A new approach to assessing coarse filter forest vegetation restoration needs: DRAFT METHODS

US Forest Service Region 6 and The Nature Conservancy

11/05/2013
Support by and THANK YOU to:

- Tom DeMeo, USFS
- Mike Simpson, USFS
- Shonene Scott, TNC
- Chris Ringo, USFS/OSU
- Kim Mellen-McLean, USFS
- Ayn Shlisky, USFS
- Jane Kertis, USFS
- Kori Blankenship, TNC/LANDFIRE
- Liane Davis, TNC
- Rick Brown
Uncharacteristic Events
Forest Values

www.mtbproject.com
Restoration as management paradigm

Photos: John Marshall
Conservation through restoration

Photos: John Marshall
Where, how much, what kinds of vegetation management for restoration?
Why is this important?
Quantifying the need for local, state, and national entities (funding!)
Telling the story: collaboratives, community groups, and popular media
Setting the context: appropriate treatments and use of limited resources
Assessing cumulative, regional scale impacts – are we making a difference?
Why Departed?

Photos: John Marshall
What needs to be done?

Photos: John Marshall
Other Assessments:

LANDFIRE Based Analysis

- 2006 TNC Oregon
- 2009 TNC Oregon
- 2012 TNC Oregon
- 2012 TNC Washington
- 2013 USFS R6
- 2013 TNC Oregon
2013 R6 Analysis –
A more robust product

• Explicit number of Acres needing Restoration, not just the amount of departure.

• **Active** and **Growth** Restoration Need

• R6-wide, all forested lands, all ownerships

• Based on best available data

• Various scales depending on scale of disturbance
Mission Statement:

The Nature Conservancy and Region 6 of the US Forest Service are conducting a joint analysis of the number of acres in need of treatment to restore historic/sustainable forest vegetation structure and composition across Oregon and Washington.

This work is intended to quantify the need for vegetation restoration and to set the context for appropriate vegetation restoration treatments at the scale of 5th field watersheds and larger geographic extents.

Methods and results will be communicated through traditional and innovative outlets including: open source peer-reviewed papers, general technical reports, briefing papers, infographics, postings on websites, and partner outreach.
Regional Restoration Needs
30,000+ ft. level

Watershed / Project Planning

Silvicultural prescriptions
“Active Restoration”

• Reduction in canopy cover and/or tree density.

• May be accomplished through fire or mechanical treatment.
Active Restoration Pathways

Treatment

Mid-Seral Closed Canopy

Mid-Seral Open Canopy

Late-Seral Closed Canopy

Late-Seral Open Canopy

forest diagrams based on illustrations by R. Van Pelt
“Growth Restoration”

• Successional processes, allowing a forest stand to grow into a later development successional class.
Growth Restoration Pathways

Time to grow

- Early Seral
- Mid-Seral Closed Canopy
- Mid-Seral Open Canopy
- Mid-Seral Closed Canopy
- Late-Seral Closed
- Late-Seral Open Canopy

forest diagrams based on illustrations by R. Van Pelt
1. Mapping & classification of “forest systems”

2. Modeled NRV reference conditions

3. Landscape unit delineation

4. Current conditions
1) Forest Systems

• Mapping
  – ILAP PVT

• Each PVT -> Landfire BpS model
2) NRV Reference Conditions

- NRV = ± 2 SD of stochastic range

Proportion of the system

<table>
<thead>
<tr>
<th></th>
<th>Early Seral</th>
<th>Mid-seral</th>
<th>Mid-seral</th>
<th>Late -seral</th>
<th>Late -seral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Closed</td>
<td>Open</td>
<td>Open</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Canopy</td>
<td>Canopy</td>
<td>Canopy</td>
<td>Canopy</td>
</tr>
</tbody>
</table>

Range of Variation (+ 2 SD)

Reference Condition (mean)

Caution: Generalized Dry Forest System
3) Landscape Delineation

- Base analysis unit = Landscape Unit + Forest System = “Strata”

- Different sized landscapes based on system and scale of historical disturbance
4) Current Conditions

GNN -> S-Classes

- BpS size and canopy cover thresholds per S-Class
- Map GNN size classes (7) and canopy cover (10)
- Map S-Classes
### Size Class definition:

