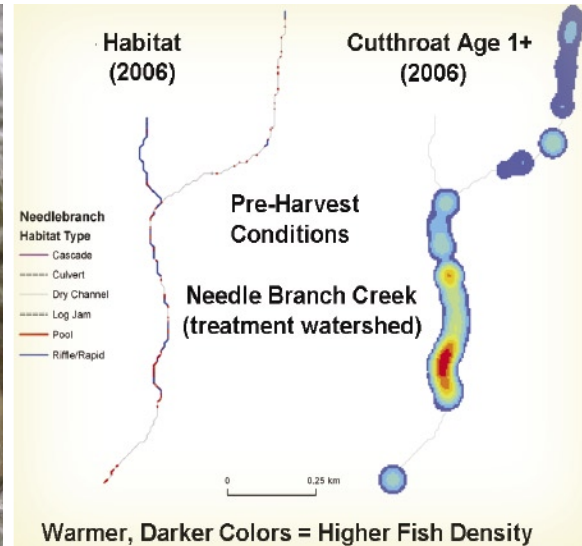


## ALSEA RIVER PAIRED WATERSHED STUDY



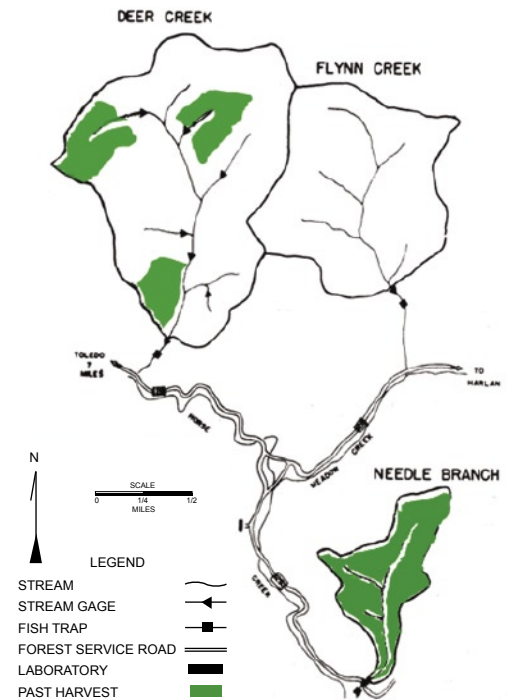
One of three comprehensive, decade-long studies of forest streams and the effects of contemporary forest practices across Western Oregon.

Far-reaching in its influence, the 1959-1973 Alsea Watershed Study produced dramatic results that forever changed Oregon's forest harvest practices. The Alsea Watershed Study Revisited, returning to the same watershed sites 50 years later, provides an extraordinary opportunity to directly compare the effects of past and present clearcutting practices and their effects on streams, fish and water quality. The Alsea Watershed Study Revisited is a key measure of how far Oregon has come in protecting water resources on managed forests, and a further test of the effectiveness of contemporary forest practices, including the Oregon Forest Practices Act (OFPA).

- The original Alsea watershed study was instrumental in developing the initial stream protection rules of the Oregon Forest Practices Act.
- The Alsea Watershed Study Revisited allows scientists to compare modern logging practices with historic practices in exactly the same location, 50 years later.
- Research is examining the effects of timber harvest on fish, aquatic invertebrates, water quality, water quantity, temperature and stream chemistry.

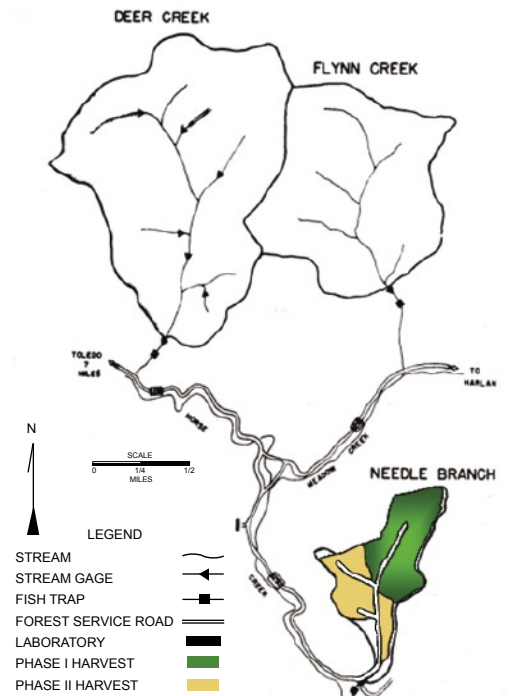
## ORIGINAL ALSEA STUDY (1959–1973)

