Northwest Forest Plan -The First 15 Years (1994-2008)

Watershed Condition Status and Trend

Results for the BLM RMPs for Western Oregon

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The Northwest Forest Plan Aquatic and Riparian Effectiveness Monitoring Program (AREMP) assesses watershed condition status and trend at two different scales, inchannel and upslope/riparian. Inchannel condition is based on stream surveys in watersheds randomly selected from the Northwest Forest Plan (NWFP) area; it describes current condition for fish and other aquatic biota. Watershed wide (upslope/riparian) condition is evaluated based on GIS and remote sensing data, and it represents more of a risk assessment, i.e., what is the likely impact of upslope and riparian conditions on the future state of aquatic organisms?

Further documentation of the methods and NWFP results can be found in our full 15-year NWFP monitoring report (Lanigan et al. 2012), which is available at http://www.reo.gov/monitoring/reports/watershed-reports-publications.shtml

Inchannel Conditions

AREMP inchannel evaluation criteria (aka benchmarks) are currently under revision, so we cannot supply an evaluation of inchannel conditions at this time. Unevaluated individual attribute data summarized at the site level are available upon request for select watersheds.

Upslope and Riparian Conditions

Methods

AREMP's most recent effort to describe upslope/riparian condition status and trend is the Northwest Forest Plan 15-year report (Lanigan et al. 2012). Upslope/riparian condition was based on mapped data e.g., road density based on FS and BLM geographic information system road layers, and vegetation data, e.g., tree canopy cover, derived from satellite imagery. BLM's western Oregon Resource Management Plan (RMP) area spans four of AREMP's province analysis areas (Oregon Coast, Klamath-Siskiyou, West Cascades, High Cascades), and each province uses a somewhat different condition assessment model, as designed by the provincial expert teams (see Lanigan et al. 2012 appendix 4). The standardized model scores range from -1 to +1, with watersheds in good condition having higher scores than those in poor condition. Scores were calculated for 1994 and 2008, and the difference in these scores was used to represent trend. Because data on every watershed in the target population were analyzed, inferential statistics are not needed to test the reliability of generalizing results from a sample to a larger population. All differences are effectively statistically significant, so what remains for judgment is whether differences are meaningful in terms of biology or management.

Study Area

For the NWFP monitoring effort, AREMP only evaluated watersheds with at least 25% federal ownership along the 1:100,000 stream layer. For this analysis, the number of watersheds was further narrowed to include only those within the RMP boundary with at least 25% of the total watershed area under BLM

management. Note however that *AREMP condition scores are based on a composite of all federal lands within each qualifying watershed.*

Status

Overall watershed condition scores of the 168 watersheds falling within the RMP ranged from a low of -0.89 to a high of +1.0, with a mean score of -0.12; the mean score for the NWFP was +0.18. Figure 1 presents a view of the distribution of scores by status category for watersheds in the RMP sample (n=168) and watersheds in the rest of the NWFP area (n=1211). The largest percentages of RMP watersheds fell into the low (38%), moderate (33%), and high (19%) categories. Few fell in the very low (8%) and the very high (2%) categories. This differed from the non-RMP NWFP, where the largest percentages of watersheds were in the very high (24%), high (26%) and moderate (28%) categories; a lower percentage of watersheds fell in the low (19%) and very low (2%) categories. These differences may be reflective of the different distribution of NWFP land use allocations in the two groups, e.g., a much smaller percentage of the RMP watersheds are in the congressionally reserved / administratively withdrawn class (2% vs. 33% for non-RMP).

