

### ArcFuels - Rapid Design and Evaluation of Landscape Fuel Treatment Projects

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Joint Fire Science Program

Research supporting sound Decisi

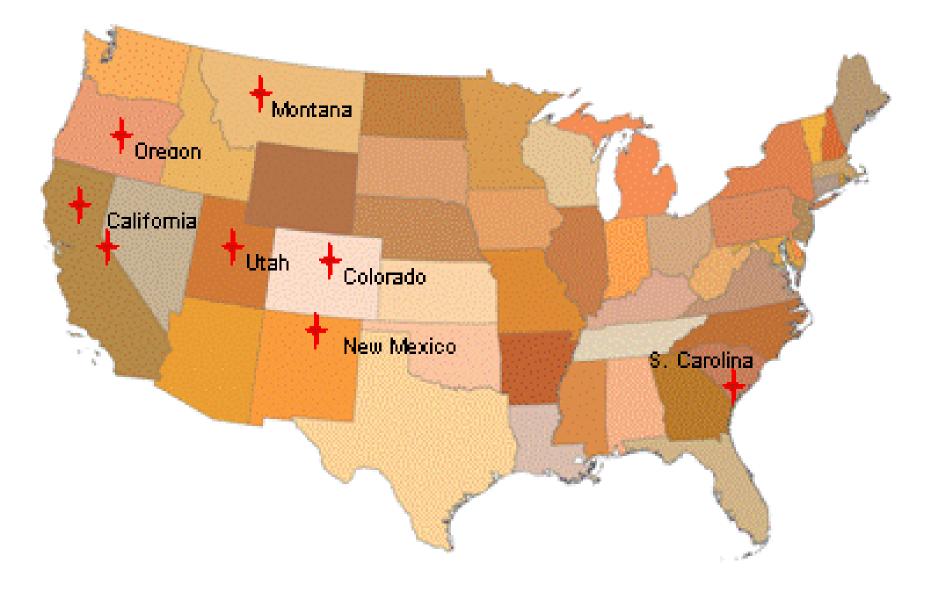


### 2005 SPOTS Pilots

**SPOTS: Spatially optimized treatments** 2. Create a consistent, interagency framework for strategic placement of treatments 3. Identify interconnecting suite of tools for strategic spatial analysis 4. Identify barriers 5. Accountability and metrics



## 2005 SPOTS Pilot Locations +





- **OTS Evaluates Landscape atment Pattern** ectiveness on "Problem"
- S
- ge fires
- igerous to the public
- naging to private property and
- able resources

### **SPOTS Process**

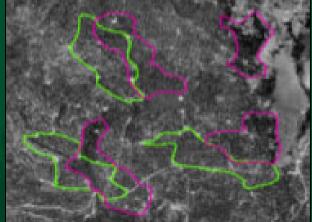




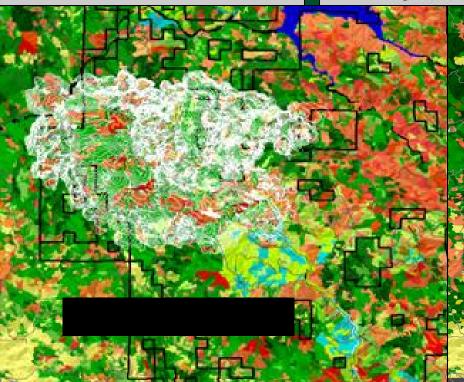
Collabortive learning in action



Real-time scenario building on dry erase whiteboard



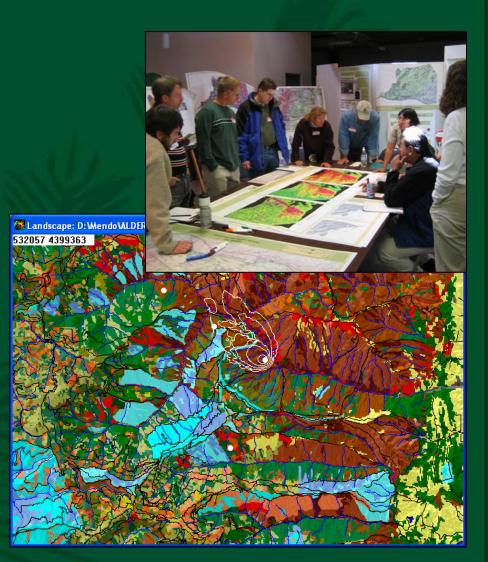
Scenario adjustments for multiple resource benefits





