Agenda Item No.:	7
Item Title:	Preliminary Results of Hinkle Creek Study and Implications for Forest Practices
Work Plan Titles & #:	Dynamic Forest Ecosystems Issue 5 and Forest Regulation Issue 6
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SUMMARY

The Watersheds Research Cooperative now includes three paired watershed studies evaluating the effects of contemporary forest management on hydrology, water quality, fish, and other aquatic biota. These three studies and the Department's Riparian Function and Stream Temperature (RipStream) Study provide the framework for the Board's work evaluating the effectiveness and efficiency of current forest practice. Equally important, these studies connect physical effects to biological effects, allowing an assessment of potential cumulative effects and the standards of protection used to evaluate effectiveness.

Dr. Arne Skaugset, Watersheds Research Cooperative Director and principal investigator on water quality and hydrology on the Hinkle Creek Paired Watershed Study, will present preliminary results from the Hinkle Creek Paired Watershed Study and staff will discuss implications of those results for the Board's future work on forest practices and dynamic ecosystem concepts. The preliminary results document the value of the paired watershed approach, illustrate higher levels of variability in effects and are suggesting that some physical processes may have relatively more significance in headwater streams than originally assumed.

This agenda item also includes a digital video presentation titled "Inquiry at Hinkle Creek, Doing Science in our Forests." Outreach and technology transfer have been a major objective of the Watersheds Research Cooperative since the origins of the Hinkle Creek Study. This video uses the Hinkle Creek Study as a case study for the scientific method and illustrates the potential opportunity for public education afforded by this and the other paired watershed studies.

CONTEXT

The large majority (85%) of the timber harvest in Oregon comes from the private industrial land base. Ensuring the productivity of these forestlands for a continued supply of solid wood is critically important. However, concern regarding the environmental effects of intensive management of these lands results from a lack of knowledge

regarding the actual environmental effects caused by contemporary forest management activities at a watershed scale.

The Hinkle Creek Paired Watershed Study, one of several similar studies conducted under the umbrella of the Watersheds Research Cooperative is addressing the:

- Effects of forest management on the physical, chemical, and biological characteristics and habitat quality in small streams without fish.
- Influence of changes in the physical, chemical, and biological characteristics and habitat quality on amphibian and invertebrate abundance, distribution, and movement, in headwater streams with and without fish.
- Role of movement in maintaining abundance and diversity of fish and amphibians as habitat quality changes throughout the stream network.

The calibration period for the study and the first harvest entry are now completed in the 10-year Hinkle Creek Paired Watershed Study. More than 12 million board feet of timber was harvested in the first harvest entry. The timber was harvested from five harvest units covering 380 acres (154 hectares) of Roseburg Forest Products (RFP) land in the headwaters of the South Fork of Hinkle Creek between August 2005 and April 2006. Four of the harvest units were intentionally located adjacent to non-fish-bearing, headwater streams directly upstream of four stream gauges in the South Fork. The fifth harvest unit was located adjacent to the watershed divide. For the first harvest entry, RFP built 1.96 miles of new road and reconstructed 3.51 miles of existing road to access and remove the timber from the watershed. RFP also transported and placed 17,325 cubic yards of rock to surface the roads in the watershed for hauling during the winter.

The second harvest entry in the South Fork of Hinkle Creek is scheduled starting in the summer of 2008 along the fish-bearing tributaries and main stem. Data collection, which began in 2001, is scheduled to continue until at least 2011.

