Implications of Lower Recent Fire Risk for Stand-Level Restoration

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Based on estimates of rates of high-severity wildfire:

1. Oregon Eastern Cascades Province: 69-yr high-severity fire rotation, based on preliminary data on the 2003 B&B fire
2. Oregon Klamath Province: 105-year high-severity fire rotation

Extrapolated from these Province estimates to Cascades/Klamath scale

“…the rate of loss of older forests to stand-replacement wildfire has been relatively high…there is evidence that wildfire activity will continue or increase…thus, it is unlikely that designating Spotted Owl habitat reserves within fire-prone landscapes will be effective”

(Recovery Plan, p. 20)

Proposed in three E. Cascades Provinces:
1. No reserves in dry forests
2. Fuel treatments on up to 65-70% of dry forests
Test: Is Fire Risk High in Dry Forests?

– GIS analysis using more complete data:
    – Our RdNBR threshold represents about 60% mean % basal area mortality of trees $\geq 50$ cm dbh
  • Old forests: 1996 (Moeur et al. 2005)
  • Northwest Forest Plan federal lands
  • Dry forest provinces (www.reo.gov)

– High-severity fire rotation
  • period/fraction of area burned
  • 5, 10, 20-year periods to study effect of period

– Old-forest recruitment (Moeur et al. 2005)
No significant trend ($p = 0.346$) in percent high severity in Cascades/Klamath

Percent high severity of 20-25% similar to HRV (Hessburg et al. 2007)

Significant ($p = 0.045$) trend in rank-order area burned at high severity in Klamath

Not much can be made of trend analysis or future predictions—only 5 fires

Looks like lots of fire but fire rotations long; what is effect of period of observation?
High-Severity Fire Rotation Versus Period of Observation

Note: Based on total area burned on federal lands, not area burned in old forest.
## Old-Forest Recruitment Versus High-Severity Fire Rotation in Old Forests (1996-2005) in Dry-Forest Provinces

<table>
<thead>
<tr>
<th>Province</th>
<th>High-severity fire rotation (years)</th>
<th>Using average recruitment estimate&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Using low recruitment estimate&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington Eastern Cascades</td>
<td>372</td>
<td>7.06</td>
<td>3.53</td>
</tr>
<tr>
<td>Oregon Eastern Cascades</td>
<td>469</td>
<td>8.92</td>
<td>4.46</td>
</tr>
<tr>
<td>California Cascades</td>
<td>4,545</td>
<td>86.36</td>
<td>43.18</td>
</tr>
<tr>
<td>CASCADES</td>
<td>746</td>
<td>14.18</td>
<td>7.09</td>
</tr>
<tr>
<td>Oregon Klamath</td>
<td>233</td>
<td>4.42</td>
<td>2.21</td>
</tr>
<tr>
<td>California Klamath</td>
<td>1,351</td>
<td>25.68</td>
<td>12.84</td>
</tr>
<tr>
<td>KLAMATH</td>
<td>575</td>
<td>10.92</td>
<td>5.46</td>
</tr>
</tbody>
</table>

<sup>a</sup> Old-forest recruitment data from Moeur et al. (2005)
High-Severity Fire Occurred Historically and Spotted Owls May Use High-Severity Burns

- E. Cascades dry forests historically shaped by mixed-severity fires (Hessburg et al. 2007)
- Spotted owls use old forest, but may benefit from successional diversity created by fire (Franklin et al. 2000)
- Spotted owls may preferentially forage in high-severity fire areas (unless logged) likely due to greater prey abundance (Clark 2007, Bond et al. 2009)
- Inappropriate to assume that high-severity fire at current rates is a risk to NSO or represents habitat “loss”
Summary—Main Findings About Fire Risk & NSO

• Fire-risk assessment unreliable over short periods (e.g., 10, 20 yrs) and small areas (province scale). Need large areas, long periods:
  – Most burned area from a few fires that are large and spotty
  – Fire rotations are several centuries--10-year data far too short
    • Climatic teleconnections (ENSO, PDO) influential in short periods
• Reported decadal high-severity fire rotations in RP revised:
  – Cascades not 69 years, but 746 years
  – Klamath not 105 years, but 575 years
• Old-forest recruitment omitted in RP fire-risk assessment. Ratios of old-forest recruitment to high-severity burned area are high:
  – Cascades: 7.1 times (low est.) to 14.2 times (avg. est.)
  – Klamath: 5.5 times (low est.) to 10.9 times (avg. est.)
• Dramatic increase in high-severity fire (e.g., 5-10 times as many huge fires per decade) would need to occur for net declines in old forest to begin; high-severity rate not currently a risk to NSO
• Spotted owls do use high-severity burned areas, so not habitat loss
Implications for Stand-Level NSO Habitat Restoration

