

United States
Department of
Agriculture

Forest Service



Pacific
Northwest Region

Siuslaw
National Forest

2004

Monitoring and Evaluation Report

Siuslaw National Forest
Fiscal Years 2001 to 2004



Devils Churn, Siuslaw National Forest

FROM THE FOREST SUPERVISOR

Thank you for taking the time and interest in reviewing the results of the Siuslaw National Forest 2001 – 2004 Monitoring Report. I just arrived as Forest Supervisor for the Siuslaw National Forest and am thrilled to be here. Having been a part of the Forest in the mid-1990s I am familiar with the innovative work done on the Forest and I look forward to supporting those efforts in the future.

This report focuses on key monitoring activities and findings since the previous publication in 2001. It also summarizes some of our most successful restoration projects for the last five years. Restoration can touch on every facet of our work and is often the foundation of our monitoring results.

In the past five years, the Forest built on our existing partnerships, and added a few new ones on the way, to help us get important work accomplished. Leveraging appropriated funding from Congress with non-profit groups and other agencies has only increased our capacity to improve fisheries habitat, thin much needed dense stands, add an economic base to local communities and support recreation pursuits.

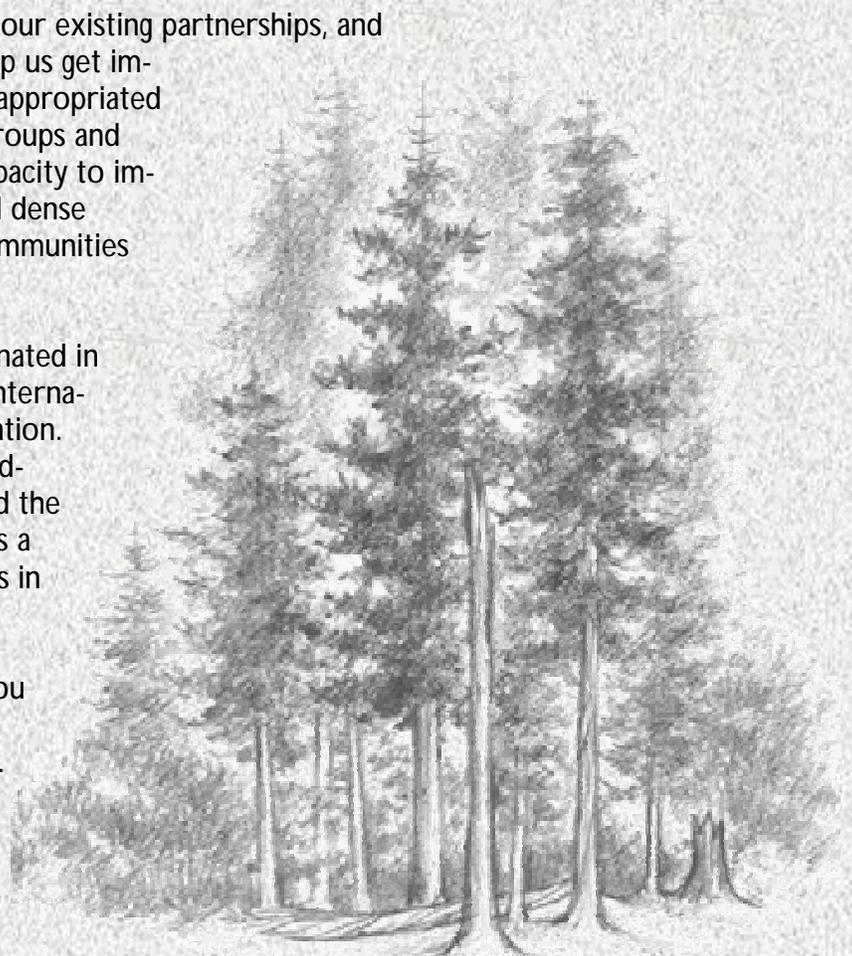
This year, our restoration projects culminated in The Thiess International River *prize*, an internationally recognized award in river restoration. The Forest highlighted the Knowles, Deadwood and Karnowsky Creek projects and the Siuslaw Stewardship Community group as a sampling of the many restoration projects in the Siuslaw River Basin.

I encourage you to review this report. You can find us on the web at www.fs.fed.us/r6/siuslaw, or stop by and visit sometime.

José Linares
Forest Supervisor



José Linares
Siuslaw Forest Supervisor



AQUATIC

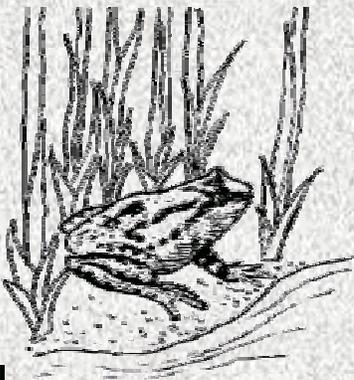
WATER QUALITY

What we have undertaken:

The Siuslaw National Forest has been investing in stream restoration to improve habitat over the past several years. The work undertaken has created a long list of successful projects like those highlighted in this report.

A history of logging, settlements, road building and farming, created conditions where many streams had been badly damaged. These conditions contributed to dramatic fish losses and poor water quality. In response, the Forest created a progressive strategy for restoring and protecting the land. High priority stream restoration projects such as Knowles Creek, Karnowsky Creek, and Ten Mile directly benefit streams and fish.

