

EROSION & SEDIMENTATION Action Plan

**Priority
Problem**

Erosion and sedimentation in the Watershed and Bay can adversely impact the human and natural environment. Impacts may include the loss of spawning and rearing habitat in both fresh and salt water, degradation of other estuarine habitats, changes in the Bay's depths and water circulation patterns, and flooding.

Goal

Reduce Sediment Risks from Forest Management Roads

Many roads in the Tillamook Watershed were built prior to current design standards and pose a number of sediment and other risks to salmonids. Such roads have been identified as a leading potential source of increased sediment. Road surfaces, cut and fill slopes, and ditches are generally chronic sediment sources, and poorly designed culverts frequently block fish passage. Failures of road crossing fills or cut and fill slopes produce episodic sediment runoff, usually related to very large precipitation events. Regular maintenance of all roads and upgrading or decommissioning older forest management roads will reduce sediment loading to streams in the Watershed.

Goal

Reduce the Adverse Impacts of Rapidly Moving Landslides

Rapidly moving landslides (debris flows) are natural events that most commonly occur during high duration and intensity rainfall events on slopes steeper than 65%. Vegetation removal may impact debris flows by changing their timing, size, and composition, reducing the value of debris flow deposits in providing fish habitat. Forest practices that maintain the vegetation components that affect either the timing or structural elements of debris flows will reduce the adverse impacts downstream.

Goal

Improve Channel Features to Improve Sediment Storage and Routing

Channel features, such as large wood and form (*e.g.*, channel development) have been modified by human activities in ways that may be adversely affecting sediment storage and routing, and therefore fish habitat. Historically, large wood stored and sorted sediment in the stream channel, creating complex pools with a variety of substrate conditions. Channels also migrated across the floodplain. Dikes, roads, and other

development now confine many channels, so that sediments are no longer spread across the floodplain. Rather, they are transported more rapidly through the system and may accumulate more rapidly in the lower reaches of the Watershed. Increased large wood supply and retention and floodplain connectivity will improve sediment storage and routing functions.

Goal **Reduce the Adverse Impacts of Erosion and Sedimentation from Developed and Developing Areas**

Roads and other hardened surfaces contribute to surface water runoff, increasing stream power and bank erosion. Road and building construction and other activities associated with development can also increase erosion by exposing unprotected soil and disrupting natural drainage patterns. Careful erosion controls on construction and development sites will reduce the contribution of sediment from urban areas.

Goal **Reduce the Adverse Impacts of Erosion and Sedimentation from Agricultural Areas**

Erosion in agricultural lowlands typically takes two forms: streambank cutting, and sheet and rill erosion. Streambank erosion is the more prevalent of the two types. Increased bank erosion is commonly associated with the removal of riparian vegetation. Cattle accessing streambanks can also increase erosion when their hooves break up the soil matrix and remove vegetation. Sheet and rill erosion can contribute significant amounts of sediment, including organic material (*e.g.* leaves and other detritus, and livestock feed, bedding and manure), in localized areas. Improved riparian condition and farm management practices will reduce sedimentation from agricultural areas.

Objectives

Upgrade 1,400 miles of forest roads on state and private lands by 2010.

Decommission 50 miles of forest management road by 2010.

Conduct regular road maintenance activities on all 2,000 miles of forest management roads.

Control runoff from all construction and development in urban areas by 2003.

Enhance 200 miles of forested riparian habitat to healthy riparian condition by 2010. (Habitat Objective)

Enhance 500 miles of riparian habitat in the 0–500' elevation band to healthy condition by 2010. (Habitat Objective)

Enhance 100 miles of upland instream habitat by 2010. (Habitat Objective)

Enhance 750 acres of tidal wetland by 2010. (Habitat Objective)

Achieve instream suspended sediment concentrations that meet salmonid requirements by 2010. (Water Quality Objective)

Document at least a 25% reduction in total suspended solids loads to rivers, with apparent trends by 2005 and statistically significant results by 2010. (Water Quality Objective)