The earlier Alsea study lasted fourteen years in Oregon's Coast Range. It was the first paired watershed study that analyzed the effects of clearcuts without stream buffers on water quality and quantity, aquatic habitat and fish populations. In the original study, three watersheds were compared—one was left untouched (Flynn Creek), another was completely clearcut (Needle Branch Creek), and a third was patchcut with buffers left along the fish-bearing stream reaches (Deer Creek). After clearcutting and slash burning, the Needle Branch drainage (see map) experienced some of the most dramatic effects to water quality ever observed from logging—for example, the stream's maximum daily temperature increased to 85°F, which was 30°F higher than pre-harvest.



## ALSEA STUDY REVISITED (2006–2016)

The original Alsea study evaluated the effects of conventional logging practices at the time of the study, including clearcuts to the edge of streams and large old trees being dragged across the ground, disturbing the soil. In the new study, the trees are smaller and harvested through state-of-the-art skyline logging, using aerial cables that elevate the logs as they are removed. The regenerated forest of the Needle Branch watershed is once again ready for commercial harvest. Flynn Creek remains an undisturbed Research Natural Area. Conducting a new harvest in this revisited paired watershed study offers a unique scientific opportunity to compare the effects of contemporary forest practices to those used in the past.



## RESEARCH TIMELINE

**2006-2008**  
Baseline Data Collection

**2009**  
First Harvest

**2010-2012**  
Phase I Post-Treatment  
Data Collection

**2013**  
Second Harvest

**2014-2016**  
Phase II Post-Treatment  
Data Collection

## MAJOR RESEARCH PROJECTS

### Water Temperature

Do current regulations maintain water temperature adequate for fish and other organisms to thrive? The original Alsea study was instrumental in defining the critical role of riparian vegetation in controlling water temperature following a clearcut harvest. Water temperatures and shade will be monitored throughout the stream network.

### Dissolved Oxygen

After clearcutting, is there sufficient dissolved oxygen in the streams? The concentration of dissolved oxygen in streams strongly influences fish and many other aquatic organisms. The original Alsea study (and others) documented that timber harvesting without stream buffers could lessen dissolved oxygen concentrations. In this study, dissolved oxygen will be measured before and after logging.

### Sediment

What is an acceptable threshold for turbidity? The earlier Alsea study illustrated how clearcutting affects erosion and confirmed the dynamic nature of sediment transport in forest streams. Current methodologies include manually collecting samples during stormflow and using turbidity-activated pump samplers to collect data.

### Water Quality and Quantity

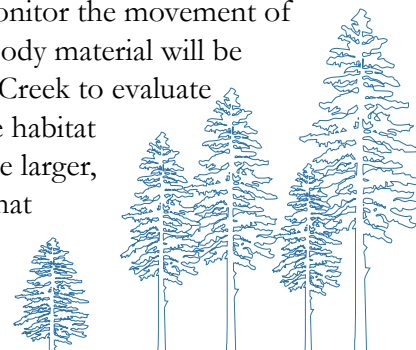
How do changes in timing and amount of water coming from forest watersheds after harvesting influence flooding, water availability, chemical and sediment changes and stream ecology? Pre-harvest stream flows from the new study compare favorably to pre-harvest flows of the original study.

### Macroinvertebrates

How do macroinvertebrates respond to harvest under the current regulations? Aquatic insect larvae and other macroinvertebrates are indicators of stream health and serve as food for fish. Invertebrate community characteristics in the substrate, in the drift and in the fish diet will be measured for two years before and after logging.

### Fisheries

What effect does logging have on hydrology and water quality and how does that affect resident fish? Monitoring of cutthroat trout and coho for distribution, growth and survival will use whole-basin census methods. Population estimates will be made in selected reaches to compare fish abundance and biomass with previous studies. PITs (Passive Integrated Transponders, which are like electronic bar codes) are used to monitor the movement of individual fish. Large woody material will be added to Needle Branch Creek to evaluate whether this can improve habitat conditions and restore the larger, older trout populations that declined after the initial harvest.



## PRELIMINARY FINDINGS

- Stream temperatures have apparently recovered to the pre-harvest levels of the original study.
- Some water temperature measurements that exceed water-quality standards have occurred, even in control watersheds.
- Records of dissolved-oxygen concentrations indicate low values.
- High nitrate levels have been recorded, and may be related to nitrogen-fixation by alder trees growing within areas of water runoff.
- Flow patterns of Needle Branch, in clearcut watershed, are similar to pre-harvest levels.
- Record flows associated with a storm dramatically affected coho salmon distribution and abundance.

