

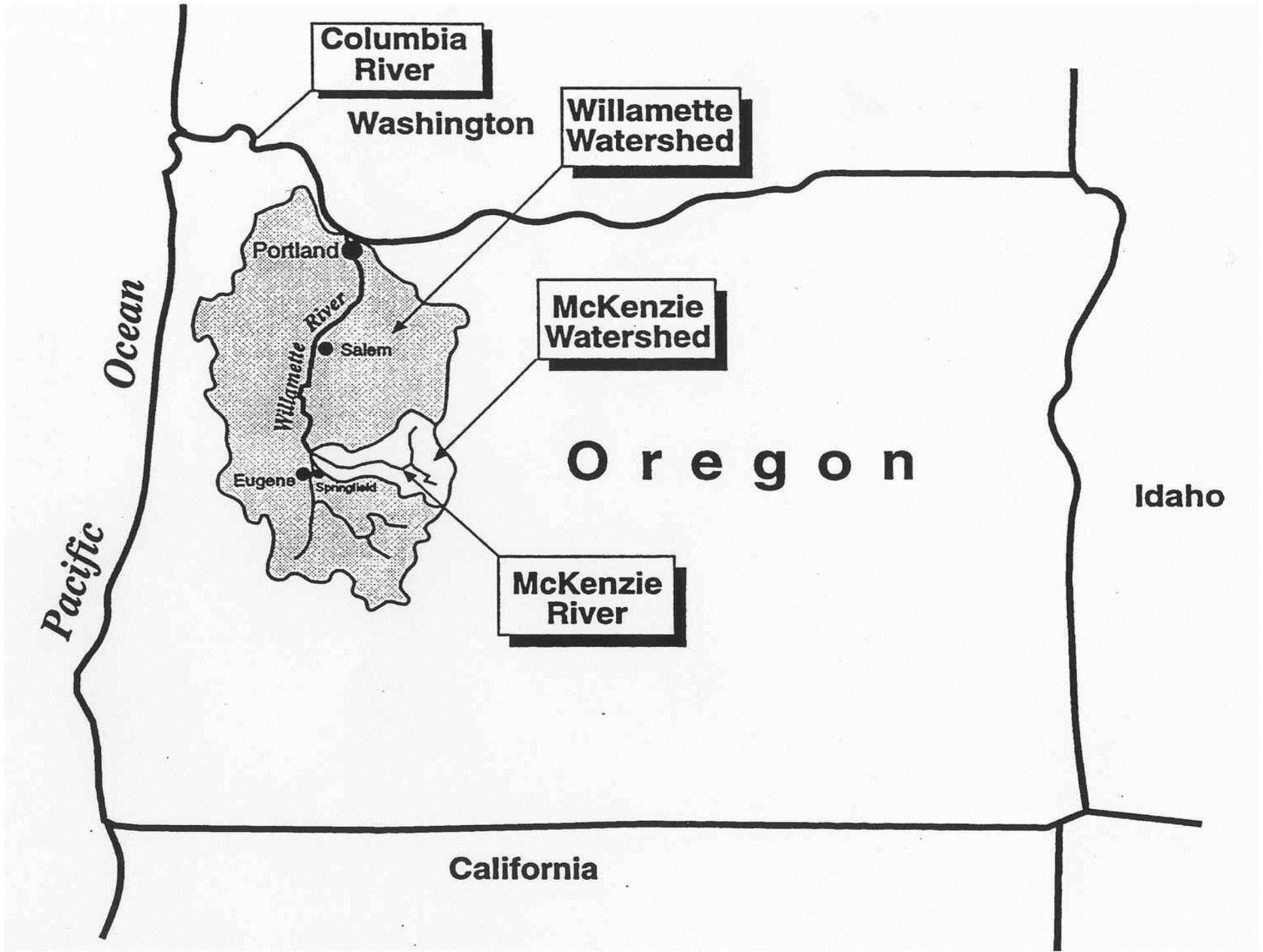
An aerial photograph of a river winding through a forested landscape. The river is dark blue and reflects the surrounding trees and sky. On the left bank, there is a small house with a brown roof and a deck, surrounded by trees. The forest is dense with green and brown trees, indicating a mix of evergreen and deciduous species. The overall scene is a natural, scenic view of a watershed.

