Fire History and Wildfire Risk Within Rogue Source Areas

28 February 2019

Kerry Metlen, Ph.D.; Forest Ecologist

Contact: kmetlen@tnc.org
People and Nature are threatened by uncharacteristic fire

- Integrate across objectives
- Explicitly account for fire
- Collaborate
- Be broad-based and transparent
Fire Environment
What Controls Fires?

**Local Fire Controls**
- Fuels
- Landscape Context
- Ignition patterns
- Fire weather

**Regional Fire Controls**
- **Regional Climate**
  - Latitude
- **Vegetation types**
- **Successional processes**

<table>
<thead>
<tr>
<th>Burn Severity</th>
<th>Time Since Previous Fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Years</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Decades</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Large trees resistant to surface fire**
- **Large trees lacking, high severity fire under most burnable conditions**
- **Mixed severity fire in a matrix of resistant and resilient forest**
- **Large trees and moderate weather/moist fuels favor low severity despite heavy fuel loads**

- **WEATHER/IGNITION LIMITED**

Photo credits clockwise from upper left: Web, Keith Perchemlides, Scott Harding, Marko Bey, and Keith Perchemlides.
Landscape Stewarded by *Frequent* Mild Fire
Vegetation and Fire Regimes of the Rogue Basin

- **Grassland**
  - Infrequent, severe fire
  - Few references, less certainty

- **Oak woodland**
  - Frequent, maintenance fire
  - Robust references, high certainty

- **Chaparral**

Redrawn from Franklin & Dyrness 1988 and Briles et al. 2005
Local Fire Regime Lines of Evidence

• Historical narratives
• Paleoecology
• Historical stand structures and species
  – inferred fire regime
    • Historical aerial photos
    • Historical stand structure – Data or GLO
• Fire scars recorded in trees
  – direct measure of fire periodicity and seasonality
Dendrochronology at Multiple Scales

Topography + Diverse Geology + Fire = Diverse Interspersed Habitats

- Grassland
- Ceanothus
- Conifer
- Mixed oak woodland
- Manzanita

Photo: Keith Perchemlides
Local Fire History

Composite site fire return interval
– 8 years on a 16 acre area

Point fire return interval
– 13 years (at a given scarred tree)

Local-scale, among sites
8-Year Historical Fire Return

Stand-scale frequent fire, ending in the 1800s

<table>
<thead>
<tr>
<th>Forest Type</th>
<th>Fire Return Interval</th>
<th>Seasonality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry mixed conifer</td>
<td>8 (1-76)</td>
<td></td>
</tr>
<tr>
<td>Yellow pine</td>
<td>9 (1-33)</td>
<td></td>
</tr>
<tr>
<td>Mixed evergreen</td>
<td>9 (2-52)</td>
<td></td>
</tr>
<tr>
<td>Moist mixed conifer</td>
<td>13 (1-116)</td>
<td></td>
</tr>
<tr>
<td>Red fir</td>
<td>14 (7-148)</td>
<td></td>
</tr>
</tbody>
</table>

Studies are:
1 - Beaty & Taylor (2007);
2 – Fry & Stephens (2006);
3 – Moody et al. (2006);
4 – Norman & Taylor (2005);
5 – Skinner (2003);
6 – Skinner et al. (2009);
7 – Stephens & Collins (2004);
8 – Taylor & Skinner (1998);
9 – Taylor & Skinner (2003);

Forests of Today are Dramatically More Dense and Fire Sensitive

1939

2009

1911 reconstructed stands
Trees > 4 inches DBH
50 trees/ acre

2011 current condition
Trees > 4 inches DBH
176 trees/ acre
Rogue Basin Forests and Woodlands

- 4.2 million acres
- Late seral forest severely deficit
- 2.1 million ac overly dense


Suppressed mild fires aggravates future Wildfire!

Remember—Only you can Prevent Forest Fires!

Remember—Only you can Prevent THE MADNESS!
Area burned will increase with climate change
Even With Full Suppression

Littell et al. 2013
Supports:
Best Science: Treatments work!

- Fuel treatments are highly effective at a landscape scale
- Large events can overwhelm individual treatments
- Thinning with controlled burning is most effective


The Choice: Vicious or Virtuous Cycle


The Problems

<table>
<thead>
<tr>
<th>Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temperatures</td>
</tr>
<tr>
<td>• Drought</td>
</tr>
<tr>
<td>• Fire probability and effects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Altered Landscapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Elevated wildfire risk</td>
</tr>
<tr>
<td>• Diminished old growth</td>
</tr>
<tr>
<td>• Overly dense forests and altered species mix</td>
</tr>
<tr>
<td>• Endangered species</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ecosystem Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Water</td>
</tr>
<tr>
<td>• Jobs</td>
</tr>
<tr>
<td>• Biodiversity</td>
</tr>
<tr>
<td>• Carbon</td>
</tr>
</tbody>
</table>
Modern Fire Environment
Management Options

Managed Fire
- Protect communities
- Controlled burns
- Improved suppression options and safety

Protect and Promote Complex Forests
- Protected areas
- Thinning to accelerate old growth development
- Proximal proactive management

Proactive Ecological Thinning
- Integrate fire management
- Resilient landscapes of open and closed forest
- Revenue and support to local economies
Forest Thinning
(Structure and Tree Species)
Thinning + Controlled Burning

Forest composition and structure
- Species selection
- Density
- Canopy layers
- Spatial patterning

Forest function
- Fuels and future fire behavior
- Light availability
- Nutrient cycling and soils
- Seedling establishment

Photo: Keith Perchemlides (TNC)
What are Wildfire Risk Assessments?