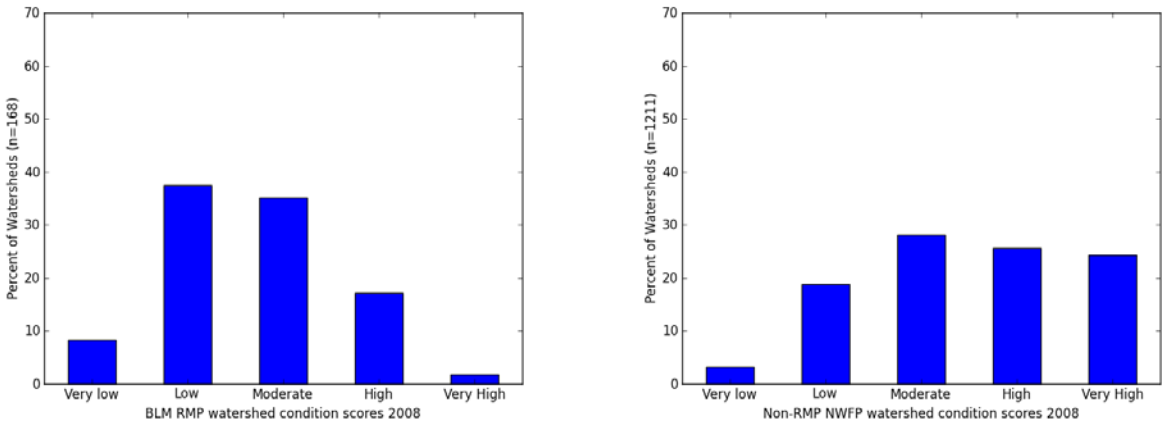

Figure 1— Latest (2008) watershed condition scores by status category for the BLM's Resource Management Plan area for western Oregon (left) as compared to the rest of the Northwest Forest Plan area (right).

The spatial distribution of watershed scores and major sub-scores (vegetation and roads) can be seen in Figure 2. Roads had the largest negative impact on scores, with 71% of watersheds receiving a very low (≤ -0.6) roads score as compared to only 2% scoring very low on vegetation attributes.