<table>
<thead>
<tr>
<th>Class Code</th>
<th>Size Class</th>
<th>Size (DBH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G/F/S = 1</td>
<td>Early</td>
<td>(0 - 4.9&quot;)</td>
</tr>
<tr>
<td>SS/SAP = 2</td>
<td>Mid</td>
<td>(5 - 9.9&quot;)</td>
</tr>
<tr>
<td>POLE = 3</td>
<td>Mid</td>
<td>(10 - 14.9&quot;)</td>
</tr>
<tr>
<td>SM = 4</td>
<td>Mid</td>
<td>(15 - 19.9&quot;)</td>
</tr>
<tr>
<td>MED = 5</td>
<td>Mid</td>
<td>(20 - 29.9&quot;)</td>
</tr>
<tr>
<td>LRG = 6</td>
<td>Mid</td>
<td>(30&quot; +)</td>
</tr>
<tr>
<td>XLRG = 7</td>
<td>Late</td>
<td>(30&quot; +)</td>
</tr>
</tbody>
</table>

- **A**: Early
- **B**: Mid
- **C**: Mid
- **D**: Mid
- **E**: Late
- **Non-Forest**
4) Current Conditions
- Size Class
4) Current Conditions
- Canopy Cover
4) Current Conditions
- S-Class
1. Mapping & classification of “forest systems”

2. Modeled NRV reference conditions

3. Landscape unit delineation

4. Current conditions
Quantifying Restoration Need

<table>
<thead>
<tr>
<th>Proportion of the system</th>
<th>Early Seral</th>
<th>Mid-seral Closed – Canopy</th>
<th>Mid-seral Open – Canopy</th>
<th>Late -seral Open – Canopy</th>
<th>Late -seral Closed – Canopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Condition (mean)</td>
<td>10 - 13</td>
<td>15 - 20</td>
<td>30 - 35</td>
<td>35 - 40</td>
<td>38 - 42</td>
</tr>
<tr>
<td>Range of Variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quantifying Restoration Need

Reference Condition (mean)

Range of Variation

Current Condition

Deficit Conditions

Over-Abundant Condition

Proportion of the system

Early Seral

Mid-seral Closed – Canopy

Mid-seral Open – Canopy

Late -seral Open – Canopy

Late -seral Closed – Canopy

Reference Condition

10 -

20 -

30 -

40 -

50 -

Mean

Current Condition

Deficit Conditions

Over-Abundant Condition
<table>
<thead>
<tr>
<th>Donating Development Class</th>
<th>Early Devl.</th>
<th>Mid Closed</th>
<th>Mid Open</th>
<th>Late Open</th>
<th>Late Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Devl.</td>
<td></td>
<td>Grow w/o fire</td>
<td>Grow w/ fire</td>
<td>Grow w/ fire + Grow w/o fire</td>
<td>Grow w/o fire + Grow w/o fire</td>
</tr>
<tr>
<td>Mid Closed</td>
<td>Regen / high fire</td>
<td></td>
<td>Thin / low fire</td>
<td>Overstory Removal</td>
<td>Grow w/o fire</td>
</tr>
<tr>
<td>Mid Open</td>
<td>Regen / high fire</td>
<td>Regen / high fire + grow w/o fire</td>
<td>Grow w/ fire</td>
<td>Grow w/o fire</td>
<td></td>
</tr>
<tr>
<td>Late Open</td>
<td>Regen / high fire</td>
<td>Regen / high fire + grow w/o fire</td>
<td>Overstory Removal</td>
<td>Thin / low fire</td>
<td></td>
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<tr>
<td>Late Closed</td>
<td>Regen / high fire</td>
<td>Regen / high fire + grow w/o fire</td>
<td>Overstory Removal</td>
<td>Grow w/o fire</td>
<td></td>
</tr>
</tbody>
</table>

- = Active Restoration
- = Growth Restoration
- = Active AND Growth Restoration
Results!

We actually finished something! However, they may change.
Active Needs

Growth Needs

R6 Total Restoration Need (Acres)

<table>
<thead>
<tr>
<th></th>
<th>Active</th>
<th>Growth</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>11,277,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td>15,842,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>27,120,000</td>
</tr>
</tbody>
</table>
Forest Restoration Need

How much, where, and what kind of forest restoration is needed in the Pacific Northwest:

In partnership, The Nature Conservancy and the US Forest Pacific Northwest Region are assessing forest vegetation restoration needs across Washington and Oregon. While the need for ecological restoration is widely acknowledged, we currently lack a comprehensive understanding of where, how much, and what kinds of treatments are needed to restore historic / resilient forest vegetation. This analysis will assist TNC and USFS in "telling the story" of forest restoration needs and in setting the context for appropriate vegetation restoration treatments and use of limited resources.

Active Forest Restoration

Restoration through a reduction in canopy cover and/or tree density. By emulating natural disturbance processes, active restoration results in a transition to an earlier development stage(s) and/or to an open canopy by successional ecotones. Active restoration may be accomplished through fire, mechanical, or any other active means.