Much of this work and monitoring of fish habitat and water quality can be seen in our "Restoration" section.



FISH HABITAT

Monitoring Efforts: The center of the monitoring and inventory program is the Forest-wide, Level II Stream Survey Program. Stream surveys provide us with a "snapshot" of current stream conditions. Survey data is used to identify potential restoration projects or the success of a such a project and also to determine the extent of fish distribution across the Forest. Stream surveys assess changes from measured baseline data in fish habitat characteristics of streams where large wood was added. The table above contains miles surveyed from 2001-2004.

Year	Miles of Aquatic Inventory
2001	20
2002	21
2003	20
2004	19

WATER QUALITY

Monitoring Efforts: Stream temperature monitoring is done on an annual basis between the months of June and October. The monitoring sites are at selected locations across the forest, and include project monitoring, long-term variability, and research sites.

All fifth-field watersheds on the Siuslaw National Forest have streams that are on the 303(d) list of water-quality impaired streams. Most of the streams are listed for exceeding stream temperature standards.

The Siuslaw National Forest is writing Water Quality Management Plans for all fifth field watersheds, which will show what restoration projects will result in improved water quality. Most of the restoration projects involve riparian thinning and/or planting to provide greater shade, woody material and future gravel retention. Other actions include following the standards and guidelines in the Siuslaw National Forest Land and Resource Management Plan (1990), the Northwest Forest Plan (1994), and implementing Best Management Practices (US Forest Service, Region 6, 1989).

LAKE MONITORING

Monitoring Efforts: In an effort to better manage aquatic invasive species, aquatic plant surveys were conducted in a number of lakes on the Oregon Coast. The surveys emphasize detection of aquatic weeds. The project is funded by the Forest Service and conducted by Portland State University's Center for Lake and Reservoirs. The Forest completed 5,941 acres of aquatic weed inventory in 2004 at 94 lakes. The Forest also surveyed 22 lakes for a total of 824 acres in 2003.

A 5-acre noxious weed eradication pilot study at Erhart Lake was completed working with the weed, Parrot's Feather.

TERRESTRIAL

VEGETATION MANAGEMENT

Monitoring is essential for learning. The EIS—by identifying a learning objective—sets in motion stronger requirements for follow-up monitoring than ever before. Further, the experiment, with its rigorous design, increases the credibility

The Five Rivers plan differs from traditional plans with the decision to establish learning as a major management objective.

of monitoring results, and provides more understanding for the monitoring investment. As the project unfolds, researchers will also be drawn to one of the largest scale replicated experiments in North America.

Developing Diverse Forest Five Rivers Experiment

The Oregon Coast range has been managed intensively for timber production for many years. The results have been densely stocked young plantations lacking structure, snags, down dead wood, and diversity. On the Forest, managers and scientists are exploring ways to achieve healthy ecosystems in second growth plantations 30 to 50 years old through thinning.

The Thinning Diversity Study has been established in which four levels of thinning were installed in study areas. The thinning treatments vary from relatively dense planted stands (250 tpa – unthinned), to 100 tpa (light thin), 60 tpa (moderate thin), and 30 tpa (heavy thin). Species diversity is also an important factor in the development of stand diversity. Therefore, additional species were experimentally planted including: western hemlock, western redcedar, red alder, Sitka spruce, grand fir, and bigleaf maple in addition to Douglas-fir. The thinning trials are monitoring how different densities of overstory trees effect the development of old-growth characteristics.

Monitoring Results :

Unthinned (~220 trees/acre)

- Good wood production and short harvest rotations (~30 to 50 yrs)
- Slow to develop large trees and complex stand structures
- Little potential for long term diverse stand structure
- Poor connectivity between understory and overstory
- Weak trees; slender boles, short live crowns, windthrow prone

Light thin (~100 trees/acre)

- Good wood production and more options for future management
- Produces larger, wind-firm trees, but rapid crown closure reduces light keeping live crowns short and little response of understory.
- Without repeated thinnings, stand diversity and complexity for old-growth development is unlikely or delayed.

Heavy/Moderate thin (~30-60 trees/acre)

- Enhances stand structure and diversity to accelerate characteristics of old-growth forests while forgoing some wood production.
- Produces very large, sturdy trees, with large live crowns.
- Stimulates vigorous and diverse understory of shrubs and trees.
- Accelerates multi-layered canopy, especially with underplanting.

This work was done in partnership with Bill Emmingham and Kathleen Maas-Hebner of Oregon State University and Sam Chan and David Larson of PNW.

TERRESTRIAL

PLANTATION MANAGEMENT AND WEEDS

Monitoring Efforts: Volume sold and harvested on the Forest is monitored and reported yearly. From 1980 to 1990 the annual volume harvested ranged from 250 MMBF to over 400 MMBF per year. The development of the Northwest Forest Plan (1994) dramatically altered the Forest's prospect for future timber production. Timber sold on the Forest since the Northwest Forest Plan has been:

Fiscal year	Sold ²
FY94	4.6
FY95	9.2
FY96	28.2
FY97	28.7
FY98	3.0
FY99	11.4
FY00	2.2
FY01	1.9
FY02	24.9
FY03	35.5
FY04 ¹	11.0

¹ Volume sold in 2004 does not include 2 other sales totaling 23.91 MMBF because it received no bids?

² Volume sold in MMBF.
MMBF = Million Board Feet

Forest Health

Insect and Disease are monitored yearly by aerial observation as a part of the Forest Health regional program. The program determines the status, changes, and trends as indicators of forest conditions. The process uses data from a grid of ground plots and aerial observations.