Erosion and Sedimentation Action Plan

- SED-01 Implement Road Erosion and Risk Reduction Projects
- SED-02 Implement Practices That Will Improve Sediment Storage and Routing
- SED-03 Reduce Risks in Landslide-Prone Areas
- SED-04 Ensure Sufficient Resources to Enforce Forest Practices Act
- SED-05 Reduce Sedimentation from Non-Forest Management Roads
- SED-06 Develop, Implement, and Enforce a Stormwater Management Ordinance

- HAB-05 Protect and Enhance Upland Riparian Areas
- HAB-06 Protect and Enhance Lowland Riparian Vegetation
- HAB-07 Protect and Enhance Instream Habitat
- HAB-09 Control Livestock Access to Streams

- WAQ-11 Implement Suspended Sediments Management Strategies

- FLD-02 Implement Watershed Drainage Modification Projects

SED-01 Implement Road Erosion and Risk Reduction Projects

What	Identify, prioritize, and implement improvements of road elements such as road fills, stream crossings, and surface problems to reduce sediment runoff risk and improve fish passage and habitat. These improvements will reduce the risk of adverse watershed effects associated with “legacy” roads by reducing landslide and washout potential; improving drainage and sediment control; and removing barriers to fish passage.
Why	Many forest roads built prior to the current BMPs or development of the Oregon Forest Practices Act pose increased risk of excessive sediment to fish habitat. These roads are the principal contributors of human-caused sediment runoff in forest areas as well as major barriers to fish passage. Upgrading substandard roads can reduce sediment production and input to streams, benefiting fish and other aquatic life, and reducing the total amount of sediment transported to the lower rivers and Bay. Industrial, federal, ¹ and State Forest landowners are implementing a voluntary program to identify and address risks from roads (OPSW workplans ODF-1S and 2S, described in Appendix D), and to evaluate the adequacy of fish passage criteria (ODF-16S). OPSW objectives call for elimination of artificial obstructions to fish passage as necessary to access key habitat for critical life stages of salmonids.
How (Who.* When.**)	<p><i>Step 1</i> Assess forest roads on federal, state, and private lands. Use road survey protocol developed jointly by ODFW, ODF, OSU, and OFIC. Assess similar roads in other ownership (<i>e.g.</i>, agricultural roads, non-paved county roads) as appropriate. (ODF and OFIC on forest lands, TCPP on non-forest lands. All roads by 2003.)</p> <p><i>Step 2</i> Develop a list of priority sites for road upgrade work. Emphasize road systems constructed prior to current forest practice standards and road systems in core areas. (ODF and Performance Partnership. Annually.)</p> <p><i>Step 3</i> Design and implement actions and maintenance practices to reduce road-related risk. Follow Oregon Forest Practice Administrative Rules (629-625-000 through 629-625-650) and the Road Management Guidebook developed by ODF. Explore cooperative agreements between adjacent landowners as a way to reduce the number of forest roads. (ODF and OFIC. Ongoing.)</p> <p><i>Step 4</i> Vacate unneeded roads and stabilize abandoned forest roads. Modify roads that will be unused for some time (decades) to reduce erosion while protecting much of the initial investment in their layout and construction. (ODF and OFIC. 50 miles by 2010.)</p>

¹ BLM and USFS fish passage, road and landslide assessment criteria come from the 1994 Northwest Forest Plan and their Land Management Planning Documents. They include BMPs for road building, maintenance, upgrading, and decommissioning.

* Coordinating entity; ensures that identified partners are on schedule.

** By end of named year.

- Step 5* Evaluate road improvement effectiveness in reducing sediment production and improving fish passage. Adjust site selection criteria, upgrade techniques, BMPs, and maintenance activities, based on evaluations of upgraded roads. (ODF. By 2001, ongoing.)
- Step 6* Implement the ODF compliance auditing program to determine the level of compliance with forest practices road maintenance rules. Use this information to determine if actions are needed to improve compliance and identify how compliance problems are best resolved. (ODF. By 2000, ongoing.)
- Step 7* Facilitate grants to assist landowners in reducing road-related risks. (ODF/TCPP. By 2000, ongoing.)