# What we learned from SPOTS

- Data prep and modeling treatment alternatives was a huge workload
- Lacked a consistent metric treatment performance metric
  - Needs to consider unpredictable wildfire events
- Excellent communication and consensus tool





Developing an Analysis and Planning Framework for District-Level Fuels Treatment Projects JFSP Project 03-4-1-04



Lessons from SPOT

**Risk Analysis** 

New ArcGIS 9.0

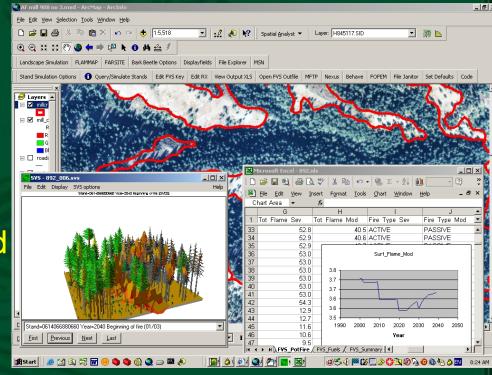




#### **ArcFuels**

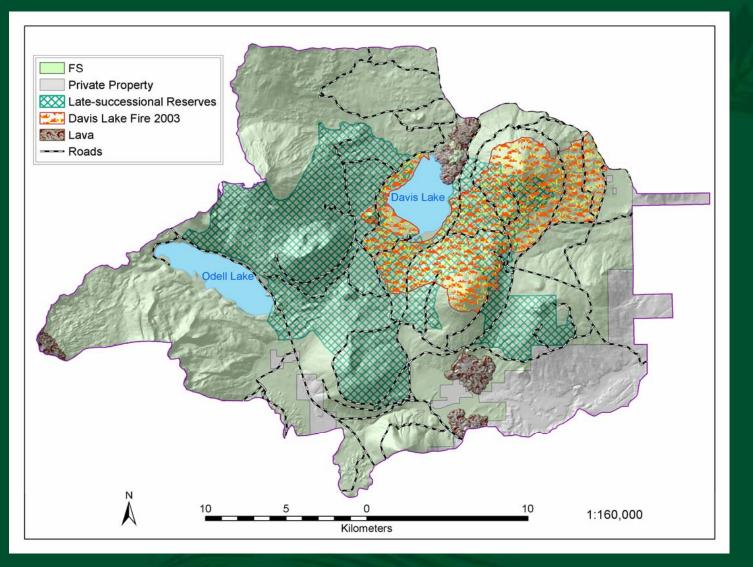
- Integrates fuels data, fire models, desktop office software into ArcMap
- Helps bridge the gap between the GIS analysts/data stewards and fire modeling community
- Appears as two toolbars in ArcMap
- Rapid design and testing of fuel treatment scenarios
- Uses both Landfire and stand inventory data
- No installation, etc.





### Case Study: Five Buttes Project, Deschutes NF



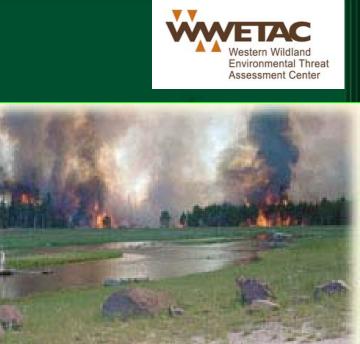


#### Ager et al. Forest Ecology and Management 246:45-56

#### 2003 Davis fire

21,000 acres
24% of the Davis owl reserve burned
5,759 acres of habitat lost
2004 District proposes Five Buttes fuel treatment project