# **Use of Payments for Ecosystem Services to Protect the McKenzie Watershed**

**Karl Morgenstern  
Eugene Water & Electric Board**

# Discussion Summary

- Background
  - EWEB utility background
  - McKenzie Watershed
  - EWEB's Source Protection Program
- Voluntary Incentives Program for Good Stewardship (investment in natural capital)



**Columbia River**

Washington

**Willamette Watershed**

Portland

Willamette River

Salem

**McKenzie Watershed**

O r e g o n

Eugene

Springfield

**McKenzie River**

Idaho

*Pacific Ocean*

*Pacific*

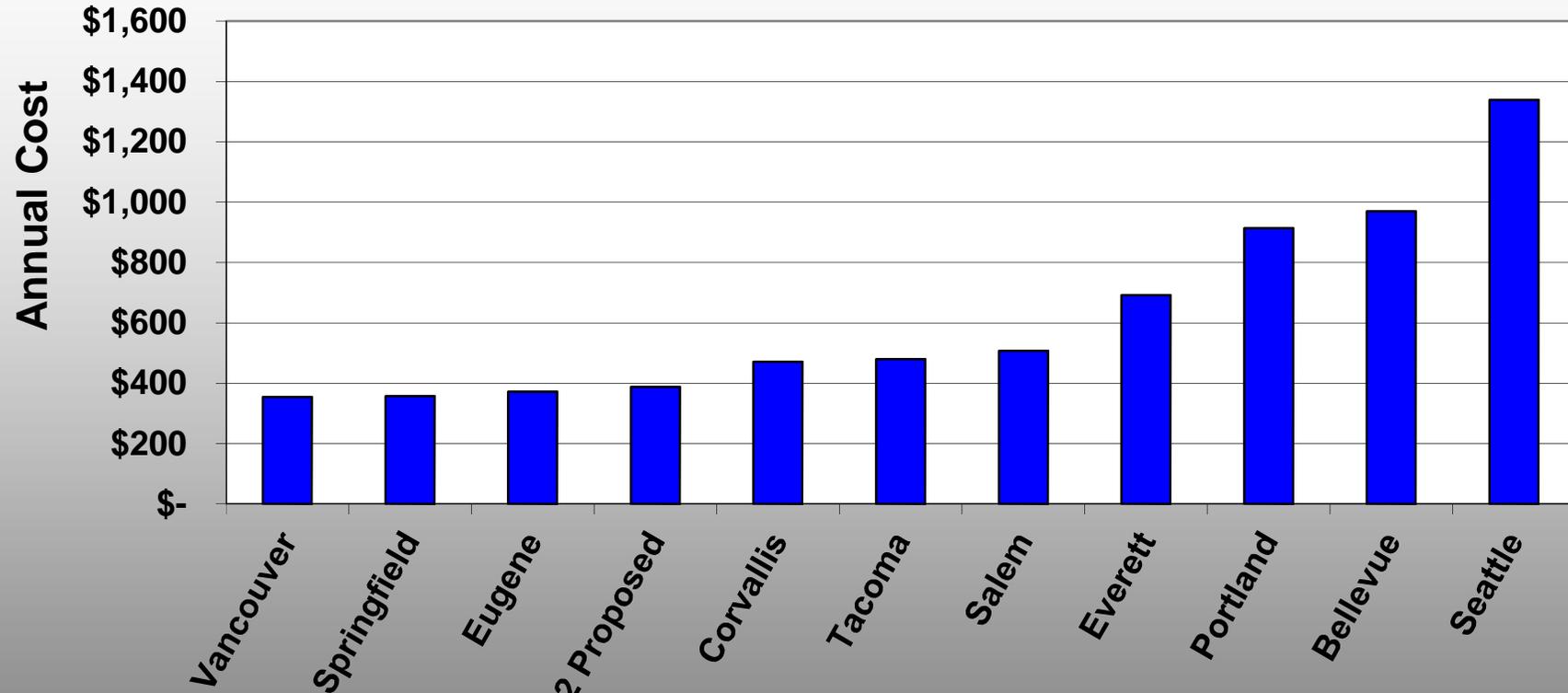
California

# EWEB Basics

- Publically owned water & electric utility since 1911.
- Electric Side:
  - 87,277 customer accounts
  - EWEB owned generation (wind farms, hydroelectric, solar, co-generation facilities)
  - \$166.8 million in revenue (retail sales)
- Water Side (McKenzie River sole source):
  - 51,628 customer accounts
  - \$22.52 million in revenue from sales