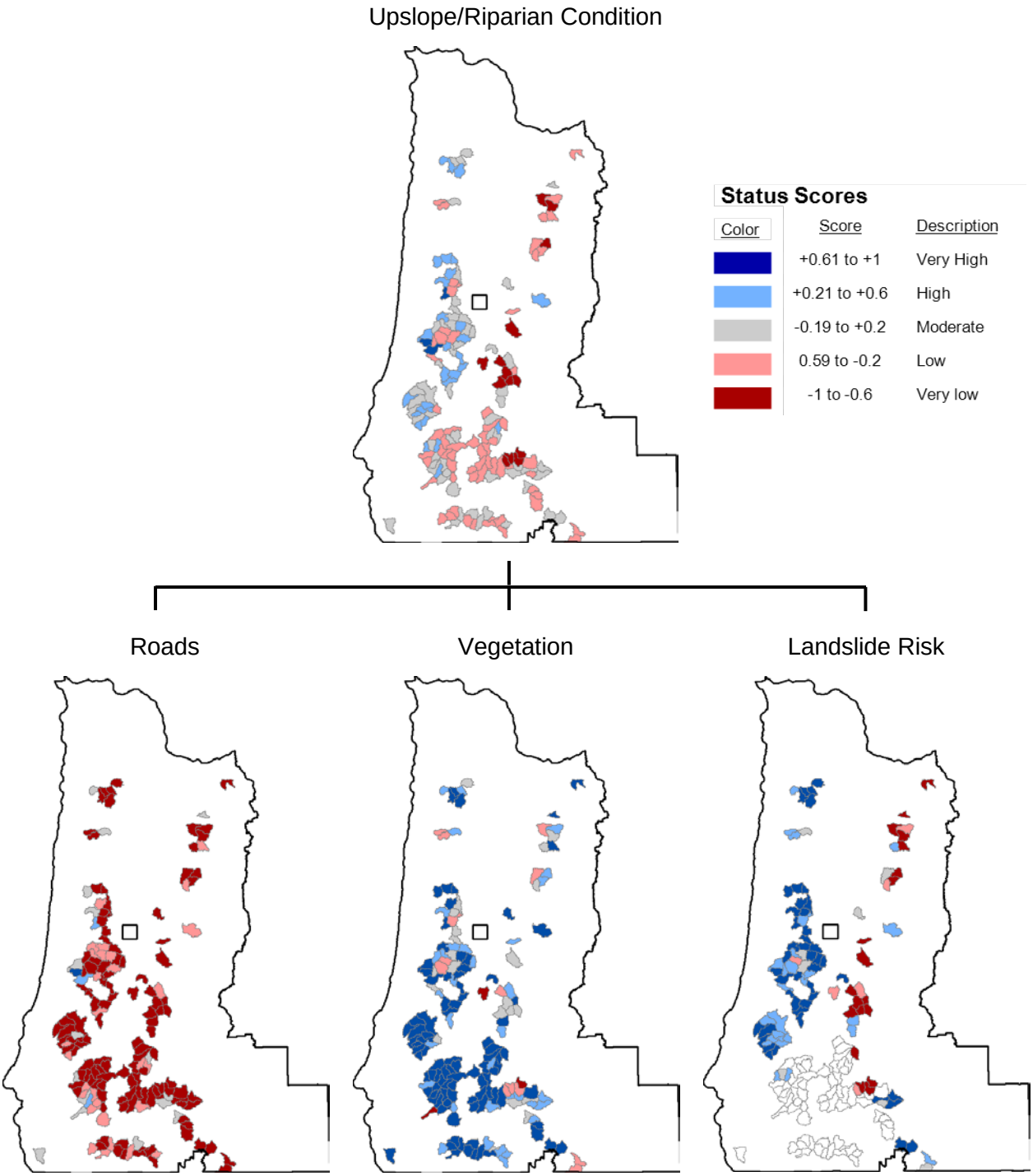

Figure 2. Watershed condition (upslope/riparian) status scores (2008) and major components for the BLM's Resource Management Plan area for western Oregon. ***Note that the Landslide Risk attribute was not used in AREMP's Klamath-Siskiyou province (south-central).***

Trend

Overall, there was a positive change in watershed scores, from a mean score of -0.18 in 1994 to -0.12 in 2008 (as compared to average change in non-RMP NWFP watersheds from +0.18 to +0.21). Figure 3 displays the spatial configuration of score changes. The watershed condition trend map uses seven

categories instead of five, and the central categories also have a smaller interval (0.2) than the extremes (0.5) for better discrimination because changes in scores tended to be more tightly grouped than the status scores.

