



Introduction

The Middle Willamette 8-Digit Hydrologic Unit Code (HUC) subbasin is comprised of 454,500 acres. The subbasin spans parts of Yamhill, Clackamas, Marion, and Polk Counties. Ninety-six percent of the watershed is under private ownership. Forty-four percent of the subbasin is used for grass seed and as pastureland and hayland, twenty-three percent is forested, and the remaining acreage is used for a variety of row and grain crops and as nurseries, orchards, and vineyards. The subbasin has 44 permitted CAFOs. Some resource concerns associated with many of the land uses include soil erosion, poor soil condition, and contaminated surface water, especially associated with CAFO waste management. Social concerns include urban/rural conflicts and inadequate technical and financial assistance.

There are 3,615 farms and 5,816 farmers in the subbasin. More than 70 percent of the farms are less than 50 acres in size. Most operators are new to agriculture and resource management and thus require significant technical assistance and incentives to adopt conservation practices.

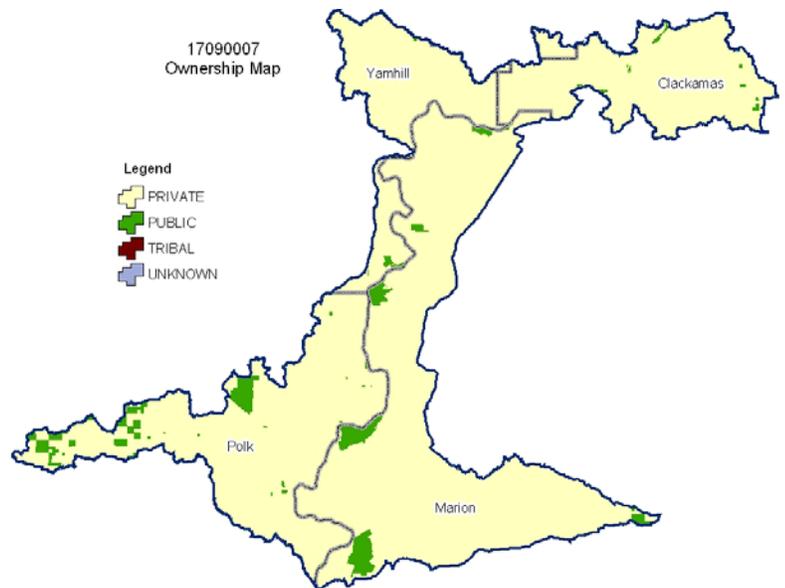
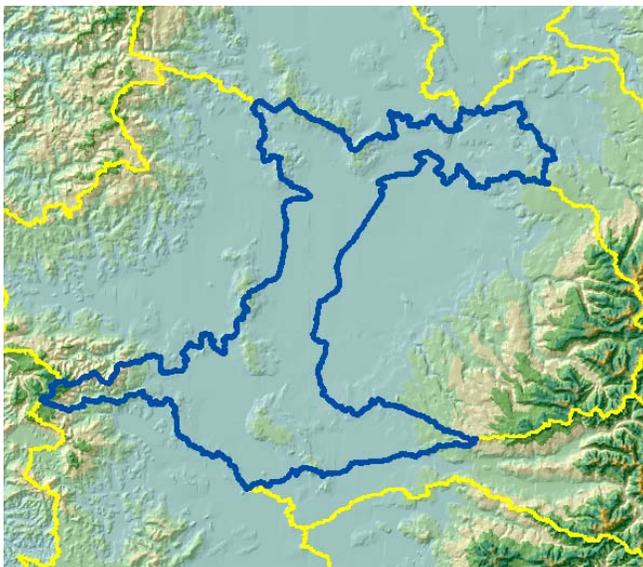
Conservation assistance is provided by four NRCS service centers, four soil and water conservation districts, one resource conservation and development (RC&D) office, and other local conservation organizations.

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Relief Map



Physical Description

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Land Cover/Land Use (NLCD ²)	Ownership - (2003 Draft BLM Surface Map Set ¹)							
	Public		Private		Tribal		Totals	%
	Acres	%	Acres	%	Acres	%		
Forest	7,200	2%	96,200	21%	0	0%	103,400	23%
Grain Crops	*	---	23,500	5%	0	0%	23,700	5%
Conservation Reserve Program Land ^a	*	---	*	---	0	0%	*	---
Grass/Pasture/Hay	6,400	1%	195,400	43%	0	0%	201,800	44%
Orchards/Vineyards/Berries	*	---	24,200	5%	0	0%	24,400	5%
Row Crops	*	---	44,000	10%	0	0%	44,800	10%
Shrub/Rangelands	*	---	*	---	0	0%	*	---
Water/Wetlands/Developed/Barren	*	---	51,400	11%	0	0%	53,000	12%
Oregon HUC Totals ^b	16,500	4%	438,000	96%	0	0%	454,500	100%

*: Less than one percent of total acres. See below for special considerations.

a: Estimate from Farm Service Agency records and includes CRP/CREP.

b: Totals are approximate due to rounding and small unknown acreages.