Understanding the Graphs

<table>
<thead>
<tr>
<th>Forest Restoration Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000-2,999</td>
</tr>
<tr>
<td>12,000,000</td>
</tr>
</tbody>
</table>

Passive Forest Restoration

Restoration through natural succession (including natural disturbance), which helps facilitate a forest stand to grow into a later development stage(s).

The Nature Conservancy
Active Restoration Need

<table>
<thead>
<tr>
<th>Region</th>
<th>USFS Active</th>
<th>Total Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBM</td>
<td>1.6</td>
<td>2.3</td>
</tr>
<tr>
<td>OEC</td>
<td>1.3</td>
<td>1.8</td>
</tr>
<tr>
<td>OSW</td>
<td>0.9</td>
<td>2.5</td>
</tr>
<tr>
<td>WEC</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>WNE</td>
<td>0.7</td>
<td>1.7</td>
</tr>
</tbody>
</table>
## Restoration Needs in Eastern R6

<table>
<thead>
<tr>
<th>Restoration Need in Acres</th>
<th>OBM</th>
<th>OEC</th>
<th>OSW</th>
<th>WEC</th>
<th>WNE</th>
</tr>
</thead>
<tbody>
<tr>
<td>USFS Active</td>
<td>1,596,000</td>
<td>1,281,000</td>
<td>993,000</td>
<td>377,000</td>
<td>766,000</td>
</tr>
<tr>
<td>Total Active</td>
<td>2,310,000</td>
<td>1,933,000</td>
<td>2,550,000</td>
<td>939,000</td>
<td>1,811,000</td>
</tr>
<tr>
<td>USFS Growth</td>
<td>1,388,000</td>
<td>735,000</td>
<td>438,000</td>
<td>300,000</td>
<td>740,000</td>
</tr>
<tr>
<td>Total Growth</td>
<td>2,108,000</td>
<td>1,195,000</td>
<td>2,034,000</td>
<td>717,000</td>
<td>1,691,000</td>
</tr>
<tr>
<td>Total Restoration Acres</td>
<td>4,418,000</td>
<td>3,129,000</td>
<td>4,584,000</td>
<td>1,656,000</td>
<td>3,502,000</td>
</tr>
</tbody>
</table>

The map illustrates the distribution of restoration needs across different regions, with varying shades indicating the level of active need. The legend at the bottom right provides a color code for the levels of active need.
Oregon Blue Mtns.

Active Needs

Growth Needs

- 0% - 25%
- 26% - 50%
- 51% - 75%
- 76% - 100%
Oregon Blue Mtns.

<table>
<thead>
<tr>
<th></th>
<th>USFS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acres</td>
<td>Acres</td>
</tr>
<tr>
<td>Active</td>
<td>1,596,000</td>
<td>2,310,000</td>
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<td>Total</td>
<td>2,984,000</td>
<td>4,418,000</td>
</tr>
</tbody>
</table>
Wet-side problems?!?

- Succession may not happen with growth alone
- Does not capture silvicultural treatment to promote OG development.
Next Steps

- New run of analysis to fix few bugs
- Manuscript for peer review
- Follow-up work for west side
- Internal TNC roll-out - January
- Public roll-out
Communication products

- Manuscript for F.E.M.
- Infographic & poster
- Short results white paper
- “Official” powerpoint slides
Thanks – Questions/Comments....
Completed Components

- Landscape units by FRG
- Forest type layer (ILAP PVT)
- PVT to BpS Crosswalk
- Stochastic ranges for BpS Reference models
- Region 6 size class decision tree
- “Size classing” script and size class layer
- S-Class rules look-up table
- “S-Classing” Script and draft S-Class layer
- Active / Passive restoration calculation logic and rules tables
- Active / Passive restoration calculations script and draft active / passive calculations
GNN -> Size Class

- **Solution:** Decision Tree process - “Modified Simpson-Shlisky”

- **CC** and **DBH** are the input data from GNN. Thresholds for each of the variables sets the size class.
  - Set by Forest System
S-Class Balance

NRV vs. current per “strata”
Active Restoration Treatment Process

This represents a generalized frequent-fire forest system.

**Suc**er**ess**ion **Clas**s
- Late - Seral Closed
- Late - Seral Open
- Mid - Seral Open
- Mid - Seral Closed
- Early Seral

**Proportion of the system**
- Reference Conditions (RC)
- Current Conditions (CC)
- Post-Treatment Conditions (PTC)

**Surplus = CC - RC**
Growth Restoration Treatment Process

This represents a generalized frequent-fire forest system.