- Abandoning reserves/extensive fuel treatments not needed:
  - If anything is shown by decadal data, current fire risk is low
    - Allows us to focus on owl habitat needs, not risk of fire
  - Extensive action inconsistent with adaptive-management framework

- Using a precautionary approach: small-scale research & adaptive management to understand NSO response to:
  - Natural processes (wildfire, insect outbreaks)
  - Science-based actions aiming to enhance/restore NSO habitat
    - e.g., There are no empirical studies of NSO response to thinning in dry forests

- After findings at small-scale are available, can scale up:
  - Manage natural processes in ways found to benefit NSO
  - Implement enhancement/restoration actions found to benefit NSO

- In the meantime, take “No regrets” active/passive steps that benefit owls first and foremost
“No Regrets”—Maintain/Restore Known Stand-Level Habitat Features for NSO in Dry Forests

- High number/density of large (> 60 cm dbh) Douglas-firs or grand/white firs (King 1993, Buchanan et al. 1995, Everett et al. 1997)
- Large basal area, especially Douglas-fir (Buchanan et al. 1995, Pidgeon 1995)
- Large quadratic mean diameter of dominant trees (Lint 2005)
- High canopy cover (King 1993, Pidgeon 1995, Lint 2005)
- Multiple tree layers, including abundant medium & small grand/white fir or Douglas-fir (King 1993, Pidgeon 1995, Everett et al. 1997)
- High density of large pine snags in lowest decay class (Pidgeon 1995)
- Large volume of mature-sized down logs (Pidgeon 1995)
- High understory litter, ferns, and tall shrubs (King 1993, Pidgeon 1995)
More “No Regrets” Stand-Level Management for NSO in Dry Forests

**ACTIVE STAND-LEVEL MANAGEMENT**

- Actively manage wildfires for resource benefit
  - To maintain fire process essential to NSO in the longterm
- Reduce excessive human-caused fires in and near NSO habitat
  - Use temporary road closures during severe droughts
  - Reduce/redesign infrastructure to limit ignitions and fire spread
- Reduce human-caused high-contrast edges that favor ignition/spread
  - Edges from logging, roads, exurban development, powerlines
  - Redesign edges to lower ignition/spread probability
  - Limit or reduce edge-creating land uses in and near NSO habitat
- Limit invasion/expansion of fire-cycle invasive species (cheatgrass)
  - Restrict human access, livestock, heavy machinery near reserves
  - Directly control fire-cycle invasives/do not burn where they occur
- Carefully manage slash from restoration treatments/other activities
  - Rapid treatment of large quantities can damage soils/favor invasives
  - Failure to promptly treat slash undermines the purpose of treatments
More “No Regrets” Stand-Level Management for NSO in Dry Forests

PASSIVE STAND-LEVEL MANAGEMENT

• Designate NSO habitat-restoration areas
  – Management focused on restoring NSO habitat components
• Expand late-successional reserves
  – Add protection from post-fire logging to additional area
  – More fully encompass remaining nesting, foraging, roosting habitat
  – Include areas of dense, old firs among younger forests
• End post-fire logging in NSO habitat
  – So owls do not avoid logged areas they could use (Clark 2007)
• Protect and maintain natural heterogeneity from mixed-severity fires
  – To provide future habitat for NSO
  – Potential insurance against unexpected or severe climatic change
Summary

• Fire-risk assessments based on short periods and small areas are generally unreliable
  – If anything, these data indicate current fire risk is low and ample time is available for careful adaptive-management steps
    • Treatments can focus on NSO habitat improvement, not fire risk

• We suggest 3 approaches to NSO recovery in dry forests:
  1. First, conduct essential research, using small-scale adaptive management, to better understand NSO response to natural processes and potential active/passive restoration actions
  2. Afterwards, scale up, but continue adaptive management:
    • Appropriate management of natural processes that benefit owls
    • Active/passive restoration actions that benefit owls
  3. Meanwhile, undertake “No Regrets” active/passive management actions that address owl habitat needs first and foremost
Baker Handouts

• New spatial reconstruction of dry forests and fire, Pringle Falls area, AD 1880-1882
  – Dry forests commonly had understory pines, at times dense understory pines
  – Shrubs were abundant, usually dense
  – Tree density in many areas was high
  – Large trees common, but small trees numerically dominant

• Fire rotation and mean fire interval longer than previously thought

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References Cited


