Draft Results – Tapash Forest Collaborative Analysis of Forest Restoration Needs and Mechanical Treatment Opportunities.

03/10/2015

Through the Tapash Sustainable Forest Collaborative and the Inter-Tribal Timber Council's "Anchor Forests" project, The Nature Conservancy in Washington (TNC) and the University of Washington Rural Technology Initiative (UW RTI) and have partnered to evaluate forest restoration needs and possible mechanical restoration treatment opportunities across eastern Washington. These analyses are built largely upon two prior studies, the Washington Forest Biomass Assessment[1] and the TNC-USFS R6 Joint Analysis of Forest Restoration Needs[2].

This document provides draft results from the TNC-UW RTI Tapash Forest Restoration Needs and Mechanical Treatment Opportunity Analysis along with brief methodological descriptions and data definitions.

The TNC-USFS R6 Joint Analysis of Forest Restoration Needs[2] evaluated where, how much, and what types of "transitions" are currently needed to restore a Natural Range of Variability (NRV) in forest structure across eastern Washington. This study builds off the conceptual framework of the LANDFIRE and Fire Regime Condition Class (FRCC) programs and is based on four primary data inputs: 1) a classification and map of forested biophysical settings (ILAP[3]), 2) NRV reference conditions for each biophysical setting (Landfire[4]), 3) a delineation of "landscape units" for each biophysical setting, and 4) a map of present day forest vegetation structure (GNN[5]). For the Tapash analysis we have incorporated UW-RTI compiled data on forest ownership, management designations, and mechanical treatment operability. Also, the Tapash restoration needs analysis presented here used updated GNN current condition data (representing year 2012) compared to Haugo et al 2015.

At the base of the restoration needs analysis was a comparison of the present day distribution of successional/structural classes (s-classes) for each biophysical setting within a landscape compared to NRV reference conditions (Figure 1). The restoration needs analysis determined for each biophysical setting and each landscape which s-classes were overrepresented and which were underrepresented compared to the NRV reference, and then how many acres would need to transition to a different s-class in order to move the present-day distribution of all s-classes to within the NRV reference. We categorized these specific transitions between s-classes as resulting from implementation of "disturbance only", "succession only", or "disturbance then succession" based upon the identity of the excess and deficit classes (Figure 2). Disturbance transitions included a reduction in tree density / cover.

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[1] Perez-Garcia, J., Oneil, E.E., Hansen, T., Mason, T., McCarter, J., Rogers, L., Cooke, L., Comnick, J., McLaughlin, M., 2012. Washington Forest Biomass Supply Assessment. Washington State Department of Natural Resoruces, Olympia, WA.

[2] Haugo, R., Zanger, C., DeMeo, T., Ringo, C., Shilisky, A., Blankenship, K., Simpson, M., Mellen-McLean, K., Kertis, J., Stern, M. 2015. A new approach to evaluate forest structure restoration needs across Oregon and Washington, USA. Forest Ecology and Management. 335:37-50.

[3] Halofsky, J.E., Creutzburg, M.K., Hemstrom, M.A., in press. Integrating social, economic, and ecological values across large landscapes. In. General Technical Report, US Department of Agriculture Forest Service, Pacific Northwest Research Station. Portland, OR.

[4] Rollins, M.G., 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. Int. J. Wildland Fire 18, 235-249.

[5] Ohmann, J.L., Gregory, M.J., 2002. Predictive mapping of forest composition and structure with direct gradient analysis and nearest-neighbor imputation in coastal Oregon, U.S.A. Can. J. For. Res.-Rev. Can. Rech. For. 32, 725-741.

Succession transitions included the growth of larger / older trees. Disturbance then succession transitions required both of these steps, reducing tree density / cover followed by growth of larger / older trees (Figure 2). Within this analysis we considered that the "disturbance" transitions between S-Classes could be accomplished through either mechanical treatments or fire.

