

Clackamas – 17090011

8-Digit Hydrologic Unit Profile

SWCD	Acres
Clackamas	539,653
Marion	62,022
Wasco	543
Jefferson	12



Introduction

The Clackamas 8-Digit Hydrologic Unit Code (HUC) subbasin is comprised of 602,000 acres, most of which is in Clackamas County. Eighty-seven percent of the subbasin is forestland. Eight percent is grass/hay/pasture, which includes two permitted dairies and one poultry operation. Other areas are used for row crops, orchards, vineyards, Christmas trees, nursery stock, and various berries and nuts. Resource concerns associated with these land uses include streambank erosion, sheet and rill erosion, surface water contamination, invasion of noxious weeds, and increasing land use restrictions and public controversy.

There are 1,531 farms in the subbasin and 2,495 operators. More than 80 percent of the operations are relatively small, commonly less than 50 acres in size. Most operators are well educated and view conservation favorably. Adoption of conservation systems can be expected to increase significantly in the subbasin if they can become more cost effective and easier to implement.

Conservation assistance is provided by one NRCS service center, the Clackamas County Soil and Water Conservation District, one resource conservation and development (RC&D) office, and other local conservation organizations.

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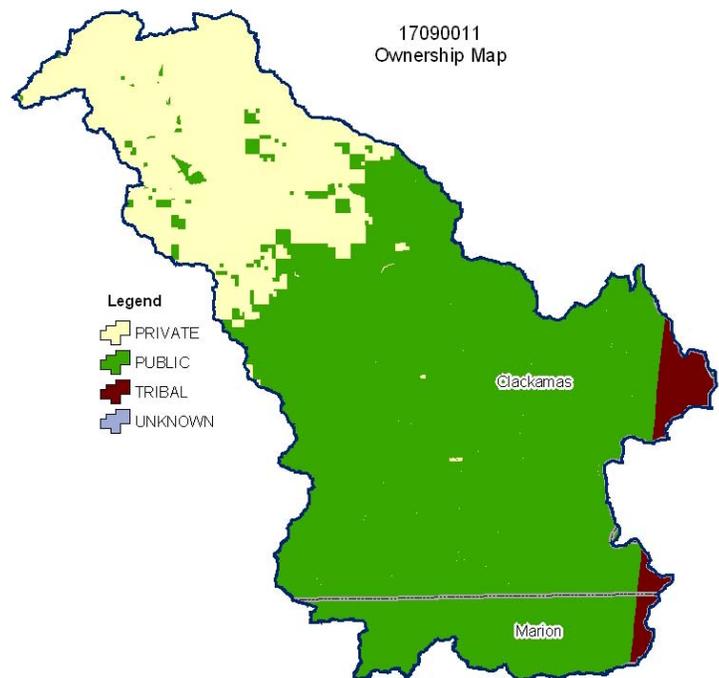
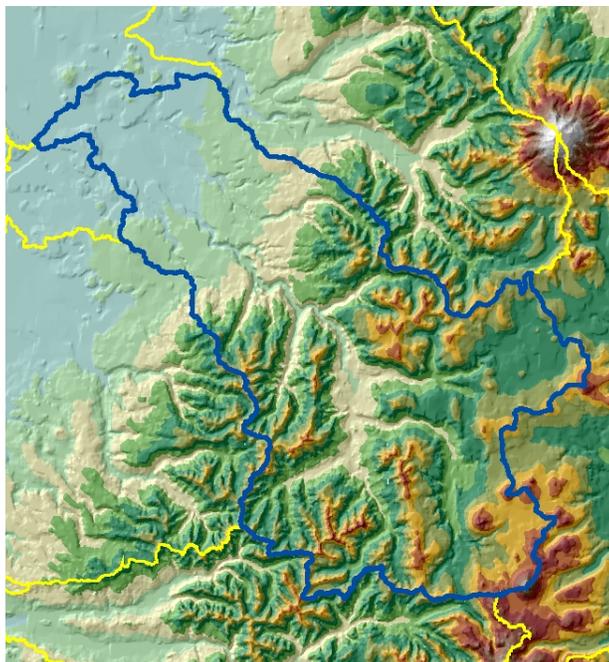
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Relief Map