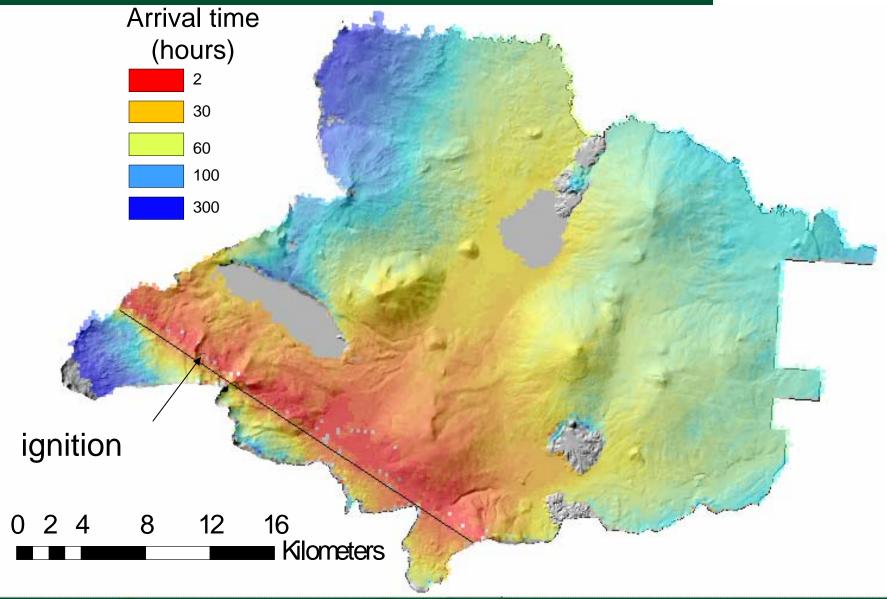


# Step 1. Assess problem fire topology with FlamMap

- Arrival time
- Travel routes
- Burn probability
- Fire size potential



#### Wildfire arrival time for a large fire

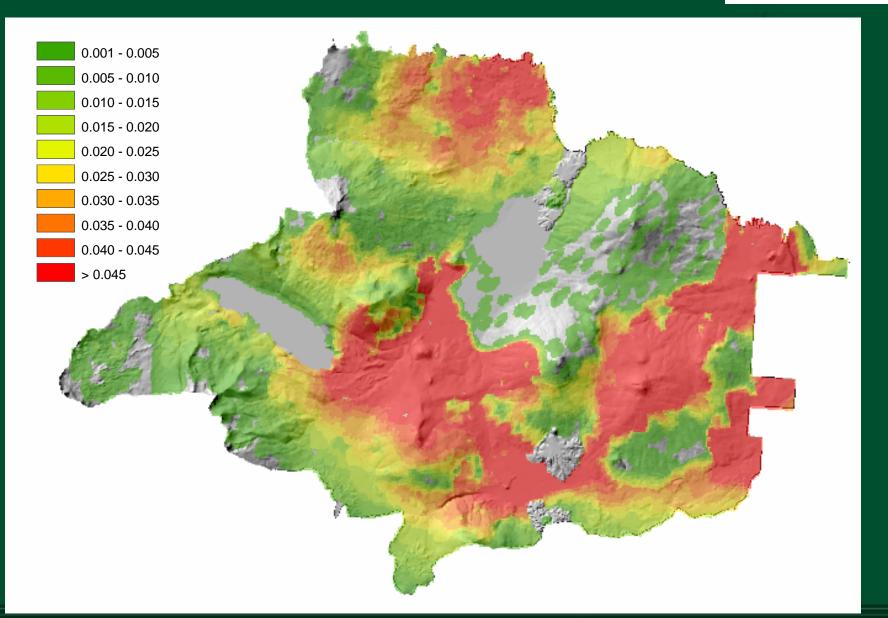


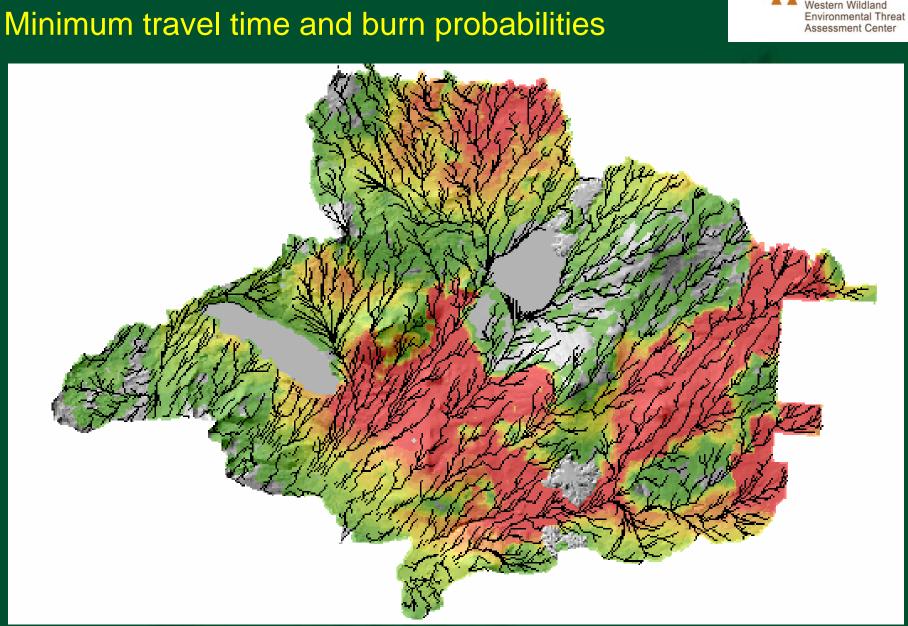