Where	Watershed-wide.
Lead Agency	ODF on forest lands, TCPP on non-forest lands.
Other Partners	Private landowners, OFIC, small woodland owners, Tillamook County, cities, federal landowners, OSU Extension, State Lands Board, DSL, watershed councils, OWEB, USFWS, NMFS, BLM, USFS, Fish Restoration and Enhancement Board, FEMA (Project Impact), COE.
Anticipated Costs	Planning costs: ODF – 2FTE for planning, \$50,000 each per year; other owners, \$100,000. Upgrade roads: \$3–7 million/year over 10 years. Decommissioning: \$50,000 per year over 5 years. Compliance audit: covered under SED-02. Maintenance: \$2–4 million/year
Monitoring	Track CCMP objectives: <ul style="list-style-type: none">• Upgrade 1,400 miles of forest roads on state and private lands by 2010.• Decommission 50 miles of forest management road by 2010. OPSW monitoring programs: <ul style="list-style-type: none">• ODF-10S Forest Practices Monitoring Program• ODF-13S Storms of 1996 Monitoring Project• ODF-23S BMP Compliance Audit Program• ODF-25S Fish Presence/Absence Surveys and Fish Population Surveys
Regulatory Issues	Forest Practices Act.
Related Actions	HAB-21 Modify Ineffective Tide Gates and Floodplain/Lowland Culverts SED-04 Ensure Sufficient Resources to Enforce Forest Practices Act SED-05 Reduce Sedimentation from Non-Forest Management Roads OPSW: ODF-1S, 2S, 5S, 10S, 13S, 15S, 16S, 23S, 25S, 34S, 35S, 36S, 59S ODOT-8 DEQ-1S, 5S, 6S DSL-6 ODFW IB4, IVC1, IVC6

SED-02 **Implement Practices That Will Improve Sediment Storage and Routing**

What Implement practices that retain additional vegetation along streams and promote restoration of floodplain function. Steps outlined in this action address relevant upland forest practices and will go beyond current FPA requirements. Steps in HABs 06, 07, 08, and 24 and FLD-02 and 05 will address floodplain function in lowland/floodplain areas.

Why These practices alter the rate of sediment transport downstream and improve instream habitat. Improved forest management practices have already reduced the adverse impacts from erosion and sedimentation, and increased the potential for future recruitment of large wood to streams. Nonetheless, restoring sediment storage and routing functions in the fluvial system will require substantial time and effort.

Because the State Forest constitutes approximately 64% of the forested lands in the Tillamook Bay Watershed, the major responsibility for this action will fall on ODF in developing its Northwest Oregon State Forests Management Plan and implementing OPSW programs (summarized in Appendix D). BLM and USFS programs are specified in the Northwest Forest Plan, adopted in 1994 in response to ESA listing of the northern spotted owl, and their Land Management Planning Documents. Private industry groups will demonstrate benefits and work to provide incentives to private landowners as well.

Incentive programs can provide private landowners flexibility and creativity in their approach to improving environmental conditions, and balance the burden of environmental restoration more fairly between private individuals and the public.

How (Who.When.)

Step 1 Actively implement measures in the Oregon Plan that retain additional vegetation or will improve the loading of large wood in streams. (ODF and private landowners. Ongoing.)

Step 2 Actively support adoption and implementation on State Forest lands of water quality strategies and stand structure targets. (Described on page V-97, V-37 of the April 1998 draft of the Northwest Oregon State Forests Management Plan, respectively) (Performance Partnership. Ongoing.)

Step 3 Assist with promoting the OPSW restoration guidelines. Actively support and implement the North Coast Salmonid Habitat Restoration Project (OPSW workplan ODF5). 115 sites were located in the Tillamook Watershed in the first two years (See Appendix G and Figure 6-1). 61 potential project sites have been identified on Tillamook State Forest lands, with additional habitat projects to be identified on private lands beginning in 1999. (Performance Partnership [support] and ODF [implement]. Ongoing.)

Step 4 Implement OPSW workplan ODF8 on sites where the native tree community was conifer-dominated, but due to historical events have become hardwood-dominated. This measure allows disturbance to produce conditions suitable for the re-establishment of conifers without increasing summer water temperatures.² (ODF. Ongoing)

Step 5 Apply OPSW workplans ODF-18, 19, 20, 21, and 22 and other voluntary measures that private industry has developed to retain additional vegetation along stream channels. Demonstrate the benefits of more protective forest practices and provide other more direct incentives to private landowners to utilize those practices. Prepare summary report to Performance Partnership. (OFIC. By 2000.)