Physical Description

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ALL NUMBERS IN THIS PROFILE ARE FOR OREGON ONLY

Land Cover/Land Use (NLCD ²)	Ownership - (2003 Draft BLM Surface Map Set ¹)							Totals	%
	Public		Private		Tribal				
	Acres	%	Acres	%	Acres	%			
Forest	416,00	69%	93,100	15%	16,200	3%	525,300	87%	
Grain Crops	*	---	*	---	0	0%	*	---	
Conservation Reserve Program Land ^a	0	0%	0	0%	0	0%	0	0%	
Grass/Pasture/Hay	6,600	1%	38,800	6%	*	---	45,500	8%	
Orchards/Vineyards	*	---	*	---	0	0%	*	---	
Row Crops	*	---	7,900	1%	0	0%	7,900	1%	
Shrub/Rangelands	*	---	*	---	*	---	6,700	1%	
Water/Wetlands/Developed/Barren	*	---	10,200	2%	*	---	13,500	2%	
Oregon HUC Totals ^b	429,900	71%	155,100	26%	16,800	3%	601,800	100%	

*: Less than 1 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:

- About 25 percent of private forest is under industrial forest ownership (OSU, Forestry Sciences Laboratory).
- Grain is commonly grown in rotation with grass seed and other crops.
- Orchards/Vineyards/Berries includes other perennial crops, such as nursery stock and Christmas trees. (Pacific Northwest Ecosystem Research Consortium)
 - ~ Orchard/Vineyards - 1,200 acres
 - ~ Nursery stock - 800 acres
 - ~ Christmas trees - 3,800 acres
 - ~
- Grass/Pasture/Hay includes approximately:
 - ~ 500 acres of grass seed (Pacific Northwest Ecosystem Research Consortium)
 - ~ 16,700 acres of pasture (Pacific Northwest Ecosystem Research Consortium)
 - ~ 5,200 acres of hay (Pacific Northwest Ecosystem Research Consortium)
 - ~
- Pasture includes commercial dairy and beef operations as well as small farms and ranches.
- Some vegetables crops are grown for fresh produce.
- Urban land use makes up 37,500 acres.

Irrigated Lands (1997 NRI ³ Estimates for Non-Federal Lands Only)	Type of Land	ACRES	% of Irrigated Lands	% of HUC
	Cultivated Cropland	5,300	52%	1%
Uncultivated Cropland	3,000	29%	<1%	
Pastureland	1,900	19%	<1%	
Total Irrigated Lands	10,200	100%	2%	

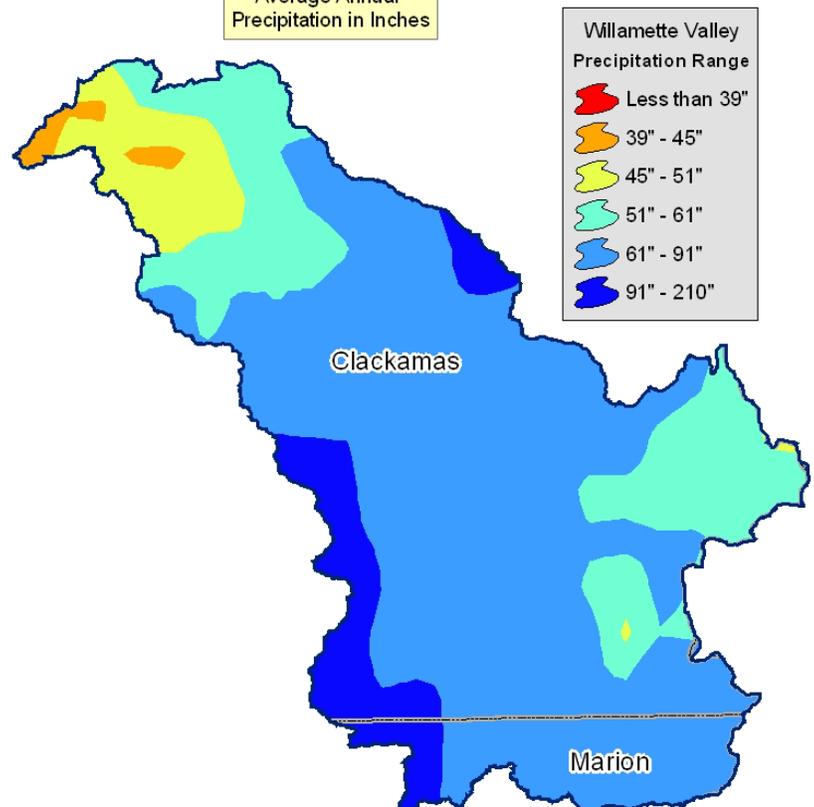
(Continued on the following pages)