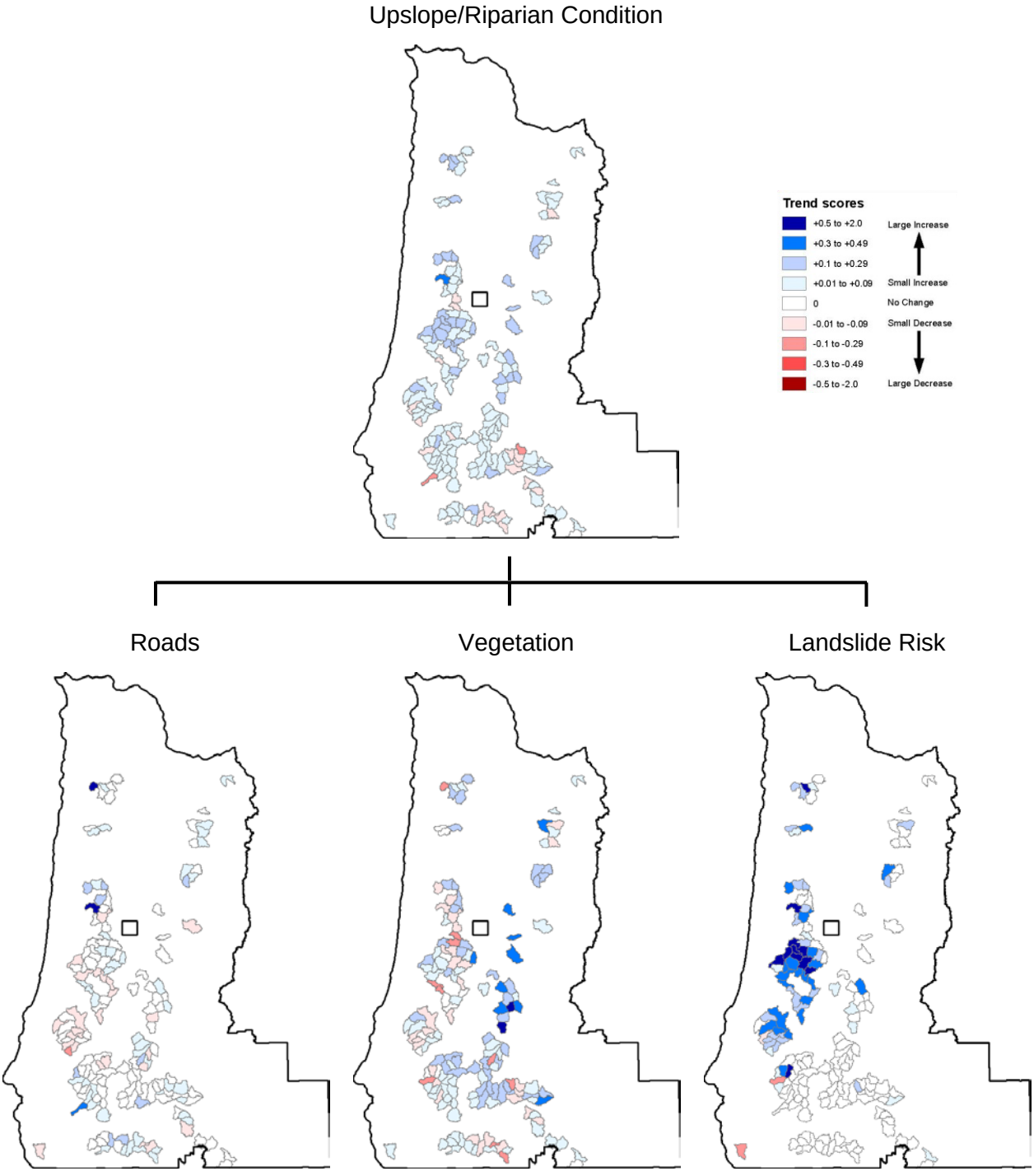

Figure 3. Change in watershed condition score and major components, 1994 to 2008, for the BLM's Resource Management Plan area for western Oregon. *Note that the Landslide Risk attribute was not used in AREMP's Klamath-Siskiyou province (south-central).*

In the RMP area, the distribution of watershed condition scores increased for 86% of watersheds versus 13% showing declines (Figure 4). The overall distribution in the RMP area had more score increases and fewer declines (in relative percentage terms) than the rest of the NWFP area. As with the NWFP as a whole, most RMP score changes (88%) were relatively small (± 0.1 in model score or ±5% of possible change from -1 to +1), and a portion of these small shifts is likely due to errors inherent in the satellite imagery vegetation classification process.

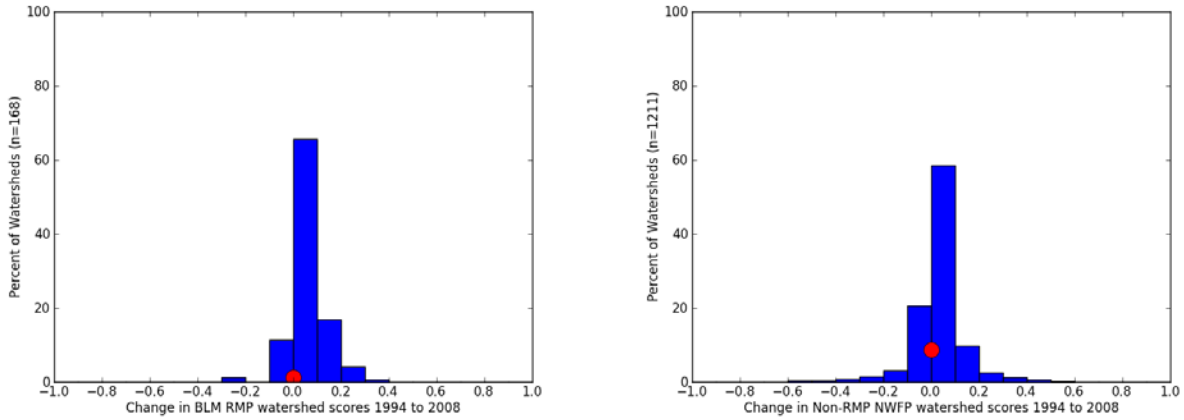

Figure 4. Distribution of changes in watershed condition scores between 1994 and 2008 for the BLM's Resource Management Plan area for western Oregon (left) as compared to the rest of the Northwest Forest Plan area (right). Red dot shows percentage of watersheds with no change in score.