Special Considerations for this 8-Digit HUC:

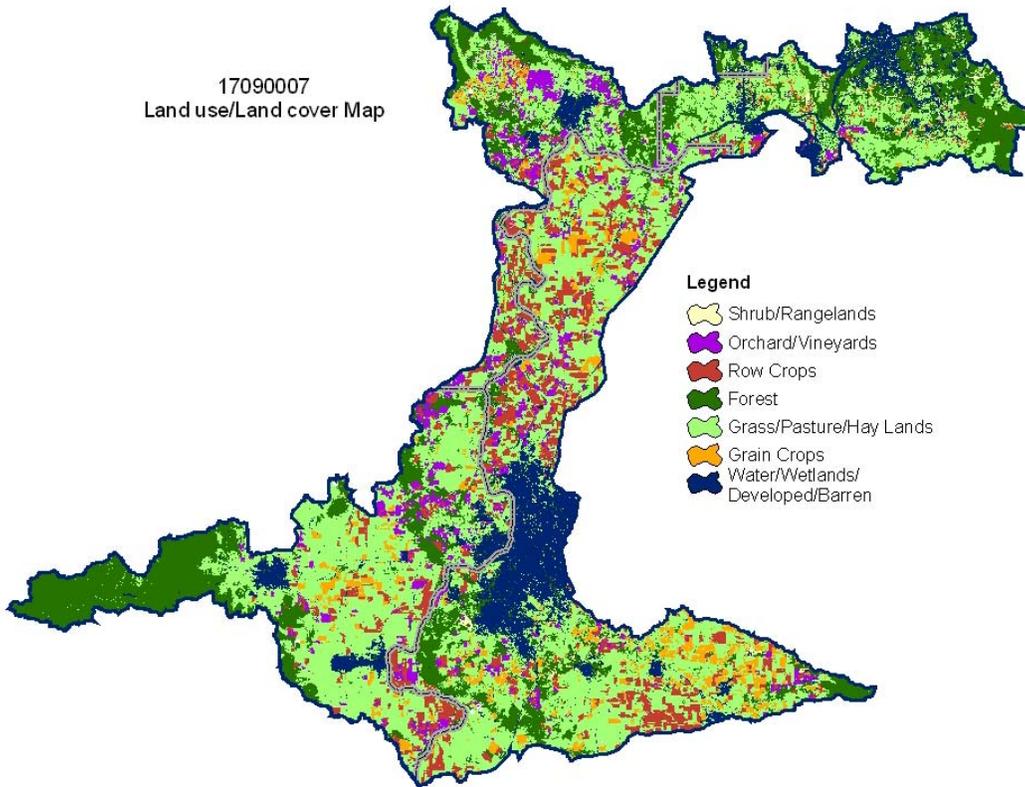
- Twenty percent of private forest is under industrial forest ownership (OSU, Forestry Sciences Laboratory).
- Grain commonly is grown in rotation with grass seed and other crops.
- Orchards/Vineyards/Berries includes other perennial crops (Pacific Northwest Ecosystem Research Consortium):
 - ~ Orchards/Vineyards/Berries - 19,700 acres
 - ~ Hops and mint - 300 acres
 - ~ Nursery stock - 3,000 acres
 - ~ Christmas trees - 6,800 acres
- Grass/Pasture/Hay includes approximately (Pacific Northwest Ecosystem Research Consortium):
 - ~ 42,800 acres of grass seed
 - ~ 58,700 acres of pasture
 - ~ 29,300 acres of hay
- Pasture includes commercial dairy and beef operations as well as small farms and ranches.
- Row crops primarily consist of corn, beans, and cole crops grown for cannery processing or fresh market.
- Urban land occupies 38,500 acres.

Irrigated Lands (1997 NRI ³ Estimates for Non-Federal Lands Only)	Type of Land	ACRES	% of Irrigated Lands	% of HUC
	Cultivated Cropland	97,800	84%	22%
	Uncultivated Cropland	14,400	12%	3%
	Pastureland	3,700	3%	<1%
	Total Irrigated Lands	115,900	100%	26%

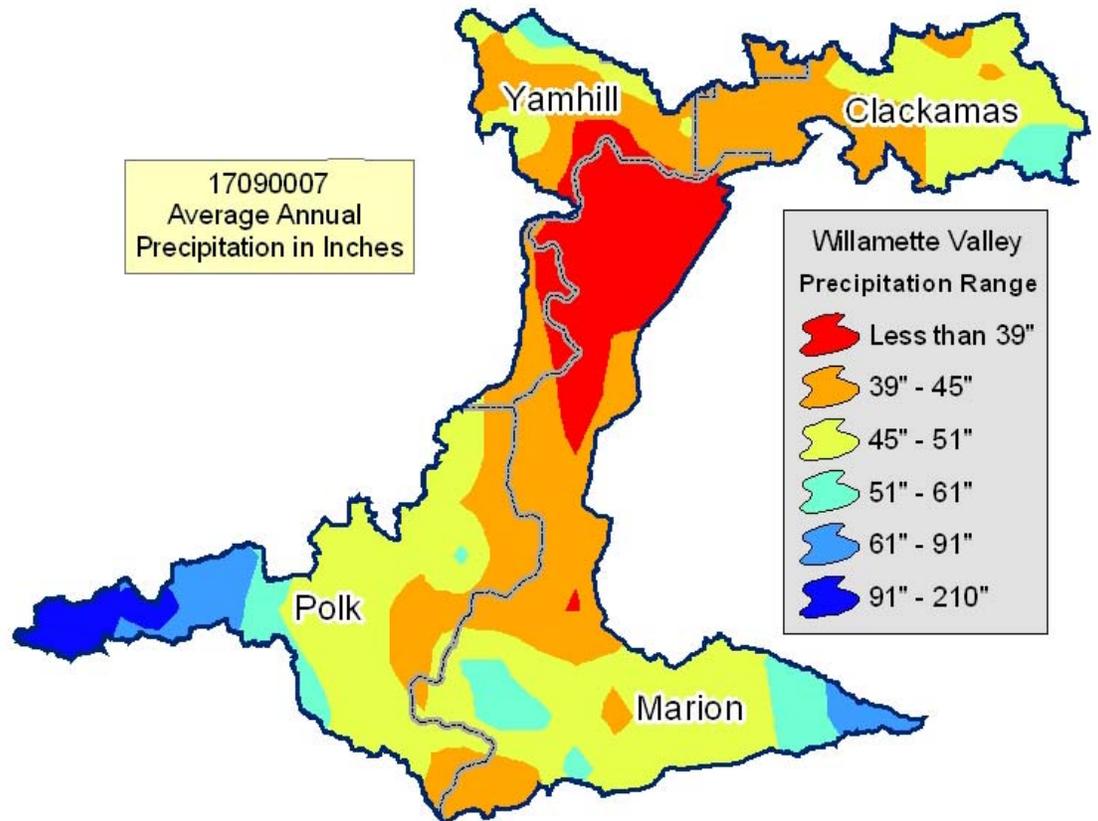
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17090007
Land use/Land cover Map