Where Forested areas, Watershed-wide.

Lead Agency ODF and OFIC.

Other Partners Private landowners, BLM, USFS, OWEB, Oregon Legislature, Performance Partnership.

Anticipated Cost ODF staff: \$50,000/year.
Costs of incentives for private forest landowners are unknown and will depend on the nature of the programs yet to be identified.

Monitoring Track CCMP objectives:

- Enhance 200 miles of forested riparian habitat to healthy riparian condition by 2010.
- Enhance 100 miles of upland instream habitat by 2010.
- Enhance 500 miles of riparian habitat in the 0–500' elevation band to healthy condition by 2010.
- Enhance 100 acres of freshwater wetland by 2010.

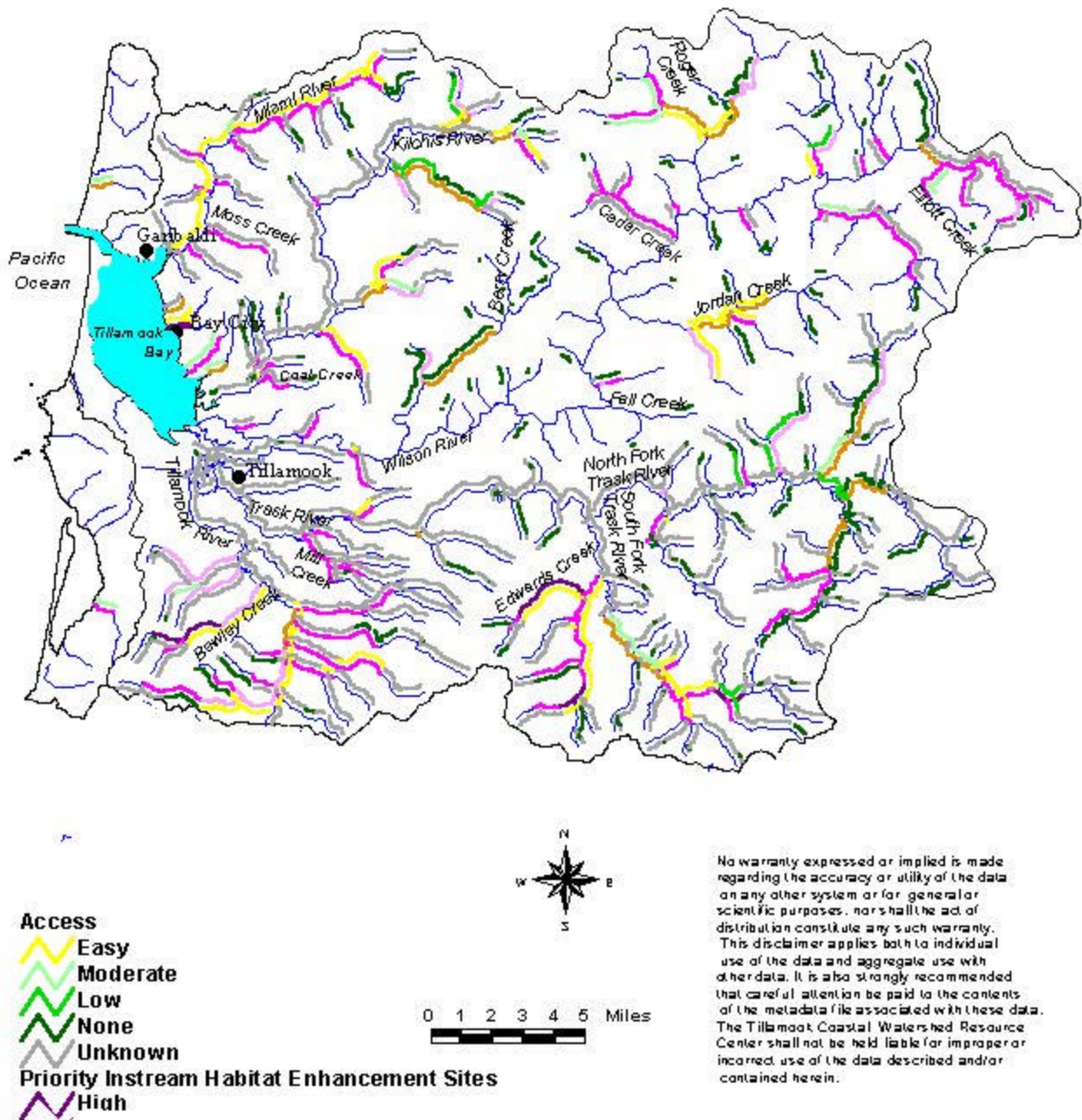
ODF monitoring of forest practices, road, and temperature protection BMPs under the Oregon Plan. Monitor voluntary projects with the Oregon Plan Stream and Watershed Restoration Project Reporting Form.

