Oregon's 2004 Water Quality Assessment

Section 305(b) Report

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Oregon Department of Environmental Quality

Water Quality Division

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Oregon's Surface Water Protection Program

The Oregon Department of Environmental Quality (ODEQ) is responsible for assuring that the state's waters are drinkable, fishable and swimable. In partnership with other natural resource agencies, ODEQ is working to preserve and protect watershed health and to restore threatened salmon populations. ODEQ protects water quality in Oregon by:

- Setting water quality standards necessary to support all beneficial uses, including protection of public health, recreational activities, aquatic life, and water supplies.
- Requiring that the discharge of pollutants into State waters be minimized and that the impact of human activities on water quality be minimized.
- Providing financial assistance for communities to upgrade waste water treatment facilities.
- Providing financial assistance to implement programs to control non point source pollution.
- Providing technical assistance and outreach/education.
- Assessing water quality in surface waters to determine if standards are met for protection of public health, fish and other aquatic life, and other uses.
- Where water quality is not acceptable, developing corrective actions and implementing them.
- Periodic re-assessment to determine progress.

Setting water quality standards

The water quality standards program is one of the cornerstones of the Clean Water Act. Through this program, States set water quality standards for waters within their jurisdiction.

Water quality standards consist of three components. First, water quality standards define a use for a water body. Uses are based on how the water has actually been used since November 1975 (existing uses) or the designation can be based on a goal (goal use) that will be achieved in the future (EPA, 11/2002, Water Quality Standards Clean Water Act § 303(c)) (http://yosemite.epa.gov/R10/WATER.NSF).

Existing or goal uses of a water body might include salmonid spawning, water contact recreation, and fishing. A water body often has to support several uses, including cold-water fish like salmon and trout, fishing and irrigation. Federal law requires that ODEQ protect the most sensitive of these uses.

The second component of water quality standards is the criteria which describe the conditions necessary to support the designated uses. Criteria can be numeric limits for individual pollutants or narrative descriptions of desired conditions. Narrative criteria describe what Oregon's waters will be "free from", like oil and scum, color and odor, and other substances that can harm people and fish. Numeric criteria assign numbers that represent limits and/or ranges of chemical concentrations, like oxygen, or physical conditions, like temperature.

The third component to water quality standards are antidegradation policies designed to prevent degradation and protect, maintain, and enhance existing surface water quality.

According to the federal Clean Water Act, States are to review their water quality standards at least once every 3 years. During this review, States revise standards to incorporate the latest scientific information and to make any other revisions the State determines are needed. ODEQ examines scientific information with a technical advisory committee. The technical committee typically evaluates the methodologies used to develop criteria and develops a range of possible criteria which is forwarded to a second group, a policy advisory committee. The policy advisory committee's role is to review the alternatives and select one. After extensive public review, the Oregon Environmental Quality Commission (EQC) adopts the changes to the water quality standards into Oregon rules. The Environmental Protection Agency reviews and approves the adopted standards.

ODEQ's current triennial review began in late 1999. Standards were revised in December 2003 and May 2004 and one more revision is anticipated in early 2005. The criteria included in this triennial review are temperature, toxic pollutants, turbidity, beneficial use designations, intergravel dissolved oxygen, some portions of antidegradation, and methods for developing biocriteria. The temperature, beneficial use designations, antidegradation and intergravel dissolved oxygen revisions were approved by EPA in March, 2004. The toxic pollutants criteria revisions, as well as a rule allowing compliance schedules and criteria for stratified waters, were adopted by EQC in May 2004 and will be submitted for EPA review and action in June. The turbidity revisions will be proposed to EQC in early 2005.

Limiting the discharge of pollutants into State waters

Wastewater Permits

The wastewater permit program has been the bedrock of ODEQ's water quality program since the first permits were issued in the late 1960's, and is credited with significant improvements in water quality in many Oregon rivers. The permit program identifies point sources of wastewater with a potential for serious water quality or public health impacts and requires that those facilities obtain and comply with a wastewater discharge permit. Permit conditions generally include effluent limits, periodic monitoring to ensure that the effluent limits are being met, compliance conditions requiring improvements in operation or special studies, special operating conditions, and other administrative requirements such as prompt reporting of any spills. In addition to issuing permits, ODEQ also conducts periodic inspections and reviews permittee monitoring records to insure that the terms of the permit are being met and no unacceptable impact on public waters is occurring.

ODEQ operates two wastewater discharge permit programs. Since 1973, point source wastewater discharges to surface waters are permitted under National Pollutant Discharge Elimination System (NPDES) permits. These permits contain effluent limits, self monitoring and reporting requirements, and best management practices as necessary to adequately regulate the discharge. The primary purpose of these permits is to insure that wastewater discharges do not cause harm to the receiving waters or endanger public health.

Wastewater discharges that affect land quality and/or groundwater, such as wastewater discharges to drain fields or spray irrigation systems, are regulated under Water Pollution Control Facilities (WPCF) permits. The primary purpose of these permits is to protect public health and groundwater.

Permits may be designated as either general or individual permits. General permits are issued by ODEQ to cover categories of minor discharges when an individual permit is not necessary to adequately protect water quality. ODEQ may issue a general permit when there are several minor sources or activities involved in similar operations that are discharging similar types of waste. New sources apply to be "assigned" to the general permit that has been issued by ODEQ. Sources that qualify for a general permit do not need to obtain an individual permit. Sources not eligible for a general permit must apply for an individual permit. Some of the sources covered by general NPDES permits are:

- Storm water
- Fish hatcheries
- Log ponds
- Seafood processing
- Petroleum hydrocarbons cleanup, and
- Vehicle wash water

Tables 1 and 2 summarize the active NPDES and WPCF permits in Oregon as of June 2004.

Table 1: Individual Wastewater Discharge Permits

Permit Type	Number of Active Permits
NPDES Major – Total	77
Domestic	49
Industrial	28
NPDES Minor – Total	286
Domestic	159
Industrial	127
WPCF Minor – Total	1188
Domestic	129
Industrial	52
On-site	1007

Table 2: General Wastewater Discharge Permits

Permit Type	Number of Active Permits
NPDES - Storm water	2206
NPDES, other than Storm water	498
WPCF - On-site	69
WPCF, other than On-site	276

Table 3 summarizes the number and type of permits issued by ODEQ between January 2003 and June 2004.

Table 3: Number of Permits Issued

Permit Type	Number of New and Renewed Permits Issued Between 1/1/2003 and 6/16/2004
Individual	
NPDES Individual	126
WPCF Individual On-site	243
WPCF Individual, other than On-site	38
General	
WPCF and NPDES General Permits	1086
General Permits, Storm water	934
General Permits, On-site WPCF	0

Like many other states, Oregon currently has a significant backlog of expired NPDES individual permits. If timely application for renewal has been made, the existing permits remain in effect until the renewal can be issued so there is no lapse in coverage. ODEQ has made reducing the permit backlog a priority for the permit program. The permitting backlog in October 2003 was 59% for NPDES majors and 42% for NPDES minors. As of June 2004, this has been reduced to 35% for NPDES majors and 28% for NPDES minors.

Major ODEQ activities related to wastewater discharge permits include:

- Permit drafting and issuance including evaluations of appropriate technology standards and water quality impacts.
- Inspections of permitted facilities, including biosolids application sites, to determine compliance with rules and the terms of the permit.
- Review of effluent monitoring reports and other reports required by permit, determine compliance with the terms of the permit.
- Issuance of enforcement actions, from administrative Notices of Noncompliance through Civil Penalties and Enforcement Orders.
- Investigate complaints received relating to operation of permitted facilities.
- Develop and implement rules, policies, and guidance relating to permits and permit issues. Provide training and technical assistance to the regulated community, through presentations, guidance documents and personal communications.
- Management of the sewage treatment plant operator's certification program. In Oregon, each sewage treatment system and sewage collection system must be supervised by a properly certified operator. ODEQ runs the operator examination program and certifies that operators have passed the exam and meet other educational and experience requirements.

Reclaimed Water

Land application and reuse of treated domestic effluent and treated industrial effluent is practiced in Oregon under a facility's water quality NPDES or WPCF permit. When done in accordance with appropriate environmental regulations, land application is beneficial for several reasons. Reclaimed water and industrial process water can provide nutrient benefits and reduce the demand for irrigation water from ground or surface water sources. Using reclaimed water can also be an effective means of achieving water quality objectives.

Finding appropriate uses for reclaimed water and industrial process water are necessary options for many communities in their efforts to comply with federal and state water quality regulations. Streams that are water quality limited may be impacted by treated wastewater discharges, and there may be the need to comply with TMDL requirements and temperature issues. Reclaimed water that is land applied can improve crop yield and soil productivity. Other uses of reclaimed water are for agriculture and forestry purposes, as well as irrigation of golf courses and turf farms. As water quality and water availability continue to be serious issues confronting growing communities in Oregon, using reclaimed water will be an important practice.

Biosolids

ODEQ's rules regulating biosolids pertain only to domestic wastewater treatment facility solids, biosolids, biosolids derived products, and domestic septage. Solids from industrial process water are not included in the biosolids rules but are regulated by other ODEQ rules. The term biosolids refers to the nutrient-rich organic solids that are derived from wastewater treatment at municipal wastewater treatment facilities. These biosolids have undergone extensive treatment to meet federal and state regulations that allow use for land application.

ODEQ works with wastewater treatment facilities to ensure that biosolids and land application activities are adequately addressed through the facility NPDES or WPCF permit, a biosolids management plan, and site authorization letters. Good agronomic practices and site management activities ensure that human health and the environment are protected.

ODEQ estimates that approximately 99% of biosolids generated by wastewater treatment facilities are beneficially used through agriculture, silviculture, and horticulture activities. Land applying biosolids has several benefits including improved soil properties, improved plant growth from recycled nutrients, increased short-term crop productivity, and increased long-term soil productivity.

Pretreatment Program

ODEQ works to minimize the discharge of pollutants through the pretreatment program. Under this program, certain cities are required to develop and operate a regulatory program for dischargers to the municipal sanitary sewer systems. ODEQ duties include review and approval of program documents developed by municipalities, and periodic inspections of municipal programs.

Objectives of the pretreatment program include:

1. Protect publicly owned treatment works (POTW) from pollutants that may cause interference with sewage treatment plant operations.
2. Prevent introducing pollutants into a POTW that could cause pass through of untreated pollutants to receiving waters.
3. Manage pollutant discharges into a POTW to improve opportunities for reuse of POTW wastewater and residuals (sewage sludge).
4. Prevent introducing pollutants into a POTW that could cause worker health or safety concerns, or that could pose a potential endangerment to the public or to the environment.

Section 401 Water Quality Certification Program

ODEQ's activities under § 401 of the Clean Water Act (CWA) are divided onto two major subprograms: dredge and fill certifications for US Army Corps of Engineers (Corps) permits, under § 404 of the CWA, or Section 10 of the Rivers and Harbors Act (1889); and certification for major hydroelectric projects being licensed or relicensed by the Federal Energy Regulatory Commission (FERC). Both subprograms utilize the full authority of the CWA to certify and condition activities that may cause a discharge to waters of the US including wetlands, such that they will meet water quality standards and other appropriate requirements of state law under § 401(d).

Section 401 Water Quality Certifications under the Dredge and Fill Program

ODEQ's § 401 certification program for dredge and fill reviews and evaluates several hundred projects annually and provides coordinated water quality comments to both the Corps and Oregon Department of State Lands (DSL) for Corps' Nationwide Permits and DSL Individual Permits and General Authorizations. Approximately 250 section 401 Water Quality Certifications are issued to the Corps for section 404 individual permits on an annual basis. Applicants may be required to pay a fee, depending on the size and scope of the proposed project, and may be required to alter the proposal to ensure state water quality requirements or standards are met throughout and post project implementation. Examples of the types of projects conducted in Oregon that require a 401 certification include river dredging, filling of wetlands for development and infrastructure purposes, stream and wetland restoration projects, decommissioning of dams, and updating existing dam structures for fish passage purposes.

Section 401 Water Quality Certifications under the Hydropower Program

ODEQ's § 401 certification subprogram for hydropower is part of a larger state infrastructure established by statute. The Hydroelectric Application Review Team (HART) process provides a coordinated state process including the authorities of ODEQ, Oregon Water Resources Department (water rights), Oregon Department of Fish & Wildlife, and other natural resource management agencies. The HART process provides multiple opportunities during the 5 ½ year FERC licensing process for ODEQ to gain adequate information on beneficial uses for its certifications. The HART statutes also provide funds for four ODEQ staff statewide for the subprogram: a lead worker at headquarters, and one in each of the three ODEQ regions.

The length of license for FERC-licensed hydro projects is from 30 to 50 years, so substantial staff effort goes into each of these certifications. Continual ODEQ effort, commencing with the Notice of Intent to License, is given to advising applicants and FERC on what studies will be needed for successful certification applications. Comments are submitted to FERC in response to the draft and final FERC license applications. New Oregon administrative rules (OAR 340-048) were adopted in April 2004 to require a draft § 401 application to be submitted at the time of the draft FERC license application, thus helping to assure that adequate information is available to support the final § 401 application. Rigorous findings documents are developed to support each certification and the license conditions needed to provide reasonable assurance that operation of the project will meet the state's water quality requirements.

Major projects certified in 2003 and 2004 included: North Umpqua in the Umpqua River drainage, and Pelton-Round Butte in the Deschutes River drainage. Decommissioning certifications have been or are being developed for Powerdale Hydroelectric Project in the Hood River drainage, and the Marmot Dam in the Willamette's Bull Run watershed. Other major ongoing certification efforts include those for Carmen Smith (Mackenzie River drainage), Clackamas (Clackamas River), Hells Canyon (Snake River), Klamath (Klamath River), Prospect (Rogue River), and Willamette Falls (Willamette River).

Providing financial incentives for communities to upgrade waste water treatment facilities

State Revolving Fund

ODEQ offers low interest loans from the Clean Water State Revolving Loan Fund (SRF) for the planning, design and construction of water pollution control facilities. In the SRF Program, Congress appropriates funds to the Environmental Protection Agency (EPA) for the purpose of capitalizing the SRF Loan Program each year. This grant amount was $1,350,000,000 for the federal fiscal year 2004, and is allocated to all the states and Puerto Rico based on a pre-determined formula. Each state must contribute a minimum matching amount of 20% of this federal grant to the program annually. Oregon's 2004 grant amount is approximately $15,000,000 which, when combined with the State's required $3,000,000 matching amount and repayments of existing loans, provided the Program with approximately $67,000,000 of available funds for providing assistance to local communities in 2004. Table 4 summarizes the SRF loans awarded for 2003 and 2004.

Table 4: SRF Loan Agreements and Amendments Executed During Calendar Years 2003 & 2004

Borrower	Amount	Binding Date
City of Albany	25,000,000	6/26/2003
City of Albany	7,573,559	9/3/2003
Arch Cape Sanitary District	70,000	12/9/2002
Arch Cape Sanitary District	233,000	12/9/2002
City of Ashland	500,000	9/17/2002
City of Astoria	2,760,000	11/12/2002
Bunker Hill Sanitary District	50,000	4/25/2003
City of Coburg	300,000	6/2/2003
City of Coquille	195,000	7/14/2003
City of Cottage Grove	9,400,000	1/21/2004
City of Creswell	2,720,000	7/9/2003
City of Creswell	650,000	11/7/2003
City of Creswell	1,935,000	3/4/2004
Deschutes SWCD	250,000	12/3/2003
East Fork Irrigation District	2,000,000	8/22/2003
City of Gold Beach	1,531,000	3/12/2004
City of Hines	949,349	11/27/2002
City of Irrigon	3,420,000	9/15/2003
Miles Crossing Sanitary Sewer District	280,000	7/11/2003
Netarts-Oceanside Sanitary District	100,000	9/17/2002
City of Portland BES	2,326,248	9/19/2003
City of Portland BES	6,404,380	9/19/2003
City of Portland BES	3,652,129	9/19/2003
City of Prineville	1,637,153	5/21/2003
City of St. Helens	2,053,000	8/19/2003
City of Salem	6,300,000	10/1/2002

Borrower	Amount	Binding Date
City of Sweet Home	2,000,000	12/23/2002
City of Tillamook	500,000	4/11/2003
City of Tillamook	304,499	4/14/2003
City of Vale	650,000	2/20/2004
City of Waldport	1,221,700	4/21/2003
City of Warrenton	700,000	7/23/2003
City of Warrenton	500,000	12/30/2003
Wedderburn Sanitary Dist	17,500	7/3/2002
Total	**88,183,517**	

The SRF program also provides technical assistance. Project officers and engineers are located in the regions, with loan officers located in ODEQ headquarters. With smaller communities, ODEQ provides extensive technical assistance during the facility planning phase.

Providing financial assistance to implement programs to control nonpoint source pollution

319 Nonpoint Source Grant Program

Grant funds available through Section 319 of the Water Quality Act of 1987 are a critical element in turning Oregon's Nonpoint Source (NPS) control program into water quality protection realities in watersheds throughout the state. Each year, ODEQ identifies programmatic and geographic targets, solicits project proposals, assembles a proposal package for EPA's review, develops contracts and agreements for disbursement of grant funds, oversees program implementation, and evaluates program accomplishments. Grants awarded in 2002 and 2003 are summarized in Table 5.