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17090011
Land use/Land cover Map



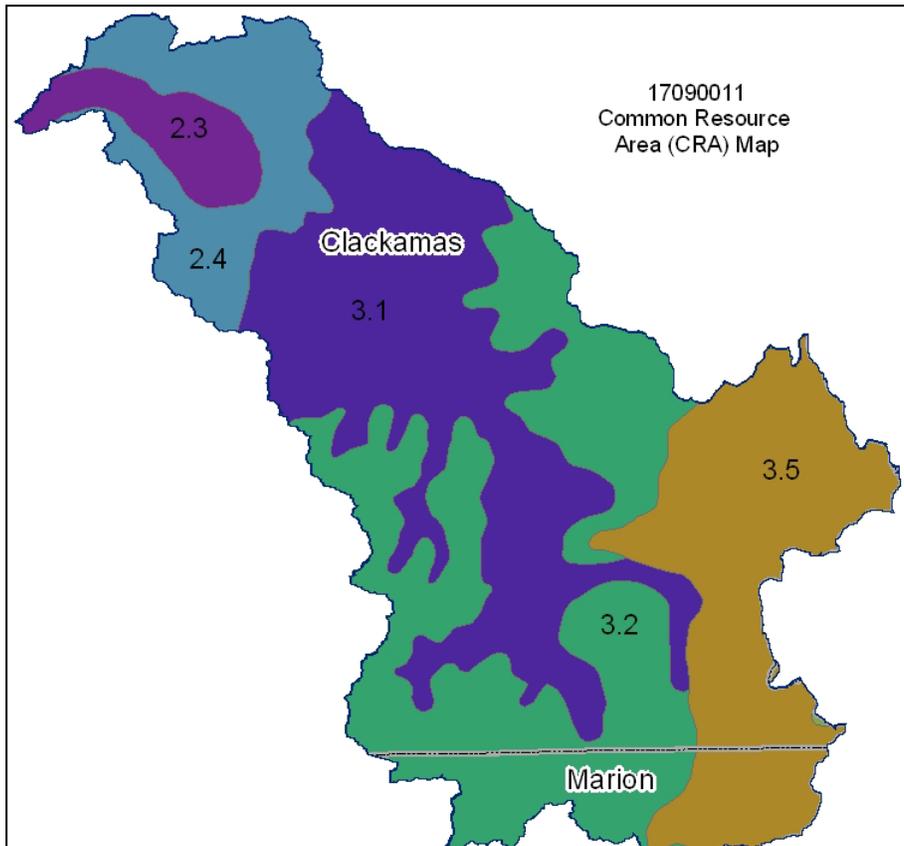
17090011
Average Annual
Precipitation in Inches



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>



2.3 – Willamette and Puget Valleys - Prairie Terraces:

This unit is comprised of the terraces in the Willamette Valley. The soils are well drained to poorly drained. Land use is variable. The temperature regime is mesic, and the moisture regime is xeric. There are 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 Douglas fir and Oregon white oak. The temperature regime is mesic, and the moisture regime is xeric. The unit does not support western hemlock, which is characteristic of the adjacent units in the Coast and Cascade MLRA's.