On the right are the acres affected by agent for years 2001—2003. Year 2004 was not yet available at the time of this publication.

¹ No information on Swiss Needle Cast available

Agent ¹	2001	2002	2003
Bear	1465	1595	2083
Douglas-fir Beetle	69	67	47
Douglas-fir engraver	—	—	8
Fir engraver	—	11	—
Port Orford cedar root disease	9	—	—
Slide	29	10	—
Spruce aphid	74	—	127
Unknown mortality agent	9	—	—
Water damage	8	—	—
Wind	29	205	80

Plantation Management

Fiscal Year	Pre-commercial Thinning	Commercial Thinning
FY00	1,943	1,445
FY01	4,419	865
FY02	1,239	547
FY03	2,331	809

Timber stand improvements are tracked yearly at the Forest. Pre-commercial thinning is used to maintain growth and vigor by thinning young stands usually between 10 to 20 years old. Commercial thinning done

in stands usually between 30-70 years old were once done to increase growth and volume in the stand. Thinning is now done on the Forest to develop late-successional stand characteristics and enhance diversity.

Weed Control

A general weed inventory of the forest was completed in FY 03. Twenty-six non-native invasive plant species (weeds) have currently been inventoried on the forest for a total of 40,200 gross infestation acres. Project specific weed inventories are also conducted in conjunction with watershed scale planning efforts. The Forest treats between 500 and 700 acres of weeds annually. Priorities are set to focus our efforts were most effective.

The forest is actively working with cooperators to manage non-native invasive plant species across jurisdictional and land ownership boundaries. The forest has encouraged and cooperated in weed control activities with private landowners, schools, local groups and organizations, and other federal state county and local governments and agencies.

TERRESTRIAL FOREST PRODUCTS AND RESEARCH

Monitoring Efforts: The Siuslaw continually monitors special places and products on the forest. One of those special areas is the Research Natural Areas (RNAs), established to conserve important natural ecosystems and to provide opportunities for research on the natural resources the USFS manages.

These areas are monitored for invasive vegetation and processes that may impede on the role of RNAs. On the Siuslaw, the major threat to RNAs is invasion by non-native species. Sand Lake RNA and Ten Mile RNA are both subject to major alteration by European beach grass.

Monitoring Efforts: Special forest products consist of forest resources not associated with timber sale contracts but are used for personal, commercial, and scientific purposes. Examples are firewood, mushrooms, moss, transplants, Christmas trees, cones, and boughs. The forest monitors and protect these resources by limiting the quantity. Specific harvest methods, locations for harvest and imposing appropriate seasonal restrictions

Research Natural Areas: Are they being protected?

Research Natural Area	Status
Sand Lake	Efforts have focused on preserving the northern section's native community. Monitoring shows that the efforts at maintaining the natives and reducing the level of beach grass has been successful. Efforts will be expanded to control Scotch broom.
Tenmile RNA / Oregon Dunes NRA	A project to revitalize the near-ocean dune processes currently altered by European beach grass is proposed; planning to be completed in 2004. The non-native has affected snowy plover habitat, and the RNA contains one of the habitat restoration project sites.
Cummins	The greatest threat to this RNA is the non-native invader knotweed. The area will be monitored every 2 –3 years to prevent establishment of knotweed
Neskowin Crest	The 25-year remeasurement of the 44 permanent plots in the RNA occurred in the spring of 2004. Stand structure, ingrowth and mortality was monitored and recorded.
Flynn Creek / Renecke Creek	Purposive surveys for rare lichen and bryophyte species were conducted. Surveyed area totaled 100 acres in Flynn Creek RNA and 84 acres in Renecke Creek RNA. Results are pending.

Special Forest Products

Product	Unit	Quantity Sold (2003)	Quantity Sold (2002)
Alder puddle sticks	pieces	22,500	12,000
Berries	lbs	200	
Boughs	tons	10	13
Cascara Bark	lbs	13,000	10,500
Christmas Trees	trees	705	755
Firewood	cords	1,989	2,201
Greenery (permits)	lbs	118,400	69,200
Greenery (leases)	---	unlimited	unlimited
Matsutake mushroom	---	unlimited	unlimited
Misc Plant Seeds	lbs	20	17
Moss	lbs	122,000	122,400
Mushrooms commercial	---	unlimited	unlimited
Post and Poles	linear ft	400	460
Transplants	plants	8,024	8,955
Seed Cones	lbs	1,560	
Vine Maple limbs	tons	24	4

TERRESTRIAL

WILDLIFE HABITAT & POPULATIONS

Snowy Plover Monitoring Efforts:

The western snowy plover nesting population is cooperatively monitored¹ each year. The population that is monitored includes ocean shores administered by the Forest Service, Oregon Parks and Recreation Department and the Bureau of Land Management. The health of the population is moderate over the short term. From 1990 to present the population has increased, but is less than levels documented in the mid-70s.

The population of nesting and over wintering western snowy plovers is static on the beaches administered by the Siuslaw.

Silverspot Butterfly Monitoring Efforts:

Yearly monitoring is done in potential habitats surrounding existing populations at Rock Creek/Big Creek, Mt. Hebo, Cascade Head, and Bray Pt. The values are compared to the mean of the past 14 years population surveys. The values for the Mt. Hebo site was 6 percent above the 14 year mean. Cascade Head was 44 percent below the 14 year mean, and Rock Creek was 28 percent below the 14 year mean. Bray Point had the lowest values with an index of 4 for 2003. Data is not available for the 2004 survey season which has just ended.