Table 5: OREGON 319 NPS Projects Section 319(h) Clean Water Act Project Summary, Years 2002-2003

Year of Award	Type of Project	Project Name	Recipient	Where	Amount of Award
2002	BMP Dev. & Implement	ONSITE set aside	ODEQ	Statewide	$150,000
2002	BMP Dev. & Implement	Tenmile Lakes Water Quality Planning and Implementation Phase II	Tenmile Lakes Basin Partnership	Tenmile Creek Basin	$247,446
2002	BMP Dev. & Implement	Demonstration of soil and water stewardship using drip irrigation	OSU Malheur Experimental Station	Malheur Co. Groundwater Management Area	$67,710
2002	BMP Dev. & Implement	Durham quarry development	Washington County	Tualatin Basin	$280,000
2002	BMP Dev. & Implement	Multnomah Building Green Roof	Multnomah Co. DSCD	Lower Willamette Basin	$75,600
2002	BMP Dev. & Implement	Walla Walla WQ Monitoring and TMDL implementation	Walla Walla Basin WSC	Walla Walla subbasin	$33,200
2002	BMP Dev. & Implement	Nestucca-Neskowin WQ monitoring and technical	Nestucca-Neskowin WS council	Nestucca-Neskowin	$34,380

Year of Award	Type of Project	Project Name	Recipient	Where	Amount of Award
		assistance		Basin	
2002	BMP Dev. & Implement	Bear Ck. Watershed comprehensive NPS reduction: community planning, demonstration projects, education and source identification and elimination	Rogue Valley Council of Governments	Bear Creek, Middle Rogue Basin	$106,260
2002	BMP Dev. & Implement	Tillamook urban/residential riparian enhancement assistance program	Tillamook County Performance Partnership	Tillamook Basin	$28,710
2002	BMP Dev. & Implement	ACWA School Mercury Reduction Pilot Project	Association of Clean Water Agencies	Lower Willamette Basin	$14,878
2002	BMP Dev. & Implement	Rogue Basin Erosion Prevention / Sediment Control Workshops	Rogue Valley Council of Governments	Middle Rogue Subbasin	$5,900
2002	BMP Dev. & Implement	Willow creek demonstration and BMP implementation project (2 year)	Malheur County SWCD	Malheur River Basin	$42,200
2003	BMP Dev. & Implement.	Demonstration of soil and water stewardship using drip irrigation	OSU Malheur Agricultural Experimental Station	Malheur and Owyhee Basins	$210,770
2003	Character. Of NPS efforts	Laurance Lake Temperature Study	Middle Fork Irrigation District (MFID)	Hood River Basin	$40,000
2003	Character. Of NPS efforts	City of Tillamook Stormwater Pollution Reduction Project	City of Tillamook	Tillamook Basin	$38,800
2002	Character. Of NPS efforts	Umpqua Basin Watershed assessment and action plan, phase III	Umpqua Basin Watershed Council	Lower Cow Creek, Myrtle Creek, Upper South Umpqua River and Looking glass Creek Basins	$106,850
2002	Character. Of NPS efforts	Upper Willamette Groundwater Management Community Outreach and Hydrogeologic Investigations	OSU	Upper Willamette Basin	$118,108
2002	Character. Of NPS efforts	Tillamook Bay watershed on-site sewage disposal system sanitary surveys	Tillamook County Performance Partnership	Tillamook Basin	$42,700

Year of Award	Type of Project	Project Name	Recipient	Where	Amount of Award
2002	Character. Of NPS efforts	Evaluation of toxics in sediment and water in the Columbia Slough using semi-permeable membrane devices	City of Portland	Columbia Basin	$27,200
2002	Character. Of NPS efforts	Tillamook Buffer Strip Effectiveness Study	Tillamook County Performance Partnership	Tillamook Basin	$39,451
2002	Character. Of NPS efforts	Bay City stormwater drainage master plan	Bay City	Tillamook Basin	$25,200
2003	NPS Coord.	Source Investigation of Legacy Pesticides DDT, Dieldrin, and Chlordane in the Upper Johnson Creek Watershed	Johnson Creek Watershed Council	Johnson Creek Basin	$28,800
2003	NPS Coord.	Upper Willamette Ground-water Quality and Land Use	Lane Council of Governments	Upper Willamette Basin	$107,255
2003	NPS Coord.	Site capability training to build capacity among local management agencies	Oregon Dept. of Agriculture	Statewide	$51,470
2003	Public Education	Student Watershed Research Project (SWRP)	PSU-Saturday Academy	Lower Willamette Basin	$60,000
2003	Public Education	Naturescaping for Clean Rivers	East Multnomah Soil and Water Conservation District	Lower Willamette Sub-Basin and the Sandy River Basin	$53,683
2003	Public Education	Unpaving the way-Building capacity of Coastal Communities to reduce Urban Runoff Impacts	OSU	Basins along the Oregon coast and within Columbia River Estuary	$98,280
2002	Public Education	John Day/Umatilla CAFO AFO demonstration project	Columbia – Blue Mt. RC&D Area	Umatilla, John Day, Walla Walla and Willow Creek Subbasins	$168,000
2002	Public Education	50 ways to love your river	Oregon Environmental Council	Umatilla, Deschutes, Rogue and Coos Basins	$35,000

Year of Award	Type of Project	Project Name	Recipient	Where	Amount of Award
2003	Watershed Restoration	Curry Comprehensive Riparian Project	South coast / Lower Rogue Watershed Council	Floras, Butte, Bethel, Morton, Elk, Sixes, Lower Rogue, Chetco, Hunter , Pistol Basins	$235,000
2003	Watershed Restoration	Upper Nehalem Watershed Riparian Restoration and Monitoring Program	Upper Nehalem Watershed Council	Tillamook Basin	$52,900
2003	Watershed Restoration	Upper. Deschutes TMDL Implementation & WQ Monitoring Project	Ryan Houston, Executive Director	Upper and Little Deschutes, Sub-basins	$52,560
2003	Watershed Restoration	Curry Sediment Abatement	South Coast and Lower Rogue Watershed Councils	Sixes River, Lower Rogue River, Chetco River Basins	$250,000
2003	Watershed Restoration	South Fork Coquille River Sediment Abatement and Assessment	Coquille Watershed Association	Coquille Basin	$95,000
2002	Watershed Restoration	Trask River riparian restoration demonstration project – Fenk project	Tillamook Co. SWCD	Trask Basin	$14,376
2002	Watershed Restoration	Clover Ck Instream Riparian Plant	Umpqua Basin Watershed Council	N. Umpqua Basin	$17,318
2002	Watershed Restoration	Trask River riparian restoration demonstration project – Sanchez project	Tillamook Co. SWCD	Trask Basin	$17,660
2002	Watershed Restoration	Smith Ck. Riparian restoration and culvert replacement	Tillamook County Performance Partnership	Nestucca Basin	$10,000
2002	Watershed Restoration	Cavitt Creek Restoration – Phase II	Bureau of Land Management	Little River Basin	$150,000
2003	Watershed Study	Rogue River – Evans Creek FLIR and Temperature Modeling	Rogue Basin Coordinating Council, Seven Basins Watershed Council	Rogue Basin	$52,250
2003	Watershed Study	Water quantity and quality assessment and monitoring in the Coos watershed	Coos Watershed Association	L. Coos River; Millicoma River; S. Fork Coos River Basins	$79,008

Year of Award	Type of Project	Project Name	Recipient	Where	Amount of Award
2003	Watershed Study	Watershed Assessment and Action Plan, Phase IV	Umpqua Basin Watershed Council	All seven watersheds in the Umpqua Basin	$135,795
2003	Watershed Study	Water Quality Assessment and Improvement in Tributaries to Coos Bay	Coos Bay WSC	South Coast Basins	$141,598
2003	Watershed Study	Long Term BMP Monitoring in the Grande Ronde	ODEQ	Grande Ronde	$93,000
2003	Watershed Study	TMDL modelers	ODEQ	Umpqua	$223,000
2003	Watershed Study	Applegate River Water Quality Management and Restoration Plan	Applegate River WSC	Applegate River Basin	$33,972
2003	Watershed Study	DNA Fingerprinting of Bacteria Sources in the Tualatin Subbasin	Clean Water Services	Tualatin Subbasin	$41,723
2002	Watershed Study	Calapooya Creek and Sutherlin Creek Mercury monitoring project	Douglas Co. SWCD	Calapooya and Sutherlin Creeks Subbasin	$34,726
2002	Watershed Study	Tillamook bay watershed long term trend volunteer monitoring	Tillamook County Performance Partnership	Tillamook Basin	$29,800
2002	Watershed Study	Water quality assessment and improvement in tributaries to Coos Bay	Coos Bay Watershed Association	Lower Coos Bay Basin	$141,598
2002	Watershed Study	Regional Lake Management Planning for TMDL Development	Coos Bay Watershed Association	Lower Coos Bay Basin	$114,540

NOTE: Shaded projects are in groundwater management areas.

Providing technical assistance and outreach/education

- Review and approve engineering plans and specifications for wastewater conveyance and treatment facilities. Plan review engineers are located in the ODEQ regional offices.

- Provide technical assistance to small communities through Economic Revitalization Teams across the state. This effort includes focused technical assistance to small communities facing multiple environmental issues, especially those related to municipal wastewater facilities. ODEQ continues to work with small communities to develop a financially realistic schedule and priority order for resolving environmental problems.

Assessing water quality in surface waters to determine if standards are met for protection of public health, fish and other aquatic life, and other uses

An effective water quality management program that can restore and protect water quality to meet the beneficial use needs of both present and future citizens of the state must be based upon an accurate and complete understanding of water quality conditions within the state. The ODEQ Water Quality Monitoring Strategy is designed to provide reliable, high quality information to answer basic questions such as:

- Is water quality changing? If so, by how much, and where?
- How does water quality vary spatially across the state?
- Does water quality meet standards?
- What pollutants are affecting water quality?

Is water quality changing? If so, by how much, and where?

In the past, "Number of river miles assessed meeting standards" had served as a benchmark of performance for water quality programs. This number was tied to the total amount of monitoring done, which was influenced by the number of special monitoring studies performed. These studies are typically concentrated in areas where water quality degradation is a concern. This creates a benchmark weighted towards the impacted waters in Oregon and tends to give the impression that water quality is generally degrading despite attempts to improve it. The Oregon Water Quality Index (OWQI) was designed to permit comparison of water quality among different stretches of the same river or between different watersheds. The OWQI benchmark measurement is tied to key indicator sites routinely monitored by the ODEQ laboratory, representing the range of water quality found throughout the state. The OWQI can be used to communicate trends in water quality and factors affecting water quality. The Oregon Water Quality Index will more adequately measure the progress (or lack of progress) made by water quality management practices.

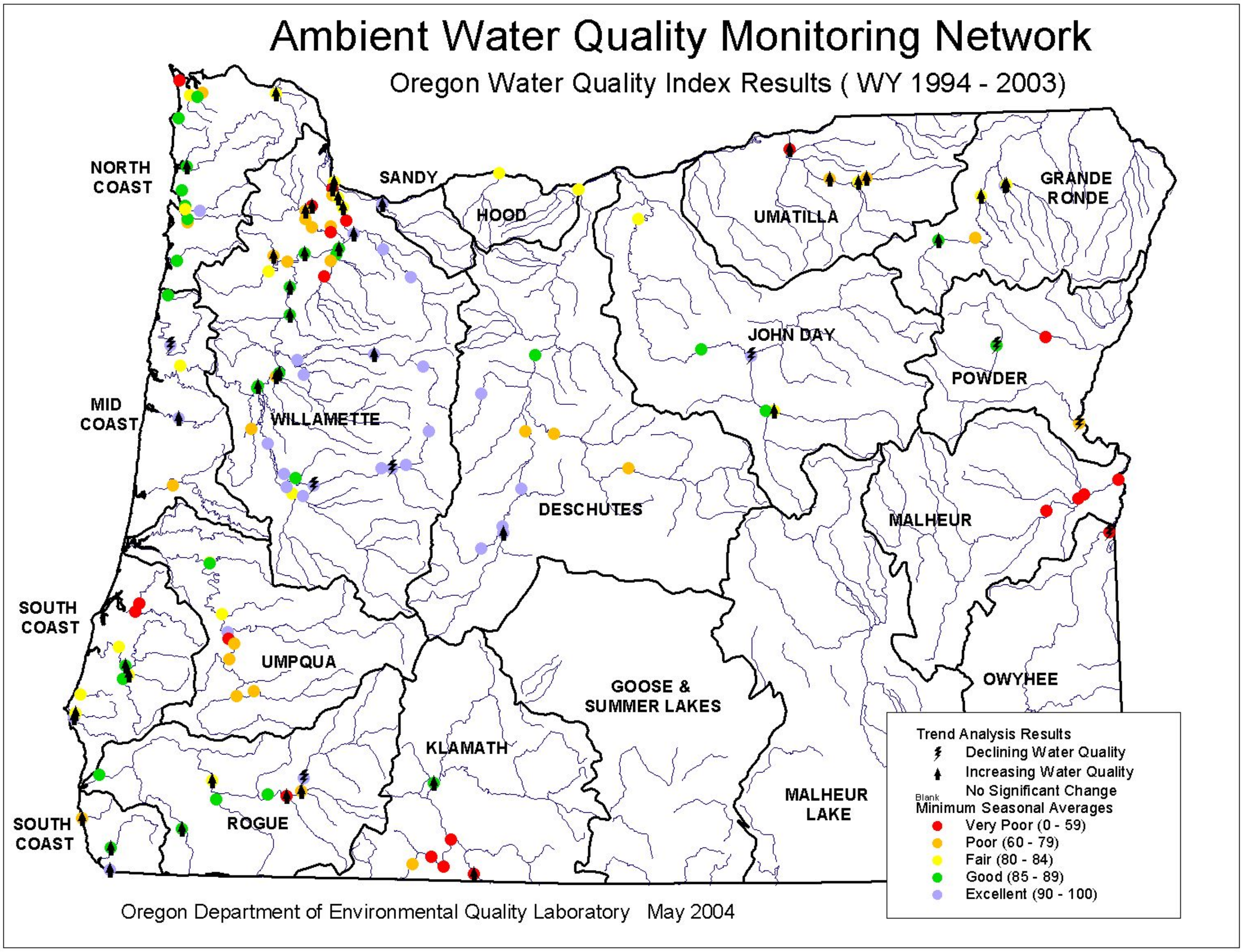
The OWQI relies on data generated from routine ambient water quality monitoring in order to analyze trends over long time periods. The ambient water quality monitoring network is designed to measure cumulative impacts from point and non-point sources in a variety of conditions. Locally, these conditions range from protected, pristine rivers such as the Sandy River to significantly impacted rivers such as the Tualatin River. Raw analytical results for eight carefully selected parameters (temperature, dissolved oxygen for percent saturation and concentration, biochemical oxygen demand, pH, total solids, ammonia and nitrate nitrogens, total phosphorus, and fecal coliforms) are converted into subindices of common units (10 - 100, worst case to ideal). The OWQI is calculated by combining these subindices. The nonparametric Seasonal-Kendall test (using WQHYDRO) is applied to OWQI results. This test takes into account seasonal variability of water quality, so any trend in water quality detected is significant. Confidence levels are computed for each trend. This trend analysis does not consider variations in meteorological or hydrological conditions or variations in sample time. This trend analysis does not consider changes in toxics concentrations, habitat, or biology.

Figure 1 shows results calculated on all samples taken in Water Years 1994-2003. Each site with sufficient data is analyzed for the presence of significantly increasing or decreasing trends.

Of the 136 monitoring sites included in this report (not all monitoring stations generate all data required for OWQI calculations), 133 had sufficient data to analyze for trends. Of these 133 sites, 43 had significant increases in water quality and 8 had significant decreases in water quality, while the rest showed no significant trend in either direction.

Figure 1 includes sites demonstrating significant improvement in general water quality as well as sites demonstrating a decline in general water quality. Seasonal averages were calculated for the summer season (June - September) and FWS season (fall, winter, spring: October - May). The minimum of these seasonal averages is used for ranking purposes and takes into account seasonal variability between different river systems.

Figure 1: Oregon Water Quality Index Site Results



How does water quality vary spatially across the state?

Probability-based Stream Surveys

Traditionally, most water quality monitoring conducted by ODEQ involves collecting chemical water quality samples at regular time intervals at the same locations on larger rivers over long periods of time. While this sort of sampling is very good for describing water quality trends over time on selected rivers, it is not very good for describing water quality on a regional basis. For example, sampling the dissolved oxygen concentration at the mouth of the Tillamook River at regular intervals for many years would give us a good idea of the trend in dissolved oxygen at that site over time. By sampling enough coastal streams we can infer something about trends in selected coastal rivers over time. However, these surveys do not give us a good idea of the percent of coastal stream kilometers with dissolved oxygen problems.

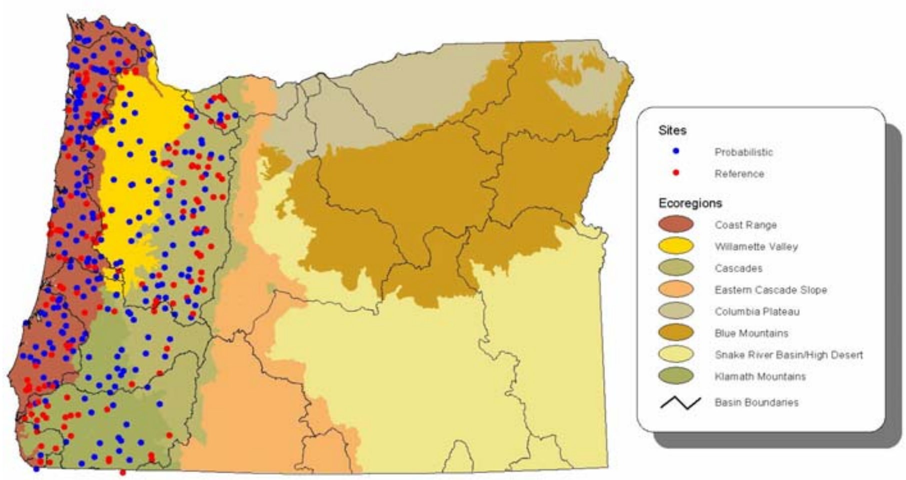
Probabilistic stream “polling” is an effective approach to describing regional stream conditions without the great expense of trying to “census” all the stream segments in a region of interest like the Oregon north coast. Since the condition of randomly selected streams sites is representative of the larger stream population regionally, the data from relatively few sites can be used to describe conditions regionally with known statistical precision and confidence.

Western Oregon Stream Surveys 1994-2001

Streams vary across Oregon and perspectives on regional stream condition can be different depending on the spatial context. ODEQ summarizes stream conditions using two spatial scales: basins and ecoregions. Basins are a typical and useful way of summarizing data. The major basins used were the North Coast, South Coast, Umpqua, Rogue, and Willamette basins. The second scale is by ecoregions. Ecoregions are areas of similar geology, climate, soils, vegetation and land use. This can also be a useful scheme for organizing data summaries since these are significant factors in determining stream characteristics. The ecoregions used in this section were the Coast Range, Klamath Mountains, Willamette Valley, and Western Cascades. Only data from basins and ecoregions west of the crest of the Cascades is summarized here.

The data presented in this section for selected biological, chemical and habitat conditions were gathered from several monitoring programs conducted by ODEQ in western Oregon from 1994 to 2001 that have used the same sampling design and protocols. The monitoring programs were the 1994-1996 Coast Range Regional Monitoring and Assessment Program (REMAP), 1999-2000 Western Cascades REMAP and 1998-2001 Oregon Plan for Salmon and Watersheds. In total, approximately 340 randomly-selected stream segments were sampled to produce these data (Figure 2). By compiling compatible data sets from different studies over several years we can obtain enough sample sites to describe stream conditions regionally. Streams were surveyed during the mid-day between the end of June and the beginning of October.

Figure 2: Western Oregon Stream Survey Sites



The Stream Population

The data summarized here are from first, second, and third order streams. A first order stream has no perennial tributaries. The confluence of two first order streams forms a second order stream, the confluence of two second order streams forms a third order stream, and so on. In Western Oregon, 85% of the total stream lengths are classified as first through third order streams. Most stream management and regulatory work done by ODEQ has been focused on larger rivers. However, smaller streams actually make up the vast majority of stream kilometers in a region. First through third order streams are critically important in determining the condition of larger streams and rivers, especially from the effects of land use activities.

Reference Condition

In order to evaluate the biology, chemistry and habitat of streams, some estimate of the "normal" or "natural" baseline conditions of streams for comparison is needed. To estimate baseline conditions ODEQ surveyed selected reference sites across the region. These reference sites represent stream segments with the least amount of human disturbance for a given region. The 25^{th} percentile value of the reference site distribution was used as the threshold between good condition sites and fair condition sites. The 10^{th} percentile of reference site distribution was used as the threshold between fair condition sites and poor condition streams.

Stream Condition Indicators

Table 6 contains indicator threshold values for designating good, fair, and poor condition streams for the following selected parameters:

<u>Biological Condition: Macroinvertebrate Community</u>

Stream macroinvertebrates are widely used as an indicator of stream health because they are sensitive to both water chemistry and habitat disturbance. Their high species diversity and wide distribution makes them useful indicators in all streams regardless of barriers to fish migration, fish stocking programs, and fishing pressure, factors that can interfere with using fish assemblage data.

The condition of the macroinvertebrate community was evaluated using a predictive model based on reference sites across western Oregon and Washington (Hawkins, unpublished manuscript). Sites with higher scores have macroinvertebrate communities that are more similar to reference conditions. Impairment thresholds were determined using the distribution of community scores found at reference sites.

<u>Biological Condition: Fish and Amphibian Community</u>

The aquatic vertebrate Index of Biotic Integrity (IBI) for western Oregon (Howlin, submitted) used here evaluates the health of the whole aquatic vertebrate community using the sensitivity or tolerance of the animals found at a site to produce a site IBI score. Higher scoring sites are more similar to what would be expected at reference sites. Index scoring and impairment thresholds are based on reference site data.

<u>Fine Sediment</u>

Excessive fine sediment in streams is an important factor effecting the spawning and survival of many stream organisms. Stream substrate particle size was measured at 55 locations on the stream bottoms along transects spread over a few hundred meters of stream length. The fine sediment values represent was the percent of those particles with a diameter of 2 millimeters or less. Impairment thresholds were determined using the distribution of fine sediment found at reference sites.

Shade

Shade or stream cover is the proportion of open sky over the mid channel of the stream that is obscured by vegetation or topography. It is important in determining stream water temperature through the amount of heat energy the stream receives as well as food energy and large woody debris inputs from riparian vegetation. Shade data presented here is an average of forty-four mid-channel measurements spread over a few hundred meters of stream length. Impairment thresholds were determined using the distribution of shade results at reference sites.

Water Temperature

Water temperature is a critical water quality parameter that directly effects the survival of sensitive species such as salmon and trout. Temperature probes that record temperature every thirty minutes were installed in streams throughout the summer months in order to capture the seasonally highest water temperatures. The seasonal maximum seven-day moving average of the daily maximum temperature was calculated for each site. Since water temperature has a specific water quality standard, we used the attainment of the 17.8 C standard as the threshold between good quality streams not violating this standard and poor quality streams with temperatures warmer that than the temperature standard rather than the temperature distribution at reference sites. There was no fair condition category for temperature.

