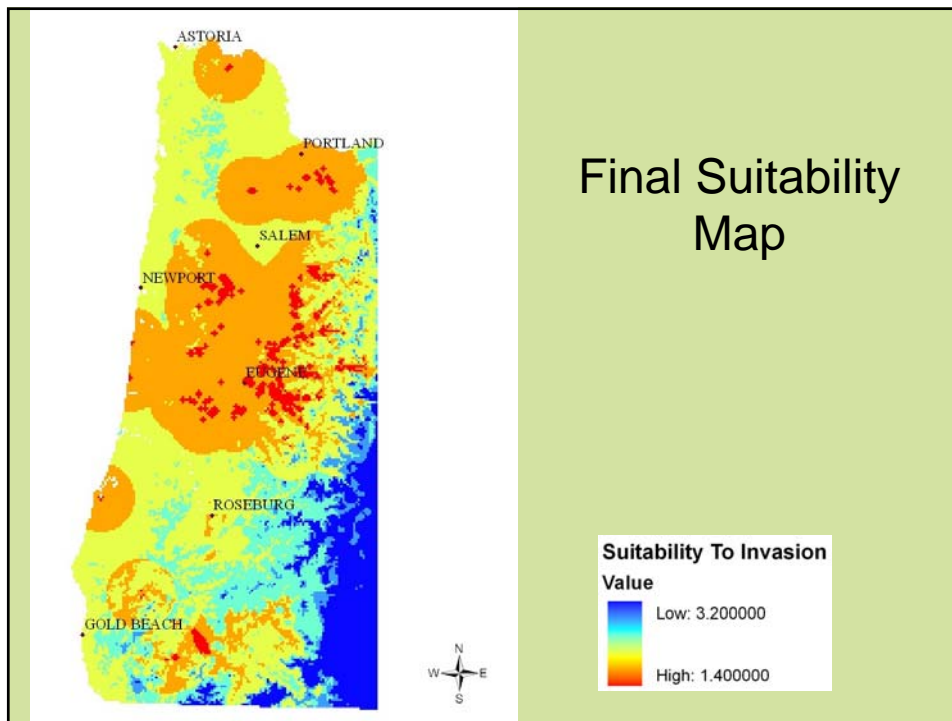
- Roadways play a major role in dispersal.
 - Disturbance, cars, humans all play role in distribution
- Suitability Values
 - 1: 0-1mi
 - 2: 1-5mi
 - 4: >5mi



Proximity to Established Sites



- Established sites are the most likely source of dispersal.
- False Brome seeds are wind dispersed and can travel long distances
- They also use animals as a dispersion vector.
- Suitability Values
 - 1: 0-1mi
 - 2: 1-5mi
 - 3: 5-50mi
 - 4: >50mi



Two Analysis Questions

Will the spread of False brome adversely effect the rare plant Kincaid's Lupine?

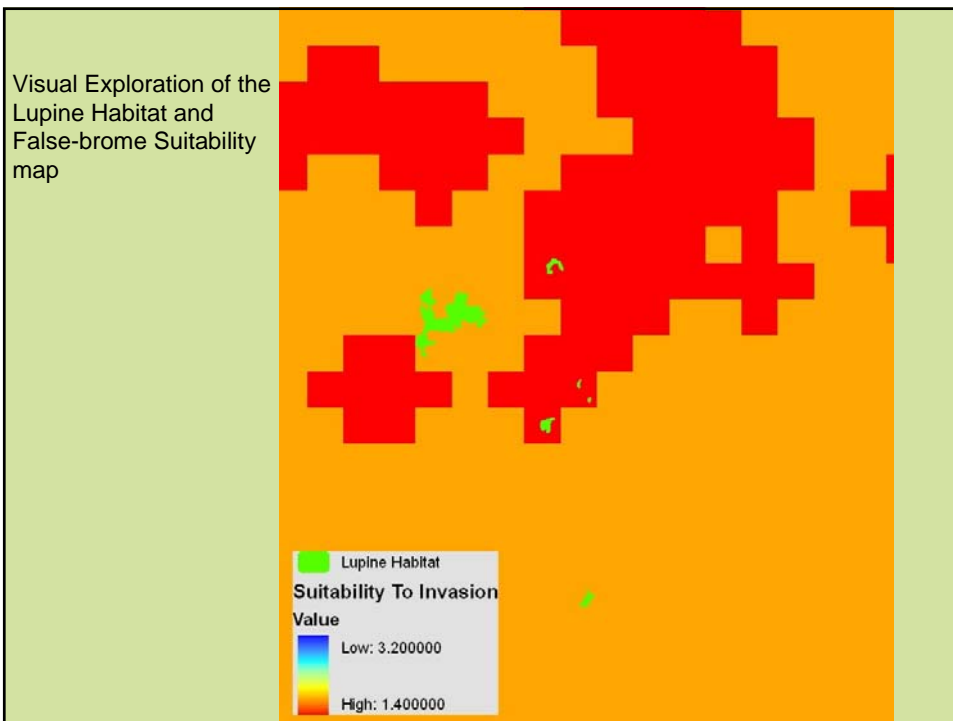
Where are the locations that we should focus our resources to try and fight the human aided spread of False brome?