# Regional Water Cost Comparison

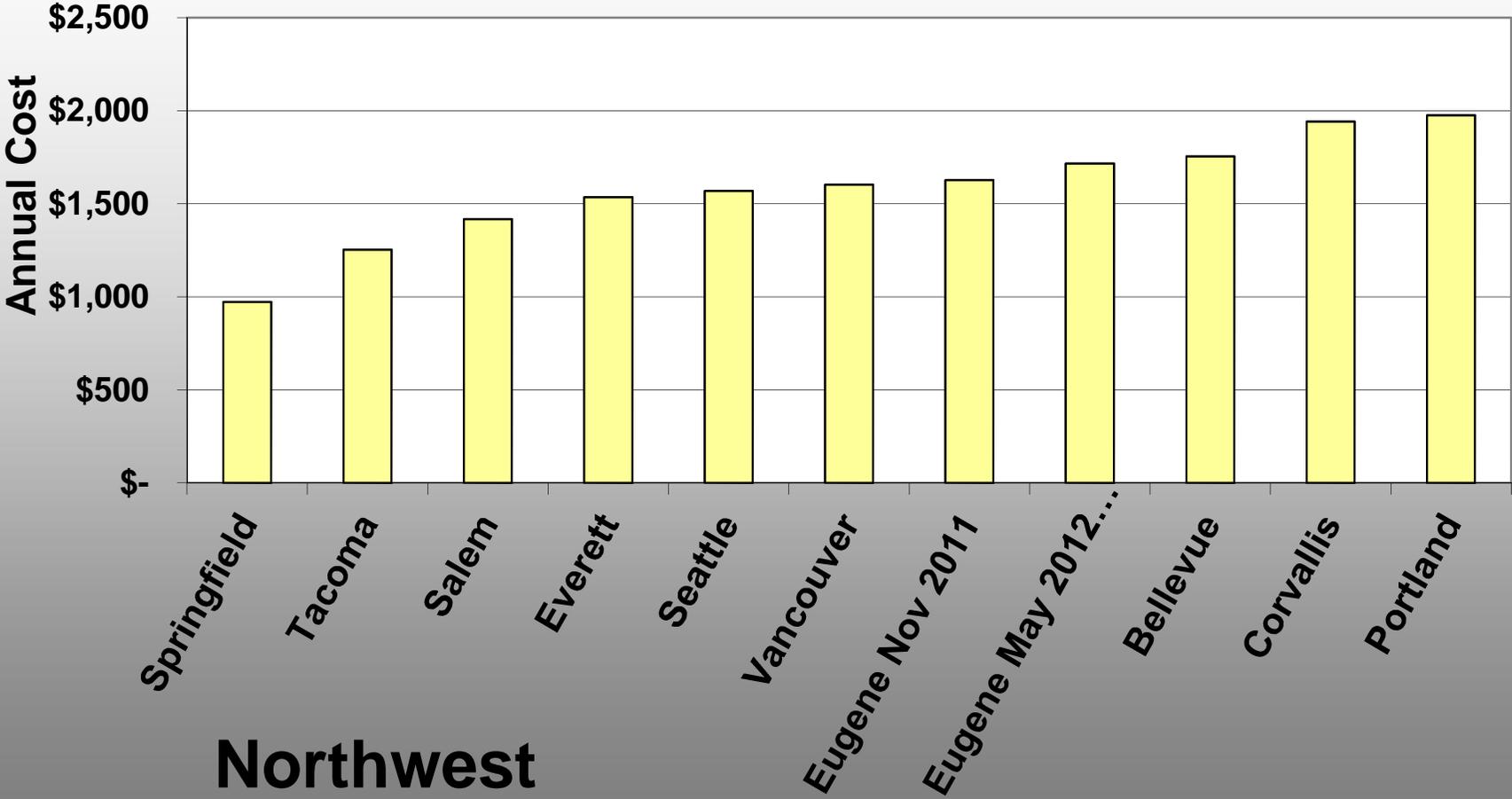
## Residential House



Northwest

# Regional Electric Cost Comparison

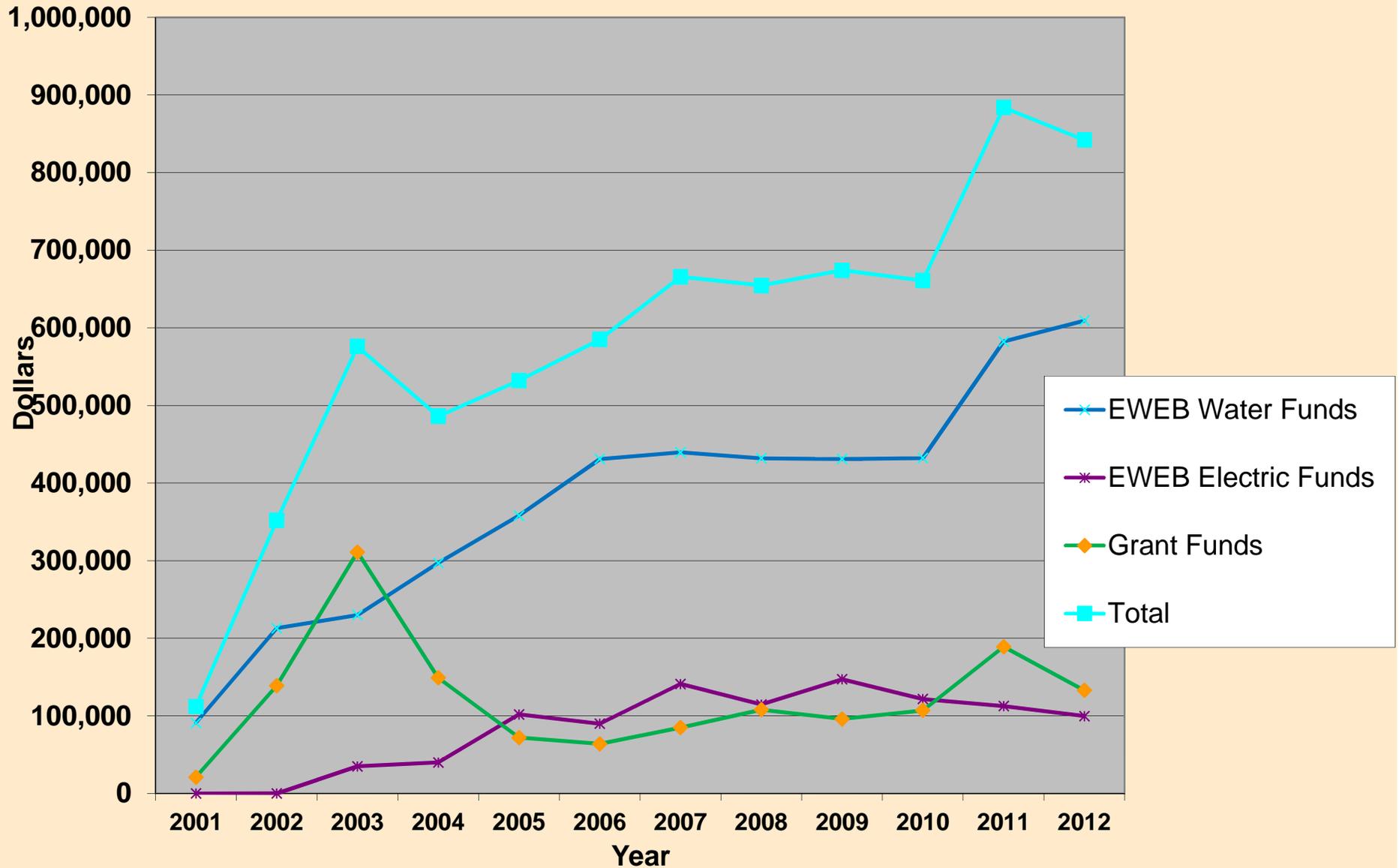
## Residential House



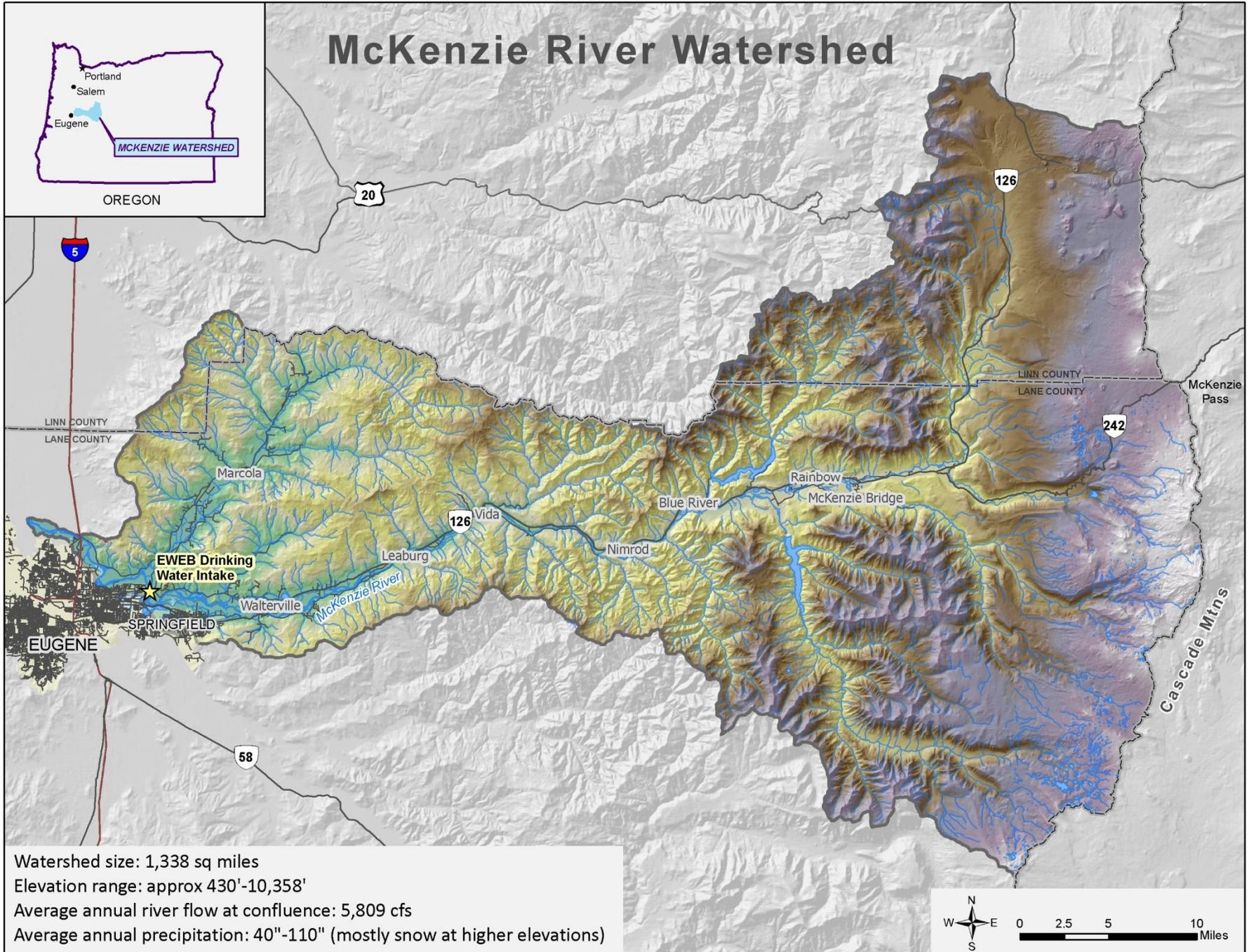