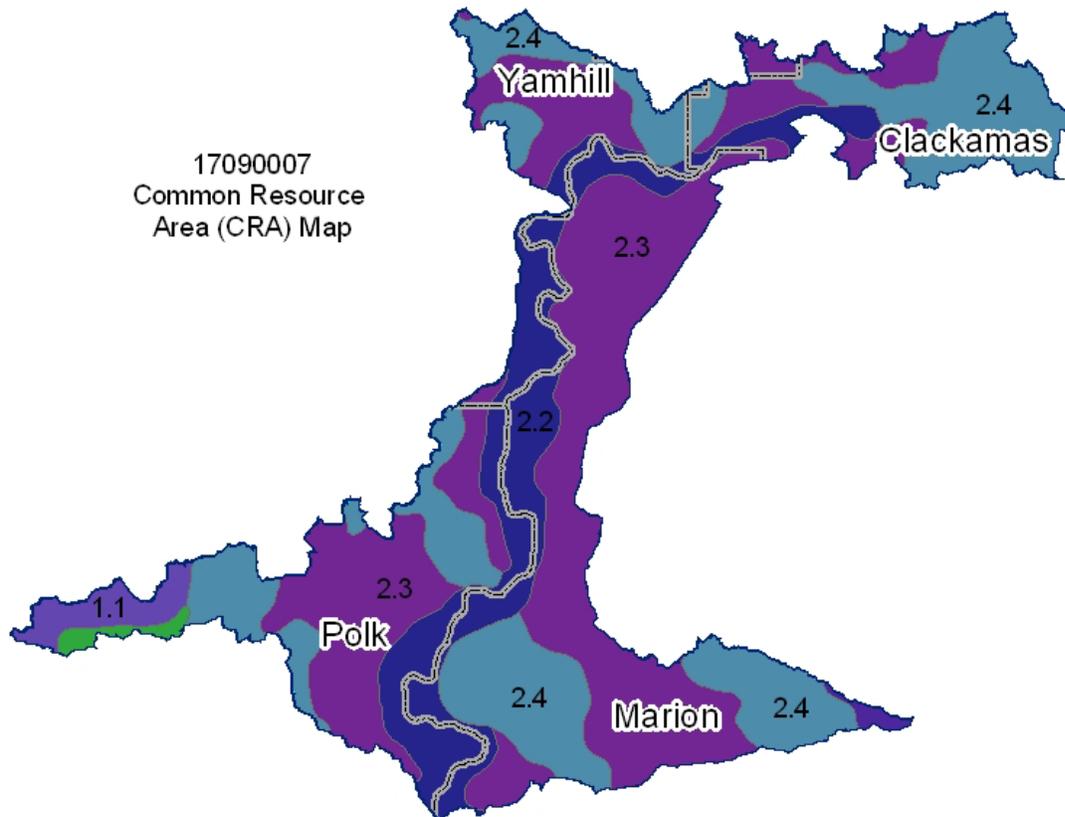
17090007
Average Annual
Precipitation in Inches



Common Resource Area Map

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Only the major units are described below - for descriptions of all units within the HUC, go to: <http://ice.or.nrcs.usda.gov/website/cra/viewer.htm>



1.1 - Northern Pacific Coast Range, Foothills, and Valleys – Volcanics: This unit is comprised of mountains that consist of basalt and are outside of the “fogbelt.” The temperature regime is dominantly mesic or frigid with a small area that is cryic, and the moisture regime is udic. The vegetation is dominantly Douglas fir and western hemlock.

2.2 - Willamette and Puget Valleys - Willamette River Flood Plains and Tributaries: This unit is comprised of the flood plain of the Willamette River and its major tributaries. It supports historic riparian areas and intensive row crops. The temperature regime is mesic, and the moisture regime is xeric.

2.3 – Willamette and Puget Valleys - Prairie Terraces: This unit is comprised of the terraces of the Willamette Valley. The soils range from well drained to poorly drained. Land use is variable. The temperature regime is mesic, and the moisture regime is xeric. It includes numerous ponded seasonal wetlands.

2.4 - Willamette and Puget Valleys - Valley Foothills: This unit is comprised of the foothills of the Willamette Valley. The soils are underlain by basalt and sedimentary rock and are typically red and clayey. The vegetation is dominantly Douglas fir and Oregon white oak. The temperature regime is mesic, and the moisture regime is xeric. The unit does not support western hemlock, although western hemlock is characteristic of the adjacent units in the Coast and Cascade MLRAs.