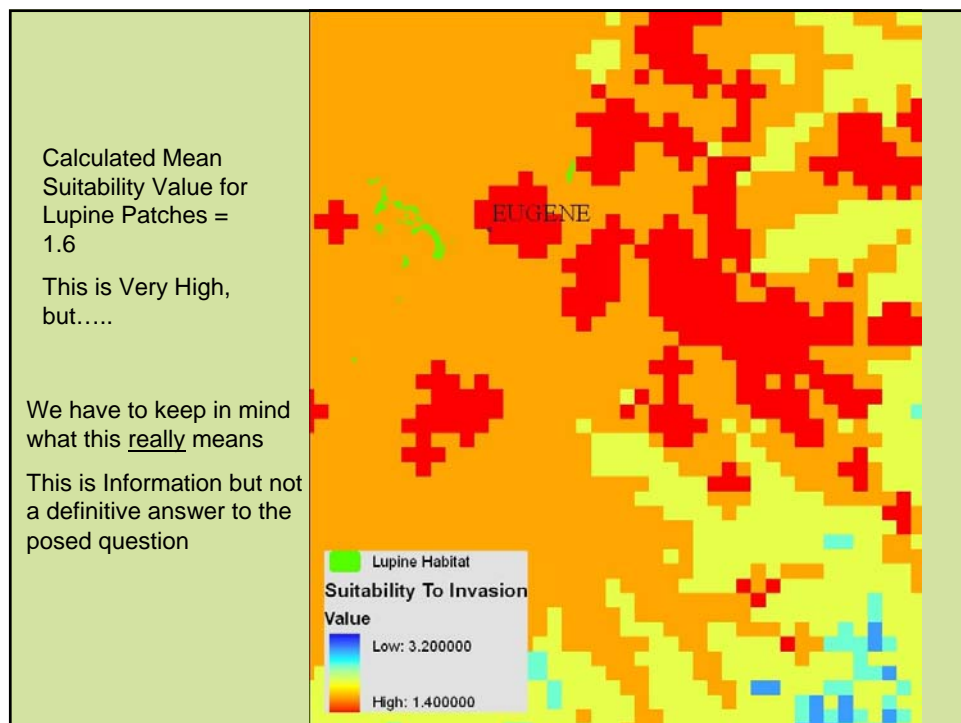
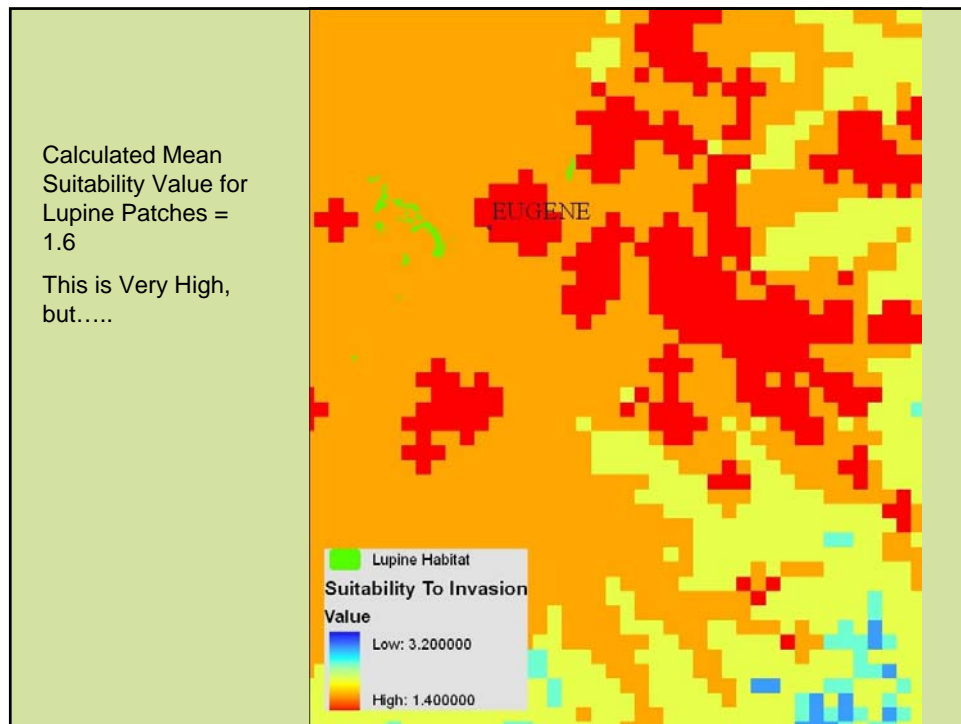
Question 1: Will the spread of False brome adversely effect the rare plant Kincaid's Lupine and the associated rare Fenders Blue Butterfly?

- **The interactions between the 3 species**
- **The areas where these species may overlap in range**

Determine the areas where these species may overlap in range

- **Compare a suitability analysis for Kincaid's Lupine the False brome invasion suitability analysis**
- **Compare surveyed locations of Kincaid's lupine to the False Brome invasion suitability analysis**





Where are the locations that we should focus our resources to try and fight the human aided spread of False-brome?