2015 - National Wildfire Hazard Potential = Likelihood & Intensity

2016 – Rogue Basin Risk Assessment
2018 – Pacific Northwest
1. Can be used as a direct measure of hazard
2. Foundational for calculating risk
Values and Their Susceptibility to Fire

Response Functions (Susceptibility)

<table>
<thead>
<tr>
<th>Sub-HVRA</th>
<th>FIL1</th>
<th>FIL2</th>
<th>FIL3</th>
<th>FIL4</th>
<th>FIL5</th>
<th>FIL6</th>
<th>spark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell towers</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-60</td>
<td>-80</td>
<td>-90</td>
<td></td>
</tr>
<tr>
<td>Electric transmission lines</td>
<td>20</td>
<td>20</td>
<td>0</td>
<td>-20</td>
<td>-60</td>
<td>-80</td>
<td>-80</td>
</tr>
<tr>
<td>FS Repeaters</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-60</td>
<td>-80</td>
<td>-90</td>
<td></td>
</tr>
<tr>
<td>Wooden bridges</td>
<td>-40</td>
<td>-50</td>
<td>-60</td>
<td>-70</td>
<td>-80</td>
<td>-90</td>
<td></td>
</tr>
<tr>
<td>Other comm sites</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-60</td>
<td>-80</td>
<td>-90</td>
<td></td>
</tr>
</tbody>
</table>

Risk Products

Burn Probability

Relative Importance

PNRA Overall Relative Importance
## Assets (no benefits from fire)

<table>
<thead>
<tr>
<th>HVRA</th>
<th>Sub-HVRA</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>Comm Sites/Cell Towers</td>
<td>0</td>
<td>0</td>
<td>-10</td>
<td>-20</td>
<td>-30</td>
<td>-30</td>
</tr>
<tr>
<td></td>
<td>Electric Trans-Line/Sub</td>
<td>0</td>
<td>0</td>
<td>-20</td>
<td>-20</td>
<td>-20</td>
<td>-20</td>
</tr>
<tr>
<td>Non-residential</td>
<td>Fire Lookouts</td>
<td>0</td>
<td>-10</td>
<td>-30</td>
<td>-60</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>National Park Structures</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Ski Area Buildings</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>USFS Cabins/Structures</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td>Recreation</td>
<td>Recreation Sites</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Ski Area (Mt. Ashland)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td>Pacific Crest Trail</td>
<td>0</td>
<td>0</td>
<td>-10</td>
<td>-10</td>
<td>-20</td>
<td>-20</td>
</tr>
<tr>
<td>Water Assets</td>
<td>Canals-Irrigation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-10</td>
<td>-10</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>Reservoirs - Drinking</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
</tr>
<tr>
<td>Where People Live</td>
<td>Residences &lt;1 / 40 ac</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 1/10 - 1/5</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 1/2 to 3/ac</td>
<td>-10</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 1/20 - 1/10</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 1/40 - 1/20</td>
<td>-10</td>
<td>-20</td>
<td>-40</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 1/5 - 1/2</td>
<td>-10</td>
<td>-40</td>
<td>-60</td>
<td>-100</td>
<td>-100</td>
<td>-100</td>
</tr>
<tr>
<td></td>
<td>Residences 3+/ac</td>
<td>-20</td>
<td>-60</td>
<td>-80</td>
<td>-100</td>
<td>-100</td>
<td>-100</td>
</tr>
</tbody>
</table>

*Fire Intensity Level: 1 = 0-2 foot flame lengths, 2 = 2-4 foot flame lengths, 3 = 4-6 foot flame lengths, 4 = 6-8 foot flame lengths, 5 = 8-12 foot flame lengths, 6 = >12 foot flame lengths*
**Resources May benefit from fire**

*Fire Intensity Level: 1 = 0-2 foot flame lengths, 2 = 2-4 foot flame lengths, 3 = 4-6 foot flame lengths, 4 = 6-8 foot flame lengths, 5 = 8-12 foot flame lengths, 6 = >12 foot flame lengths

**NSO=Northern Spotted Owl

**NRF NSO=Nesting, Roosting, and Foraging Northern Spotted Owl Habitat
Oregon Explorer

https://tools.oregonexplorer.info/OE_HtmlViewer/Index.html?viewer=wildfireplanning

Oregon Explorer Teresa Alcock (Teresa.ALCOCK@oregon.gov) – Water Intake Brian Fulfrost (Brian.FULFROST@state.or.us)
We will be reviewing PODs for the Rogue Basin March 16 and 17, stay tuned
Red Dot = Point of Risk

Blue Shade = Fire source
Rogue Basin Cohesive Forest Restoration Strategy: A Collaborative Vision for Resilient Landscapes and Fire Adapted Communities

Wildfire Risk Mitigation
Ecological Restoration Need

Forest and Wildland Fire Management that Benefits People and Nature
Transformative Land Management NOT Business As Usual