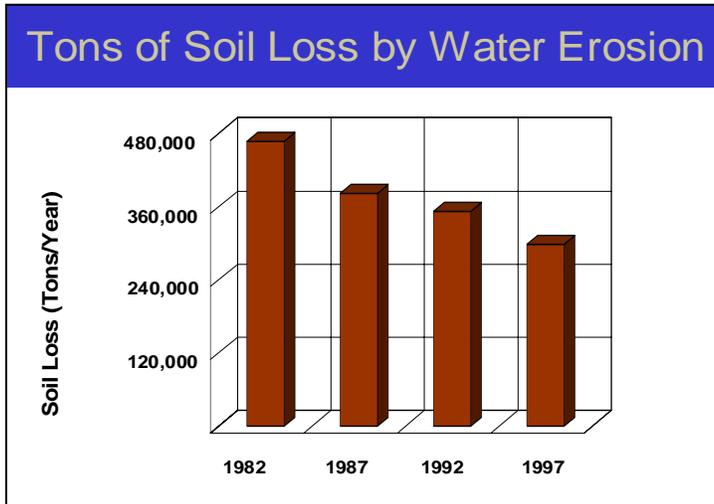
Physical Description – Continued

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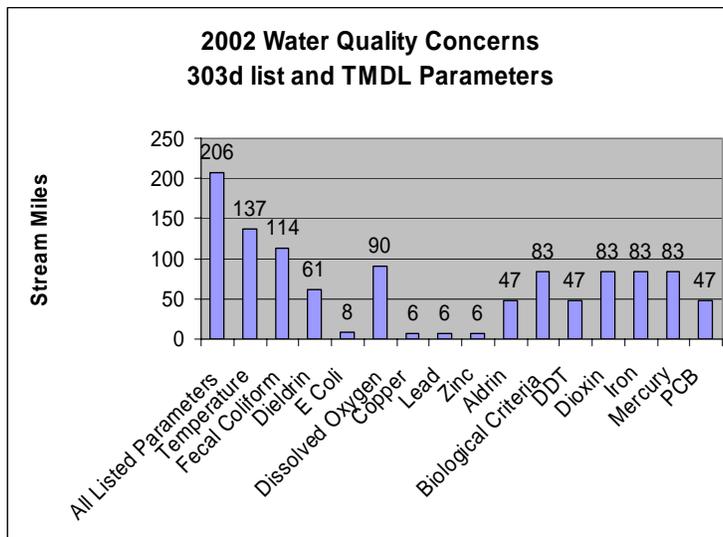
		ACRES	ACRE-FEET			
Irrigated Adjudicated Water Rights (OWRD ⁴)	Surface	63,199	160,780			
	Well	69,329	176,377			
	Total Irrigated Adjudicated Water Rights	132,528	337,157			
Stream Flow Data	USGS 14198000 WILLAMETTE RIVER AT WILSONVILLE, OR	Total Avg. Yield	20,612,602			
		May – Sept. Yield	3,700,957			
		MILES	PERCENT			
Stream Data ⁵ <i>*Percent of Total Miles of Streams in HUC</i>	Total Miles – Major (100K Hydro GIS Layer)	635	--			
	303d/TMDL Listed Streams (DEQ)	206	32%			
	Anadromous Fish Presence (StreamNet)	66	10%			
	Bull Trout Presence (StreamNet)	0	0%			
		ACRES	PERCENT			
Land Cover/Use ² Based on a 100-foot stretch on both sides of all streams in the 100K Hydro GIS Layer	Forest	6,554	27%			
	Grain Crops	763	3%			
	Grass/Pasture/Hay	10,513	44%			
	Orchards/Vineyards	821	3%			
	Row Crops	1,447	6%			
	Shrub/Rangelands – Includes CRP Lands	207	<1%			
	Water/Wetlands/Developed/Barren	3,701	15%			
	Total Acres of 100-foot Stream Buffers	24,006	--			
Land Capability Class <i>(Croplands & Pasturelands Only)</i> <i>(1997 NRI³ Estimates for Non-Federal Lands Only)</i>	1 – slight limitations	6,400	2%			
	2 – moderate limitations	147,700	56%			
	3 – severe limitations	71,800	27%			
	4 – very severe limitations	28,700	11%			
	5 – no erosion hazard, but other limitations	0	0%			
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	9,400	4%			
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife	0	0%			
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%			
	Total Croplands & Pasturelands	264,000	--			
Confined Animal Feeding Operations – Oregon CAFO Permit – 12/2004						
Animal Type	Dairy	Feedlot	Poultry	Swine	Mink	Other
No. of Permitted Farms	30	3	8	3	0	0
No. of Permitted Animals	40,165	1,300	1,766,000	2,025	0	0