Table 1 shows the percentage contribution of roads, vegetation, and landslide risk to the different levels of score changes. Only two watersheds declined by more than 5% (-0.1), and these declines both appear to be due to vegetation losses from fires (based on an overlay of the MTBS fire history GIS layer): North Fork Silver Creek (Biscuit fire 2002) and Elk Creek/Flat Creek (Timbered Rock fire 2002), both on the Medford District.

Scores declined by 0.1 or less in 11% of watersheds, and this portion of the distribution was driven mostly by vegetation scores (83%). A few watersheds had minor increases in road miles (0.2 - 3.6 miles), which contributed a lessor amount to these small declines. Two watersheds showed no change in score (red dot on Figure 4).

Sixty-four percent of the watersheds had score increases between 0 and +0.1. Increases in vegetation scores were the dominant driver (62%) for this range, but with some contribution from landslide risk (24%, which is based on roads and vegetation in landslide prone topographies) and roads (13%).

Positive trends in the +0.1 to +0.3 range were mostly due to reduced landslide risk (57%), driven mainly by vegetation maturing from the higher risk <4" DBH class to the lower risk >4" DBH class. Direct vegetation indicators (percent cover and large size classes) also contributed (34%) to score increases, while road decommissioning played a lessor role (9%).

Only one watershed increased by more than +0.3: Upper Lobster Creek in the Salem District. Almost 15 miles of road were decommissioned in this watershed since the initiation of the Northwest Forest Plan, which contributed directly to the score increase through improvements in roads indicators (54%) and indirectly through reduction in landslide risks (46%).

Table 1—Attribute influences on the BLM's Resource Management Plan area for western Oregon watershed condition score changes between 1994 and 2008

	All Watersheds (n = 95)		Attribute Influences (%)		
Score Change Categories	**Count**	**Percentage**	**Roads**	**Vegetation**	**Landslide Risk**
-0.5 to -2.0					
-0.3 to -0.49					
-0.1 to -0.29	2	1	0	100	0
-0.09 to <0	18	11	16	83	2
0	2	1			
>0 to +0.09	107	64	13	62	24
+0.1 to 0.29	37	22	9	34	57
+0.3 to 0.49	1	1	54	0	46
+0.5 to 2.0					

Watershed Trend by Land Use Category

The magnitude of changes did differ somewhat by land use allocation (Figure 5). Although the majority of changes were small (< ±0.1) for all categories, the LSR class experienced more of the larger positive changes (> +0.1) than the matrix (there were only two watersheds classified as congressionally reserved). Changes in key and nonkey watersheds were less pronounced, with key watersheds showing somewhat more positive changes (> +0.1) but also a wider range of change. Figure 6 shows the trend map with key watersheds highlighted.