# Minimum travel time routes 16 12 8 () Kilometers

# Burn Probability - No treatments, 2000 wildfires, 24 hour burn periods

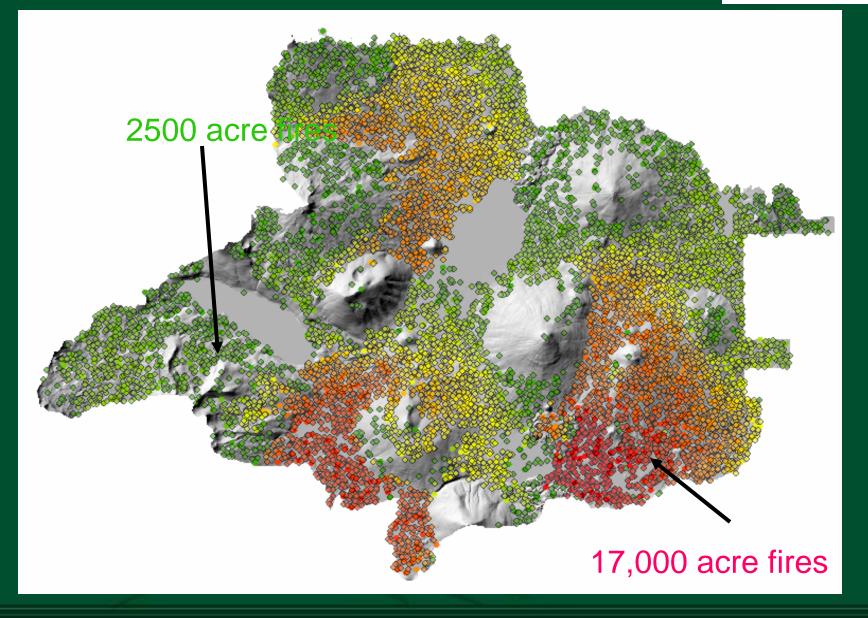






# Potential fire size - size of fire generated from each ignitions





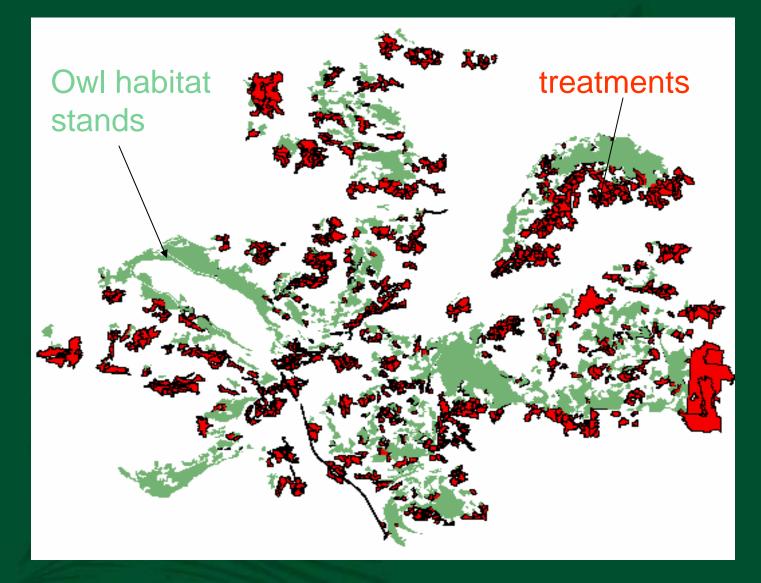


# Step 2. Design treatments

- Treatment Optimization
- Protect specific resources
- FRCC
- Etc.