Resource Concerns

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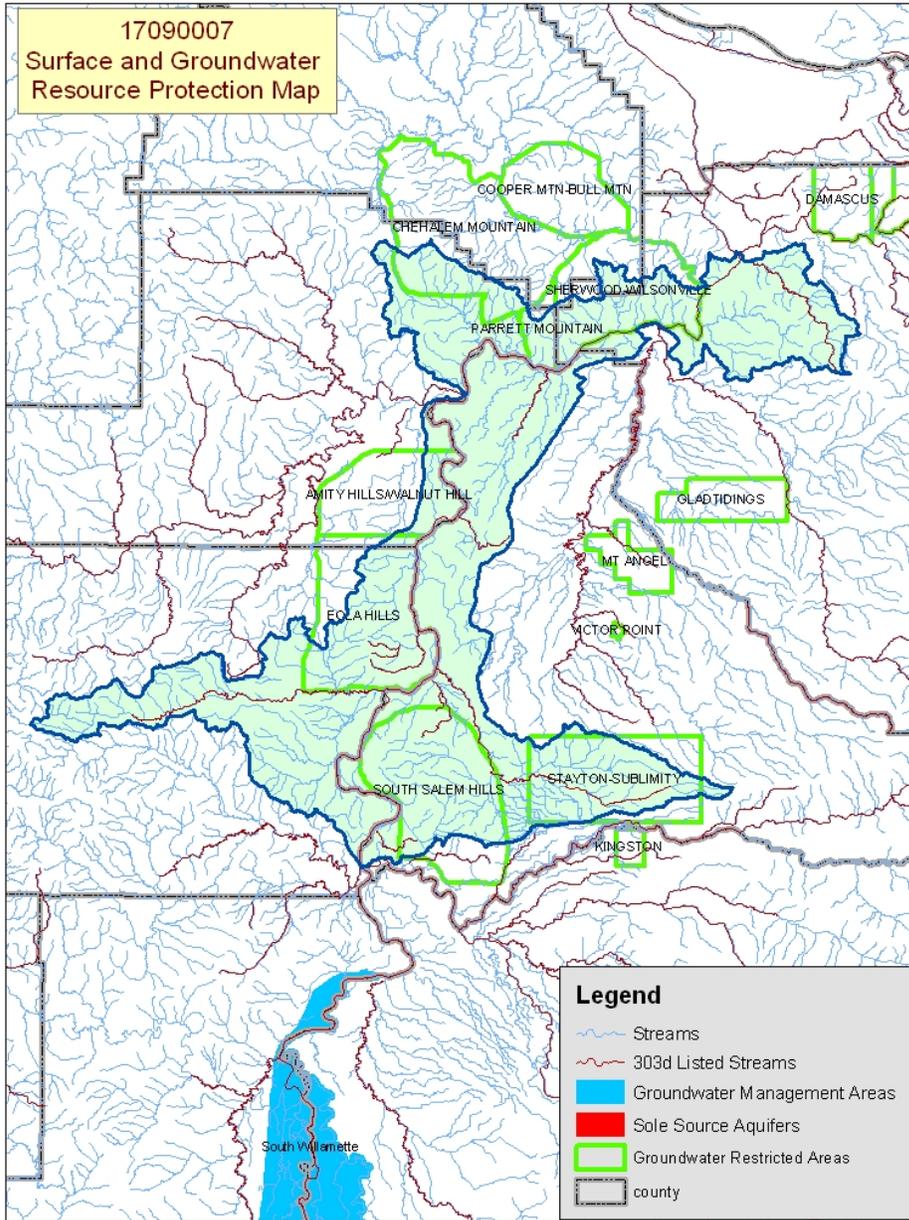
- ❖ Sheet and rill erosion by water on the croplands and pasturelands have been reduced by nearly 170,000 tons of soil per year from 1982 to 1997.
- ❖ NRI estimates indicate that 17,000 acres of the agricultural lands still had water erosion rates above a sustainable level in 1997.
- ❖ Controlling erosion not only sustains the long-term productivity of the land, but it also affects the amount of soil, pesticides, fertilizer, and other substances that move into the Nation's waters.
- ❖ Through NRCS programs, many farmers and ranchers have applied conservation practices to reduce the effects of erosion by water. As a result, erosion rates on the croplands and pasturelands fell 30 percent, from 1.6 tons/acre/year to 1.1 tons/acre/year, from 1982 to 1997.



- ❖ More than 66 percent of the listed stream miles exceed State water quality standards for temperature. Elevated stream temperatures may be due to inadequate riparian shade, stream channel widening, and other anthropogenic or natural causes.
- ❖ Fecal coliform and E Coli can be an indication of livestock waste runoff, but they also are typical results of poorly functioning onsite sewage disposal systems.
- ❖ Much of the pollution from heavy metals and chemicals is related more to industrial land use than to agriculture.
- ❖ Conservation practices that can be used to address these water quality issues include grazing management and use of riparian buffers.

Watershed Projects, Plans, Studies, and Assessments			
NRCS Watershed Projects ⁶		NRCS Watershed Plans, Studies, and Assessments ⁷	
Name	Status	Name	Status
None		Beaver Creek	Installed – 1961
ODEQ TMDL's ⁸		ODA Agricultural Water Quality Management Plans ⁹	
Name	Status	Name	Status
Columbia & Willamette Rivers	Completed	Middle Willamette	Completed
Rickreall Creek	Completed		
Willamette Basin	Draft for Review		
OWEB Watershed Council ¹⁰	Watershed Council Assessments ¹¹		NWPCC Subbasin Plans and Assessments ¹⁸
Salem-Keizer, Claggett Creek, Glenn-Gibson Creek, Pringle Creek, and Rickreall Watershed Councils	Chehalem Watershed Assessment; Luckiamute River/Ash Creek/American Bottom Watershed Assessment; Pringle, Glenn-Gibson, Claggett, and Mill Creeks Watershed Assessment; and Rickreall Watershed Assessment		Willamette Subbasin Plan

(Continued on page 8)



Map Footnote [417](#)