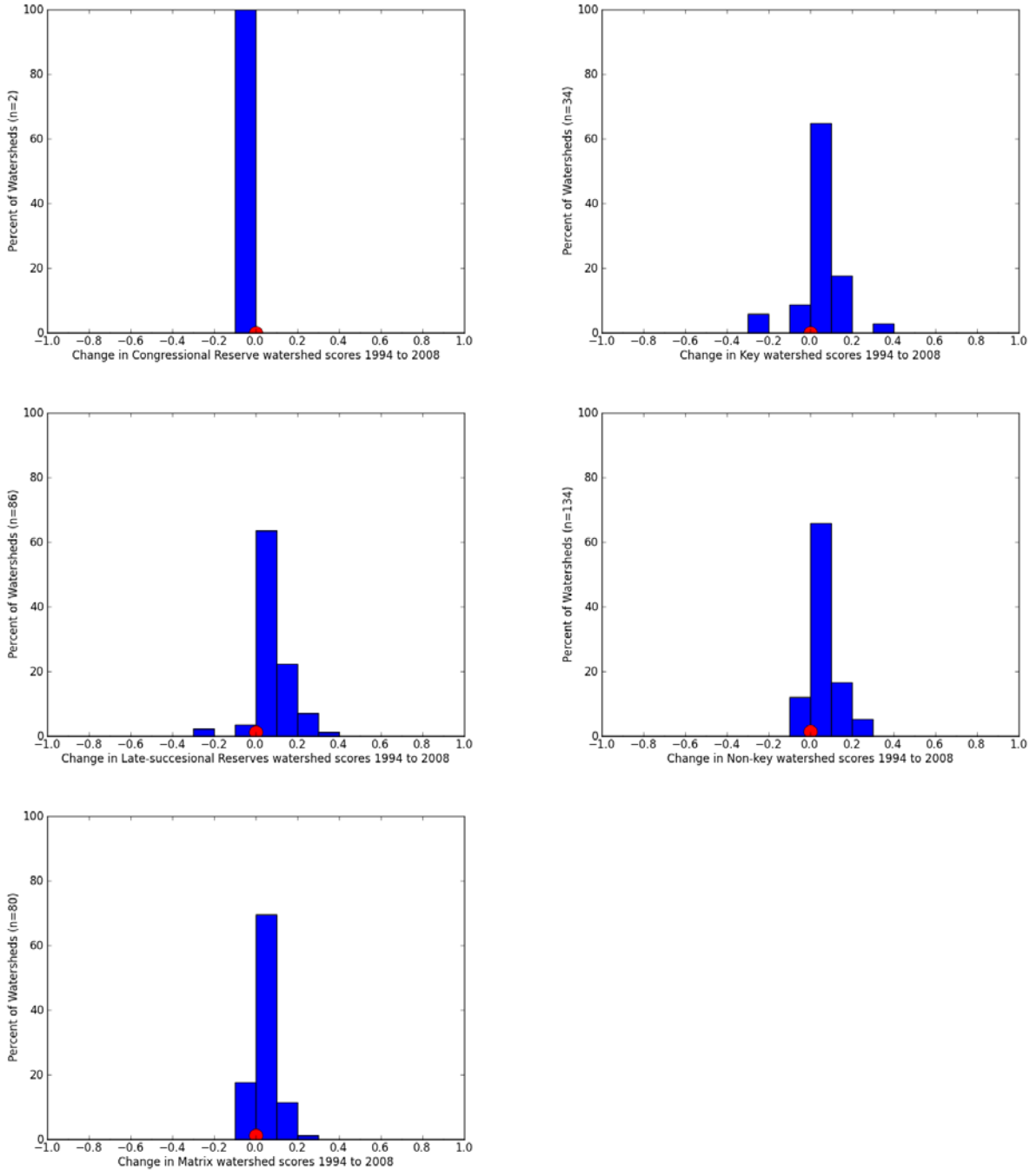

Figure 5. BLM's Resource Management Plan area for western Oregon watershed trend distributions by land use allocation (each sixth-field HUC was classified to the largest land use allocation). Red dot shows percentage of watersheds with no change in score.