3.1 - Olympic and Cascade Mountains - Western Cascades Lowlands and Valleys: This unit comprises the lower elevations of the Cascade Mountains, adjacent to the Valley Foothills unit (2.4). The soils are underlain by basalt, andesite, and rhyolite. The vegetation is Douglas fir and western hemlock. The unit is one of the most important timber-producing areas in the Northwest. The temperature regime is mesic, and the moisture regime is udic.

3.2 - Olympic and Cascade Mountains - Western Cascades Montane Highlands: This unit comprises the middle to high elevations of the Cascades. The vegetation is Douglas fir, western hemlock, mountain hemlock, Pacific silver fir, and noble fir. Elevation is typically more than about 3,000 feet. The mountains are highly dissected and have steep slopes. The temperature regime is frigid and "warm" cryic, and the moisture regime is udic. The unit normally has a deep annual snowpack.

3.5 - Olympic and Cascade Mountains - Northern Cascade Crest Montane Forest: This unit consists of an undulating plateau punctuated by volcanic buttes and cones that reach a maximum elevation of about 6,500 feet. The unit is extensively forested with mountain hemlock and Pacific silver fir. The temperature regime is cryic, and the moisture regime is udic. Although this unit has the same moisture and temperature regime as unit 3.3, this unit is noticeably moister and the break between units 3.3 and 3.5 is transitional.

Physical Description – Continued

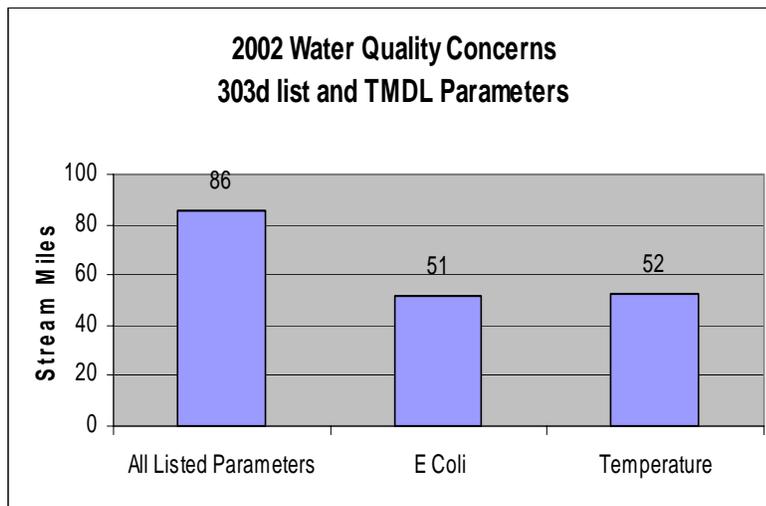
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		ACRES	ACRE-FEET			
Irrigated Adjudicated Water Rights (OWRD ⁴)	Surface	5,935	15,126			
	Well	3,594	9,160			
	Total Irrigated Adjudicated Water Rights	9,529	24,286			
Stream Flow Data	USGS 14210000 CLACKAMAS RIVER AT ESTACADA, OR	Total Avg. Yield	1,987,248			
		May – Sept. Yield	547,349			
		MILES	PERCENT			
Stream Data ⁵ <i>*Percent of Total Miles of Streams in HUC</i>	Total Miles – Major (100K Hydro GIS Layer)	978	---			
	303d/TMDL Listed Streams (DEQ)	86	9%			
	Anadromous Fish Presence (StreamNet)	86	9%			
	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	24,827	89%			
	Grain Crops	48	0%			
	Grass/Pasture/Hay	1,559	6%			
	Orchards/Vineyards	33	0%			
	Row Crops	236	1%			
	Shrub/Rangelands – Includes CRP Lands	258	1%			
	Water/Wetlands/Developed/Barren	930	3%			
	Total Acres of 100-foot Stream Buffers	27,892	---			
Land Capability Class <i>(Croplands & Pasturelands Only)</i> <i>(1997 NRI³ Estimates for Non-Federal Lands Only)</i>	1 – slight limitations	0	0%			
	2 – moderate limitations	13,900	46%			
	3 – severe limitations	15,800	52%			
	4 – very severe limitations	800	3%			
	5 – no erosion hazard, but other limitations	0	0%			
	6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest	0	0%			
	7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat	0	0%			
	8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply	0	0%			
	Total Croplands & Pasturelands	30,500	---			
Confined Animal Feeding Operations – Oregon CAFO Permit – 12/2004						
Animal Type	Dairy	Feedlot	Poultry	Swine	Mink	Other
No. of Permitted Farms	2	0	1	0	0	0
No. of Permitted Animals	1,435	0	75,000	0	0	0