- **Identify possible recreation sites**
- **Identify the suitability values at those sites**
- **Display sites based on suitability values**



RECREATION ALERT!

Invasive Plant Watch

revised September 2003



False-brome (*Brachypodium sylvaticum*) is an invasive grass species that is rapidly expanding in the Pacific Northwest. One of the epicenters for false-brome is the McDonald-Dunn Research Forest, and people are unknowingly the major agents for seed dispersal.

Forest managers are actively working to reduce the spread of invasive species, but **WE NEED YOUR HELP**.

Visitors to the forest are urged to remove false-brome seeds from their clothing, footwear and bikes before leaving the forest. The **Three Sisters Wilderness, Cape Perpetua, the Metolious Headwaters, and the Rogue River** are just a few areas that have seen recent invasion of false-brome; most likely a result of seeds hitchhiking on unsuspecting recreationists like yourself!

What you can do...

Clean your shoes, bikes & rigs before recreating in new places.



False-brome seeds will hitch-

Recreation Sites

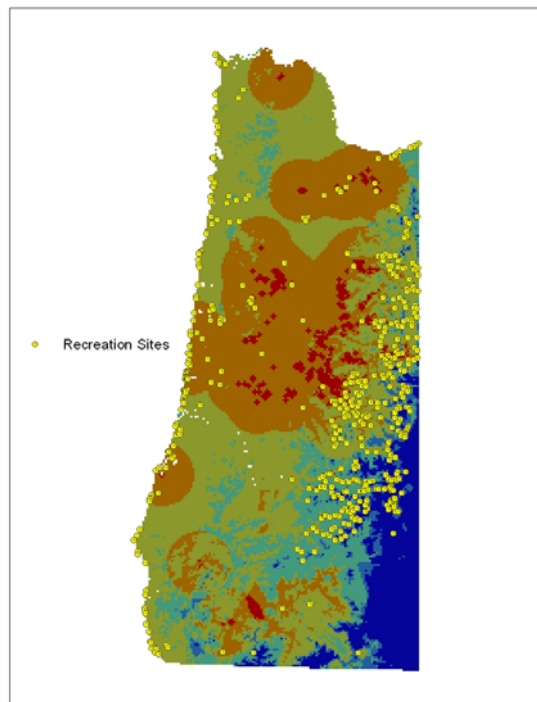
- Trail Heads
- Campgrounds
- State Parks
- Etc.

Data From 4
National Forests:

- Willamette
- Siuslaw
- Mount Hood
- Umpqua

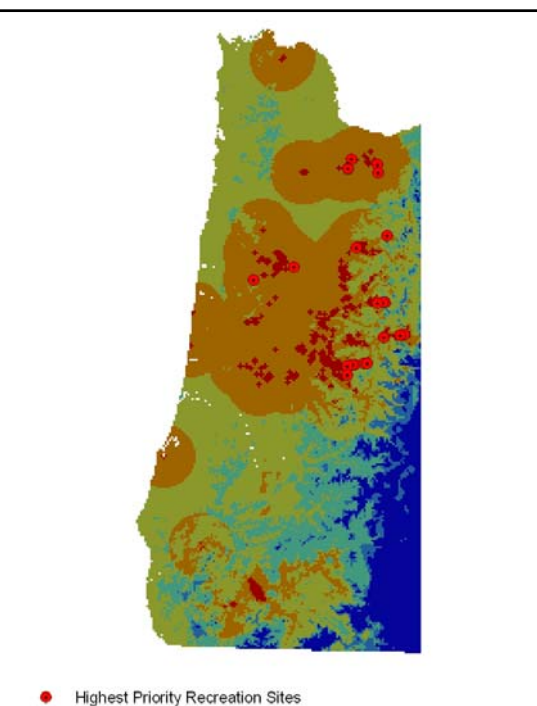
And Oregon Land
Ownership Layer

- State Parks



Sites with the Highest Suitability

Suitability
Values Lower
Than 1.4



Sites with the Highest Suitability and High Suitability

Suitability Values Lower Than 1.6



○ High Priority Recreation Sites
● Highest Priority Recreation Sites

Conclusions

- Suitability analysis confirms prior research findings
- Western Oregon is highly suitable
- Unlikely to spread east because of Cascades (elevation)
- Most likely to spread north into Washington and south into California
- Our prediction model indicates Kincaid's lupine habitat is at risk from false brome invasion

Critiques

- **Study Area could have been broader**
 - Eastern Oregon, Washington, and California
- **No specific consideration of interactions between False-brome and Kincaid's Lupine**
- **Coarse scale of final suitability analysis**
- **Subjectivity of some of the suitability decisions**
- **Could have incorporated more data sources for some aspects of suitability**
 - Vegetation, Land Use, Soil Moisture, Soil Type

Problems with our analysis

- Other researchers included soil moisture and vegetation layers in their false brome prediction models
- We could not use these layers in our study because:
 - Gap vegetation data corrupted?
 - Given the broad environmental amplitude of false brome, a vegetation layer was not necessary
 - Study area too large: soil datasets too large