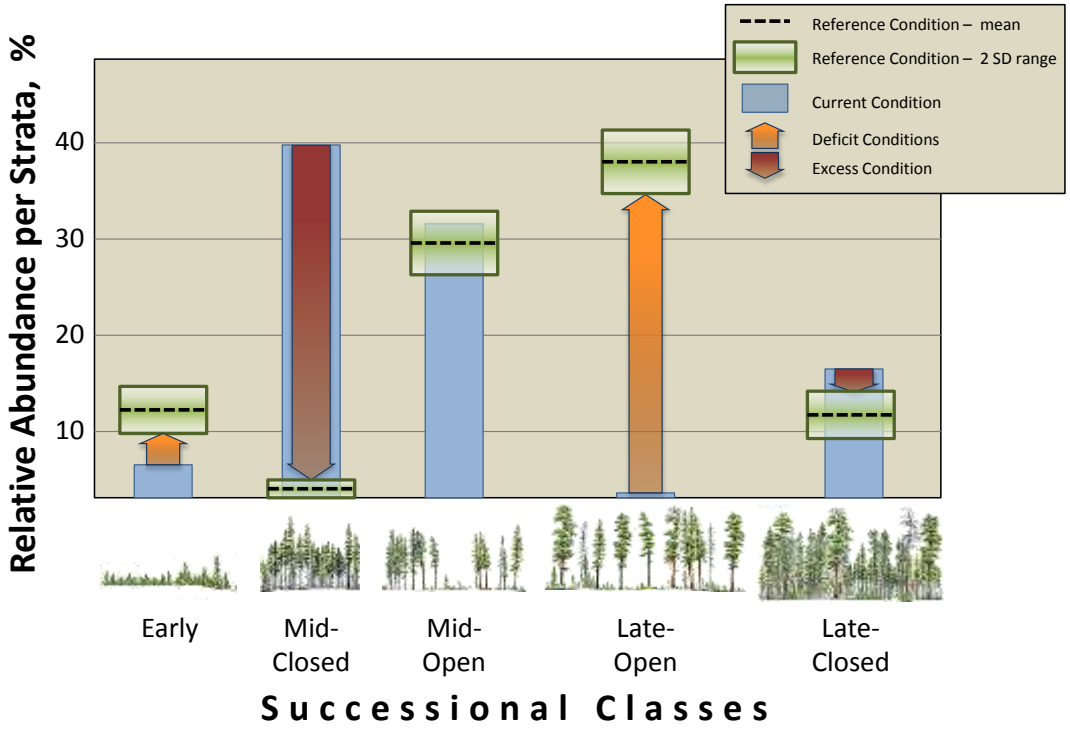

Figure 1. *Example of how the comparison of excess and deficit s-classes to natural range of variability reference conditions (NRV) are determined for a strata (biophysical setting x landscape unit). This example depicts a Dry Mixed-Conifer biophysical setting within the WA East Cascades. Forest illustrations adapted with permission from Robert Van Pelt.*