Resource Concerns

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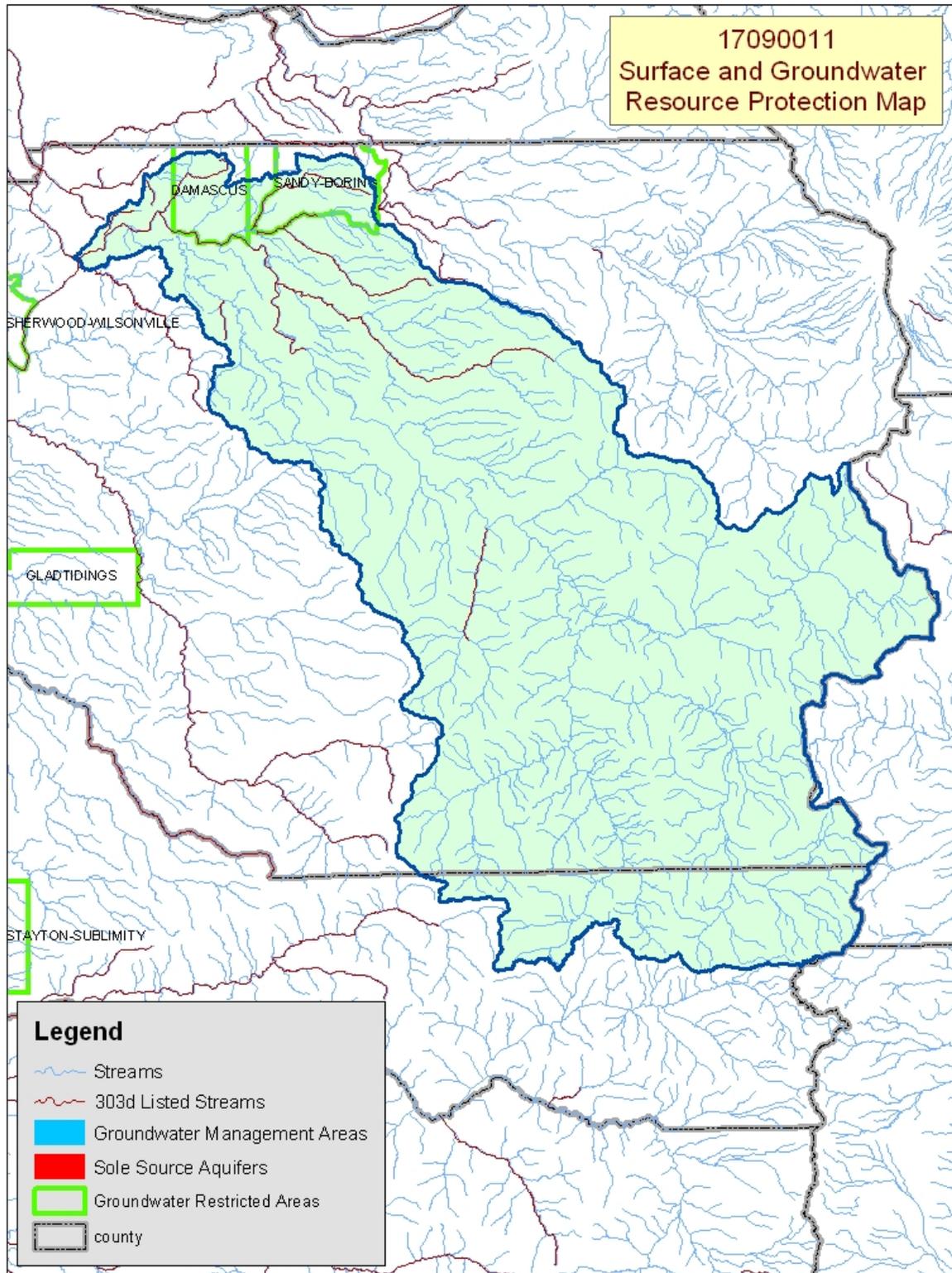
Tons of Soil Loss by Water Erosion: Due to the limited amount of non-Federal cropland and pastureland within this HUC, no reliable NRI soil loss estimates are available.