Regulatory Issues The NMFS listed Coastal Coho as a threatened species under the Endangered Species Act on August 3, 1998. Management implications of that listing on Oregon's forest practices regulations are still unknown.

² In situations where existing riparian vegetation is incapable of developing characteristics of a mature streamside stand in a “timely manner,” the process will provide functional stream shade, some woody debris, and bank stability in the short term while creating conditions to attain desired future conditions more quickly than would otherwise be achievable under natural succession. See HAB-05 for conditions and restrictions.

Related Actions	HAB-05	Protect and Enhance Upland Riparian Areas
	HAB-06	Protect and Enhance Lowland Riparian Areas
	HAB-07	Protect and Enhance Instream Habitat
	OPSW	ODF-5S, 7S, 8S, 18S, 19S, 20S, 21S, 22S, 27S, 30S, 31S
		DSL- 6

Potential Instream Habitat Enhancement Areas and Heavy Equipment Access Ratings in Tillamook Bay Watershed



Source: North Coast Stream Project: Guide to Instream and Riparian Restoration Sites and Site Selection. Barry Thom and Kelly Moore. ODFW, Corvallis, OR. June 1997.

Prepared by Mary Barozak

Figure 6-1.

SED-03 Reduce Risks in Landslide-Prone Areas

What Encourage silvicultural practices likely to reduce adverse impacts from landslides.

Why Landslides of the right size and frequency can enhance fish habitat by supplying large woody debris, leading to channel complexity. However, some land use practices may result in larger and more frequent slides that the rivers can handle. Many areas in the Coast Range have steep slopes and are susceptible to landslides. Activities that further steepen the land surface, concentrate water, or remove vegetation from these slopes can increase the risk, timing, and composition of landslides. Landslides which reach stream channels can deposit large quantities of sediment in streams, adversely impacting habitat over their course and downstream of the affected reach, or scouring all material from mountain stream channels.

Landslide risks associated with forest management roads are largely addressed through SED-01 and SED-05. This action focuses on harvest-related silvicultural practices. Encouraging retention of vegetation so that large wood is available to be delivered to channels can reduce adverse effects of landslides. When landslides do occur large woody debris can help retain and rework debris-torrent materials into productive fish habitat.

How (Who.When.) *Step 1* Continue ODF evaluation of risks to water and fish resources prior to approval of proposed harvesting operations on high risk sites under OAR 629-630-500. (ODF. Ongoing.)

Step 2 Complete ODF analysis of landslide and debris flow data from its “Storms of 1996” monitoring study and submit latest scientific findings and recommendations of the *Forest Practices Advisory Committee on Salmon and Watersheds* to the Board of Forestry for rule review. (ODF. By 1999.)

Step 3 Support implementation of silvicultural practices resulting in increased vegetation retention along streams, including Type N streams in especially high risk areas, through:

- (1) adopt by 2000 and implement the NW Oregon State Forest Management Plan for State Lands (ODF. Ongoing.); and
- (2) measures such as ODF 18, 19, 20, and 22 developed under the Oregon Plan in cooperation with OFIC for private lands. (ODF, OFIC and other private foresters. By 2001, ongoing.)

Where Forest lands, Watershed wide.

Lead Agency ODF.