Restoration Efforts

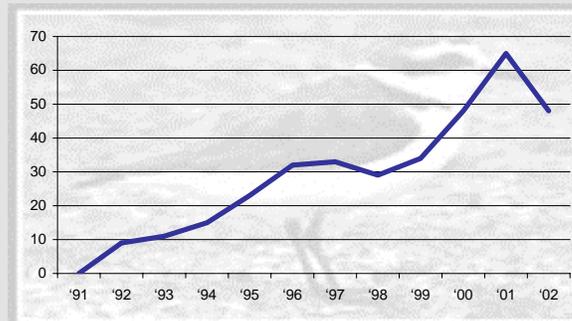
Over 80% of the open, relatively flat sandy areas where snowy plovers traditionally nested in coastal Oregon, have been invaded by European beachgrass and succeeding vegetation over the years.

The Siuslaw National Forest has restored an average of 30 acres of nesting habitat each year for the past 4 years, reduced predation by enclosing virtually all known nests with protective fencing, removed favorable predator habitat and protected habitat by seasonally closing nesting areas to recreational use by people and their dogs, horses, and motor vehicles to prevent disturbances in key areas.

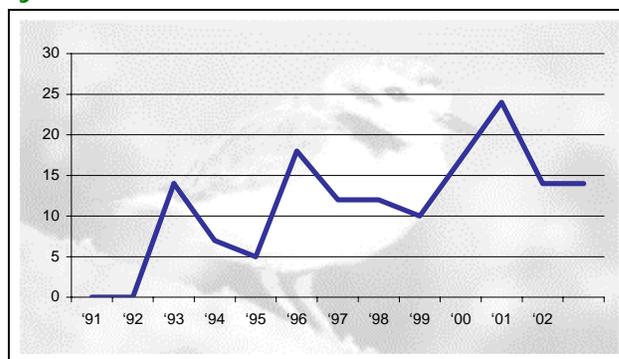


"Effective management of both plover habitat and human use requires a comprehensive strategy of public education, habitat protection and enforcement."

Western Snowy Plover Nesting Summary for Siuslaw NF



Fledgling Summary for Siuslaw NF

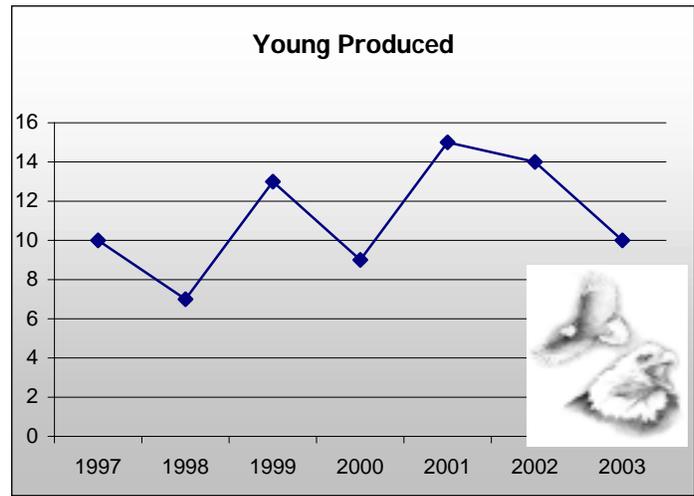


¹Nature Conservancy, Oregon Department of Fish and Wildlife, Mapleton Ranger District, Oregon Dunes NRA, U.S. Fish and Wildlife Service, and volunteers.

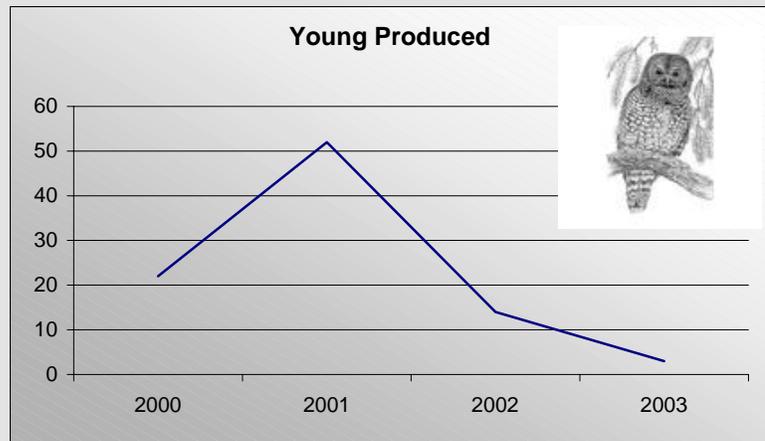
Northern Bald Eagle

Monitoring Efforts: Bald eagle habitat and populations are monitored in cooperation with the Fish & Wildlife Service as funding allows. Bald Eagles specifically use mature conifer or old growth habitat preferably along large rivers and major tributaries. The bald eagle habitat base (acres near large bodies of water and are capable of growing old growth habitat) on the Forest is fixed at approximately 153,200 acres. The amount of currently suitable bald eagle habitat within the bald eagle habitat base on the Siuslaw National Forest is 62,300 acres or 40.6% of capable. This figure has not changed measurably in recent years, but is projected to increase over the next 5 decades with the designation of Late Successional Reserves as part of the Northwest Forest Plan.