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES ¹²	
THREATENED SPECIES	CANDIDATE SPECIES
Mammals - Canada lynx Birds - Bald eagle, Northern spotted owl Fish - Chum salmon, Steelhead, Chinook salmon, Bull trout Invertebrates - Fender's blue butterfly Plants - Golden paintbrush, Willamette daisy, Howellia, Bradshaw's lomatium, Kincaid's lupine, Nelson's checker-mallow	Birds - Yellow-billed cuckoo, Streaked horned lark Amphibians and Reptiles - Oregon spotted frog Fish - Coho salmon Invertebrates - Taylor's checkerspot
ESSENTIAL FISH HABITAT¹³ - Chinook	PROPOSED SPECIES None

Resource Concerns - Continued

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Resource Concerns/Issues by Land Use							
SWAPA +H Concerns	Specific Resource Concern/Issue	Pasture\Hay	Grass Seed	Grain Crops	Row Crops	Perennial Crops (Orch/Vine/ Berries)	Forest
		Soil Erosion	Sheet & Rill		X	X	X
	Concentrated Flow or Gully		X				X
	Streambank						X
	Irrigation Induced				X		
Soil Condition	Tilth, Crusting, Infiltration, and Organic Matter		X	X	X		
	Soil Compaction	X		X	X	X	
Soil Contamination	Excess Animal Wastes & Other Organic Nutrients	X					
Water Quantity	Water Management For Irrigated Land				X	X	
Water Quality, Surface	Pesticides		X	X	X	X	
	Nutrients & Organics	X			X	X	
	Suspended Sediments & Turbidity		X	X	X	X	X
	Low Dissolved Oxygen				X	X	
	Temperature	X	X	X	X	X	X
	Pathogens	X					
Air Quality	Aquatic Habitat Suitability		X	X	X	X	
Plant Condition	Smoke Particulates Causing Safety/Health Problems		X			X	
Animal Habitat, Domestic	Productivity, Health, & Vigor	X					
	Management	X					
Human, Economics	Land Use Constraints/Restrictions	X	X	X	X	X	X
	High Risk & Uncertainty		X		X	X	
	High Capital/Financial Costs	X		X	X	X	
	High Labor Costs or Availability				X	X	
	High Management Level Required				X	X	
	Low or Unreliable Profitability	X	X				X
Human, Political	Inadequate Availability of Cost Share Programs	X	X	X	X	X	X
	Lack of Technical Assistance	X	X	X	X	X	X
	High Degree of Controversy	X	X	X	X	X	X

Pasture/Hay

- Forage and grazing management issues common on pastureland of small farms and ranches.
- Proper waste management is needed for CAFOs to avoid water and soil contamination associated with nutrients and pathogens, especially near the livestock headquarters.

Grass Seed

- Grass seed is commonly produced under contract. Pest management and erosion control are primary concerns during years when the crop is being established.
- Smoke from burning stubble after harvest sometimes results in health and safety issues.

Grain, Row, and Perennial Crops

- Residue, nutrient, and pest management and use of filter strips and buffers are necessary to control erosion and maintain water quality. Irrigation water management is an issue for irrigated crops in groundwater restricted areas.
- The economic risk of adopting integrated pest management in lieu of use of chemicals on high-value orchards and vineyards is a concern.

Forestland

- On non-industrial forestland, the objectives of landowners commonly do not include actively managing the land for timber production.

General

- Land use constraints and pressure to develop hinders investment in conservation. Viable production agriculture in the watershed is diminishing.
- Increasing land values and conflicting urban/rural land uses have resulted in serious social, political, and economic concerns for resource management in the watershed.

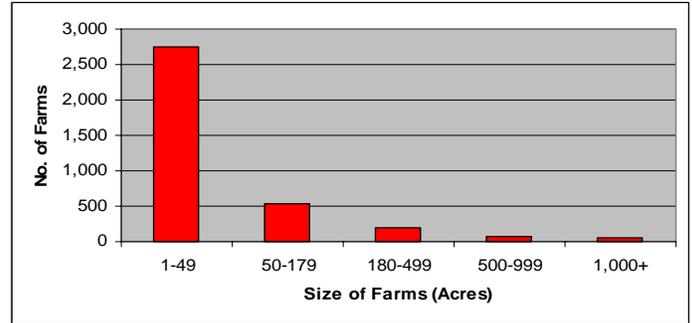
Census and Social Data^{/14}

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Number of Farms: 3,615

Number of Operators: 5,816

- Full-Time Operators: **1,158**
- Part-Time Operators: **4,658**



Estimated Level of Willingness and Ability to Participate in Conservation^{/15}: **Low to High**