# Treat 20% of the landscape to protect remaining owl habitat







# Step 3. Assess treatments

Change in burn probability

Reduction in risk

Burn probability for 4 treatment scenarios

×

#### 0% treatment

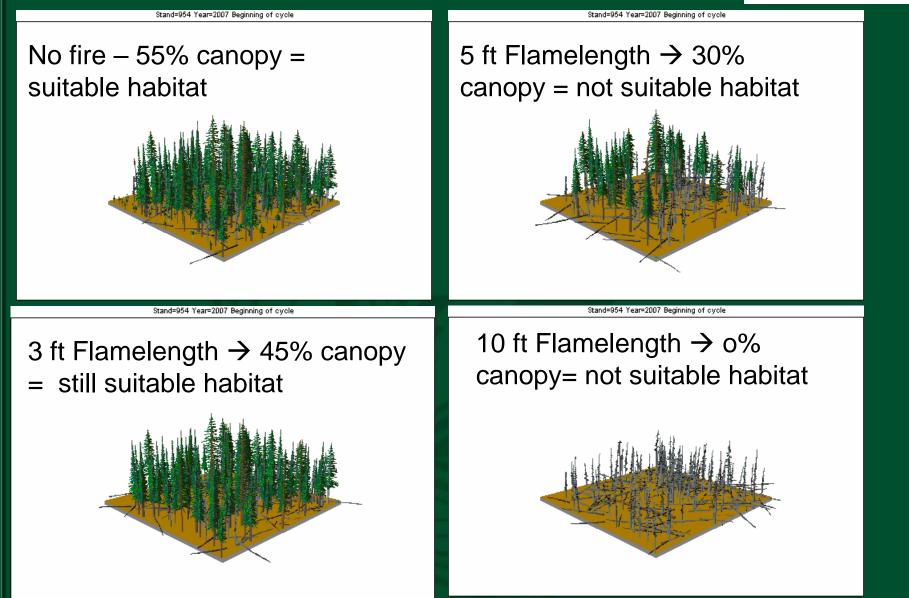


#### 20% treatment

#### 50% treatment

# Burn probability does not indicate loss – need to consider fire intensity



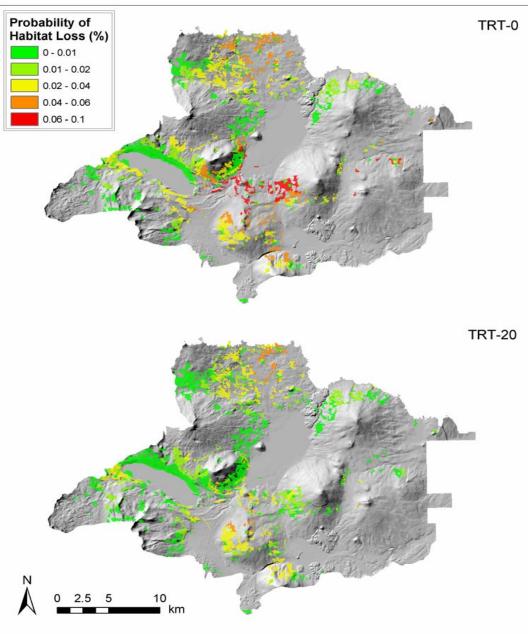




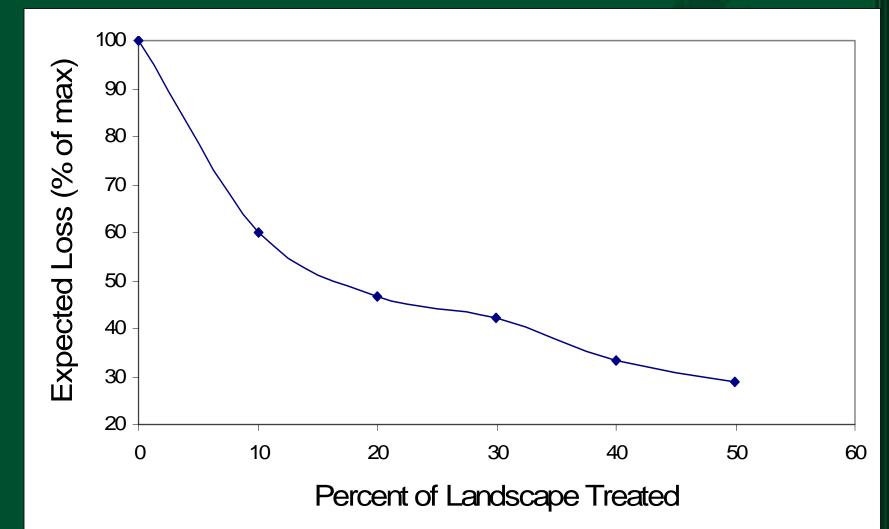
#### Calculala the probability of a fire that eliminates owl habitat

#### "expected loss"

Integrates fire spread, intensity, and effects of a problem fire



#### Expected Loss of Spotted Owl Habitat for 6 Treatment Intensities



Environmental Threat

Assessment Center



# Towards a Risk Analysis Framework

- Consider likelihood, intensity, and effects
- Risk = probability<sub>(intensity)</sub> x loss<sub>(intensity)</sub>
- Fuel treatments can mitigate risk by targeting one or more risk factors
  - Reduce likelihood
  - Reduce intensity
  - Reduce effects