Northern Bald Eagle Popula-



Northern Spotted Owl Population Trends



Northern Spotted Owl Monitoring Efforts:

Monitoring of northern spotted owl population size and reproduction for the Forest relies 100% on the current PNW demographic study.

To the right is a summary of these data trends. In the future, the interagency Effectiveness Monitoring workgroup for the northern spotted owl is developing methods for monitoring habitat and restoration at the province scale. The Forest will adopt these procedures to determine trends at the Forest.

AIR

AIR QUALITY

Good air quality is a most valuable resource! Visitors enjoy the fresh air, vistas and salt laden breezes of the coastal forests and beaches. Inconspicuous living things like fungi and aquatic diatoms, insects and amphibians, to mosses, lichens, trees and other plants, depend on clean air. They, in turn, comprise the ecological life support system that provides many other things people need or value, such as clean drinking water, oxygen to breathe, fertile soils, wood products, and habitat and forage for wildlife.

Pollutants of concern to Siuslaw National Forest managers are nitrogen and sulfur oxides (from fuel combustion), and ammonia (from agriculture). Low inputs of these pollutants have fertilizing and acidifying effects—shifting the composition of plant and microbial communities, usually favoring weedy species. High inputs directly harm plants, animals, aquatic ecosystems, and soils. Some pollution reaches the Siuslaw National Forest from Asia, but most pollution is a function of individual actions and life styles here in the Pacific Northwest and the degree to which emissions of the many small and large regional industrial sources are controlled.

Monitoring Efforts: The Siuslaw National Forest monitors the most air pollution sensitive plant life (lichens and mosses) using a Forest-wide network of nearly 100 plots. Lichen community composition and the levels of pollutants in lichen and moss tissue are measured and used to map air quality. In addition, the Siuslaw National Forest is part of the interagency National Trends Network to monitor pollutants in rain and snow. The monitor, located at the Alsea Guard Station, has been in operation for nearly 20 years.

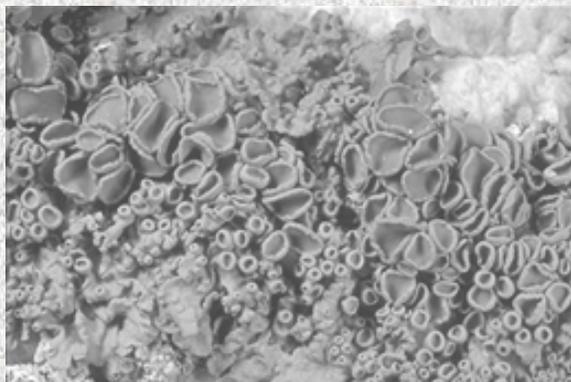
Future Monitoring: In the summer of 2003, field crews began the first revisits of the biomonitoring sites installed during the 1990s. Sites will be revisited over a period of 2-4 years. Biomonitoring and precipitation chemistry data will be integrated to detect changes and

In contrast, the orange lichen to the right, *Xanthoria parietina*, is not native to western North America. It thrives where nitrogen availability is enhanced. Its a pretty color, but does it have an ecological function?

Monitoring Results:

- ◆ Air quality on the forest is excellent
- ◆ Sensitive species are widespread and abundant
- ◆ levels of pollutants in lichens and mosses are among the lowest in the Region
- ◆ precipitation chemistry is within background ranges for the nation
- ◆ The forest has 3 especially valuable hot spots of diversity for rare and endemic lichens

Lobaria oregana, or Lettuce-lung, appears in the background above. It is an air-pollution sensitive lichen that is widespread on the Siuslaw National Forest. This lichen contributes to nutrient cycling, insect diversity, and provides winter forage for wildlife.



SOCIAL

ACCESS & TRAVEL MANAGEMENT

Changes to the Roads

The Siuslaw National Forest has undergone enormous change since 1990. With implementation of the Northwest Forest Plan in 1994, the Forest went from a program of intensive timber management providing an annual timber harvest of over 300 million board feet, to a program composed of riparian and late-successional reserves with a harvest of 25 million board feet. This change reversed decades of road system expansion and led the Siuslaw to evaluate the strengths and liabilities

In 1994, following an extensive public involvement efforts, of its entire road network, the Forest issued an Access and Travel Management (ATM) guide that identified the basic primary and secondary road system deemed essential for public access and travel throughout the Forest. The primary and secondary road system comprised about one third of the road network, leaving the other two thirds of the system open to question. Due to reduced timber harvest, road maintenance funds became scarce, forcing the Forest to make choices about which non-primary and non-secondary roads to maintain or close. More information on these changes are available on our website www.fs.fed.us/r6/siuslaw.

Activities Accomplished: A Roads Analysis was completed in 2002 and captured what we learned through past analyses and monitoring, to be important today. It captured the cumulative knowledge that we've gained from years of studying and monitoring roads and current road management in order to better inform land managers about the benefits and liabilities of roads, ways to mitigate risks, and sources of additional information.

Resulting Changes: Total system road mileage has declined due to decommissioning roads not selected as part of the Key Road system. These roads receive a variety of treatments to stabilize them, restore hydrologic function, and remove the road from the drivable Forest network. The majority of these decommissioned roads were short logging spurs not needed for current management or access. Other decommissioned roads were those presenting a high risk of resource damage, primarily along mid-slope and valley bottom sections that adversely impact aquatic resources. Table 1 illustrates how the system has changed since 1990.