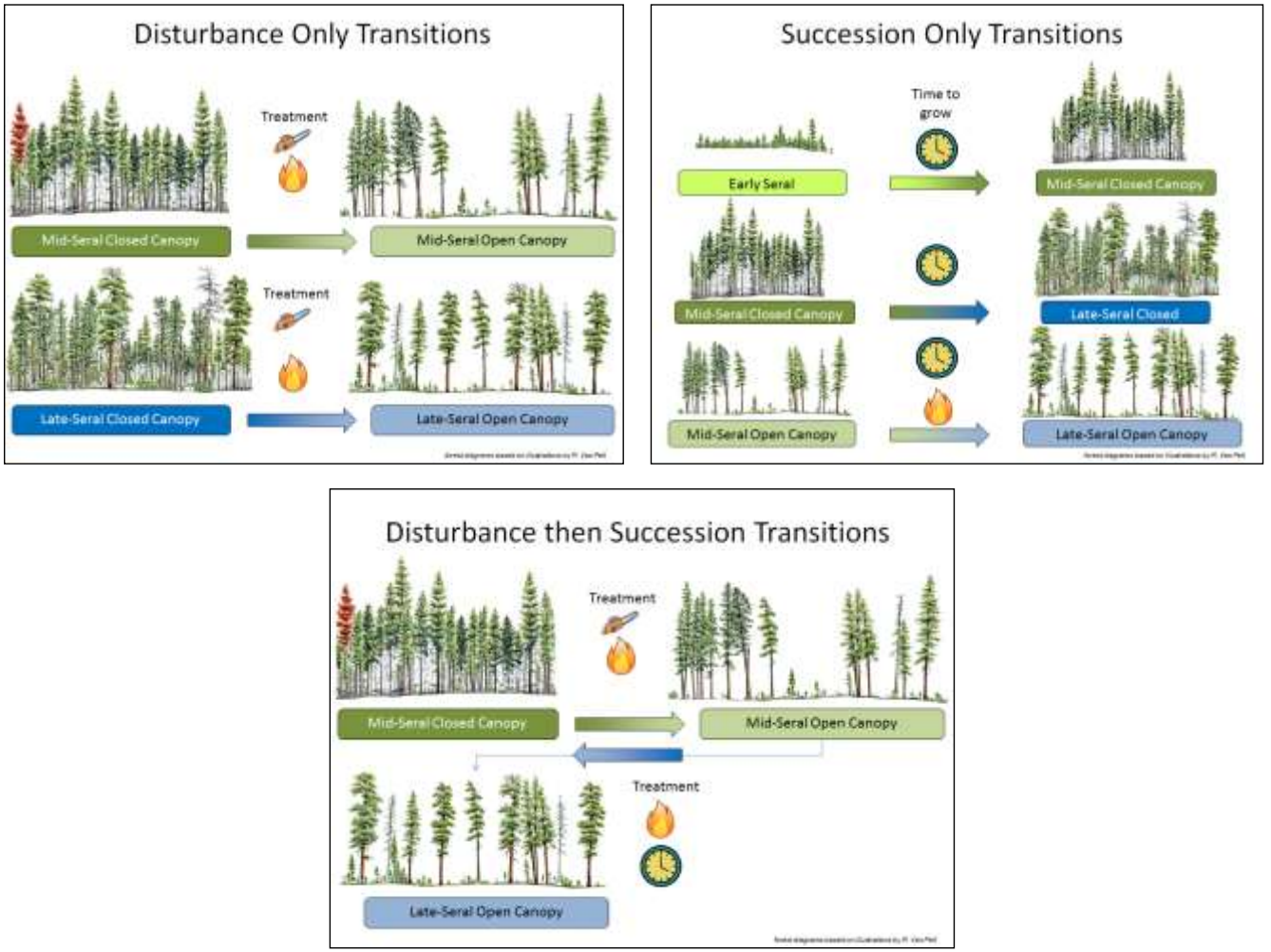

Figure 2: Examples of potential "Disturbance Only", Succession Only" and "Disturbance then Succession" restoration transitions.

Table 1: Forest structure restoration needs by forest ownership within Kittitas and Yakima Counties. Restoration needs definitions and framework from Haugo et al. 2015, but updated with 2012 GNN current condition data. Forest ownership mapping from University of Washington Rural Technology Initiative.

Forest Ownership	Total Forest* ac.	Disturbance Only ac.	Disturbance then Succession ac.	Succession Only ac.
Kittitas Co.				
USFS	419,896	34,476	26,713	26,456
State DNR	96,507	5,238	21,380	7,374
State Other	49,017	3,873	11,397	1,805
Private Indust.	118,722	9,930	16,347	6,084
Private Non-Indust.	61,256	7,609	12,126	1,707
Other	6,746	625	758	415
Yakima Co.				
USFS	453,709	64,112	30,516	10,976
State DNR	115,406	8,852	22,512	5,385
State Other	28,112	2,579	8,024	1,245
Tribal	498,660	33,723	91,854	26,720
Private Indust.	8,258	282	2,407	441
Private Non-Indust.	37,344	4,772	6,086	1,240
Other	6,698	1,201	733	174

*Overlay of Current Condition and Forest Ownership data had errors in spatial projection, resulting in an estimated ~7% of forest acres being excluded from analyses.