A range of Preliminary results are now resulting from the Hinkle Creek Paired Watershed Study. These results document the value of the study approach and also offer new insight into biological and physical effects of harvesting in headwater streams. Among the results are data and analysis on temperature effects, hydrologic effects and fish distribution and behavior. A number of research papers have been presented including:

- Physical hydrology research, presented by A. E. Skaugset with co-authors N. Zegre, K. Kibler, and T. Otis.
- Spatial and temporal patterns of coastal cutthroat trout distribution in a headwater stream network, presented by R. E. Gresswell with co-authors D. S. Bateman, D. P. Hockman-Wert, and M. S. Novick.
- Benthic invertebrates in headwaters: evaluating the effect of fish present/absence, presented by W. J. Gerth with co-author J. L. Li.
- Modeling relationships along a stream network: an application of a new model, presented by N. A. Som with co-author L. M. Ganio

The first two masters' theses using data from the Hinkle Creek Paired Watershed Study have been successfully defended at Oregon State University. In addition, four masters'

students and three PhD students have work underway using data from the Hinkle Creek study.

Lance George defended his master's thesis Titled Baseline Stream Chemistry and Soil Resources for the Hinkle Creek Research and Demonstration Area Project. Marc Novick defended his master's thesis, Persistence of Spatial Distribution Patterns of Coastal Cutthroat Trout in a Cascade Mountain Stream.

RECOMMENDATION

The preliminary results from Hinkle Creek strongly suggest that the pathways established by the Board's Forest Regulation and Dynamic Ecosystem Work Plans are sound. These results suggest that as the mechanisms resulting in the variable effects are better understood through this research, alternative approaches to current forest practices with improved efficiency and effectiveness are likely. Equally important the results suggest that alternative standards related to water quality, especially temperature in headwater streams may also offer improved protection of beneficial uses. The results will have implications for federal, state and private forests.

The Department recommends that the Watersheds Research Cooperative studies and the RipStream project and their expected timelines and products be more fully encompassed within the two related work plans. In addition, the Department recommends that adequate funding for the WRC be a major initiative of the Department's 2009-11 budget request.

NEXT STEPS

The Trask and the Alsea Paired Watershed Studies are now underway. These studies join the Hinkle Creek Paired Watershed Study under the WRC umbrella. This collaboration of three watershed studies under one research cooperative provides greater ecological context to address contemporary forest management effectiveness questions. The three studies use similar designs and methods in different watersheds.

The Trask research is being conducted at two scales – within the immediate area of harvest treatments and at downstream locations throughout the watershed. Installation of the data gathering infrastructure is underway. The Oregon Watersheds Enhancement Board will be providing funding for a substantial portion of the infrastructure costs.

The Alsea Study provides an opportunity to compare water resource responses to current forest practices with those resulting from an extreme manipulation in the 1960s. The original Alsea Watershed Study assessed the effect of timber harvesting on water, aquatic habitat, and salmonid resources using a paired-watershed approach. Flynn Creek was an undisturbed control watershed in the original study and remains an undisturbed Natural Research Area under management by the USDA Forest Service. The water quality impacts observed for Needle Branch under the original study are sometimes erroneously cited as the inevitable consequence of clearcutting.

Monitoring of forest practices under RipStream will also be providing reach level data on the short and longer-term effects of current water protection strategies. The objective of this study is to evaluate effectiveness of forest practices rules and State Forest management strategies in protecting stream temperature and promoting riparian structure that provides necessary functions for the protection of fish and wildlife habitat. On privately owned forestland, riparian management areas are being managed under forest practice rules as described in the Forest Practices Act. On state-owned forestland, riparian management areas are being managed using riparian and aquatic strategies as described in the Northwest State Forests Management Plan. This project is evaluating stream temperature and riparian condition two years before and five years after harvesting. Field work began in 2002 and is expected to be completed by 2010.

Periodic reporting of the status and ongoing results of these studies will be provided annually to the Board. As data illustrate opportunities for improved efficiency and/or effectiveness of forest practices, recommendations will be made to the Board.

Each installation will cost about $900,000 per year to fully implement for an initial 10-year time period (2004 dollars). We need to secure strong support and funding from the Legislature in addition to the current funding from county governments, landowners and federal agencies. Funding from the Oregon Legislature would be invaluable to provide critical base support for the research program.