Water Chemistry

The chemical quality of water is critical to the survival fish and other stream organisms. Approximately 20 water chemistry parameters were collected at each stream. These data are summarized here using the Oregon Water Quality Index (OWQI) (Cude 2001). The OWQI is calculated by scoring 10 important water quality parameters individually based on the regionally expected value at an unimpaired stream and them summing the parameter scores for an overall site score. OWQI scores range from 0 to 100 with higher scores representing better water quality. OWQI scores are broken into three condition categories based on the range of water quality conditions found at least impaired reference condition sites.

Table 6: Category Thresholds

Indicator	Measure	Good	Fair	Poor	Category Basis
Aquatic Macroinvertebrate Community Score	Multivariate community predictive for western Oregon and Washington first through third order streams (Hawkins)	>0.85	0.85-0.75	<0.75	Based on 10th and 25th percentile of western Oregon reference site scores.
Aquatic Vertebrate Score	Vertebrate index of biotic integrity for western Oregon streams (Howlin, et. al.)	>60	60-50	<50	Based on 10th and 25th percentile of western Oregon reference site scores.
Fine Sediment	Percent of stream substrate <2 mm diameter (Peck, et. al.)	<22%	22-35%	>35%	Based on 10th and 25th percentile of western Oregon reference site scores.
Shade	Percent of mid channel stream cover (Peck, et. al.)	>50%	50-32%	<32%	Based on 10th and 25th percentile of western Oregon reference site scores.
Temperature	Seven-day moving average of daily temperature maximum	<17.8 C	-	>17.8 C	State water quality standard, OAR 340-41-(basins)(2)(b).
Water Quality	Oregon Water Quality Index (Cude, 2001)	>89	89-80	<80	Based on 10th and 25th percentile of western Oregon reference site scores.

Basin Assessments

Five major western Oregon basins were assessed: North Coast, South Coast, Umpqua, Rogue, and Willamette Basins. Because of the probability sampling approach, data are presented in terms of percent of all first through third order stream kilometers in the basin.

Overall, the Willamette Basin had the highest proportion of biologically impaired streams with excessive fine sediment, warm water temperatures, and poor chemical water quality being the main stressor measured. The Umpqua Basin had the greatest number of stream kilometers violating the water temperature standard.

Assessment data are presented in order from most to least impaired. Tables 7 and 8 and Figures 3 through 7 present basin condition data.

Table 7: Basin Biotic Condition Indicators, ODEQ Probabilistic Stream Surveys, 1994-2001

All Basin Streams *	Total Stream Kilometers *	Assessment Type	Condition			Precision	Confidence
			%Good	% Fair	% Poor		
North Coast Basin	5885	Macroinvertebrate Community Score	67%	13%	20%	95%	±13
		Aquatic Vertebrate Community Score	38%	31%	31%	95%	±10
South Coast Basin	4007	Macroinvertebrate Community Score	69%	14%	16%	95%	±16
		Aquatic Vertebrate Community Score	68%	18%	14%	95%	±13
Umpqua Basin	6070	Macroinvertebrate Community Score	54%	8%	38%	95%	±20
		Aquatic Vertebrate Community Score	32%	32%	36%	95%	±17
Rogue Basin	6218	Macroinvertebrate Community Score	41%	36%	23%	95%	±22
		Aquatic Vertebrate Community Score	78%	11%	10%	95%	±26
Willamette Basin	12469	Macroinvertebrate Community Score	53%	5%	43%	95%	±12
		Aquatic Vertebrate Community Score	36%	20%	44%	95%	±11

* Third order or less.

Table 8: Basin Stressors, ODEQ Probabilistic Stream Surveys, Third Order Streams and Less, 1994-2001

All Basin Streams*	Stressors	Condition			Precision	Confidence
		% Good	% Fair	% Poor		
North Coast Basin	Fine Sediment	32%	28%	40%	95%	±10%
	Shade	90%	4%	6%	95%	±14%
	Temperature	91%	-	9%	95%	±14%
	Water Quality	56%	22%	22%	95%	±10%
South Coast Basin	Fine Sediment	63%	3%	35%	95%	±13%
	Shade	72%	21%	7%	95%	±16%
	Temperature	78%	-	22%	95%	±22%
	Water Quality	65%	21%	14%	95%	±13%
Umpqua Basin	Fine Sediment	40%	24%	36%	95%	±15%
	Shade	85%	15%	0%	95%	±20%
	Temperature	40%	-	60%	95%	±23%
	Water Quality	55%	13%	32%	95%	±19%
Rogue Basin	Fine Sediment	73%	15%	12%	95%	±19%
	Shade	95%	3%	3%	95%	±25%
	Temperature	87%	-	13%	95%	±24%
	Water Quality	64%	25%	11%	95%	±19%
Willamette Basin	Fine Sediment	47%	1%	51%	95%	±10%
	Shade	94%	4%	2%	95%	±16%
	Temperature	65%	-	35%	95%	±14%
	Water Quality	47%	35%	18%	95%	±10%

* Third Order or Less

Willamette Basin

The Willamette Basin had the highest number stream kilometers in poor condition for aquatic life use of any of the basins assessed: 43% of the stream kilometers had poor macroinvertebrate communities and 44% had poor vertebrate communities. The leading stressors in the Willamette basin were fine sediment (51%) and warm water temperature (35%). The stream kilometers with sediment impairment were higher in the Willamette basin than in any other basin assessed.

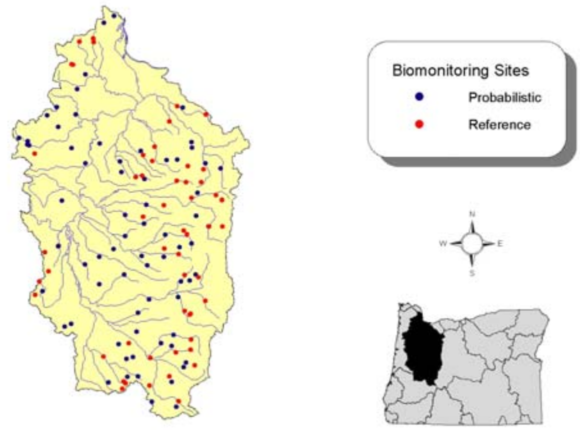
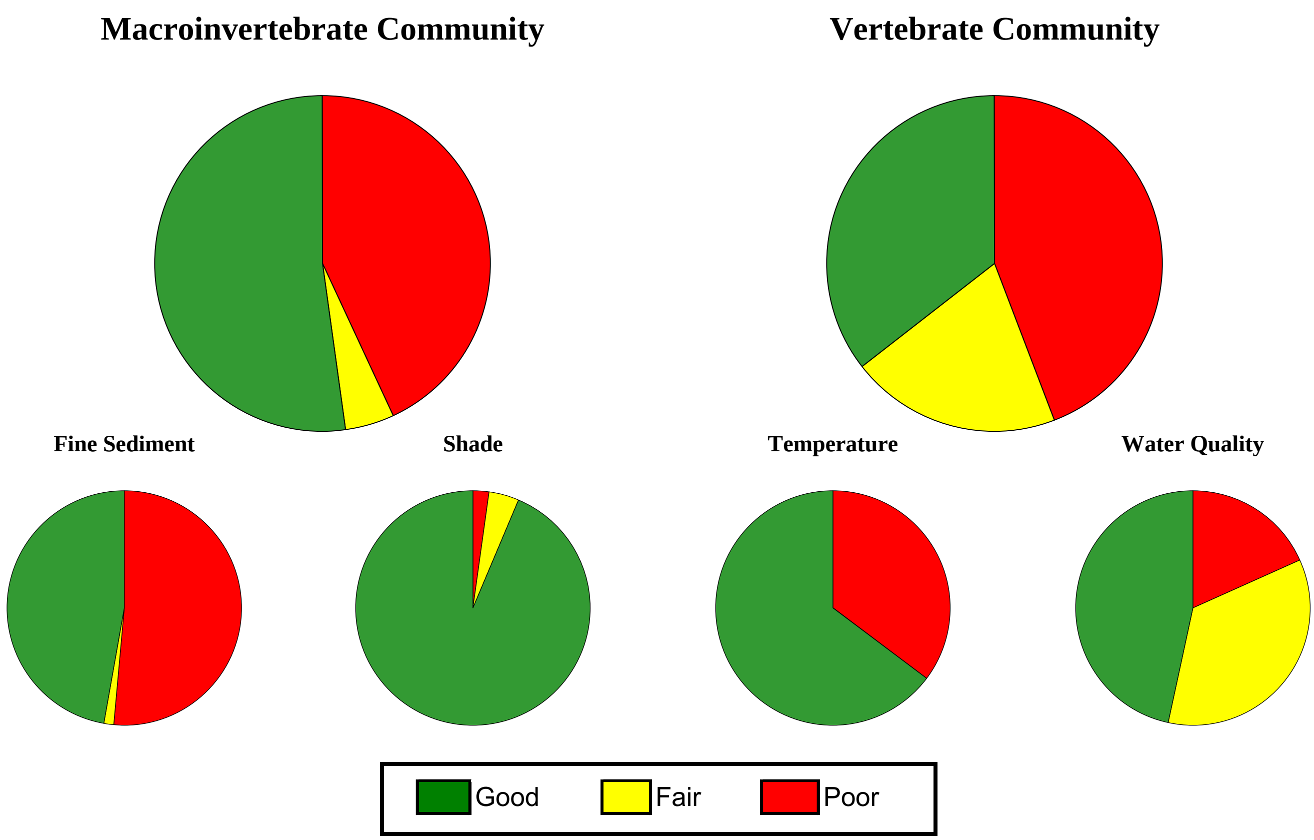


Figure 3: Willamette Basin



Umpqua Basin

In the Umpqua Basin, 38% of the stream kilometers showed poor macroinvertebrate community condition, and 36% showed poor vertebrate community condition. Leading stressors in the Umpqua basin were warm water temperature (60%) and fine sediment (36%). Impairment by warm water temperature was higher in the Umpqua basin than any other basin assessed.

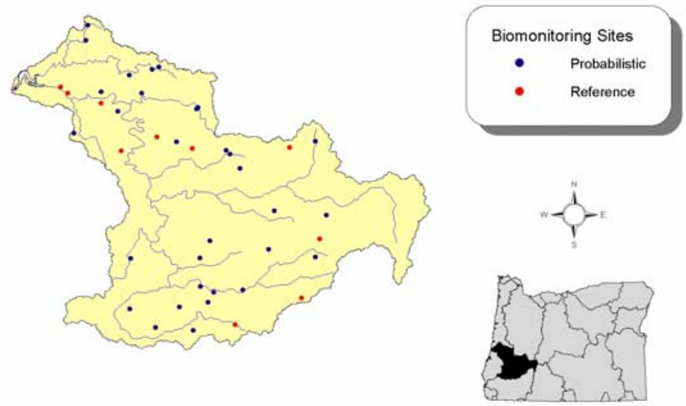
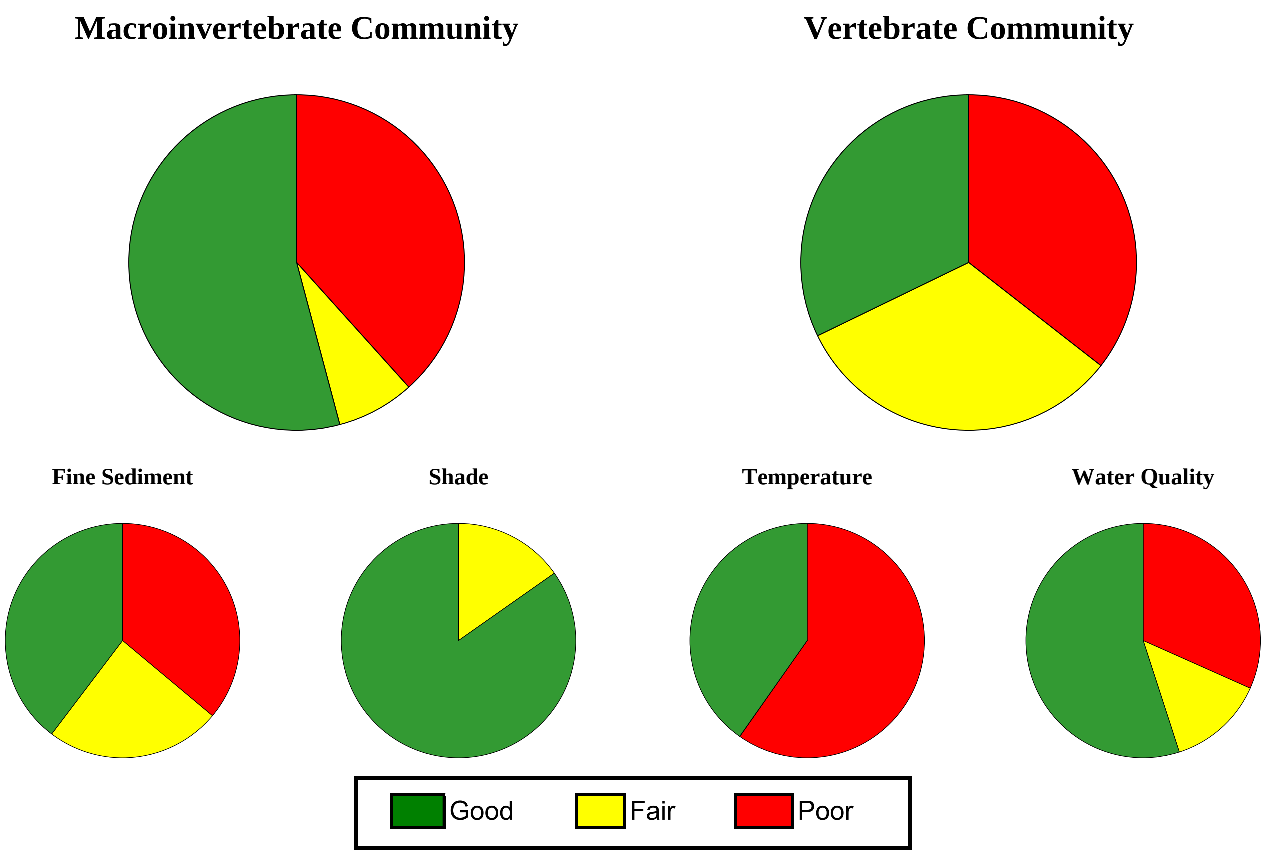


Figure 4: Umpqua Basin



<u>North Coast Basin</u>

The North Coast basin had 20% of its stream kilometers indicating poor macroinvertebrate communities and 31% with poor vertebrate communities. The major stressors were fine sediment (40%) and overall poor water quality (22%). The North Coast was second only to the Willamette in the highest proportion of streams with fine sediment impairment (51% in poor condition for sediment). Water temperature impairment was low in the North Coast with only 9% of the stream kilometers exceeding the water temperature standard.

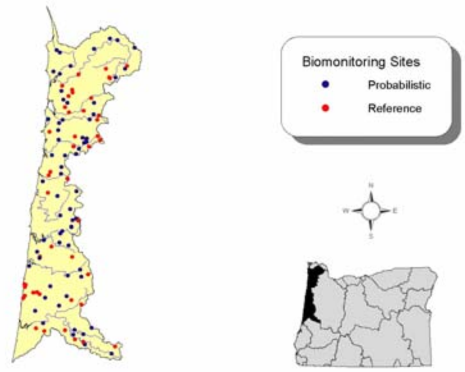
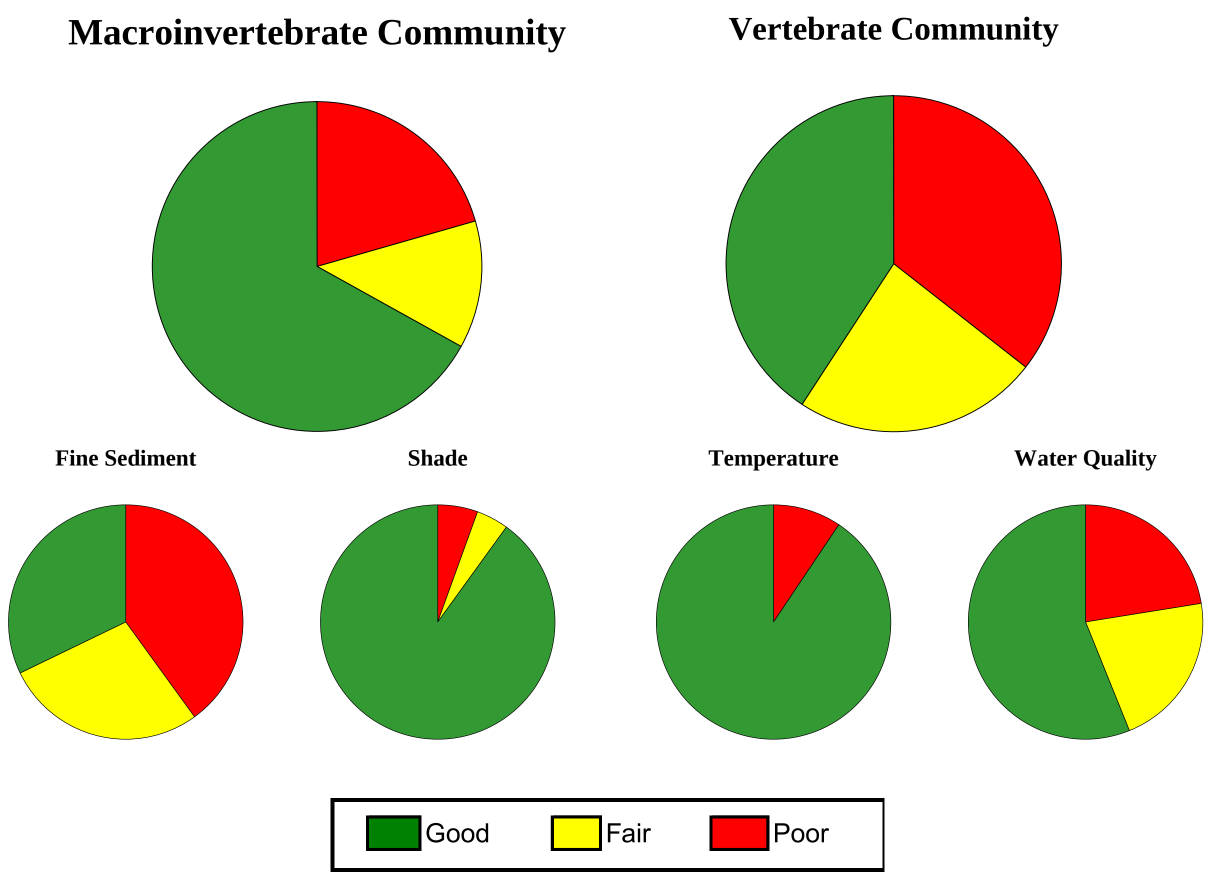


Figure 5: North Coast Basin



South Coast

The South Coast basin had a relatively low level of impairment compared to other assessed basins with 16% of the stream kilometers in poor condition for macroinvertebrates and 14% in poor condition for vertebrates. Fine sediment (35%) was the leading source of stream impairment.