A second step within the Tapash analysis was to evaluate disturbance restoration needs with respect to potential constraints on mechanical treatments. We intersected our TNC-USFS Joint Analysis restoration need results with UW-RTI compiled data on forest ownership, forest management zones, wetland and riparian buffers, slopes, and distances from existing forest roads. Management Zones distinguish those areas that were eligible for timber management (uplands) from those that were ineligible and include areas withdrawn in order to achieve administrative objectives or due to regulatory restrictions.

Because the spatial coverage of UW-RTI data was slightly smaller than the TNC-USFS Joint Analysis and there was a small but noticeable error in the projection of UW-RTI and GNN data, the total number of forest acres and acres of restoration need per owner are less than presented in Haugo et al 2015. Also, we are not presenting distance from road results in Tables 2 and 3 as the influence of distance from road was highly correlated with forest ownership and management zones.

Table 2: Disturbance Restoration Needs (Disturbance Only + Disturbance then Succession) from Haugo et al 2015 (updated with 2012 current condition data) by land management designations and potential constraints on mechanical treatments within Kittitas and Yakima Counties. Forest ownership, management zones, and slopes mapping from University of Washington Rural Technology Initiative.

	All Dist. Rest. Needs*	Proportion of All Disturbance Restoration Needs					
		Uplands <45% Slope		Uplands >45% Slope		Restricted Mgmnt.	
Forest Ownership	**ac.**	**ac.**	**%**	**ac.**	**%**	**ac.**	**%**
Kittitas Co.							
Forest Service	61,190	17,166	28	6,169	10	37,855	62
DNR	26,618	18,481	69	3,714	14	4,424	17
Other State	15,269	12,055	79	2,004	13	1,211	8
Industrial	26,277	20,187	77	3,679	14	2,411	9
Non-Industrial	19,735	16,150	82	1,338	7	2,247	11
Other	1,383	891	64	126	9	365	26
Yakima Co.							
Forest Service	94,627	23,652	25	4,873	5	66,103	70
DNR	31,365	22,739	72	3,798	12	4,827	15
Other State	10,603	7,029	66	2,313	22	1,261	12
Tribal Forestlands	125,577	90,203	72	8,730	7	26,644	21
Industrial	2,689	2,288	85	204	8	198	7
Non-Industrial	10,858	8,050	74	1,218	11	1,589	15
Other	1,934	1,457	75	283	15	194	10

*Overlay of Current Condition and Forest Ownership data had errors in spatial projection, resulting in an estimated ~7% of forest acres being excluded from analyses.

Table 3. Disturbance Restoration Needs (Disturbance Only + Disturbance then Succession) from Haugo et al 2015 (updated with 2012 current condition data) by potential vegetation type and potential mechanical operability on USFS lands within Kittitas and Yakima Counties. Forest ownership, management zones, and slopes mapping from University of Washington Rural Technology Initiative.

	All Dist. Rest. Need*	Prop. Of All Dist. Rest. Needs			
		Uplands, <45% Slope		Other	
Forest Ownership	**ac.**	**ac.**	**%**	**ac.**	**%**
Kittitas Co. - USFS					
Ponderosa pine - Dry	979	597	61	382	39
Mixed Conifer - Dry	26,445	14,958	57	11,487	43
Mixed Conifer - Moist	6,882	5,180	75	1,703	25
Pacific silver fir - Intermediate	8,324	6,975	84	1,349	16
Mountain hemlock	15,099	12,872	85	2,226	15
Subalpine parkland	3,461	3,442	99	19	1
Yakima Co. - USFS					
Oregon wh. oak - Ponderosa pine	43	43	100	0	0
Ponderosa pine - Dry	1,558	648	42	910	58
Mixed Conifer - Dry	35,981	20,284	56	15,697	44
Mixed Conifer - Moist	13,149	9,942	76	3,207	24
Pacific silver fir - Intermediate	6,638	5,995	90	643	10
Mountain hemlock	13,274	10,949	82	2,324	18
Subalpine parkland	23,984	23,114	96	871	4

*Overlay of Current Condition and Forest Ownership data had errors in spatial projection, resulting in an estimated ~7% of forest acres being excluded from analyses.