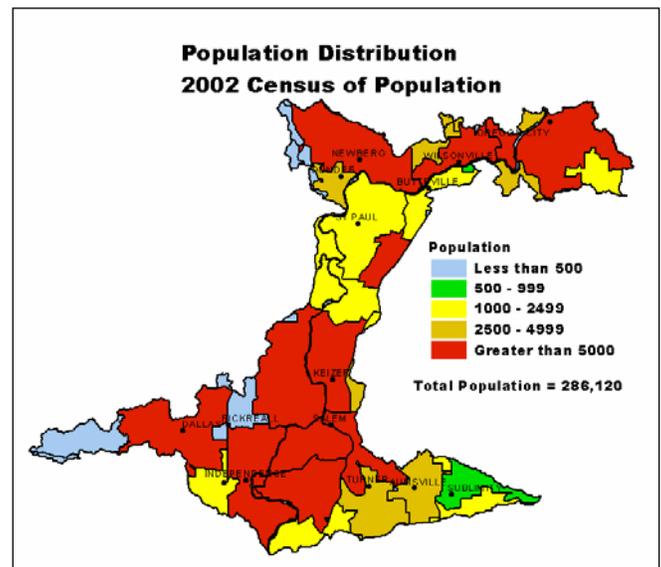
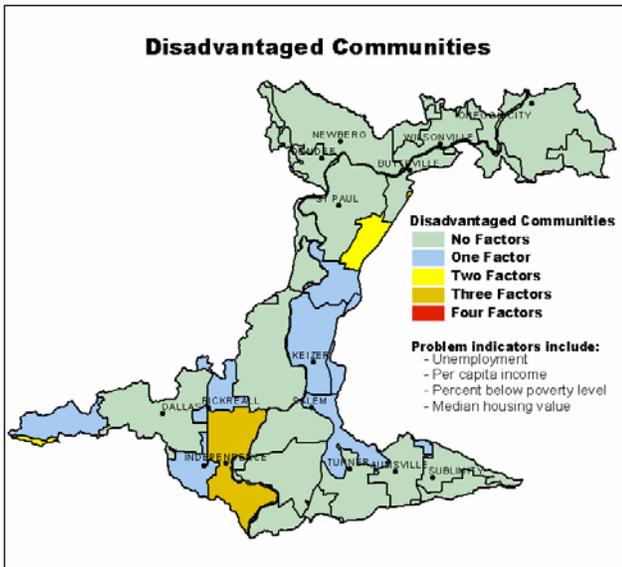
Operators of large, viable agricultural operations in the Middle Willamette subbasin are inclined to adopt conservation systems if they perceive them to be in the best interest of their operation and that of agriculture throughout the subbasin. These operators are reasonably aware of local resource concerns and the connection between the management of their operation and local resource issues. These farmers and ranchers are able to fit most recommended conservation practices into their current farming systems; however, technical and financial assistance as well as one-on-one discussions about the benefits of conservation to their operation are needed before they can be persuaded to adopt new conservation practices.

Landowners of the nearly 2,750 farms and ranches that are smaller than 50 acres in size are not inclined to adopt conservation practices. Many of these operators are new to agriculture and resource management and are unaware of the connection between their operation and local natural resource concerns. A concerted effort by the local conservation partnership is necessary to increase the diffusion of conservation among these landowners.

Evaluation of Social Capital^{/16} **Moderate**

Social capital is estimated to be moderate in the Middle Willamette subbasin. The community's greatest strength appears to be a moderately high level of participation in civic organizations. Residents in the subbasin tend to be well educated, financially stable, and connected to various media sources. Community projects tend to be completed.

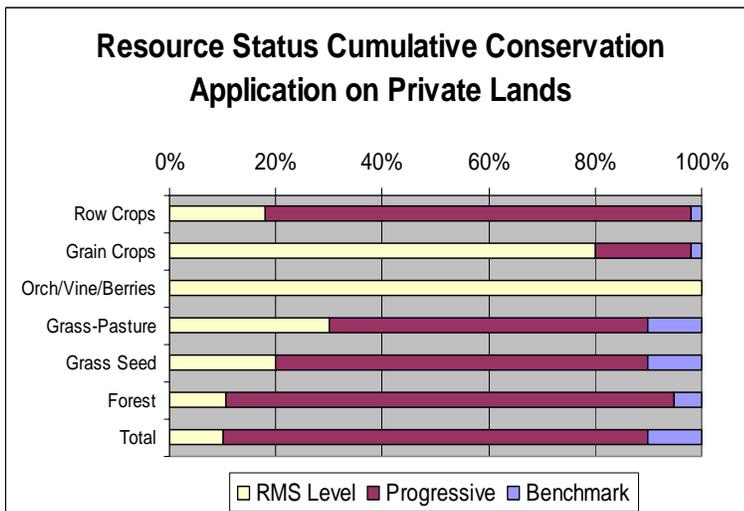
The community might benefit from increased participation in agricultural and natural resource organizations and in local discussions and decisions, particularly by minority groups.



Progress/Status

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PRMS Data	FY99	FY00	FY01	FY02	FY03	Avg/Year	Total
Total Conservation Systems Planned (Acres)	1,086	869	2,356	759	2,010	1,416	7,062
Total Conservation Systems Applied (Acres)	90	46	454	807	660	411	2,057
Conservation Treatment Acres							
Waste Management (Number)	1	2	2	1	1	1	7
Buffers (Acres)	0	52	57	58	81	50	248
Erosion Control (Acres)	0	0	790	553	850	439	2,193
Irrigation Water Management (Acres)	0	0	0	323	550	175	873
Nutrient Management (Acres)	0	0	3	737	1,121	372	1,861
Pest Management (Acres)	0	515	108	989	856	494	977
Prescribed Grazing (Acres)	0	0	38	0	137	35	175
Trees & Shrubs (Acres)	1	46	103	334	20	101	504
Conservation Tillage (Acres)	0	128	0	174	75	75	377
Wildlife Habitat (Acres)	368	587	1,150	888	825	764	3,818
Wetlands (Acres)	0	92	140	131	71	87	434



Estimates are based on information received from local conservationists in the watershed.