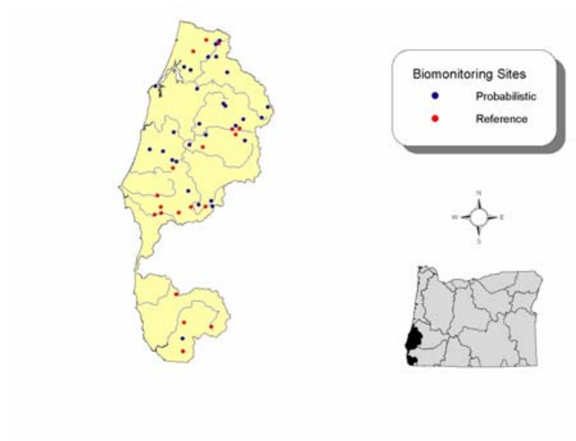
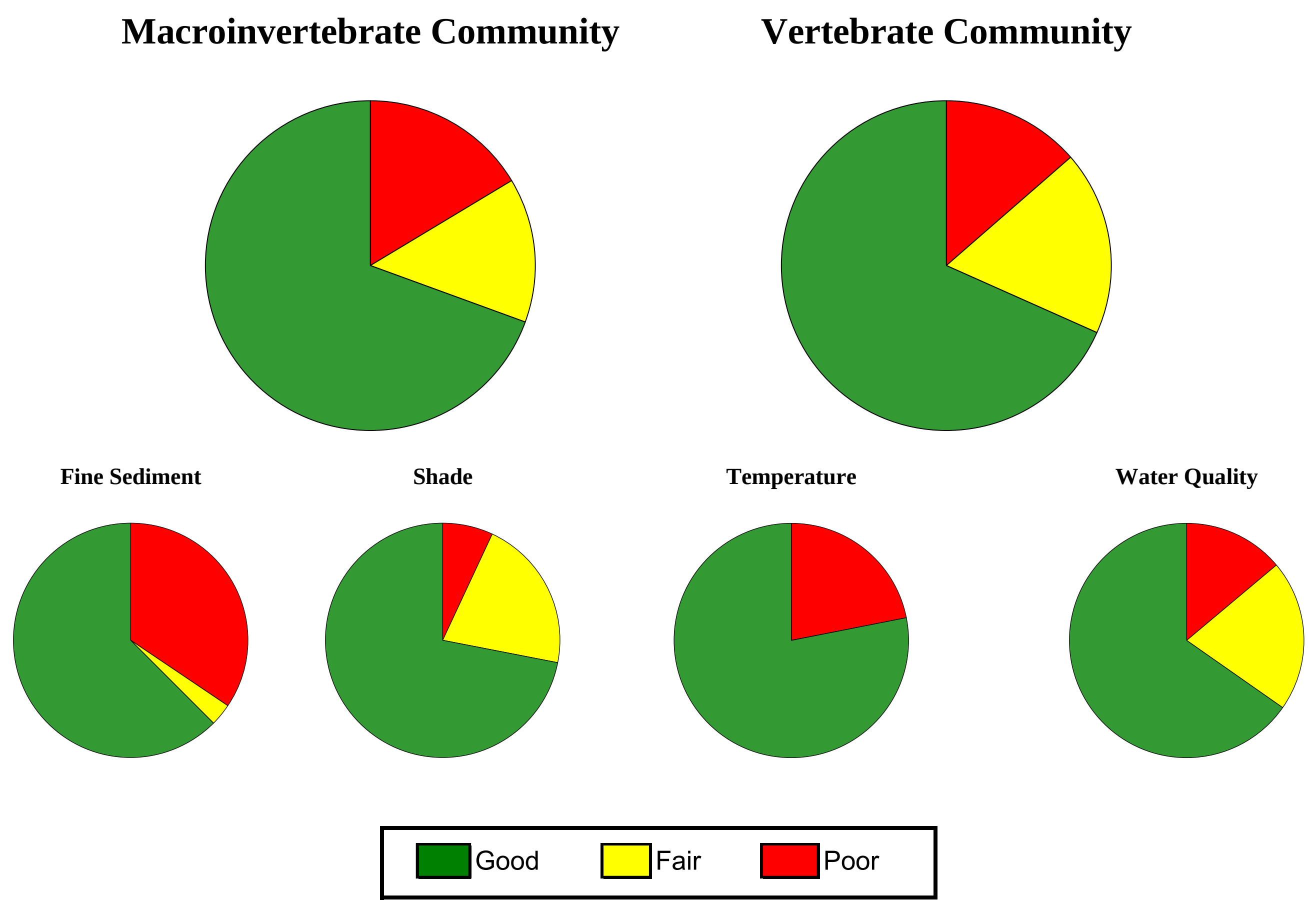


Figure 6: South Coast Basin



Rogue Basin

The Rogue basin showed relatively unimpaired biotic conditions compared to the other basins with 23% of the macroinvertebrate community and 10% of the vertebrate community in poor condition. Water quality was the most significant stressor (36% in poor or fair condition) along with fine sediment (27% in fair or poor condition).

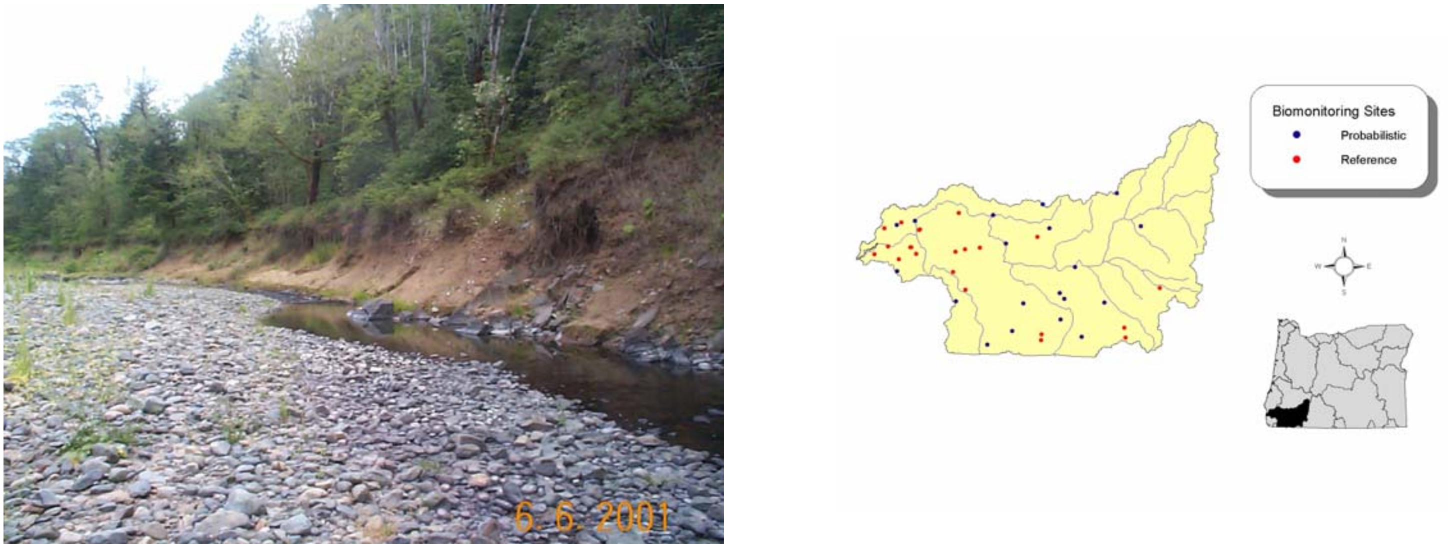
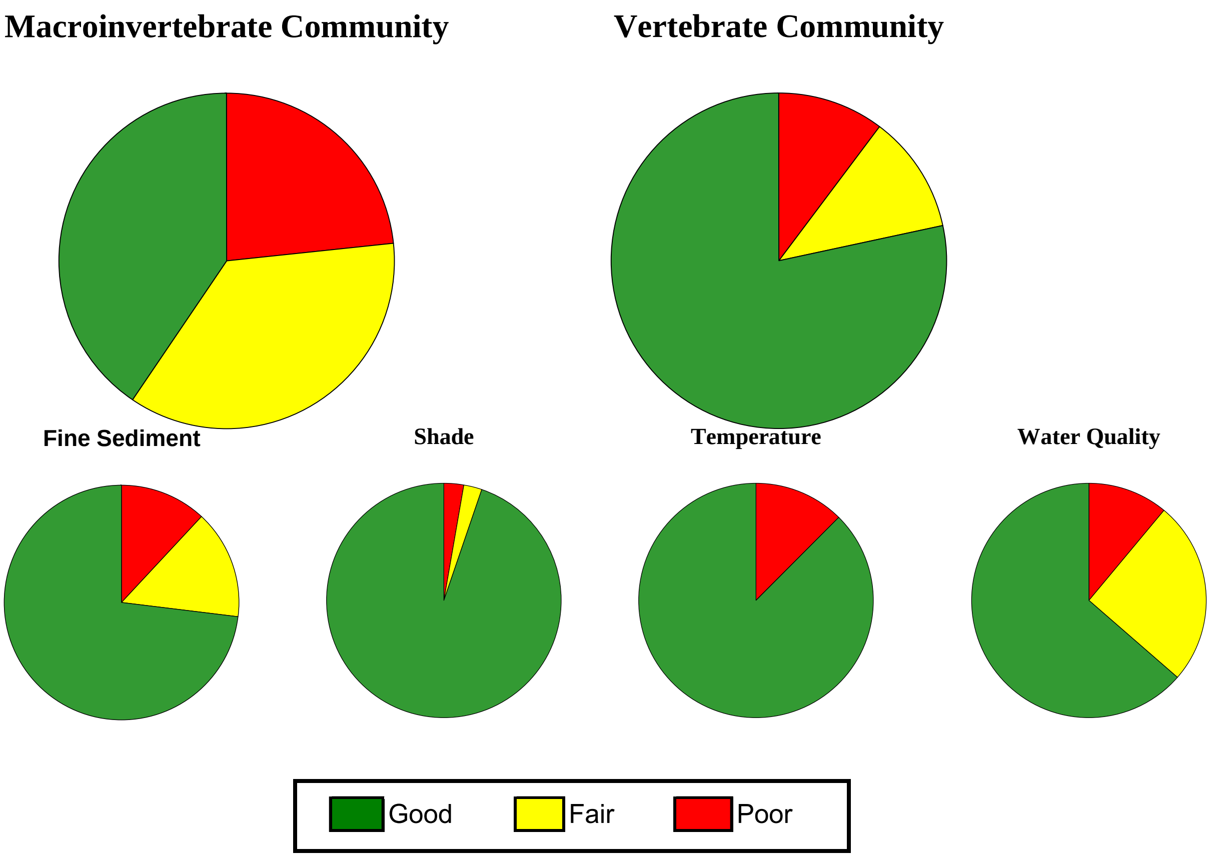


Figure 7: Rogue Basin



Ecoregion Assessment

Drainage basins are a common and useful spatial framework for assessing and managing water resources. However, major drainage basins can contain very different ecological regions with inherently different climate, geology, soils, and vegetation. For example, the Willamette basin spans three major ecologically distinct regions from the western Cascades, Willamette valley floor to the east slope of the Coast Range. The patterns of human land use, stressors, and stream condition are different in the three ecoregions. Looking only on a basin scale may not be the most appropriate way to summarize stream condition regionally.

In general, the Willamette Valley ecoregion had the highest proportion of stream kilometers in poor condition. Major stressors measured in this region were fine sediment, warm water temperatures and poor overall water quality. High water temperature was the leading source of impairment in the Klamath Mountains ecoregion and excessive fine sediment was the leading stressor measured in the Coast Range. The greatest proportion of streams with good biotic condition and low stressor levels was the Cascades ecoregion.

Stream conditions were assessed for four western Oregon ecoregions: Willamette Valley, Coast Range, Klamath Mountains, and Cascades. Tables 9 and 10 and Figures 8 through 11 summarize ecoregion data.

Table 9: Ecoregion Biotic Condition Indicators, ODEQ Probabilistic Stream Surveys, 1994-2001

All Ecoregion Streams*	Total Stream Kilometers*	Assessment Type	Condition			Precision	Confidence
			% Good	% Fair	% Poor		
Coast Range	12120	Macroinvertebrate Community Score	76	10	13	95%	±10
		Aquatic Vertebrate Community Score	44	28	28	95%	±8
Willamette Valley	8660	Macroinvertebrate Community Score	8	5	87	95%	±32
		Aquatic Vertebrate Community Score	14	1	85	95%	±25
Klamath Mountains	8780	Macroinvertebrate Community Score	50	24	26	95%	±18
		Aquatic Vertebrate Community Score	56	17	27	95%	±17
Cascades	5090	Macroinvertebrate Community Score	53	10	37	95%	±12
		Aquatic Vertebrate Community Score	59	35	6	95%	±12

* Third Order or Less

Table 10: Ecoregion Stressors, ODEQ Probabilistic Stream Surveys, Third Order Streams and Less, 1994-2001

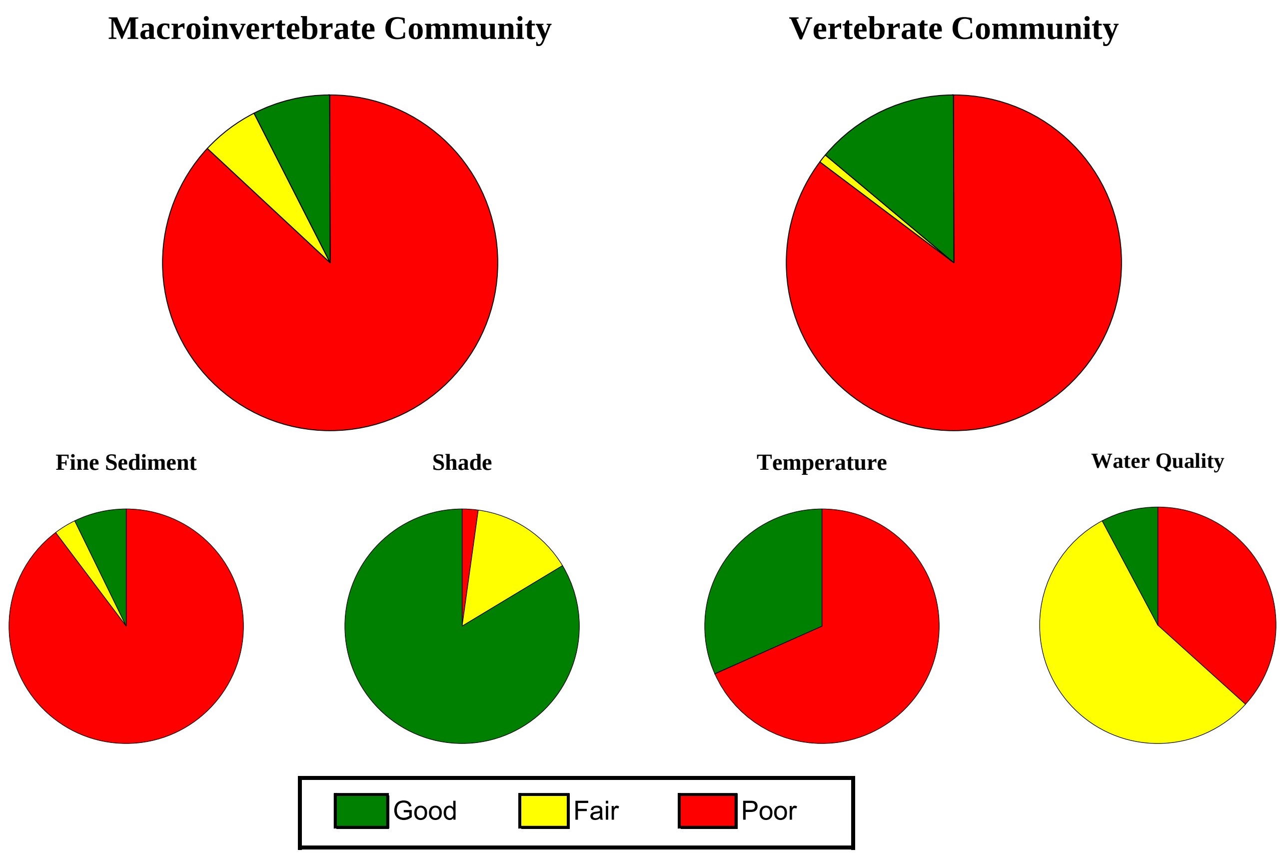
All Ecoregion Streams*	Stressors	Percent Good Condition	Percent Fair Condition	Percent Poor Condition	Precision	Confidence
Coast Range	Fine Sediment	42	17	41	95%	±7
	Shade	99	1	0	95%	±10
	Temperature	77	0	23	95%	±11
	Water Quality	58	26	16	95%	±7
Willamette Valley	Fine Sediment	7	3	90	95%	±22
	Shade	84	14	2	95%	±32
	Temperature	32	0	68	95%	±35
	Water Quality	8	56	37	95%	±23
Klamath Mountain	Fine Sediment	65	14	22	95%	±14
	Shade	89	9	2	95%	+19
	Temperature	54	0	46	95%	±20
	Water Quality	45	27	28	95%	±14
Cascades	Fine Sediment	71	18	11	95%	±11
	Shade	85	14	0	95%	±16
	Temperature	91		9	95%	±14
	Water Quality	92	3	5	95%	±11

* Third order or less.

Willamette Valley Ecoregion

The Willamette Valley ecoregion differs from the adjacent Coast Range and Cascades ecoregions by its lower precipitation, less topographic relief, and lower elevation. This ecoregion was originally characterized by rolling prairies, mixed deciduous and coniferous forest, and extensive wetlands. Today it is an extensive and productive agricultural area. It also contains Oregon's larger cities and most of the state's population.

Figure 8: Willamette Valley Ecoregion



Klamath Mountains Ecoregion

This is a geologically and biologically diverse area. It has mild, moist winters and lengthy summer droughts compared to the Coast Range to the north. The predominant vegetation is a mixed coniferous forest.

The Klamath Mountains ecoregion had 26% of its stream kilometers in poor condition for macroinvertebrate communities and 27% in poor condition for vertebrate communities. The major stressors were warm water temperatures (46%) and overall poor water quality (28%)

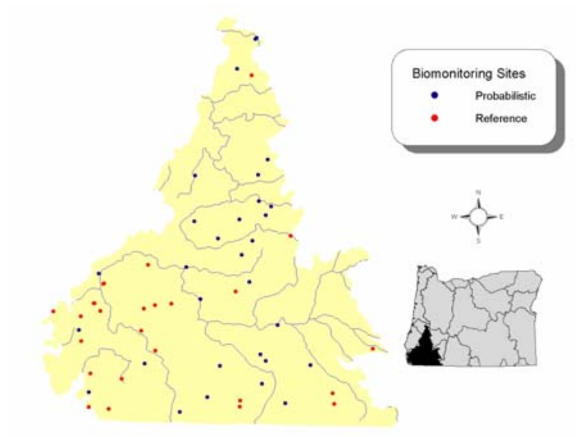
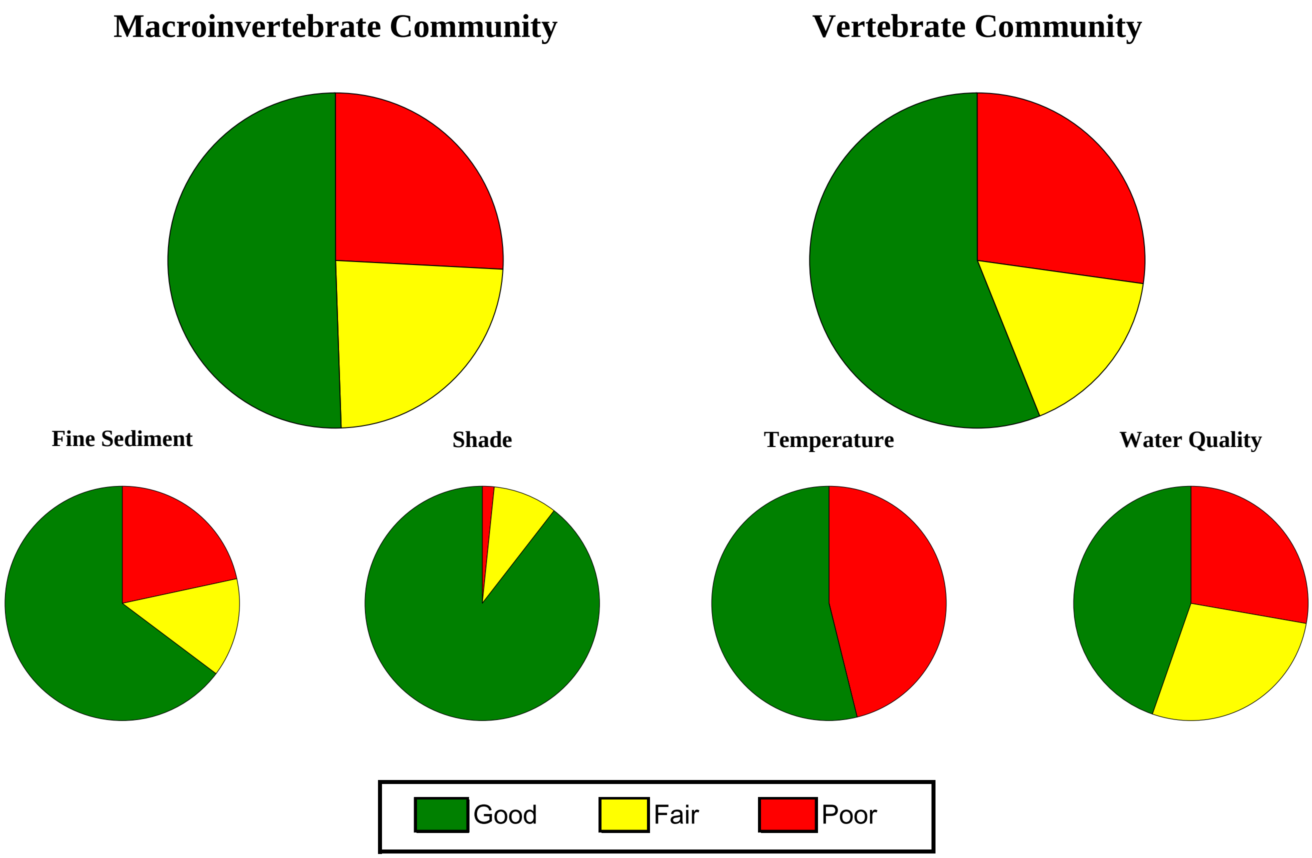


Figure 9: Klamath Mountains Ecoregion



Coast Range Ecoregion

The Coast Range ecoregion is a low mountain range with high rainfall and coniferous forest vegetation. The original vegetation was a mosaic of western red cedar, western hemlock, and Douglas fir with Sitka spruce along the coast fog line. Logging and human management of this area has made Douglas fir prevalent today.