Other Partners	OFIC, other private landowners, USFS, BLM, Tillamook County, ODFW, DLCD, and NMFS.
Anticipated Costs	Costs associated with decreased revenue from harvests.
Monitoring	<p>Actions relating to ODF 18, 19, 20, and 22 will be monitored under the Oregon Plan.</p> <p>Track CCMP objective:</p> <ul style="list-style-type: none">• Enhance 200 miles of forested riparian habitat to healthy riparian condition by 2010.
Regulatory Issues	<p>Oregon FPA Administrative Rules may be affected by Board of Forestry rule review and ESA salmon listing.</p> <p>USFS and BLM activities are governed by the Northwest Forest Plan, which amended their Planning Documents.</p>
Related Actions	<p>SED-01 Implement Road Erosion and Risk Reduction Projects</p> <p>SED-02 Implement Practices That Will Improve Sediment Storage and Routing</p> <p>HAB-05 Protect and Enhance Upland Riparian Areas</p> <p>OPSW ODOT-8 DEQ-5S, 6S DSL-6 ODF-3S, 13S, 37S, 38S</p>

SED-04	Ensure Sufficient Resources to Enforce Forest Practices Act
What	Maintain two Forest Practice foresters assigned to the Tillamook District for forest practices education, prevention and enforcement activities. Decrease the number of Forest Practices Act violations.
Why	ODF achieves FPA rule compliance through a program of rule education, technology transfer, and enforcement. Increased compliance with the laws and rules regulating timber lands in the Watershed will both improve environmental conditions and provide ODF with better feedback on the effectiveness and validity of current programs.
How (Who.When.)	<p><i>Step 1</i> Maintain funding for two forest practice foresters. (ODF. By 2000, ongoing.)</p> <p><i>Step 2</i> Implement the ODF compliance auditing program to obtain a statistically reliable sample of BMP compliance. Use this information to determine if actions are needed to improve compliance and identify how compliance problems are best resolved. (ODF. By 2000, ongoing.)</p>
Where	Forest lands, Watershed-wide.
Lead Agency	ODF.
Other Partners	OWEB, OFIC.
Anticipated Cost	Staff time: ODF – Forest Practice foresters, 2.0 FTE, \$50,000 each per year for 10 years (\$1M). ODF has already budgeted this ongoing cost.
Monitoring	Implementation.
Regulatory Issues	Forest Practices Act.
Related Actions	<p>SED-01 Implement Road Erosion and Risk Reduction Projects</p> <p>SED-02 Implement Practices That Will Improve Sediment Storage and Routing</p> <p>SED-03 Reduce Risks in Landslide-Prone Areas</p> <p>OPSW ODF-55S</p>

SED-05 Reduce Sedimentation from Non-Forest Management Roads

What State, federal, and local (County and city) road authorities will evaluate appropriate road activities and functions (*e.g.*, project development, construction, maintenance, and operations) for sedimentation effects and, wherever practicable, fish passage (See HAB-21). Identify potential impacts to receiving streams and develop best management practices (BMPs) to minimize those impacts to the maximum extent practicable.

Why Paved, graveled, and unpaved roads may be significant sediment sources. Tillamook County and ODOT own and maintain 336 and 145 center lane miles, respectively. Legal jurisdiction of road authorities is limited to their operational right of way. Consequently road authorities have no legal authority over adjacent land uses. However, road authorities can reduce stream sediment impacts by ensuring that roads are designed and maintained to minimize erosion/sedimentation.

- How (Who.When.)**
- Step 1* Review maintenance activities to identify potential impacts to receiving streams, and develop BMPs to minimize potential impacts. (Tillamook County. By 2001.)
 - Step 2* Ensure that road authority project development activities, construction, and long term development practices meet the guidance in Management Measures for Urban Areas, Construction Activities and Roads, Highways, and Bridges, as required under the CZARA, Coastal Nonpoint Pollution Control Program. (Tillamook County. By 2001.)³
 - Step 3* Conduct construction and project development reviews that identify impacts to receiving streams and habitat, and mitigate for unavoidable impacts. Include appropriate regulatory authorities (*e.g.*, ODFW, NMFS, COE, and DSL) in the review process. (Tillamook County and ODOT. By 2002, ongoing.)
 - Step 4* Evaluate the appropriateness of including the ODF Landslide Hazard Model in the County construction/development program. (Tillamook County. By 2000.)⁴
 - Step 5* Partner with DEQ to develop a statewide NPDES permit to meet the requirements of the Clean Water Act, including TMDL allocations. (ODOT. By 2001)

Where Non-forest management roads: Watershed-wide.