Intensity

**Risk** 

## **ArcFuels - Status**



- Website online
- Adopted by the R5 Fireshed and Stewardship Assessment Process
- Support by the WO RD&A Charter (Szymoniak), Fuels Modeling Institute, INFORMS, and the Western Threat Center
- User interest from all federal land management agencies
- Three workshops completed last spring
- National Rapidspot workshop in Portland Nov 6-8
  - Co-sponsored by WWETAC and WO
  - Nine invited teams come with data and projects
  - Teams leave with substantial part of the analysis completed for the selected project



### Future

- Integrate Rapidspot training into fire management coursework
- Hybridize Rapidspot with the WFDSS style web-based project management system
  - Create an interagency inventory and reporting system for fuel treatment and wildfire risk assessment projects at all scales
  - District NEPA, Forest level risk assessments, FPA, Forest Planning, etc.
  - Strive for a uniform analysis framework
  - Integrate risk assessment process to address GAO and OIG reports

#### Treatment design - ArcFuels

#### Risk outputs for NEPA

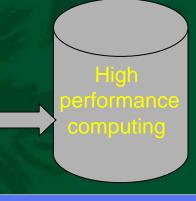
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#### Website for processing risk analyses

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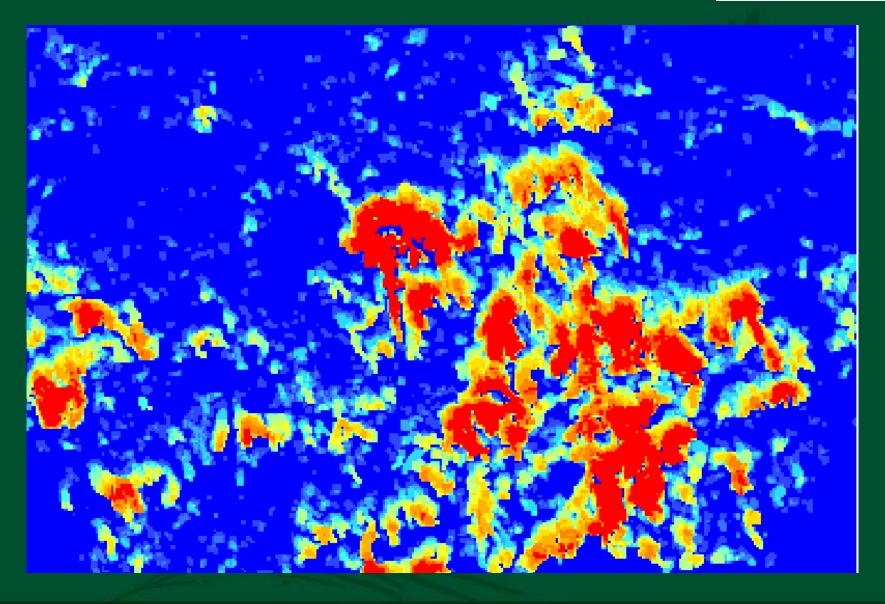


#### National fuel treatment summaries



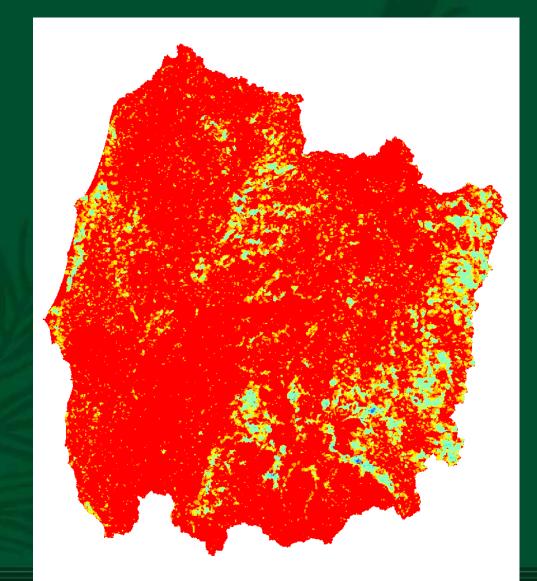
#### Ochoco NF





# 8.5 million acres SW Oregon





# www.fs.fed.us/pnw/wwetac/arcfuels aager@fs.fed.us

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