- ❖ Progress over the last 5 years has been focused on:
 - ~ Nutrient and pest management on CAFOs and cropland.
 - ~ Erosion control on cropland.
 - ~ Wildlife habitat management in riparian and wetland areas.
- ❖ Farmers of row crops (e.g. corn, beans, and cole crops) commonly rely on crop consultants.
- ❖ Grain producers typically have not worked with NRCS but have adopted a high level of management.
- ❖ Most farmers who grow perennial crops operate at a high level.
- ❖ Much of the pasture that is at the benchmark level is on small farms.
- ❖ Much of the forestland is associated with riparian areas and oak savannahs and is not managed for forage or timber.

Lands Removed from Production through Farm Bill Programs

- ❖ Conservation Reserve Program (CRP): **495 acres**
- ❖ Wetland Restoration Program (WRP): **705 acres**
- ❖ Conservation Reserve Enhancement Program (CREP): **13 acres**

Footnotes/Bibliography

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All data is provided "as is." There are no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for general planning purposes only.

1. Ownership Layer – Source: The 1:24,000 scale public ownership layer is the land ownership/management for public entities, including Federal, Tribal, State, and local entities. This is a seamless, statewide Oregon Public Ownership vector layer composed of fee ownership of lands by Federal, State, Tribal, county, and city agencies. The layer is comprised of the best available data compiled at 1:24,000 scale or larger, and the line work matches GCDB boundary locations and ORMAP standards where possible. The layer is available from the State of Oregon GIS Service Center: <http://www.gis.state.or.us/data/alphalist.html>. For current ownership status, consult official records at appropriate Federal, State, and county offices. Ownership classes grouped to calculate Federal ownership vs. non-Federal ownership by the Water Resources Planning Team.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Oregon Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA; Online linkage: <http://edcwww.cr.usgs.gov/programs/lccp/nationallandcover.html>; Abstract: These data can be used in a geographic information system (GIS) for any number of purposes, such as assessing wildlife habitat, water quality, pesticide runoff, land use change, etc. The State data sets are provided with a 300-meter buffer beyond the State border to facilitate combining the State files into larger regions.
3. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
4. Irrigated Adjudicated Water Rights – Water Rights Information System (WRIS), Oregon Water Resources Department, <http://www.wrd.state.or.us/maps/wlexport.shtml>
5. StreamNet is a cooperative venture of the Pacific Northwest's fish and wildlife agencies and tribes and is administered by the [Pacific States Marine Fisheries Commission](#). StreamNet provided data and data services in support of the region's fish and wildlife program and other efforts to manage and restore the region's aquatic resources. Official StreamNet website: <http://www.streamnet.org/>
6. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>.
7. Natural Resources Conservation Service, Watershed Plans, Studies, and Assessments completed, http://www.nrcs.usda.gov/programs/watershed/Surveys_Plng.html#Watershed%20Surveys%20and%20Plan
8. Oregon Department of Environmental Quality Total Maximum Daily Loads, <http://www.deq.state.or.us/wq/TMDLs/TMDLs.htm>
9. Oregon Department of Agriculture, Agricultural Water Quality Management Plans, http://www.oregon.gov/ODA/NRD/water_agplans.shtml

Footnotes/Bibliography Continued

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10. Oregon Watershed Enhancement Board, <http://oregon.gov/OWEB/WSHEDS/index.shtml>
11. Watershed Assessments completed by local watershed councils following the Oregon Watershed Assessment Manual, http://oregon.gov/OWEB/docs/pubs/ws_assess_manual.shtml.
12. NRCS Field Office Technical Guide, Section II, Threatened and Endangered List.
13. Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265. As amended through October 11, 1996.
14. Data were taken from the 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Data were also taken from the U.S. Population Census, 2000.
15. Conservation participation was estimated using NRCS Social Sciences Technical Note 1801, [Guide for Estimating Participation in Conservation](#), 2004. Four categories of indicators were evaluated: Personal characteristics, farm structural characteristics, perceptions of conservation, and community context. Estimates are based on information received from local conservationists in the watershed.
16. Social capital is an indicator of the community's ability and willingness to work together to solve problems. A high amount of social capital helps a community to be physically healthy, socially progressive, and economically vigorous. A low amount of social capital typically results in community conflict, lack of trust and respect, and unsuccessful attempts to solve problems. The evaluation is based on NRCS Technical Report Release 4.1, March, 2002: [Adding Up Social Capital: An Investment in Communities](#). Local conservationists provided information to measure social capital. Scores range from 0 to 76.
17. [Surface and Groundwater Resource Protection Map](#)
 - a. 2002 303d Listed Streams designated by Oregon Department of Environmental Quality and approved by the Environmental Protection Agency, Section 303d Clean Water Act, <http://www.deq.state.or.us/wq/303dlist/303dpage.htm>
 - b. Groundwater Management Areas designated by the Oregon Department of Environmental Quality, Oregon Revised Statutes – Ground Water ORS 468B.150 to ORS 468B.190, <http://www.deq.state.or.us/wq/groundwa/wqgw.htm>
 - c. Groundwater Restricted Areas designated by Oregon Water Resources Commission, Oregon Department of Water Resources, http://egov.oregon.gov/OWRD/PUBS/aquabook_protections.shtml
 - d. The Sole Source Aquifer (SSA) Protection Program is authorized by Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq), <http://www.epa.gov/safewater/ssanp.html>
18. Subbasin assessments and plans are developed by local groups (SWCDs, watershed councils, tribes, and others) as part of the Northwest Power and Conservation Council's fish and wildlife program in the Columbia River Basin. This program is funded and implemented by the Bonneville Power Administration. <http://www.nwcouncil.org/fw/subbasinplanning/Default.htm>.