³ ODOT has participated in such a review in consultation with the Association of Oregon Counties and NMFS. The review resulted in the “Oregon Department of Transportation Maintenance Water Quality Best Management Practices Guide, November 1998.”

⁴ ODOT will incorporate the ODF Landslide Hazard Model into its natural resource mapping process in 1999.

Lead Agency	Tillamook County.
Other Partners	ODOT, Cities of Tillamook, Bay City, and Garibaldi, NMFS, DEQ, DSL, ODFW, COE.
Anticipated Cost	Project costs are project-specific: at least 1.0 FTE for project development and review.
Monitoring	Track CCMP objectives: Achieve in-stream suspended sediment concentrations that meet salmonid requirements by 2010. Control runoff from all construction and development in urban areas by 2003.
Regulatory Issues	Clean Water Act. Endangered Species Act. DSL/COE Fill/Removal Permits.
Related Actions	SED-01 Implement Road Erosion and Risk Reduction Projects OPSW: ODOT-3, 6, 8, 9 ODF-13S

SED-06	Develop and Implement a Stormwater Management Ordinance
What	Pass city and County ordinances regulating activities and urban land uses that can directly or indirectly increase sediment loading above normal levels. Require effective construction site erosion control on all urban construction sites in all Tillamook Bay Watershed jurisdictions.
Why	<p>A comprehensive stormwater management ordinance will control direct and indirect sediment loads in urban areas. The effect on sediment production or transport from urban construction sites or developments can be significant, and disproportionate to size and area. Sediment transport rates from unprotected or disturbed soils vastly exceed those of vegetated or artificially-surfaced areas.</p> <p>Effects on channel erosion from urban activities are related to an increase in peak stream flow, and hence a disturbance in the balance between erosion and deposition in a given stream reach. The width, depth, and meandering nature of a stream channel are in a dynamic equilibrium with the forces of the water that flow through the channel. An increase in the volume of water carried by the stream increases the erosive force in the stream channel. The result is often a streambank failure. Delaying the delivery of storm water from a site allows for solids in the storm water to settle out or be filtered out before they reach the stream. Also, peak stream flow and intensity of erosive forces are reduced.</p>
How (Who.When.)	<p><i>Step 1</i> Develop a model ordinance. (Tillamook County. By 2000.)</p> <p><i>Step 2</i> Introduce model ordinance to local jurisdictions' planning commissions. (Tillamook County. By 2000.)</p> <p><i>Step 3</i> Adopt stormwater management ordinances in the Watershed's three cities and Tillamook County. (Tillamook County and Cities of Tillamook, Bay City and Garibaldi. By 2001.)</p>
Where	Tillamook County and incorporated cities of Bay City, Garibaldi, and Tillamook.
Lead Agencies	Tillamook County Board of Commissioners and city councils of Bay City, City of Tillamook, and Garibaldi.
Other Partners	Tillamook County DCD, local planning commissions and local legislative bodies, DLCD, DEQ.

Anticipated Cost

Cost for developing and adopting an ordinance: \$25,000.
Continuing substantial costs for implementing ordinance.
Stormwater engineering studies: \$25,000–\$50,000 each.

Monitoring

Monitor CCMP objectives:
Achieve in-stream suspended sediment concentrations that meet salmonid requirements by 2010.
Control runoff from all construction and development in urban areas by 2003.

Regulatory Issues

Management measures required by Coastal Non-Point Pollution Control Program (CNPCP). Appropriate urban land use response to sediment TMDL and salmon habitat protection issues.
Phase II storm water requirements under the Clean Water Act will require construction site erosion control permits on sites one acre and larger in the next two years.

Related Actions

WAQ-08 Ensure Adequate Non-Point Urban Runoff Treatment and Retention
OPSW: DEQ-1S, 6S, 15S
DLCD-5