- ❖ Over 60 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.
- ❖ E coli can be an indication of livestock waste runoff, but it also is typical of poorly functioning onsite sewage disposal systems and urban runoff.
- ❖ 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		None	
ODEQ TMDL's ⁸		ODA Agricultural Water Quality Management Plans ⁹	
Name	Status	Name	Status
Willamette Basin	Draft for Review	Clackamas	Completed
OWEB Watershed Council ¹⁰	Watershed Council Assessments ¹¹		NWPCC Subbasin Plans and Assessments ¹⁸
Clackamas River Basin Council	Clear and Foster Creek Watershed Assessments, Rock and Richardson Creek Watershed Assessments		Willamette Subbasin Plan

(Continued on page 8)



Map Footnote [417](#)

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 (Xmas/Nursery/ Berries)	Shrub/Range	Forest
		Soil Erosion	Sheet & Rill		X	X	X
Concentrated Flow or Gully				X	X		
Streambank	X						X
Soil Mass Movement							X
Soil Contamination	Excess Fertilizers & Pesticides			X			
Water Quality, Surface	Pesticides		X	X	X		
	Nutrients & Organics	X	X				
	Suspended Sediments & Turbidity			X	X		
Plant Condition	Productivity, Health, & Vigor	X					X
Human, Economics	Land Use Constraints/Restrictions	X	X	X	X		X
	High Labor Costs or Availability			X	X		
	High Management Level Required	X					
Human, Political	High Degree of Controversy			X			X

Pasture/Hay

- Forage and grazing management commonly are issues on pastureland on small farms and ranches.
- Proper waste management is needed for livestock operations to maintain water quality and avoid soil contamination associated with nutrients and pathogens, especially around the livestock headquarters.

Grain, Grass Seed, Row & Perennial Crops

- Management of residue, nutrients, and pests and use of filter strips and buffers are needed to control erosion and maintain water quality. Irrigation water management is an issue for irrigated crops in groundwater restricted areas.
- Grass seed is commonly produced under contract and in rotation with grain. Pest management and erosion control are primary concerns during the years when the crop is being established.
- Smoke from burning stubble after harvesting sometimes creates issues for health and safety.
- Adopting integrated pest management in lieu of use of chemicals on high-valued orchards and vineyards is an economic risk.

Forest

- On non-industrial forestland, landowner objectives are commonly concerned with aesthetic value, not timber production.

General

- Pressure to develop hinders conservation efforts. The long-term future for agriculture in the watershed is uncertain.
- High land values and conflict between agriculture and urban/suburban land uses increase cost and social issues for farming.