Biotic indicators show 28% of the stream kilometers in poor condition for vertebrate communities and 13% in poor condition for macroinvertebrate communities. Impairment from fine sediment was extensive (41%), second only to the Willamette Valley. Although the streams were highly shaded, 23% of the stream kilometers violated the temperature standard.

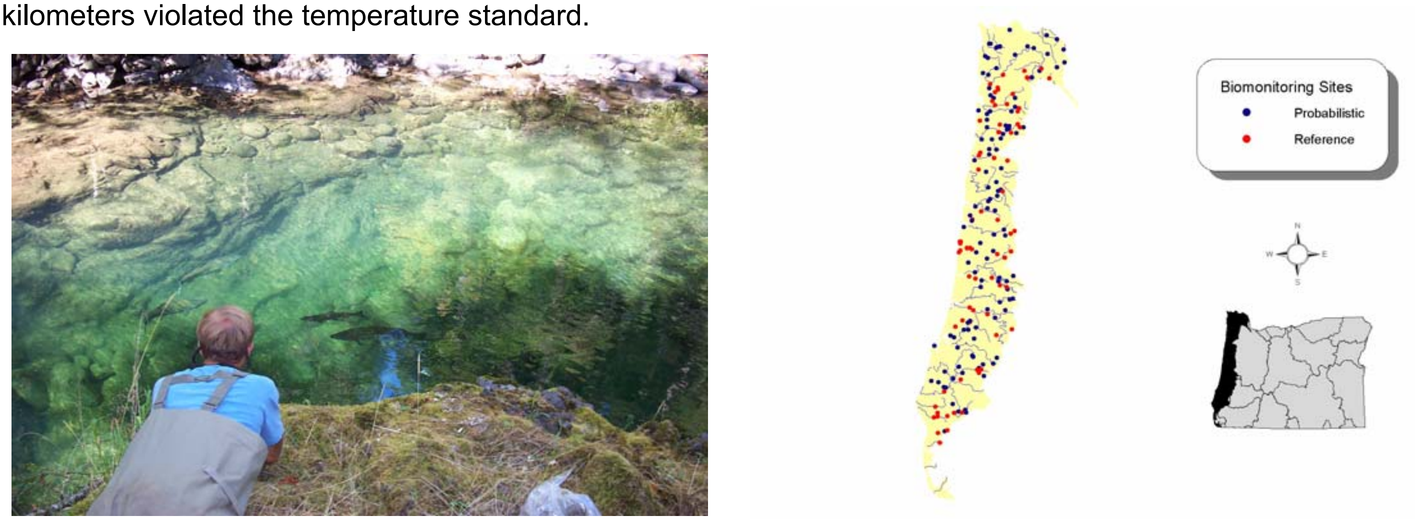
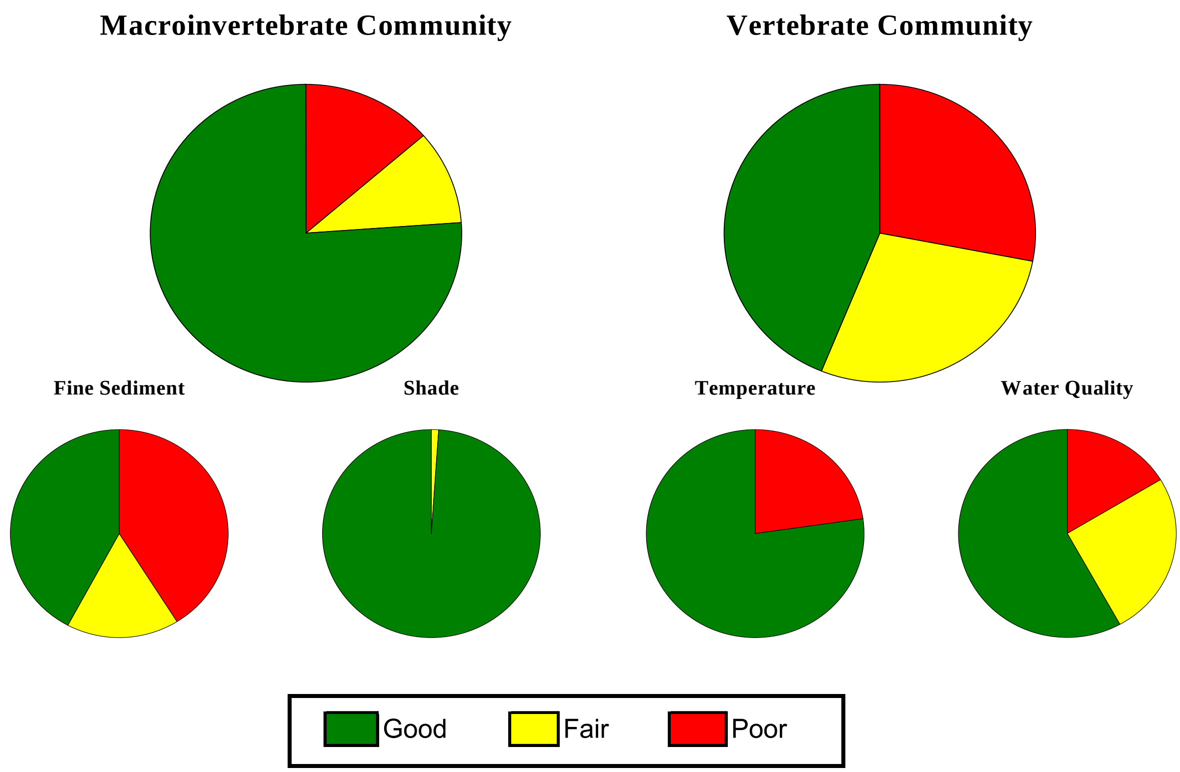


Figure 10: Coast Range Ecoregion



Cascades Ecoregion

This mountainous, volcanic region is characterized by steep ridges and river valleys, high precipitation, and productive coniferous forests.

The macro invertebrate community indicates that 37% of the stream kilometers are in poor condition. This ecoregion had the least impaired vertebrate community with only 6% of the stream kilometers in poor condition. The stressors measured showed the fewest stream kilometers in poor condition among the assessed ecoregions (sediment - 11% poor; shade - 0% poor; temperature - 9% poor; water quality - 5% poor).

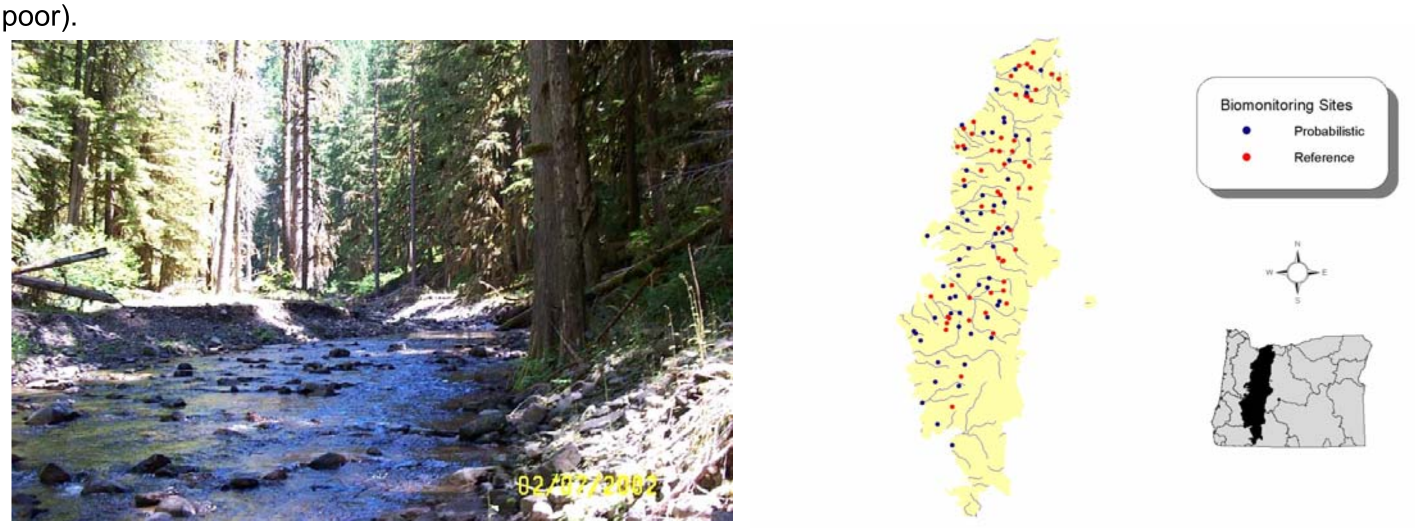
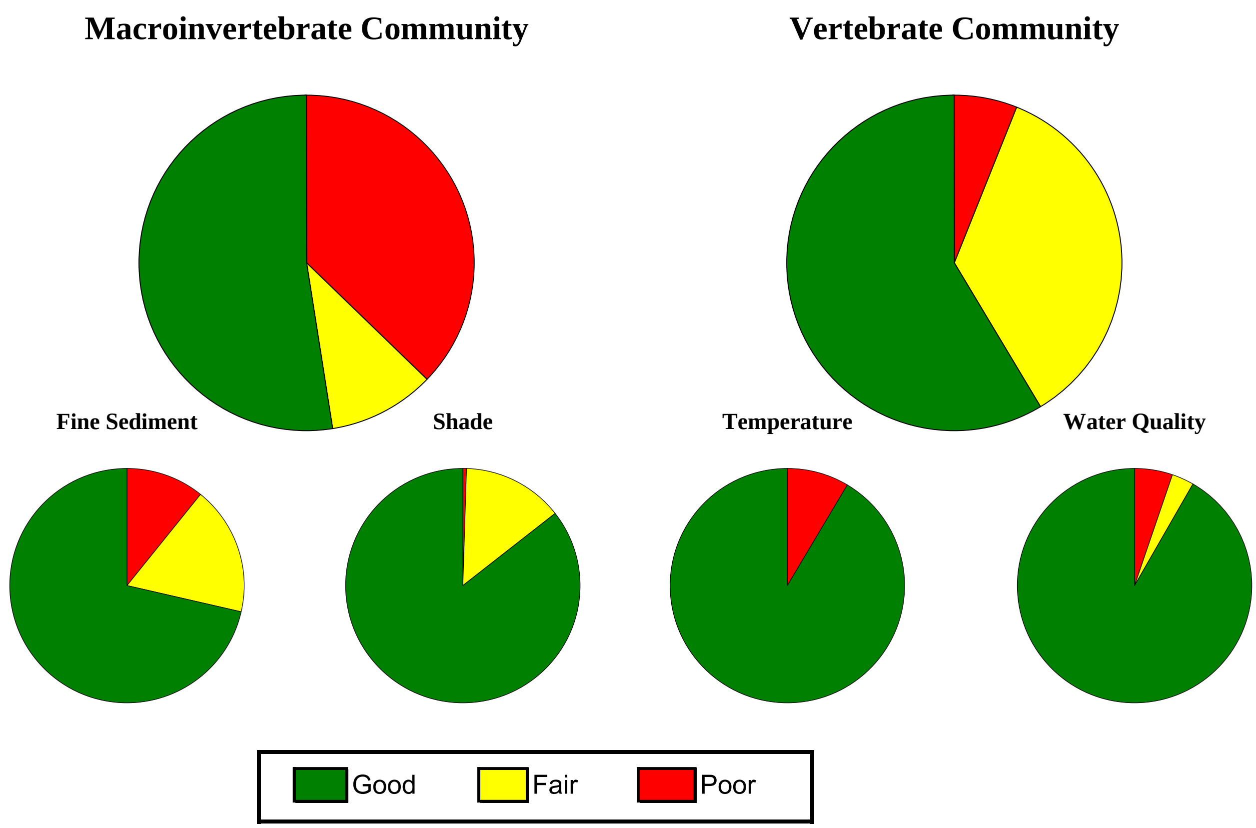


Figure 11: Cascades Ecoregion



Western Pilot Coastal Environmental Monitoring and Assessment

In 1999, ODEQ received funding from EPA to conduct monitoring as part of the Western Pilot Coastal Environmental Monitoring and Assessment Program (CEMAP). This 5 year program is designed to assess overall coastal environmental health. Under this program, water column measurements are combined with information about sediment characteristics and chemistry, benthic organisms, and data from fish trawls to describe the current estuarine condition. Eighty sites from Oregon's estuaries as well as fifty sites from the Columbia River Estuary were sampled. Figures 12 through 15 show sampling locations in Oregon in years 1999 through 2002.

Seventeen of the Oregon sample locations are found in small estuaries that are part of the larger Columbia River Estuary. These include Youngs Bay (4 locations), Cathlamet Bay (6 locations), and smaller sloughs and tributaries such as Marsh Island Creek, Youngs River, Knappa Slough, Bradbury Slough, Wallace Slough, Clatskanie River, and Rinearson Slough. Samples outside the Columbia system were collected in Netarts Bay, Nestucca Bay, Little Nestucca River, Salmon River, Siletz Bay, Yaquina Bay, Yaquina River (2 locations), Alsea River, Yachats River, Siuslaw River (2 locations), Smith River (2 locations), Umpqua River (4 locations), Scholfield Creek, Coos Bay (6 locations), Coos River (2 locations), Catching Slough (2 locations), and Rogue River.