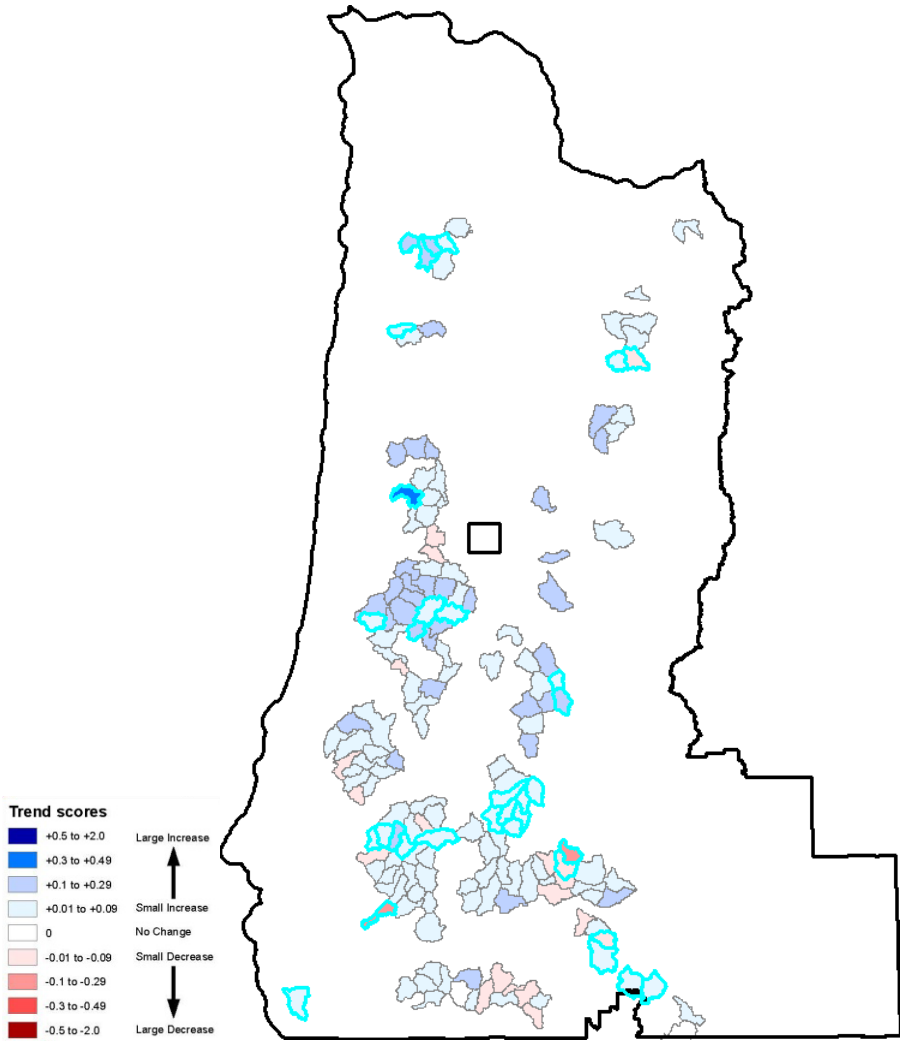

Figure 6. Watershed trend with key watersheds highlighted (light blue) within BLM's Resource Management Plan area for western Oregon.

Conclusions

Not all watersheds can be expected to be in good condition at any one time as watersheds are naturally dynamic systems and individual watersheds will cycle through conditions of high and low habitat quality (Naiman et al. 1992, Reeves et al. 1995). Therefore, the most important product of AREMP's monitoring program is the trend in the overall distribution of individual watershed ratings in a given area. Implementing the Northwest Forest Plan's Aquatic Conservation Strategy should result in an overall distribution of watershed condition scores that is maintained or improves over time" (Lanigan et al. 2012). The average watershed condition score for the BLM RMP area for Western Oregon has improved more than the average of the non-RMP NWFP watersheds based on AREMP's monitoring results. However, the average of condition of RMP watersheds is still below that of the rest of the NWFP area.

A 20-year assessment of upslope/riparian and inchannel condition status and trend will be done in 2014.

References

Lanigan, S.H.; Gordon, S.N.; Eldred, P.; Isley, M.; Wilcox, S.; Moyer, C.; Andersen, H. 2012. Northwest Forest Plan—the first 15 years (1994–2008): watershed condition status and trend. Gen. Tech. Rep. PNW-GTR-856. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 155 p.

Naiman, R.J.; Beechie, T.J.; Benda, L.E. [et al.]. 1992. Fundamental elements of healthy watersheds in the Pacific Northwest coastal ecoregion. In: Naiman, R.J., ed. Watershed management: balancing sustainability and environmental change. New York: Springer-Verlag: 127–188.

Reeves, G.H.; Benda, L.E.; Burnett, K.M. [et al.]. 1995. A disturbance based ecosystem approach to maintaining and restoring freshwater habitats of evolutionarily significant units of anadromous salmonids in the Pacific Northwest. American Fisheries Society Symposium. 17: 334–349.