Year	Total Miles of System Roads	Total Miles Maintained	Miles Not Regularly Maintained
1990	2,530	2,530	0
1994	2,500	750	1,750
2002	2,280	770	1,510



SOCIAL

RECREATION & ACCESSIBILITY

Monitoring Efforts: In addition to the recreation personnel routine monitoring visits to recreation sites, law enforcement officers, in the course of the routine night patrols, monitor curfew compliance. Off-highway groups/clubs, operating under a formal agreement with the agency, also assist the agency in reporting violations and incidents. Off-highway vehicles noise limits are monitored by agency personnel at riding-area entry points.

Monitoring Results:

Area Closures Generally Observed

Generally, most off-highway vehicle enthusiasts observe the posted closures. Less than 5% of the users have violated the closures.

Off Highway Vehicle Noise

Only about fifty per cent of the off-highway vehicles that were tested meet the current decibel limit of 93 dB, with an additional 2dB allowed for field testing conditions. Increased sales for ATV's with larger engines, and then equipped with aftermarket exhaust systems, have difficulty meeting the Oregon Dunes decibel limit.

Dispersed Camping Payment

Most OHV campers pay the assigned fee, however they do not complete the free-sand camping permit meant for the dispersed camping areas. Changes to the program in 2005 will make the fee envelope the permit.



Monitoring Efforts and Actions: The forest continues to work on projects designed to increase accessibility to all people regardless of physical abilities. One of the biggest efforts in the last four years was the completion of the Devil's Churn Overlook on Cape Perpetua. Planning and design was done for an interpretive building and restroom at the site, which have since been constructed. The two new buildings help make the site better meet its recreation opportunity setting of roaded natural. The new buildings meet access standards, and with the overlook make Devil's Churn Viewpoint more usable to people of various physical abilities.



Recreation setting quality was retained in some areas and will be restored elsewhere in a large area of the dunes within the Oregon Dunes National Recreation area as a results of planning work done in 2003 and completed in 2004. Sand camping sites were designated and their size reduced and design criteria for them were set. This is expected to result in a more natural appearing recreation setting that will better meet semi-primitive motorized standards for this Oregon Dunes area.

More increases in accessibility

- In Horsfall beach, Wildmare, Bluebill, Spinreel, Lagoon, Waxmyrtle, and Driftwood II Campgrounds, one or two camping sites were made fully accessible. Lagoon, Waxmyrtle, Carter Lake, Tahkenitch, and Tillicum Beach campgrounds now have accessible restrooms.
- A viewing deck was constructed along Lagoon Trail, which meets access standards.
- Fee stations for collecting fees are now more accessible.

SOCIAL

PROGRAMS & BUDGETS

Forest Budget

The table to the right lists budgets and actual expenditures for all major programs collectively from FY2000 through FY2004. After a year of deficit spending in FY2000, the forest funded itself and continues to manage a surplus budget.

Budget and Expenditures for Fiscal Years 2000—2004		
	Final Budget	Expenditures
FY2000	\$16,790,000	\$17,476,000
FY2001	\$18,039,000	\$17,373,000
FY2002	\$23,140,000	\$23,131,000
FY2003	\$20,266,595	\$18,170,579
FY2004	\$18,003,000	still being determined

Forest Plan Amendments

Siuslaw Forest Plan Amendments since 2000.

August 22, 2002. Sparrow Blowdown Salvage. Temporary non-significant amendment to Siuslaw National Forest Land and Resource Management Plan that changes the management area prescription for the 45 acre blow down area from *Management Area 10(F) – Plant, Fish, and Wildlife Habitats* to *Timber/Wildlife/Fish/Dispersed Recreation*. This temporary amendment will be in effect until the blown down timber is salvaged. Upon completion of harvest operations, the area will revert back to MA 10(F). This action met the need to reduce the threat of wildfire spreading into adjacent private lands while minimizing the impacts to the character of the Umpqua Spit Inventoried Roadless Area.



List of Contributors

Karen Bennett	Watershed Coordinator	Bob Nowak	Forester
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Jessie Dole	Landscape Architect	Ken McCall	Transportation Planner
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Linda Geiser	Ecologist	Allison Reger	Analyst (Writer/Editor)
Stuart Johnston	Silviculturist	John Sanchez	Fisheries Biologist
Bob Northrop	Fisheries Biologist	Barb Ellis-Sugai	Geologist/Hydrologist
		Barb Williams	Budget and Finance Officer

RESTORATION

RESTORING THE LAND

The Siuslaw is committed to working with our partners to restore the land.

In the following pages the Siuslaw National Forest would like to highlight our restoration projects that have proved so successful in the challenge of restoring endangered species such as the coho salmon. Some of our activities in the "Biological" section bring to light our work with the Western Snowy Plover. Following are just a few more projects that highlight our commitment to restoration. Our business plan published in 2001 "*Decades of Change... A Challenge for the Future*" outlines where the Siuslaw has been, where we are going and how we will get there. In the business plan the former Forest Supervisor Gloria Brown is quoted as saying:

"Our restoration projects will have measurable and evident outcomes – outcomes that emphasize species and habitat recovery across entire watersheds.

*Gloria Brown, 2001
Siuslaw Forest Supervisor*

The following pages demonstrate this promise by highlighting work completed in Knowles Creek, Tenmile Watershed, and Karnowsky Creek and the monitored results.