Figure 12: 1999 Coastal EMAP Sites

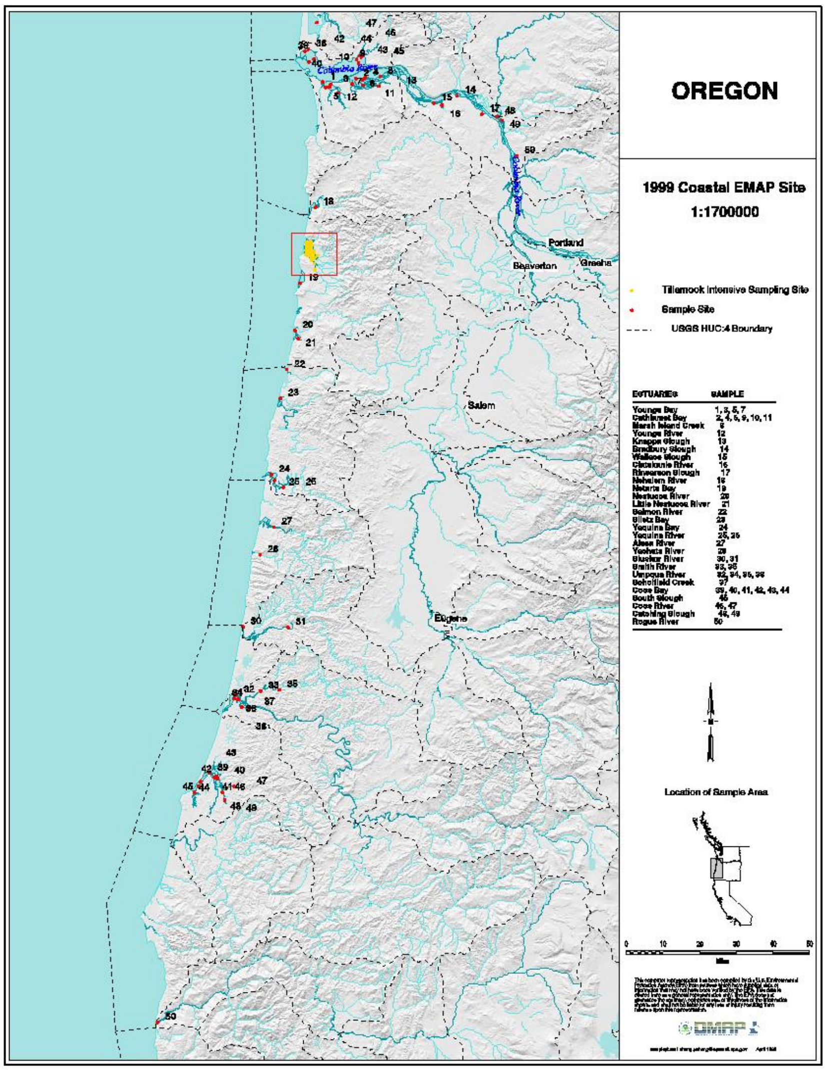


Figure 13: 2000 Coastal EMAP Sites

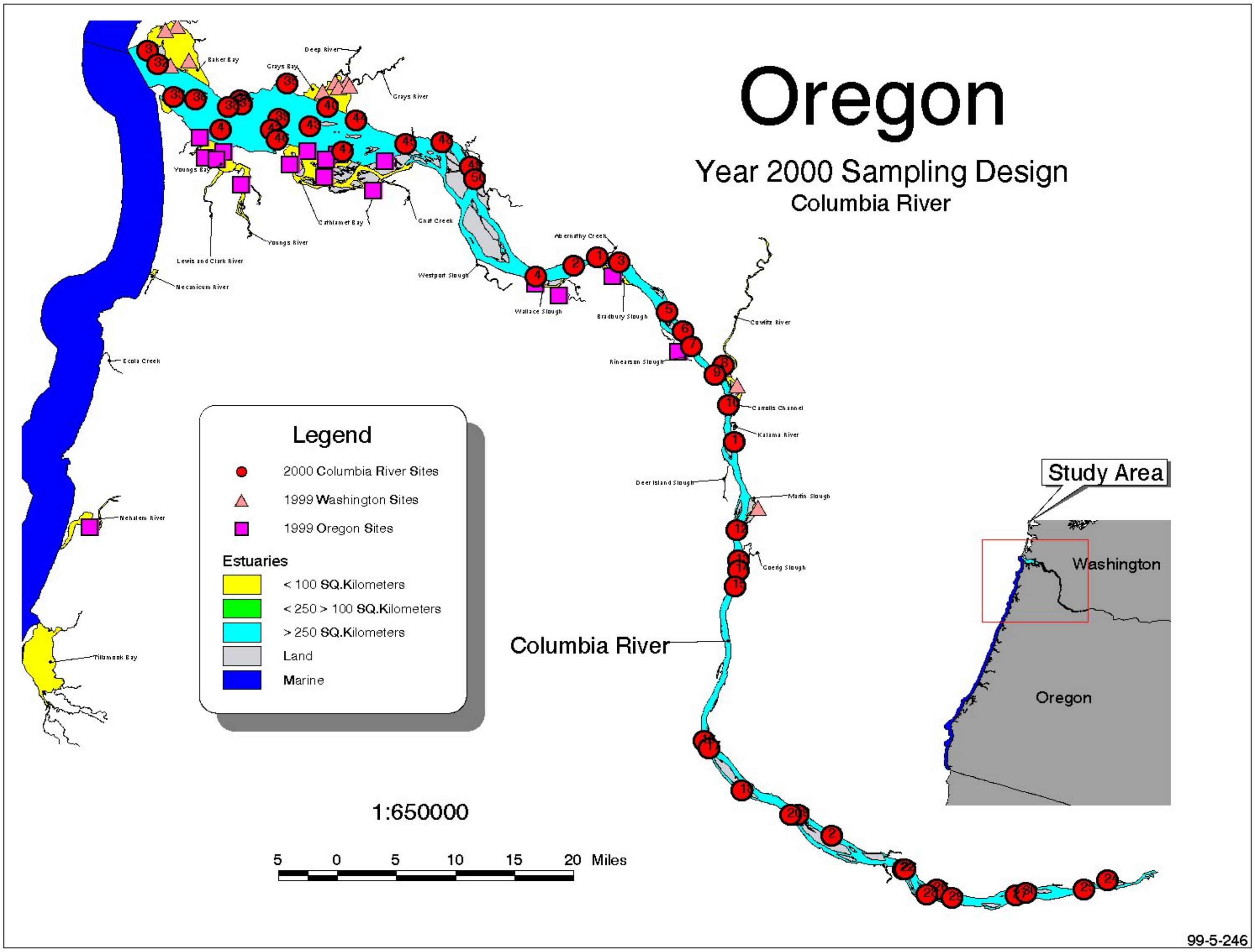


Figure 14: 2001 Coastal EMAP Site

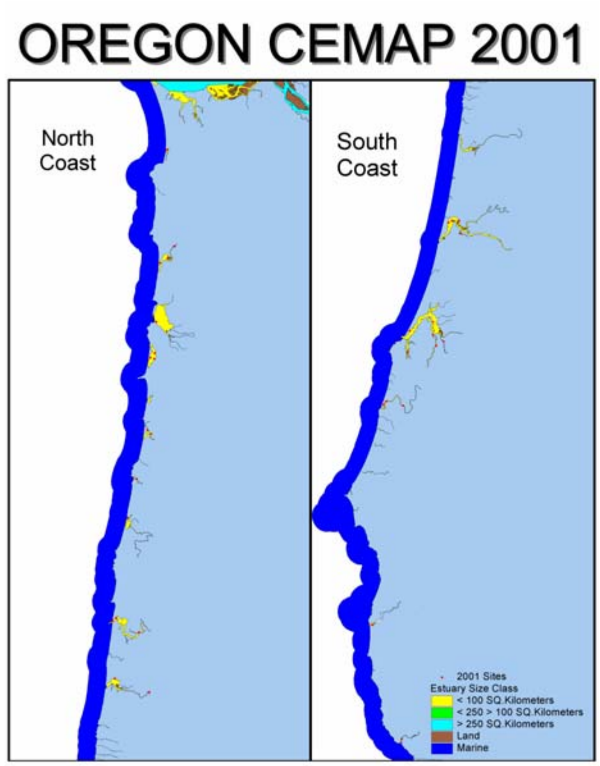
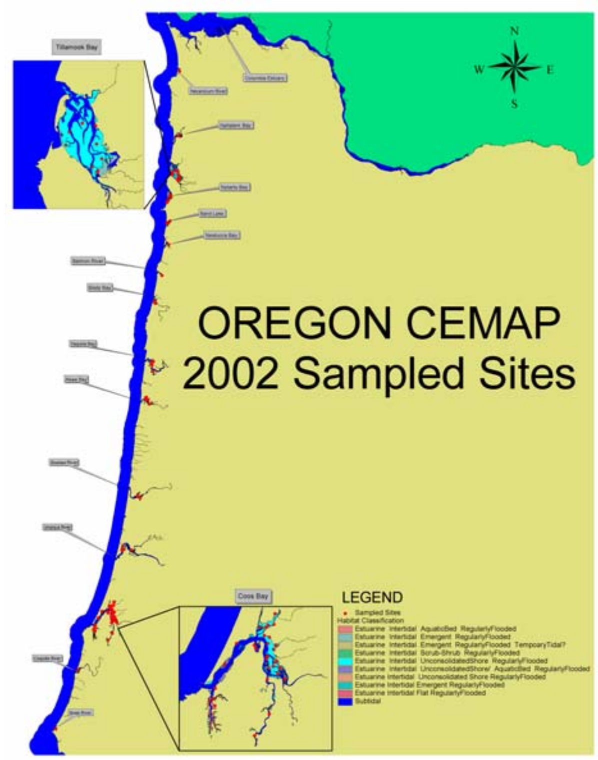


Figure 15: 2002 Coastal EMAP Sites



Does water quality meet standards?

ODEQ uses the results from both the ambient monitoring program and the random sampling programs to determine if water quality standards are met. ODEQ also designs a monitoring plan for the agency's "toxics" monitoring activities. Since 1999, toxics monitoring has concentrated on pesticides in the Hood River watershed. Several pesticides have been detected in the surface waters there, with methyl azinphos and chlorpyrifos detected at concentrations exceeding surface water toxics criteria. Follow-up monitoring of fish tissue for mercury continues in the Willamette Basin where several fish consumption mercury advisories are posted.

ODEQ also uses third party data to evaluate water quality. Volunteer monitoring through watersheds groups and other organizations is a new and expanding element for the collection of water quality data. ODEQ provides monitoring equipment, training, technical assistance, and data management for volunteer monitoring groups. Through December 1999 equipment and training was provided for over 30 watershed groups. A data quality matrix has been developed to assign data quality levels and appropriate uses for volunteer monitoring data. A Volunteer Monitoring Coordinator provides full-time assistance to watershed councils and other volunteer monitoring groups.

ODEQ solicits and reviews water quality data every two years to develop a list of water bodies that do not meet water quality standards. This list, known as the 303(d) list, allows ODEQ to identify and prioritize water quality problems. The list also serves as a guide for developing and implementing watershed recovery plans to achieve state water quality standards. The 2002 303(d) list identifies approximately 15,000 river miles in the State that are impaired by at least one pollutant, including elevated temperatures, low dissolved oxygen, elevated bacteria levels and metals and organics. ODEQ also identifies waters that are meeting water quality standards as well as "waters of concern" that require more monitoring to determine the water quality status.

What pollutants are affecting water quality?

ODEQ conducts extensive assessments to provide a detailed characterization of water quality conditions and to determine cause and affect relationships at the watershed level. Most source assessments are conducted for the purpose of developing Total Maximum Daily Loads (TMDLs) as required by the Clean Water Act for streams that do not meet water quality standards (water quality limited). Additional source information can be gleaned from the discharge monitoring reports (DMRs) submitted by facilities with NPDES permits.

Developing corrective actions

The process for establishing a plan to improve water quality begins when the water body appears on ODEQ's 303(d) list. TMDLs describe the amount of each pollutant a waterway can receive and still not violate water quality standards. In the past, rivers and streams may have had several different TMDLs, each one determining the limit for a different pollutant. Now using a comprehensive approach, ODEQ takes into account all pollutants entering a water body and develops TMDLs that will control all pollutants in a particular geographic area. ODEQ is moving towards developing TMDLs on a basin wide scale (generally on a 3^{rd} field US Geological Survey Hydrologic Unit Code).

When establishing TMDL limits, ODEQ:

- Reviews existing data and monitors to determine what pollutant is causing water quality problems and in what amounts it is entering the water. The review and monitoring also attempts to determine how much of the pollution comes from point sources, including discharges from industry and sewage treatment facilities; non-point source pollution, such as runoff from farms, forests and urban areas; and how much comes from natural sources such as decaying organic matter or nutrients in soil.

- Assesses the hydrological (flow), chemical, physical, and biological conditions of the watershed. The studies involve synoptic sampling surveys to characterize spatial variability and seasonal and diurnal studies to characterize seasonal and diurnal variability.
- Uses techniques such as computer models to determine what affect the pollution is having on the stream or river, and how much of the pollutant can be discharged without exceeding water quality standards in the watershed.
- Uses this information to establish permit limits on the amount of pollutant each pipe can discharge and limits on non-point sources that are controlled through various water quality management plans. This comprehensive approach focuses on watershed plans developed locally.
- Includes a margin of safety in the TMDL to account for uncertainty and reserve capacity that allows for future discharges to a river or stream without exceeding water quality standards.

Water quality management plans to restore streams and rivers to water quality standards are developed by government agencies in cooperation with landowners.

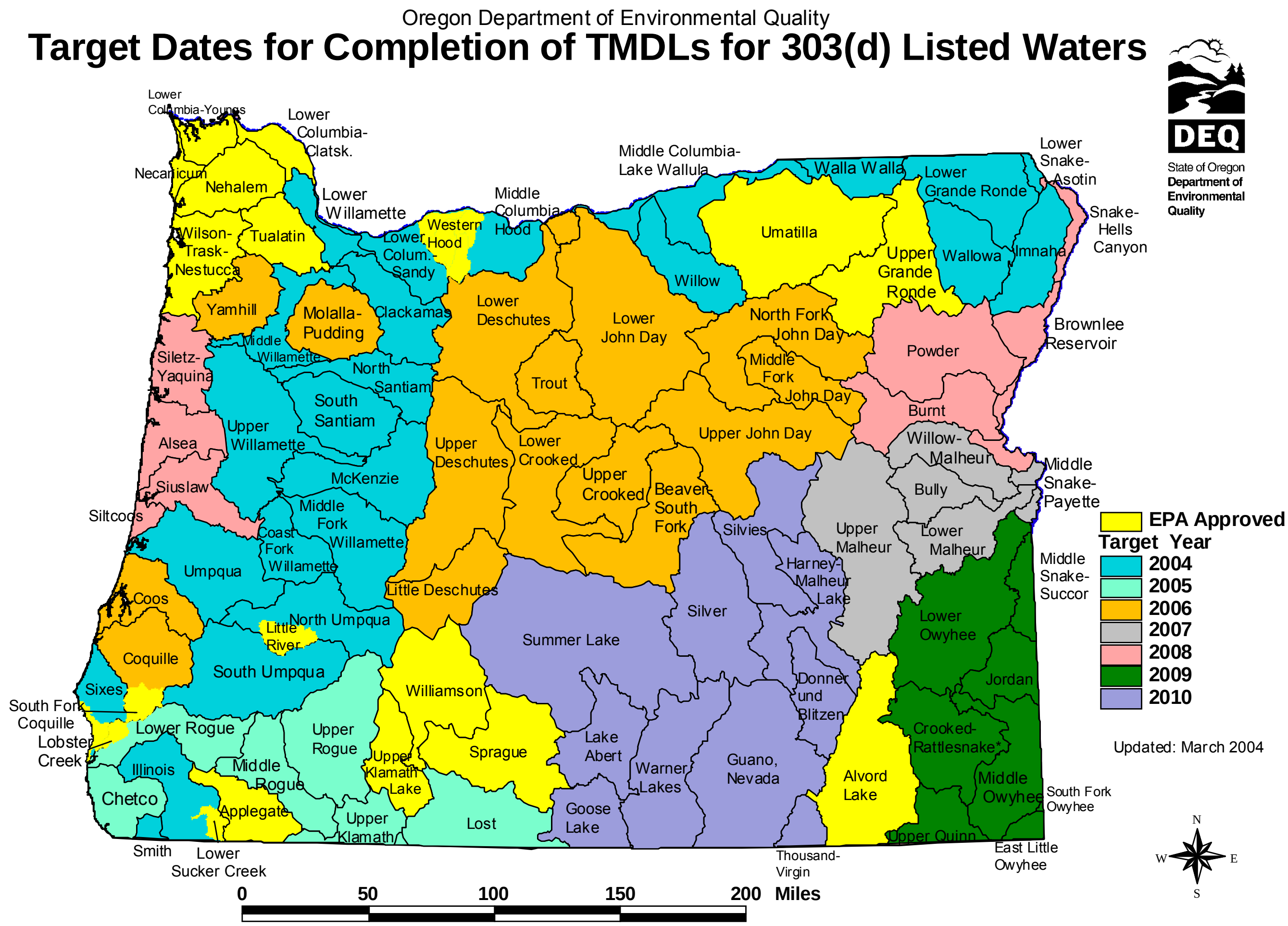
- If the land adjacent to a water body is agricultural, then the Oregon Department of Agriculture would work with the landowners in the watershed to devise and implement a management plan (as stipulated by Oregon Senate Bill 1010).
- If the land is private or state forest, the Oregon Department of Forestry implements the Forest Practices Act.
- Federal agencies (such the U.S. Forest Service or the Bureau of Land Management) would have responsibility to develop watershed management plans for federal lands.

In urban and rural areas not covered by other state or federal agencies, cities and counties would develop management plans, working closely with local watershed councils. These plans are sent to ODEQ for inclusion in an overall water quality management plan. EPA has approved a number of TMDLs since 2000. These TMDLs addressed: the Upper Grande Ronde subbasin, the Upper South Fork of the Coquille River, the Tillamook Bay subbasin, the Nestucca Bay subbasin, the Tualatin subbasin, the Upper Klamath Lake drainage, the Umatilla subbasin, the Western Hood River subbasin, the Little River subbasin, the Lower Sucker Creek sub basin, the Lobster Creek subbasin, the Lower Columbia River (for total dissolved gas), North Coast basin (Nehalem, Necanicum, Lower Columbia – Youngs, Lower Columbia – Clatskanie), Applegate subbasin, Snake River/Hells Canyon (temperature) and Alvord subbasin. Additional TMDLs are scheduled for completion in 2004 and 2005, as described in Table 11 and Figure 16.

Table 11: Draft Schedule for TMDL Development

TMDLs Likely To Be Completed in 2004 and 2005 (by Basin)
Umpqua
NE Corner (Wallowa, L Grande Ronde, Imnaha)
Walla Walla
Middle Columbia/Hood
Willamette
Sixes
Sandy
Chetco
Rogue
Willow
Upper Klamath/Lost

Figure 16: Status of TMDL Development



Oregon's Groundwater Protection Program

The Oregon Groundwater Quality Protection Act of 1989 (ORS 468B.150 through 468B.190) sets a broad goal for the State of Oregon:

"To prevent contamination of Oregon's ground water resource while striving to conserve and restore this resource and to maintain the high quality of Oregon's ground water resource for present and future uses."

All state agency programs are required to be consistent with this goal. The Oregon Department of Environmental Quality (ODEQ) and other natural resource agencies protect groundwater by:

- Conducting statewide programs to identify and characterize groundwater quality.
- Establishing programs to prevent groundwater quality degradation through the use of the best practicable management practices.
- When groundwater contamination is found, taking action to prevent further groundwater quality declines and to restore groundwater quality.

ODEQ coordinates groundwater activities and implements a number of groundwater protection programs including:

- Monitoring and assessment programs to identify areas with groundwater quality problems.
- Programs to address area-wide groundwater problems and areas where non-point source activities are contributing contamination.
- Drinking water source water assessment program, jointly conducted by the Oregon Department of Human Services Drinking Water Program and ODEQ.
- Underground injection control program.
- On-site program.

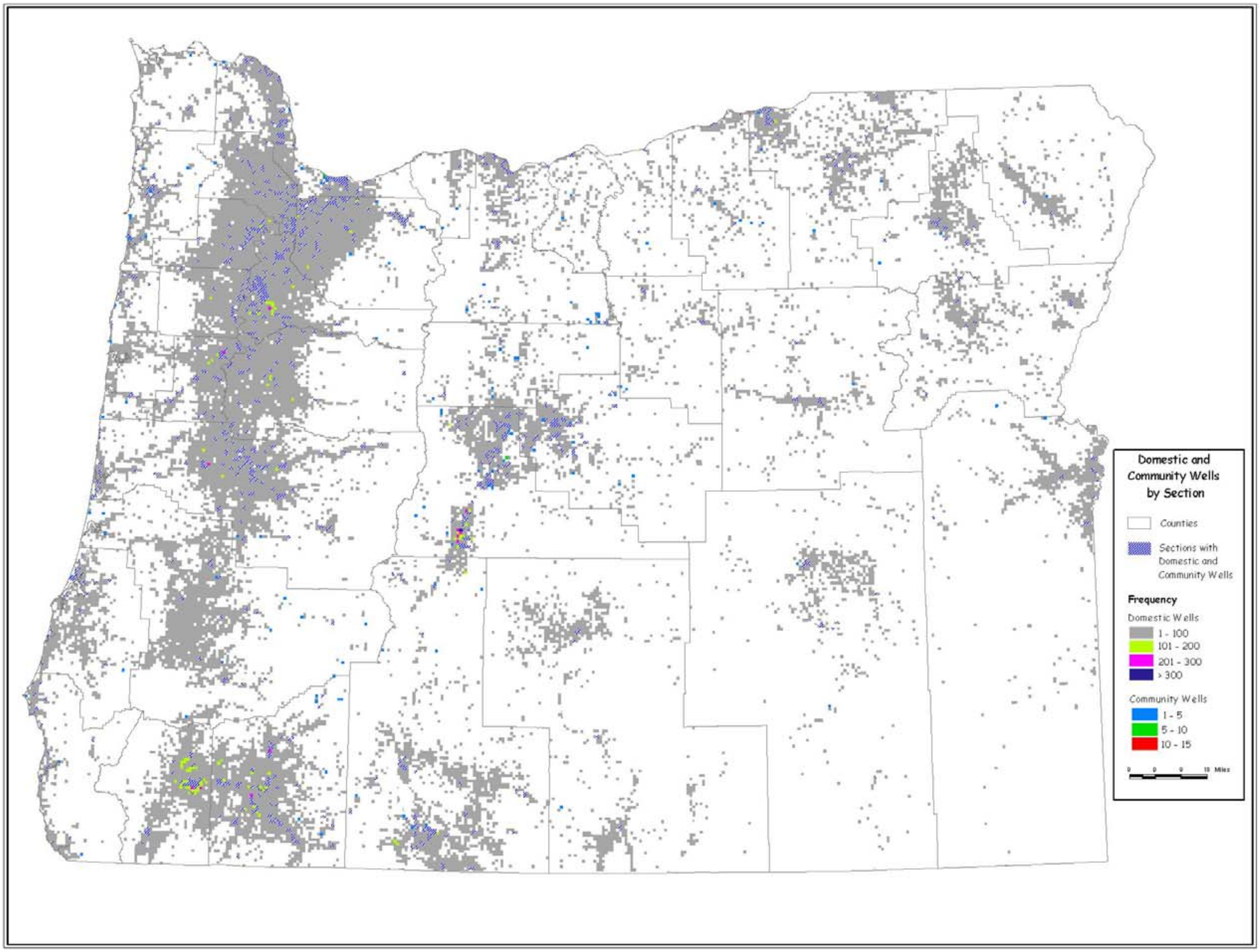
Other state agencies also implement programs to protect groundwater such as:

- Groundwater use, availability, water rights and well construction programs conducted by the Oregon Water Resources Department.
- Domestic well testing program administered by the Oregon Department of Human Services Drinking Water Program.
- Public drinking water system monitoring program administered by the Oregon Department of Human Services Drinking Water Program.
- Programs regulating farming practices administered by the Oregon Department of Agriculture.

Groundwater monitoring and assessment

Groundwater resources in Oregon have many valuable uses and functions. Groundwater comprises about 95% of the available fresh water supply and is the primary source of drinking water. Almost 2,000 community water wells and 200,000 individual home (domestic) water supply wells have been installed to provide drinking water to Oregonians throughout the state. Figure 17 shows the distribution of domestic and community water supply wells across the state.

Figure 17: Distribution of Drinking Water Wells in Oregon



Plotted by Public Land Survey Section (Township, Range, Section)
Source: Oregon Water Resource Department Well Log Database, March 2004

Domestic Well Testing

Domestic drinking water supply wells are not routinely tested for water quality, but state law requires testing at the time of a real estate transaction. A home owner selling a property with a drinking water well must test the water for nitrate and total coliform bacteria. The owner submits the test results to the Oregon Department of Human Services Drinking Water Program (ODHS). Between 1989 and 2003, about 24,633 nitrate tests have been done by home owners. Nitrate sample results are summarized by county in Table 12. Most of the domestic well tests (82%) show nitrate levels below 2 mg/L and reflect background groundwater quality. Some tests show elevated nitrate levels (greater than 2 mg/L) that could indicate groundwater is being effected by human activities at the land surface. Counties in Oregon where domestic well testing shows nitrate levels above a state action level (7 mg/L) or federal drinking water standard (10 mg/) are shown shaded in Table 12.