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, Oregon chub 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
	PROPOSED SPECIES – None
ESSENTIAL FISH HABITAT¹³ - Chinook	

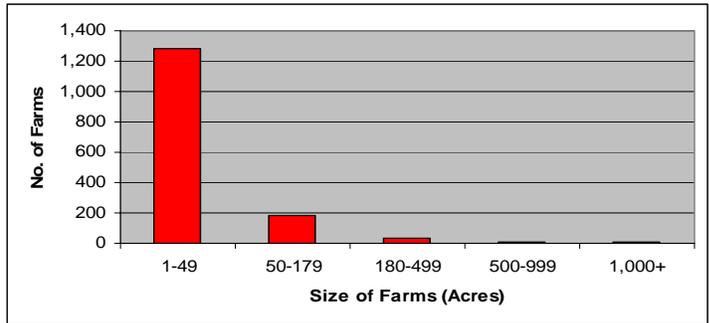
Census and Social Data^{/14}

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Number of Farms: 1,531

Number of Operators: 2,495

- Full-Time Operators: **457**
- Part-Time Operators: **2,038**



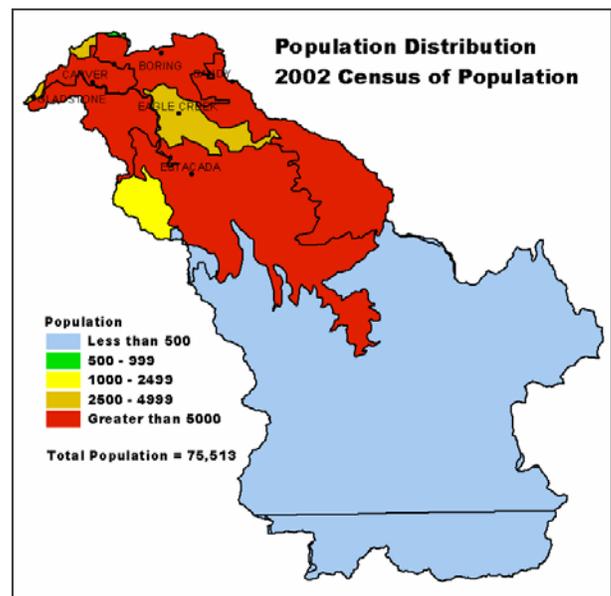
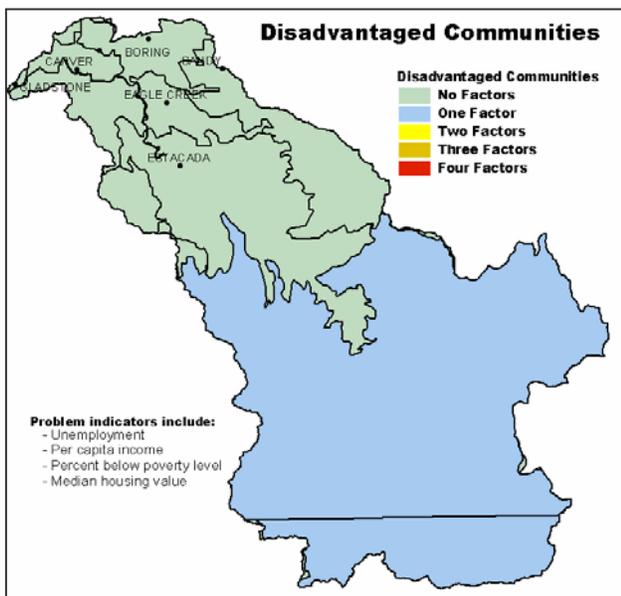
Estimated Level of Willingness and Ability to Participate in Conservation^{/15}: **Moderate to High**

Large acreage, commercial operators are generally aware of local resource concerns and have the ability to adopt conservation systems into their current operations. Small acreage operators tend to lack resource management experience, but they perceive a positive effect of conservation systems on local resource concerns.

Most operators in the subbasin do not have conservation plans; however, the majority are well educated and have a favorable stewardship attitude. This might indicate that with appropriate technical assistance and incentives it might be possible to significantly increase conservation in the subbasin.