The Restoration Story in Knowles Creek

Knowles Creek is a tributary of the lower Siuslaw River. Historical sources suggest that in-migration of spawning coho surpassed 400,000 in Knowles Creek. A hundred years later, fewer than 1,700 smolts were starting that same journey. In the mid 1980s when watershed and fisheries professionals realized that the stream was out of balance, an unprecedented agreement between agencies, environmentalists and industrial foresters was formed. This partnership outlined a holistic restoration strategy including:

- Protecting the existing refugia areas
- Storm-proofing roads and provide access through culverts for aquatic species
- Re-establishing late-successional vegetation especially in riparian areas on flats and debris fans
- Conducting scientific studies to understand critical processes that create and maintain aquatic habitat.

Activities accomplished

- Over 100 in-stream structures
- 12 acres of riparian forest adjacent to 2 miles of channel
- Protected 20% of the basin as a refugia
- Decommissioned or improved culverts on over 5 miles of road
- Storm-proofed road system

Monitoring Results

- Strong runs of Coho increase 90%
- Moderate to weak runs of Coho increased between 200% - 2000%
- Cutthroat increased 432%
- Steelhead increased 28%
- Chinook populations at historic levels
- Uncovered the value of wood in creating refugia for young salmon to congregate

The Restoration Story in Tenmile Watershed

Settlers moved into the Cummins/Tenmile area in the early 1900's. Few homesteaders could make a living off the land, in part due to the areas rugged coastline. Logging and road construction began in the 1950's and continued into the early 1990's. The inherent instability of the steep, highly dissected slopes resulted in large areas, primarily Cummins Creek, being left in a near pristine condition and were designated wilderness in the 1980's. Other areas where activities associated with settlement and timber harvest continued, resulting in the removal of most large conifers from riparian areas, roads have disconnected stream channels, increased landslide rates, and altered the distribution of landslide deposits.

Siuslaw National Forest began a cooperative restoration and monitoring study on Tenmile and Cummins Creeks in 1991. In-stream restoration activities were implemented on Tenmile Creek in 1996 while Cummins Creek was used as a no treatment control.

*Restoring ecological processes
by reducing risks and barriers to recovery
and providing key elements that have been re-
moved*



Figure 1: Road decommission along Cape Creek removes a barrier to floodplain recovery.

Restoration Accomplishments

Restoration activities were designed to restore ecological processes that have been altered by recent (last 150 years) human activities. Linkages among processes, restoration objectives and activities needed to be identi-

Process	Watershed Analysis Findings	Restoration Objective	Restoration Activity	Monitoring Activity
Landslides	Higher Rate Less Wood	Reduce Management Related Landslides	Road Stabilization Decommission	Landslide Area Road Densities
Vegetative Succession	Low Abundance Of Large Conifers	Accelerate Development Of Late Successional Conditions	Thinning Under-story Release Planting	Vegetative Composition Survival Growth
Wood Dynamics In Streams	Low Abundance Of Large Wood	Restore Processes Associated With Large Wood	Wood Additions	Basin-Wide Habitat Survey Channel Maps Wood Movement
Aquatic Habitat Development	Low Complexity And Diversity Of Habitats	Increase Salmonid Freshwater Survival Rates	Wood Additions Move Riparian Campsites	Overwinter Survival, Smolt Production

Wood is Good: Large trees which fall into coastal streams play a dominant role in forming pools, metering sediment, trapping spawning gravels and creating a more complex stream environment. Activities associated with settlement and timber harvest have removed most large conifers from the Tenmile Creek riparian area. The reduction in large conifers has resulted in extremely low levels of large wood (~12 pieces/mile) in Tenmile Creek when compared with less disturbed basins (50-130 pieces/mile) like Cummins Creek. This low level of large wood has reduced Tenmile Creek's capacity to store sediment and organic matter, and develop high quality fish habitat. As a result, stream channels are becoming isolated from their floodplains, and off channel habitats and deep, complex pools have been reduced.

What makes a stream healthy?

- adequate amounts of vegetation, large woody debris or other natural structures
- abundance of large conifers
- complex channel structure to support diversity of habitat types
- adequate water quality to support native fish and invertebrate communities



The Addition of Wood in Tenmile: Large wood was added to Tenmile Creek to restore ecological processes associated with wood dynamics in streams, including development and maintenance of fish habitat. About 200 whole trees with limbs (~33" diameter at breast height & 100' long) and about 40 shorter pieces, several with root wads attached, were placed into 3.5 miles of Tenmile Creek with a large helicopter in fall 1996. Pieces were placed in 54 sites, most often in logjams adjacent to unconfined, low gradient flats consisting of about 3-8 pieces each. Pieces of wood that were added to Tenmile Creek were left un-ballasted to mimic natural wood dynamics. Since some movement of large wood was expected, each piece was tagged, mapped and its distribution was documented annually.

Most pieces have moved slightly from their original position, but only 23% have floated downstream. The location of 97% of the pieces added to Tenmile Creek is known as of summer 2002.

Monitoring Results



The quality and quantity of fish habitat in Tenmile Creek has increased since 1996.



Deep pools with complex wood cover tripled following wood additions and salmonid populations have responded positively.



Over winter survival of coho and steelhead have significantly increased since large wood was added while the no treatment control basin remains unchanged.



Steelhead smolt production has doubled while coho production has remained unchanged.