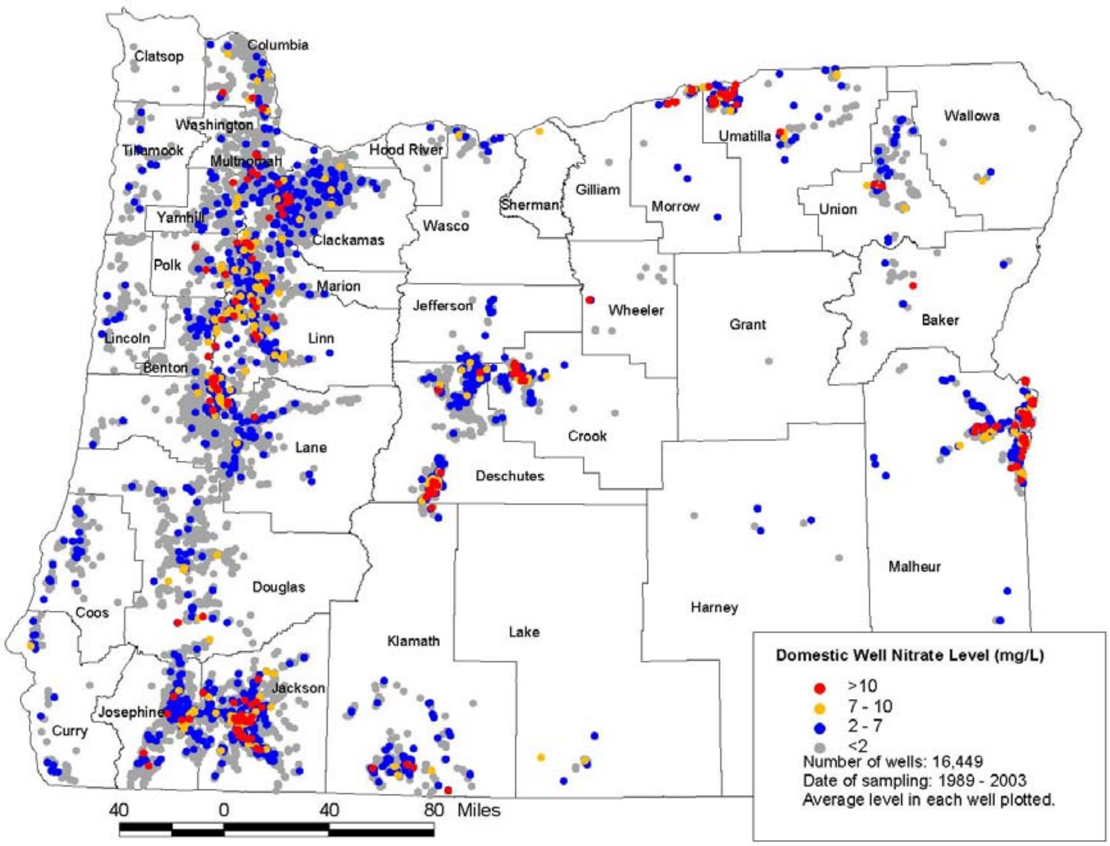
Table 12: Domestic Water Well Testing

	Number of domestic well results in each range				
Nitrate (mg/L)	**<2**	**2 to 7**	**7 to 10**	**>10**	**Total**
Statewide	20,252	3,465	494	422	24,633
	82.2%	14.1%	2.0%	1.7%	
County					**% > 7 mg/L**
Baker	133	19	3	2	3%
Benton	512	68	18	7	4%
Clackamas	1970	175	13	10	1%
Clatsop	32	0	0	0	0%
Columbia	431	29	8	4	3%
Coos	416	57	1	0	0%
Crook	372	313	52	41	12%
Curry	171	28	0	2	1%
Deschutes	2306	413	62	25	3%
Douglas	812	54	7	2	1%
Gilliam	5	2	0	0	0%
Grant	88	24	0	0	0%
Harney	153	41	6	0	3%
Hood River	15	1	0	0	0%
Jackson	3134	501	58	45	3%
Jefferson	28	20	0	0	0%
Josephine	4075	363	17	7	1%
Klamath	579	130	13	7	3%
Lake	156	32	8	3	6%
Lane	1385	165	32	31	4%
Lincoln	133	12	0	1	1%
Linn	511	126	16	7	3%
Malheur	308	195	53	81	21%
Marion	503	145	34	15	7%
Morrow	72	47	12	30	26%
Multnomah	167	12	0	0	0%
Polk	62	6	3	2	7%
Sherman	0	4	2	0	33%
Siskiyou	0	1	0	0	0%
Tillamook	110	16	0	1	1%
Umatilla	630	332	60	83	13%
Union	242	41	7	3	3%
Wallowa	15	1	2	0	11%
Wasco	66	11	1	0	1%
Washington	362	36	1	6	2%
Wheeler	25	8	3	4	18%
Yamhill	273	37	2	3	2%

Source: ODEQ database from real estate transaction data, April 2004

Figure 18 shows the locations and range of nitrate levels for about 16,449 wells where the database contains complete address information. For wells that have been tested more than once, the average nitrate range is plotted.

Figure 18: Domestic Water Well Nitrate Levels



Source: ODEQ database from real estate transaction data, April 2004.

Public Water System Testing

The Oregon Department of Human Services Drinking Water Program tracks data on water quality testing for public water systems (PWS) in the state. Over 90% of the active public water supply systems (3,219 systems serving almost 1 million people) rely exclusively on groundwater as a source of water. These water systems use groundwater drawn from over 5,000 wells. Public water systems periodically test water quality for a variety of contaminants including nitrate. Nitrate sample results from throughout the state are summarized in Table 13. Most of the wells supplying the public water systems (87%) report nitrate levels below 2 mg/L and reflect background groundwater quality. Some wells have elevated nitrate levels (greater than 2 mg/L) that could indicate groundwater is being effected by human activities at the land surface. Counties in Oregon with public water systems reporting nitrate levels in wells above a state action level (7 mg/L) or federal drinking water standard (10 mg/) are shown shaded in Table 13.

Table 13: Public Water Systems

	Number of PWS wells in each range				
Nitrate (mg/L)*	**<2**	**2 to 7**	**7 to 10**	**>10**	**Total**
Statewide	2,828	390	31	13	3,262
	86.7%	12.0%	1.0%	0.4%	
County					**% > 7 mg/L**
Baker	32	4	0	0	0%
Benton	68	8	0	0	0%
Clackamas	290	14	2	0	1%
Clatsop	15	0	0	0	0%
Columbia	68	17	1	0	1%
Coos	33	2	1	0	3%
Crook	56	13	3	0	4%
Curry	51	4	0	0	0%
Deschutes	203	38	1	1	1%
Douglas	98	4	0	0	0%
Gilliam	5	1	0	0	0%
Grant	26	1	0	0	0%
Harney	24	14	0	0	0%
Hood River	16	1	1	0	6%
Jackson	202	35	0	0	0%
Jefferson	36	4	1	0	2%
Josephine	184	22	0	0	0%
Klamath	169	8	1	0	1%
Lake	31	2	0	0	0%
Lane	311	37	5	3	2%
Lincoln	55	3	0	0	0%
Linn	165	35	2	0	1%
Malheur	11	16	1	5	18%
Marion	173	34	2	0	1%
Morrow	15	3	2	1	14%
Multnomah	54	16	3	1	5%
Polk	21	6	0	0	0%
Sherman	7	8	0	0	0%
Tillamook	52	5	0	0	0%
Umatilla	81	14	4	0	4%
Union	33	1	0	0	0%
Wallowa	20	1	0	0	0%
Wasco	51	4	1	2	5%
Washington	91	7	0	0	0%
Wheeler	4	1	0	0	0%
Yamhill	77	7	0	0	0%

*Results of Nitrate (as N) or Nitrate + Nitrite (as N) analysis averaged for each well.
Source: Oregon Department of Human Services Drinking Water Program database, April 2004

Statewide Groundwater Monitoring

ODEQ conducts on-going groundwater monitoring and assessment to characterize the quality of groundwater in the state. ODEQ is currently focusing groundwater monitoring activities in four areas of the state where efforts to address groundwater problems are underway. These projects are discussed in the following section.

Programs to Address Area-wide Groundwater Problems

ODEQ is currently focusing groundwater monitoring, protection, and restoration activities in four areas of the state:

- La Pine Area
- Southern Willamette Valley
- Northern Malheur County
- Lower Umatilla Basin

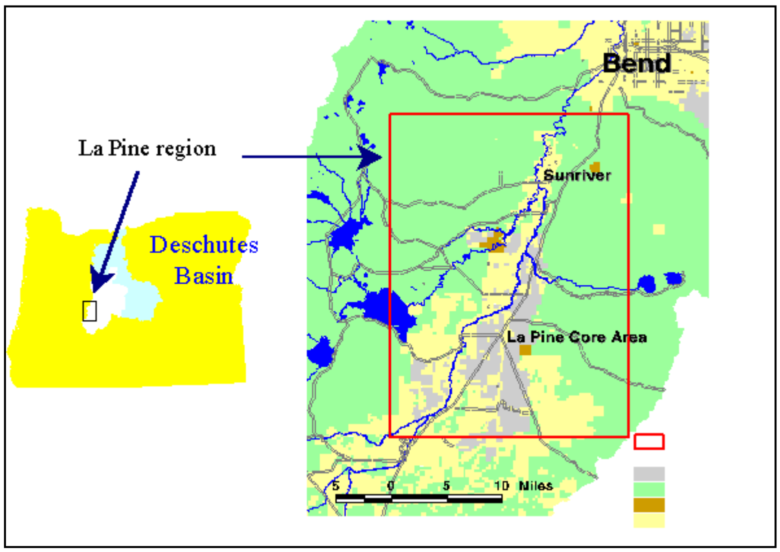
La Pine Groundwater Assessment and Demonstration Project

The La Pine region (Figure 19) in central Oregon was platted in the 1960's and 1970's prior to passage of Oregon's land use planning laws. Within a 125 square mile corridor near the Deschutes and Little Deschutes Rivers, over 15,000 one-half to one acre lots were platted. The anticipated use of on-site septic systems on each lot creates a threat to shallow groundwater in rapidly draining soils.

Groundwater is the main source of drinking water in this rural area with over 4,000 domestic water wells in use. There are also about 100 community water supply wells serving small-scale subdivisions, schools and businesses in the region.

In the mid-1990s, Deschutes County and ODEQ assessed the potential impact of residential development in the La Pine region on groundwater quality. The studies predicted that nitrate levels in groundwater would exceed the federal maximum contaminant level of 10 mg/L within 20 years.

Figure 19: La Pine Groundwater Project Area



Source: LaPine National Demonstration Project website
http://marx.deschutes.org/deq/LaPineIndex.htm

In 1999, the United States Congress awarded a $5.5 million 5-year grant to ODEQ and Deschutes County in an effort to protect the region's groundwater as part of the La Pine National Decentralized Wastewater Treatment and Disposal Demonstration Project. The La Pine region was selected to evaluate innovative nitrogen reducing technologies and to develop and use a three-dimensional groundwater flow and contaminant transport model as a planning tool.

The La Pine National Demonstration Project includes elements to:

- Install new and retrofit existing on-site septic systems with innovative denitrification treatment systems.
- Initiate an on-site septic system maintenance infrastructure.
- Establish a groundwater monitoring network of existing private and public water supply wells.
- Monitor the innovative on-site septic systems to evaluate performance and effects on groundwater quality.
- Conduct 3-dimensional groundwater flow modeling and nitrogen contaminant fate and transport modeling, and assess optimum lot density based on model results.
- Establish a low-interest loan fund for on-site septic system repair or replacement.

As of April 2004, 40 innovative on-site septic systems and 9 control on-site septic systems have been installed. The effect of these systems on groundwater quality is being evaluated by monitoring a network of about 150 monitoring wells and by sampling public and private drinking water wells. In addition, preliminary data have been collected to evaluate groundwater and surface water interaction along the Deschutes and Little Deschutes Rivers within the study area.

In 2000, ODEQ and Deschutes County conducted baseline groundwater sampling in 199 domestic and public water supply wells. Results showed 10% of the wells had nitrate concentrations higher than background levels. Groundwater monitoring results and other data from the study show that groundwater moves slowly in the area, and that nitrate from on-site septic systems is in the early stages of creating groundwater contamination. On-site septic systems have been discharging nitrate for over 40 years, but contamination has only been reaching groundwater for the past 10 years. The majority of nitrate loading has occurred since 1988. Most domestic drinking water wells in the area withdraw groundwater that pre-dates the period of development and heavy nitrate loading. The 3-dimensional groundwater flow modeling and nitrogen contaminant fate and transport modeling predict that nitrate levels in the groundwater used for drinking water will continue to increase if preventive measures are not taken.

Southern Willamette Valley Groundwater Assessment

The Willamette Basin in Oregon includes one of the major river and watershed systems in the state as well as significant groundwater aquifers. (Figure 20)

Figure 20: Location of the Willamette Basin, Oregon

Source: Oregon State Service Center for Geographic Information Systems

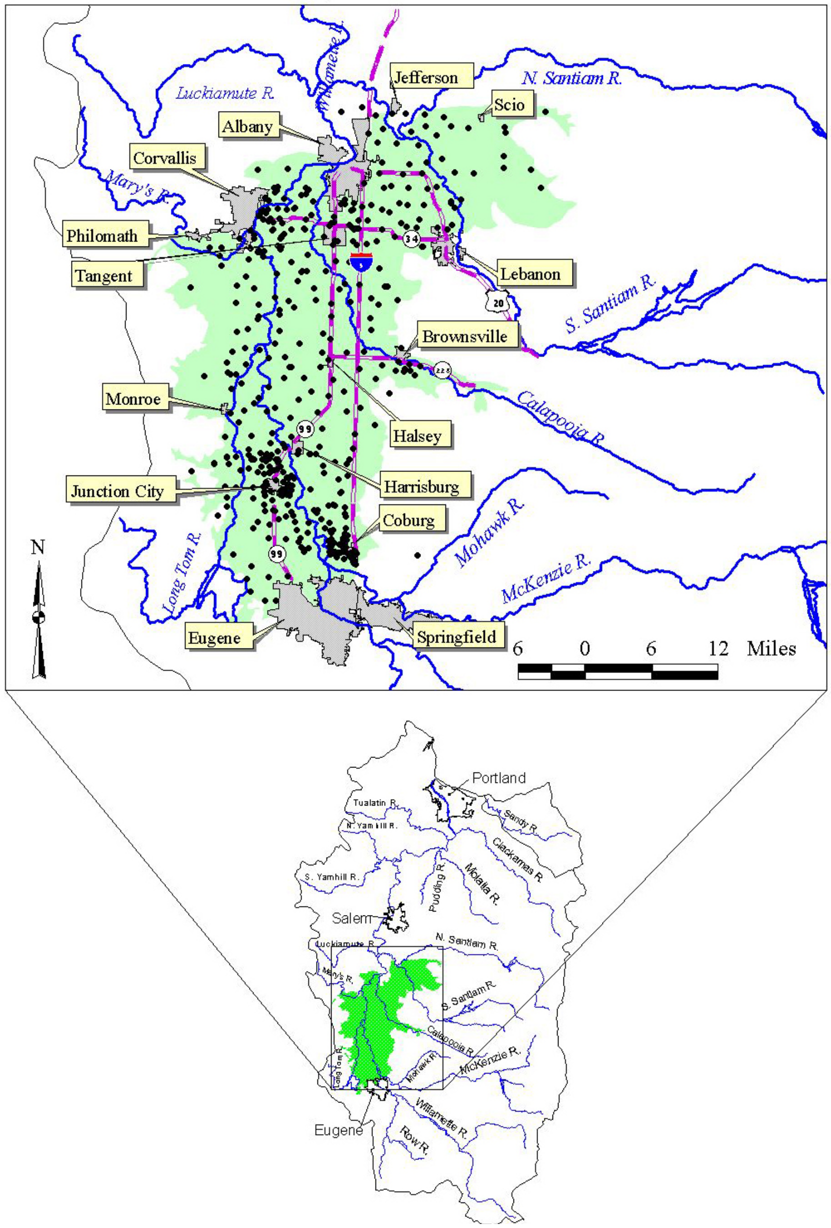
Groundwater is an important natural resource in the basin and provides drinking water to over 1,700 public water systems and over 100,00 private residential wells. Groundwater assessments conducted by ODEQ in 1993 and 1994 documented significant groundwater contamination from nitrate and other pollutants in the Southern Willamette Valley area.

As follow up to those studies, ODEQ conducted further groundwater quality assessments in the Southern Willamette Valley in 2000, 2001, and 2002. Over the course of these studies, ODEQ collected groundwater samples from 496 water wells and analyzed groundwater for nitrate, pesticides, and other parameters. Figure 21 shows the study area and the well locations.

Nitrate was found in elevated concentrations (> 3 mg/L) in more than 50% of the sampled wells. Nitrate concentrations in about 11% of the wells exceed the drinking water standard of 10 mg/L. Pesticides were found in 69% of the sampled wells. Samples were analyzed using methods with detection limits in the parts per trillion range. Three of the 15 detected pesticides have established drinking water standards. None of the results exceeded these standards. The most commonly detected pesticides were atrazine (33% samples), desethyl atrazine (58% samples), and simazine (12% samples).

The monitoring information confirmed nitrate levels in groundwater exceed 7 mg/L, a level which is 70% of a maximum measurable level established in state law. ODEQ proposed in fall 2003 that a Groundwater Management Area (GWMA) be declared in the Southern Willamette Valley. The proposed area included much of the valley floor near the Willamette River between Albany and Eugene. The area was declared a Groundwater Management Area in May 2004.

Figure 21: Southern Willamette Valley Groundwater Studv – Well Locations

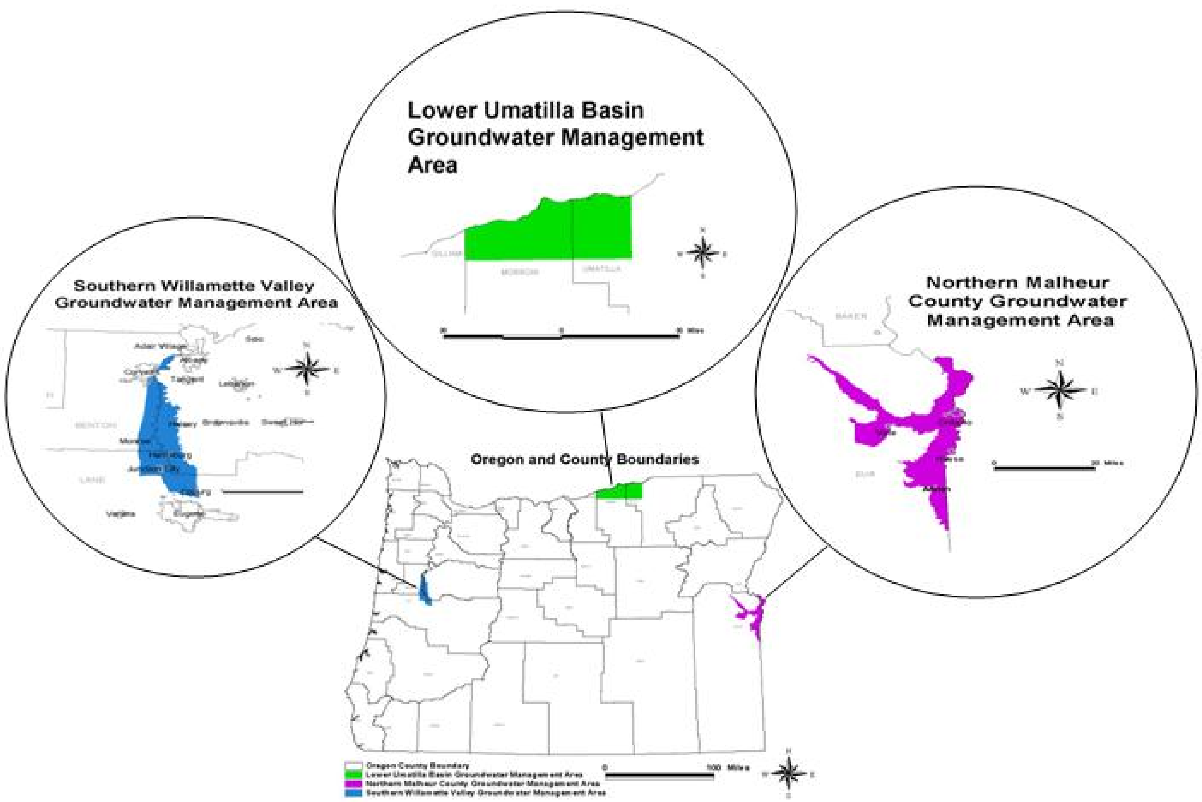


Groundwater Management Areas

In areas of Oregon where groundwater monitoring shows groundwater contamination at sufficiently high levels, and the contamination is potentially related to non-point source activities on the land surface, ODEQ can declare a groundwater management area (GWMA) under state law (ORS 468B.180). ODEQ then designates a lead agency responsible for developing an action plan to reduce existing contamination and prevent further groundwater contamination. The Oregon Department of Agriculture is responsible for developing the portion of the action plan to address farming practices. A groundwater management committee comprised of affected and interested parties is appointed by ODEQ. This committee works with state agencies to develop and implement an action plan to reduce groundwater contamination originating from point and non-point source activities in the GWMA.