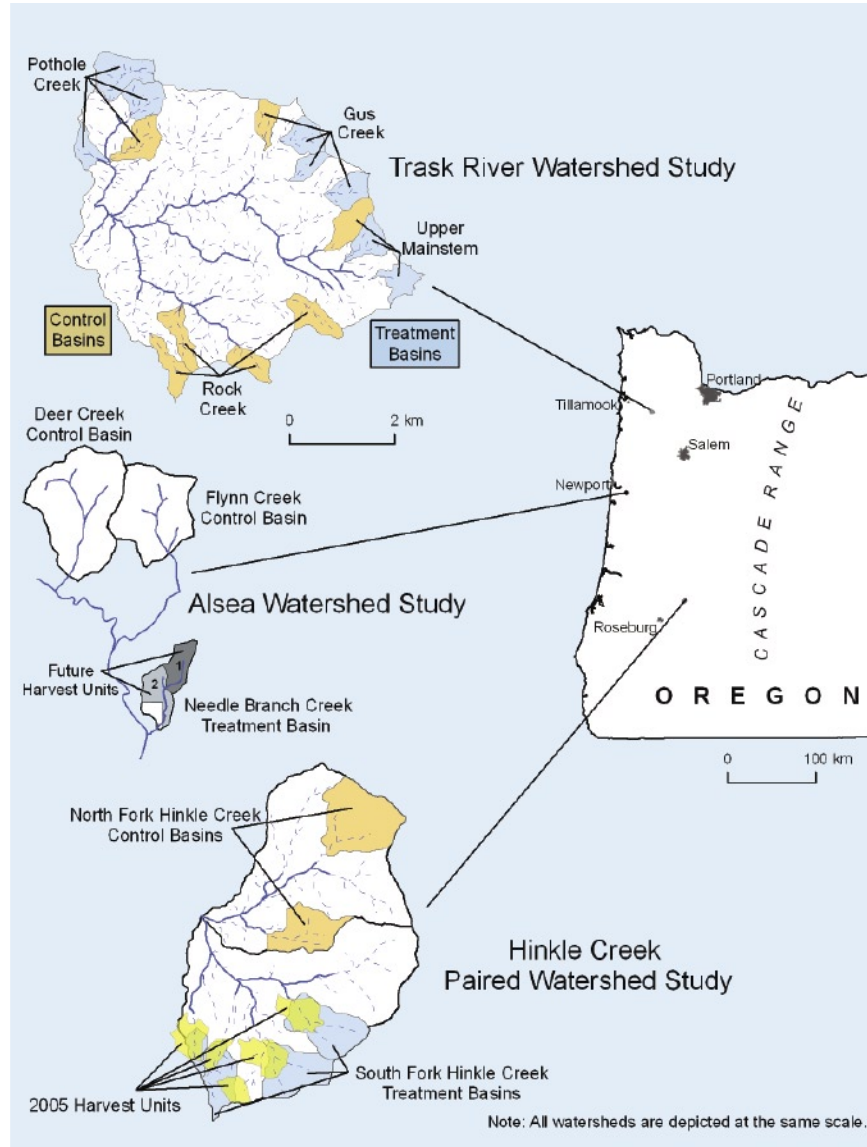
## SPONSORS

The National Council for Air and Stream Improvement, Inc. (NCASI), in cooperation with Plum Creek Timber Company, Oregon State University (OSU), the Watersheds Research Cooperative (WRC), the U.S.D.A. Forest Service and Colorado State University are implementing the Alsea Watershed Study Revisited. Database Web sites for the general public and researchers were developed in 2006 and are available at <http://www.ncasi.org/programs/areas/forestry/alsea/default.aspx>.



## ONE OF THREE LONG-TERM WATERSHED STUDIES

The Alsea Watershed Study is one of three long-term watershed studies underway in Oregon evaluating the effects of forest harvest on streams. The other long-term studies include the Hinkle Creek Study and the Trask River Study. These studies are managed by the Watersheds Research Cooperative (WRC), an umbrella organization for environmental research in Pacific Northwest watersheds affected by forest management practices. The WRC is a collaboration of individuals, companies, organizations and agencies, with primary leadership provided by the Oregon State University College of Forestry.



To learn more about the Watersheds Research Cooperative and its collaborators, or to view reports from the individual watershed studies, visit [www.watershedsresearch.org](http://www.watershedsresearch.org).