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

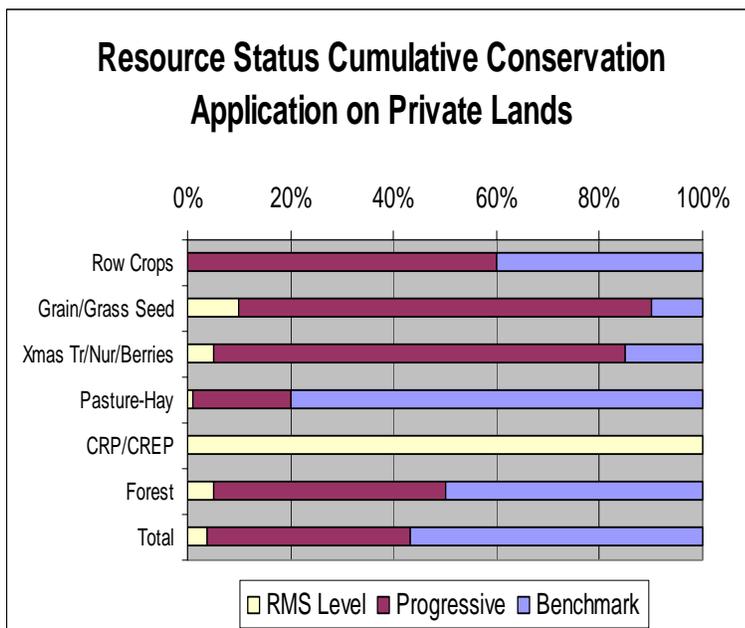
Social capital in the Clackamas subbasin and the ability of the communities to successfully address local resource concerns is adequate. The communities have had modest success in completing community projects. The greatest social capital comes from the communitywide participation in issues residents deem important, such as education and safety. Conversely, if the communities consider natural resource management unimportant then participation in promoting conservation can be expected to be nonexistent. The Clackamas subbasin would benefit from increasing communitywide awareness of resource concerns and getting communitywide involvement in the diffusion of conservation throughout the subbasin.



Progress/Status

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PRMS Data	FY99	FY00	FY01	FY02	FY03	Avg/Year	Total
Total Conservation Systems Planned (Acres)	214	340	147	42	22	153	765
Total Conservation Systems Applied (Acres)	0	39	102	189	0	66	330
Conservation Treatment Acres							
Waste Management (Number)	0	0	0	1	0	0	1
Buffers (Acres)	0	15	0	40	4	12	59
Erosion Control (Acres)	0	0	0	0	0	0	0
Irrigation Water Management (Acres)	0	0	0	0	0	0	0
Nutrient Management (Acres)	0	0	0	1	96	19	96
Pest Management (Acres)	0	0	3	4	0	1	7
Prescribed Grazing (Acres)	0	0	58	0	0	12	58
Trees & Shrubs (Acres)	0	1	3	46	3	11	53
Conservation Tillage (Acres)	0	0	5	9	0	3	14
Wildlife Habitat (Acres)	23	3	85	44	0	31	155
Wetlands (Acres)	0	0	0	4	0	1	4



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

- ❖ Progress over the last 5 years has been focused on:
 - ~ Nutrient management on CAFOs and cropland.
 - ~ Wildlife habitat management in riparian and wetland areas.
- ❖ Farmers growing row crops (e.g. cole, corn, and beans) for fresh produce typically do not seek USDA assistance.
- ❖ Grain producers may not work with NRCS, but they have adopted a high level of management.
- ❖ Most farmers that grow perennial crops generally operate at a high level.
- ❖ Much of the pasture that is at the benchmark level is on small farms.
- ❖ Private industrial forestland owners typically do not work with NRCS and SWCDs; however, their land commonly complies with State forest practice requirements.
- ❖ Much of the private non-industrial forestland is associated with riparian areas and oak savannahs that are not managed for forage or timber production.

Lands Removed from Production through Farm Bill Programs

- ❖ Conservation Reserve Program (CRP): **None**
- ❖ Wetland Restoration Program (WRP): **None**
- ❖ Conservation Reserve Enhancement Program (CREP): **4 acres**

Footnotes/Bibliography

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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/wrlexport.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

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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>.