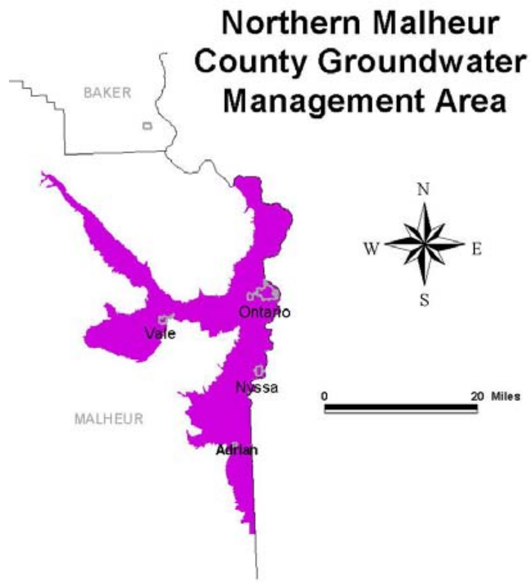
Oregon currently has three GWMAs (Figure 22) – the Northern Malheur County Groundwater Management Area and the Lower Umatilla Basin Groundwater Management Area, declared over a decade ago, and the Southern Willamette Valley Groundwater Management Area, declared in May 2004. ODEQ is currently assisting with implementation of the approved GWMA Action Plans in the Northern Malheur County and Lower Umatilla Basin. ODEQ samples groundwater quality monitoring networks, reviews data to assess groundwater quality trends, and supports local efforts to implement best management practices (BMPs) to maintain and restore groundwater quality. These efforts are described more fully in the following sections.

Figure 22: Groundwater Management Areas in Oregon



Northern Malheur County Groundwater Management Area

Figure 23: Northern Malheur County GWMA



The Northern Malheur County GWMA was declared in 1989 after ODEQ groundwater monitoring showed significant groundwater contamination in the northeastern portion of the county. Land use in the county is dominated by agriculture. Thirty-four percent of the sampled wells had nitrate levels above the drinking water standard of 10 mg/L. The presence of the pesticide Dacthal was an additional concern. Sampling confirmed that most of the contaminated groundwater is present in the shallow alluvial sand and gravel aquifer which receives a large proportion of its recharge from irrigation canal leakage and irrigation water.

The Northern Malheur County Action Plan, dated December 1991, includes recommendations that allow farmers to customize BMPs to their farm's needs. The state agencies and groundwater management committee chose to implement the Action Plan on a voluntary basis recognizing that individuals, businesses, organizations, and governments will, if given adequate information and encouragement, take positive actions and adopt or modify practices and activities to reduce contaminant loading to groundwater. The success of the action plan is gauged by both the adoption of BMPs and improvement of water quality within the GWMA.

The Natural Resources Conservation Service and Soil and Water Conservation District are working with farmers to develop water quality plans to address groundwater concerns. Alternative irrigation and fertilization management practices have been designed and recommended for the area. To date, approximately 261 water quality plans have been developed, accounting for more than 40% of the total acreage in the Northern Malheur County GWMA.

Currently, ODEQ samples a network of approximately 38 wells every other month and analyzes for nitrate and Dacthal and tests a more complete suite of analytes approximately once a year. In 2003, ODEQ finalized a formal trend analysis of nitrate and Dacthal data collected during the first 8.5 years of implementing the Action Plan. The analysis indicated that the area-wide groundwater nitrate trend was no longer increasing. Rather, the area trend was either flat or slightly decreasing. Individual wells showed a mix of increasing, decreasing, and flat nitrate trends across the area. The trend analysis also revealed an area-wide downward trend for Dacthal. Recommendations from the trend analysis include focusing additional attention on areas where groundwater quality is not improving as quickly as anticipated. Progress is being made at the land surface. However it may take years or even decades for groundwater quality to return to natural background levels. ODEQ and implementing partners concluded that sufficient progress has been made to continue the voluntary nature of the Action Plan.

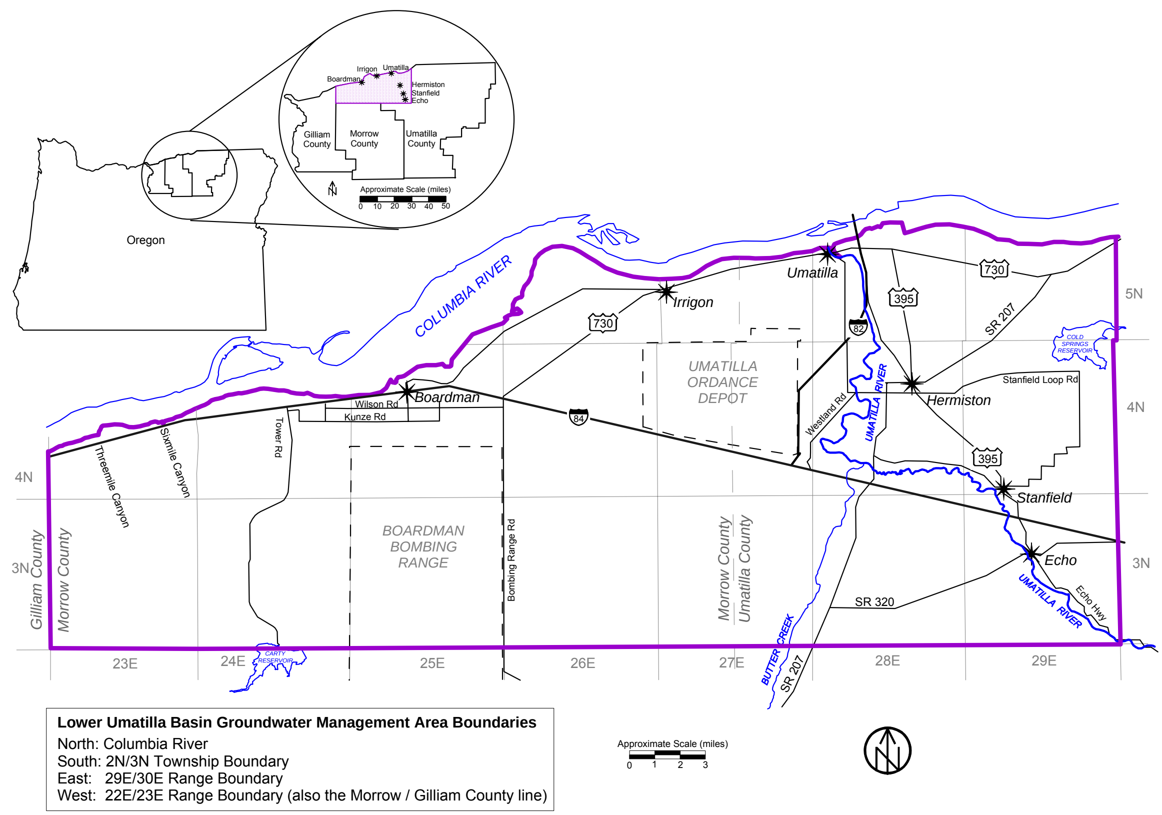
Lower Umatilla Basin Groundwater Management Area

The Lower Umatilla Basin Groundwater Management Area was declared in 1990 after ODEQ groundwater assessments identified nitrate contamination in groundwater in the northern portions of Umatilla and Morrow Counties (Figure 24). Thirty three percent of the groundwater samples from private wells in the area had nitrate contamination above the 10 mg/L drinking water standard. ODEQ worked together with the Oregon Water Resources Department and Oregon Health Division on a comprehensive study of the area in the early 1990s and identified five potential sources of nitrate loading to groundwater:

- Irrigated agriculture.
- Land application of food processing water.
- Septic systems (rural residential areas).
- Confined animal feeding operations.
- Washout lagoons at the Umatilla Chemical Depot.

Figure 24: Lower Umatilla Basin Groundwater Management Area

Location and Boundaries of Lower Umatilla Basin Groundwater Management Area



The Lower Umatilla Basin Action Plan was finalized in December 1997. This voluntary plan focuses on education and outreach, identifying and encouraging adoption of appropriate best management practices (BMPs), and making soil sampling and groundwater nitrate testing equipment and supplies available for local use. In addition, over 90% of the total acres in the Lower Umatilla Basin GWMA are covered by an irrigation water management plan. In November 2002, the "First Four-Year Evaluation of Action Plan Success and 2001 Annual Progress Report" was finalized. The report concluded that sufficient progress had been made to continue the voluntary nature of the Action Plan.

ODEQ samples a network of approximately 38 wells every other month to analyze for nitrate. Approximately once a year, these wells are sampled for a larger list of contaminants including major ions, metals, and pesticides. The data are being used to evaluate changes in groundwater quality over time in response to adoption of BMPs. Implementation of the Action Plan also includes ongoing community outreach and education efforts highlighting groundwater quality concerns and solutions.

ODEQ and EPA conducted an area-wide sampling of water wells in fall 2003 intended to reproduce a summer 1992 area-wide sampling event. As in 1992, the groundwater samples were analyzed for nitrate and other common ions. Additionally, analysis for perchlorate was done in the 2003 sampling event. Although a thorough data analysis has not yet been completed, an initial evaluation indicates that many wells show higher nitrate concentrations in 2003 compared to 1992. However, due to the inherent variability of groundwater nitrate concentrations (including seasonal fluctuations), it is inappropriate at this point to draw conclusions regarding long term nitrate trends from two groundwater data sets. The sampling results also showed low levels of perchlorate present in groundwater throughout the area. ODEQ is considering future follow up assessment activities to determine the potential perchlorate sources, assess the extent of contamination, and evaluate treatment options available to the affected well owners.

Southern Willamette Valley Groundwater Management Area

Oregon's most recent action to address area-wide groundwater contamination problems was to declare a Southern Willamette Valley Groundwater Management Area in May 2004. The declaration was based on groundwater quality monitoring information collected in 1993, 1994, 2000, 2001, and 2002. The data showed that nitrate levels in shallow groundwater in parts of the Southern Willamette Valley exceed 7 mg/L, a level which is 70% of the maximum measurable level defined in state law to trigger action. The sources for nitrate in groundwater are suspected to be at least in part due to nonpoint source activities such as densely clustered or failing septic systems; agricultural practices; agricultural, commercial, or residential application of fertilizer; or animal waste management practices. The geographic area included in the Southern Willamette Valley GWMA is shown in Figure 25.

In the coming months, ODEQ will designate a lead agency responsible for developing an action plan to reduce existing contamination and to prevent further contamination of the affected groundwater aquifer. The Oregon Department of Agriculture will be responsible for developing the portion of the action plan that addresses farming practices. ODEQ will also appoint a groundwater management committee to advise the state agencies while developing the action plan.

Figure 25: Southern Willamette Valley GWMA

Drinking Water Source Water Assessment Programs

The Federal Safe Drinking Water Act requires states to develop Source Water Assessments for public drinking water supply systems (surface water and groundwater sources). ODEQ and the Oregon Department of Human Services Drinking Water Program (ODHS) implement this program for Oregon. The assessment for each drinking water system includes a delineation of the groundwater and surface water source areas, evaluation of the sensitivity of the source area, and an inventory of the potential contamination sources in the area.

In Oregon, 2460 public water systems using groundwater sources will receive source water assessments by June 2005. ODHS conducts the well head delineations and sensitivity analyses for groundwater systems. ODEQ is responsible for surface water delineations and watershed sensitivity analyses. ODEQ and ODHS are conducting inventories of potential contamination sources in all the public water systems being assessed. As of March 2004, ODHS has completed 1642 of 2460 groundwater source delineations and sensitivity analyses; ODEQ and ODHS have conducted 1520 of 2460 contamination source inventories for groundwater systems. ODHS has completed 1350 source water assessments for groundwater-based public water systems in Oregon.

The source water assessments provide the basis for a community to voluntarily develop a plan to protect the source area that supplies their drinking water. The primary incentive for local communities to develop and implement drinking water protection is the benefit of a more secure source of high quality water. Other incentives may include a reduction in public water supply monitoring requirements and the reduced likelihood of costs for replacement and/or treatment of contaminated drinking water. ODEQ provides some direct technical assistance to communities as they determine how to protect their local public drinking water sources. The contaminant source inventories in the delineated wellhead protection areas provide useful information as the community evaluates the risks and develops a protection plan. Typical contaminant sources found in the inventories completed in the past year include high density housing, septic systems, auto repair shops, gas stations, irrigated crops, managed forest land, grazing animals, and transportation corridors.

Underground Injection Control Program

ODEQ is authorized by the Environmental Protection Agency to operate the Underground Injection control (UIC) program under the authority of the Safe Drinking Water Act. Injection systems are any system that dispose fluids below the subsurface encompassing a wide range of designs.

In Oregon, all groundwater has potential use as a drinking water source. The primary goal of the UIC program is to protect groundwater resources from disposal practices that release wastewater and stormwater that is injected directly into groundwater, above shallow aquifers or sensitive areas by regulating the design, citing, treatment and maintenance of UICs. Common types of UICs include:

- Stormwater systems such as sumps, infiltration galleries, drywells, soakage trenches, and drill holes.
- Large domestic on-site drain fields and cesspools serving 20 or more people or with a design capacity of 2,500 gallons per day.
- Industrial and commercial process or wastewater underground disposal systems (includes drain fields of any size).
- Cooling water return flows.
- Aquifer recharge and remediation.
- Geothermal heating systems.

ODEQ currently has an inventory of over 43,000 injection systems statewide and is ranked as the second largest inventory in the U.S. Stormwater disposal is the dominant use of injection systems in Oregon. The main pollutants of concern include heavy metals, toxic organics, volatile organic compounds (VOCs) nutrients, salts, petroleum products, pesticides and bacteria. Disposal of polluted fluids may potentially impact nearby surface waters and harm sensitive habitat areas. Injection discharges in or near contaminated sites can move the existing groundwater plume under adjacent lands and may have adverse economic impacts. In some cases, ODEQ may require monitoring when injection systems are used.

Owners and operators of existing and new injection systems are required to register their UICs to see if they qualify as rule authorized (in lieu of a permit). There is no fee for registration and rule authorization review. Some types of discharges are considered to be benign such as closed loop roof drains and geothermal systems. New systems must be registered and rule authorized prior to construction and use, as required by both state and federal law. Existing systems need to be registered and be evaluated for continued use and may qualify as rule authorized or be retrofitted for continued use.

If a system cannot qualify as rule authorized, the owner will need to either modify the system, hook up to a local stormwater sewer line if available, acquire a state permit at a regional office, or decommission the injection system. ODEQ rules require the consideration of the other eco-friendly disposal options, including surface infiltration, before an injection system can be allowed. Once a site is registered and qualifies as rule authorized, a letter is issued to the owner/operator as well as the local jurisdiction. Assignment of a UIC number does not mean that the site qualifies as rule authorized.

Several types of injection systems are prohibited: motor vehicle drains, agricultural drains, large cesspools, or any system directly discharging into the high seasonal water table. Common pitfalls to rule authorization of storm water injection include: mixing of discharges; failure to minimize runoff or use other alternatives; use of injection systems at commercial/industrial loading docks; installation too close to a drinking water source (municipal or private); location in a known contaminated or sensitive site (e.g. landslide); failure to maintain, pre-treat, or have spill prevention; or failure to submit a storm water management plan.

Once the site is entered into the database and reviewed, ODEQ staff will contact the owner or consultant by phone if the registration data is found to be incomplete or if the site as proposed does not qualify as rule authorized. In general, UICs need to be registered 60 to 90 days in advance to allow for changes in the design that may be needed to meet UIC design and sitting requirements. Additional data may be requested. Processing is variable depending upon the time of year and adequacy of the data submitted. If the requested data is not received after several reminder calls, the site is registered only, and not authorized for use and is noted in the UIC database.

The owner/operator may be asked to close or acquire a state permit from the regional office. Currently, in some regions, there is a backlog of permits so it may be an extended time before ODEQ can issue a permit. State permits are generally required for process or wastewater disposal (e.g. car wash), large municipal owners, and users of toxic/hazardous materials.

ODEQ requires owners/operators to file a closure form prior to decommissioning an injection system. Owners must vacuum any liquid, sludge, and sediment from catch basins, sumps or drill holes. The vacuumed material should be characterized in some cases to be sure it is not hazardous or toxic. The materials must also be disposed of properly. Storm water injection systems are, in general, either closed by excavation or filled with concrete, bentonite grout or controlled density fill to stop all fluid movement. Decommissioning reports must be filed with ODEQ and signed by an Oregon licensed Professional Engineer, Registered Geologist or Certified Engineering Geologist prior to decommissioning. ODEQ may request additional data or will send a letter authorizing the proposed closure. The ODEQ UIC database is available on the internet for public use and is used to compile quarterly and annual EPA reports. Owners of large numbers of UICs, such as municipalities can acquire a blank copy of the database for their own use to facilitate registration and subsequent management. Information about the Oregon UIC program is available on the UIC web page at: www.deq.state.or.us/wq/groundwa/uichome.htm

On-Site Program

More than one million Oregonians, or about 35 percent of the state's population, use on-site sewage systems, also known as septic systems. Most of these are single-family homes in rural areas without access to community sewer systems.

ODEQ manages the on-site sewage treatment and disposal program statewide, and provides direct service for on-site system permitting and installation in 14 counties around the state. These include Clatsop, Coos, Douglas, Josephine, Baker, Grant, Gilliam, Harney, Lake, Morrow, Umatilla, Union, Wallowa, and Wheeler counties. ODEQ issues between 3,000 and 5,000 new permits annually in direct-service counties.

The 22 remaining Oregon counties manage the program through local governments under contract with ODEQ. People seeking a siting variance in any of Oregon's counties must apply through ODEQ.

Specific activities done by ODEQ in direct service counties include:

- Evaluate proposed building sites to identify what kind of on-site sewage system is suitable for the soils, the risk of groundwater contamination, and whether there is enough land area to support a new and replacement system.
- Issue permits to construct septic systems.
- Inspect new systems to ensure that they are correctly installed and will function properly.
- Work with property owners to repair failing systems.
- Respond to citizen complaints about raw sewage or failed septic systems.

ODEQ also directly administers a statewide program regulating septic system installation and pumping businesses. This work includes:

- Licensing companies which pump out septic tanks.
- Licensing companies that install septic systems.

ODEQ also administers the on-site program statewide. Major work areas include:

- Setting standards for system siting, system construction, and on-site sewage products (i.e. septic tanks and drainfields).
- Providing oversight for counties implementing the on-site program.
- Providing training for county agents.

ODEQ is currently working on rule revisions which will allow alternative treatment technologies (ATT) such as aerobic treatment units and packed bed filters to enter the state. Home owners purchasing these systems will be required to maintain operation and maintenance contracts with certified service providers and submit annual reports. System installers will be required to become certified, and their bonding amount will increased along with septic pumpers. The proposed rules also add a requirement for time of sale inspection of ATTs.