Wood additions create and maintain off channel habitats and deep complex pools that are preferred habitat for many salmonids and provide important refugia for juvenile during high stream flow.



Several logjams have collected substantial debris that are sources of nutrients for the stream.



Large wood pieces that float downstream often function as key structural elements that initiate and stabilize logjams.



Enchanted Valley Stream Restoration

The Oregon Coast Range was once a prime production area for coho salmon *Oncorhynchus kisutch*. Unfortunately much of the freshwater habitat for coho salmon has been altered to the point that it is no longer suitable for spawning and early rearing of these fish. Beginning in the late 1800's Euro-American settlers began converting these low gradient stream valleys to farmland. In the process the slow, meandering streams in these valleys were straightened and diked to prevent damage from floods. The straightened channels increased the stream's velocity and provided few resting places for young coho salmon.

Enchanted Valley was acquired by the Siuslaw National Forest through a land exchange in 1991. The valley floor had long ago been converted to pasture. Initially, the Forest Service planned to maintain the open nature of the pasture to benefit elk, but its potential as salmon habitat soon became apparent.

The three photos of Bailey Creek on the right tell an important story. A remnant of the old channel was still visible in 1955 as a meandering thread in the upper 2/3 of the valley. By the time the Forest Service acquired the valley this remnant channel was gone and only a channel ran along the right margin of the valley ("before" photo). The "after" photo shows the results of the restoration work. Note the sinuous nature of the new channel

Monitoring Results



Photo points demonstrate the **rapid recovery** of streambank vegetation and aquatic plants. Willows planted along the banks should eventually provide shade to the stream.



The sinuous nature of the new channel increased total channel length by **30%** over the straightened old channel and pool volume increased **100%**



First year results show a **five-fold increase** in juvenile coho salmon using the new channel when compared to numbers estimated for the old channel!

Restoration work:

The primary purpose of the restoration project was to improve rearing conditions for juvenile coho salmon by recreating a meandering channel through the middle of the valley. In order to accomplish this:

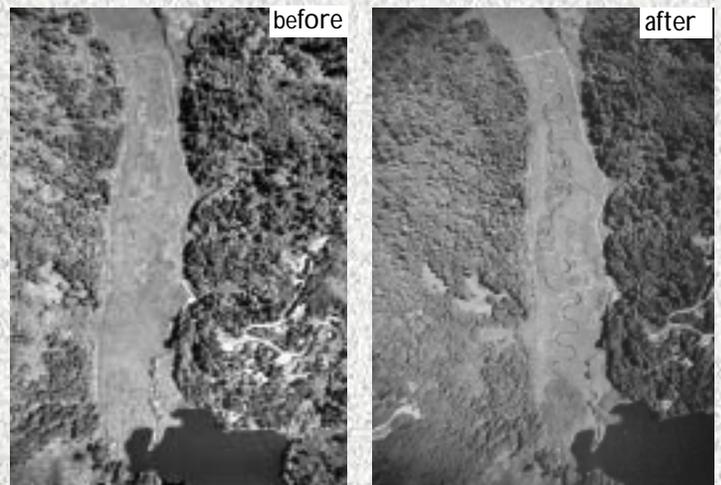
- Many partners were involved, including the Siuslaw Watershed Council, Water Conservation District and Mapleton Schools.
- A whole new channel for Bailey Creek had been constructed using heavy equipment including excavators and dump trucks.
- The project was implemented in 1999 and 2000, with some work occurring in 2001.

Monitoring of the project will determine if the remaining portion of the valley will be treated in the future.



Enchanted Valley, 1955

This photo taken in 1955 showed the potential for the salmon habitat in the Enchanted Valley.





Headcutting resulting in 10 to 12 feet of entrenchment, is one effect of channelization.

Karnowsky Creek Prize Winning Restoration

The Karnowsky Creek watershed is one of the many sub watersheds within the lower Siuslaw River Valley. It's restoration was recognized with the Theiss International River *prize* river restoration award.

The Karnowsky Creek Valley was greatly altered by farming practices which channelized and down-cut stream systems, truncated tidal influences and introduced non-native plant communities. Unprecedented agreements between agencies, universities and community members were made to quickly and efficiently enact a mutually agreed upon plan to restore the valley to its pre-pioneer conditions. Innovative restoration practices using state-of-the-art computer mapping tools and aerial photography were employed to more accurately design the plan and communicate it to all.

The Karnowsky Creek Restoration Plan is a watershed planning framework where restoration strategies are linked to community participation and long term research.

Project Goals

- Restore wetland, stream, and floodplain functions that once provided excellent rearing habitat for Coho Salmon.
- Encourage the formation of native plant communities and guard against the invasion and spread of exotic species
- Develop partnerships with organizations and individuals who will participate in restoring Karnowsky Creek
- Develop and present the project in a manner that is inclusive and respectful of local landowners and the broader community
- Consider creative options for small-scale economic opportunities in pastoral valley bottoms

Project Accomplishments

- 90 acres of riparian planting
- 3 miles of stream channel reconstruction
- 150 full-length logs placed in stream channel and on flood plains
- Groundwater capture monitored
- Landowner demonstration sites developed
- Freshwater mussels relocated to save populations during construction
- 230 landowners involved planting 60,000 trees

The new vigilance within the watershed has uncovered two new areas of monitoring:

- Identification of lead levels which exceed established toxicity limits
- Identification of shell erosion and premature die-off of fresh water mussels



Karnowsky Creek in the 1800s and 1900's