Northwest



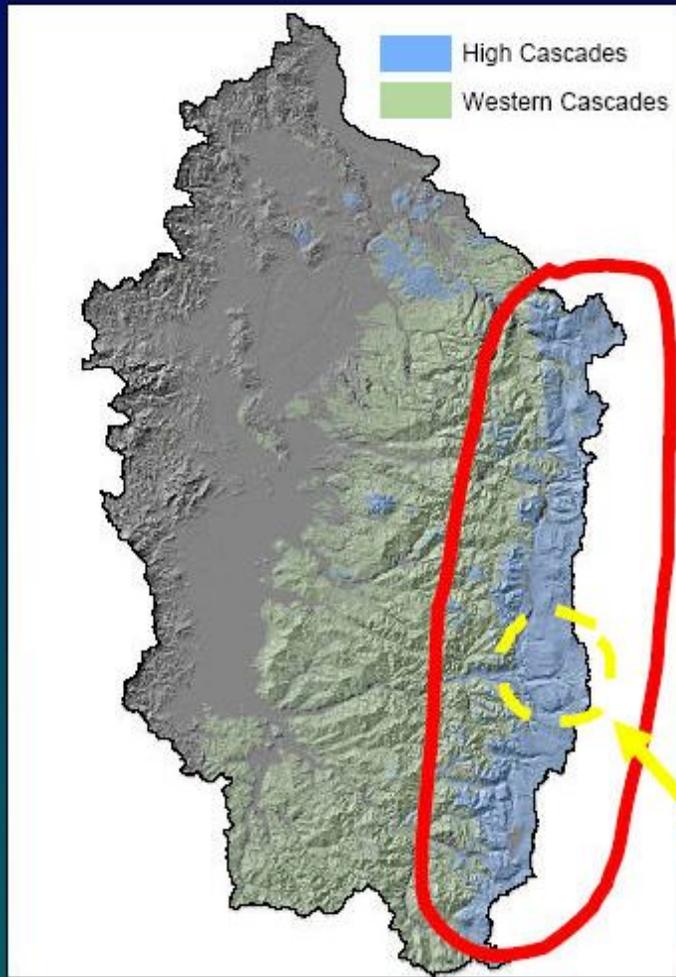
**Table 1: Source Protection Program Costs from 2001 to 2012**



# McKenzie River Watershed



Watershed size: 1,338 sq miles  
Elevation range: approx 430'-10,358'  
Average annual river flow at confluence: 5,809 cfs  
Average annual precipitation: 40"-110" (mostly snow at higher elevations)



# High Cascades

*Young basalts, basaltic andesites, andesites, pumice, and ash < 7 million years old*

*Youngest Mckenzie Pass lava flows ( $\leq 3000$  years old)*



BELKNAP CRATER

LITTLE BELKNAP SHIELD

MT. WASHINGTON

MT. JEFFERSON

BALD PETER

DUGOUT BUTTE

GREEN RIDGE

BLACK BUTTE

BLACK CRATER

# Cascade Springs - blue pools



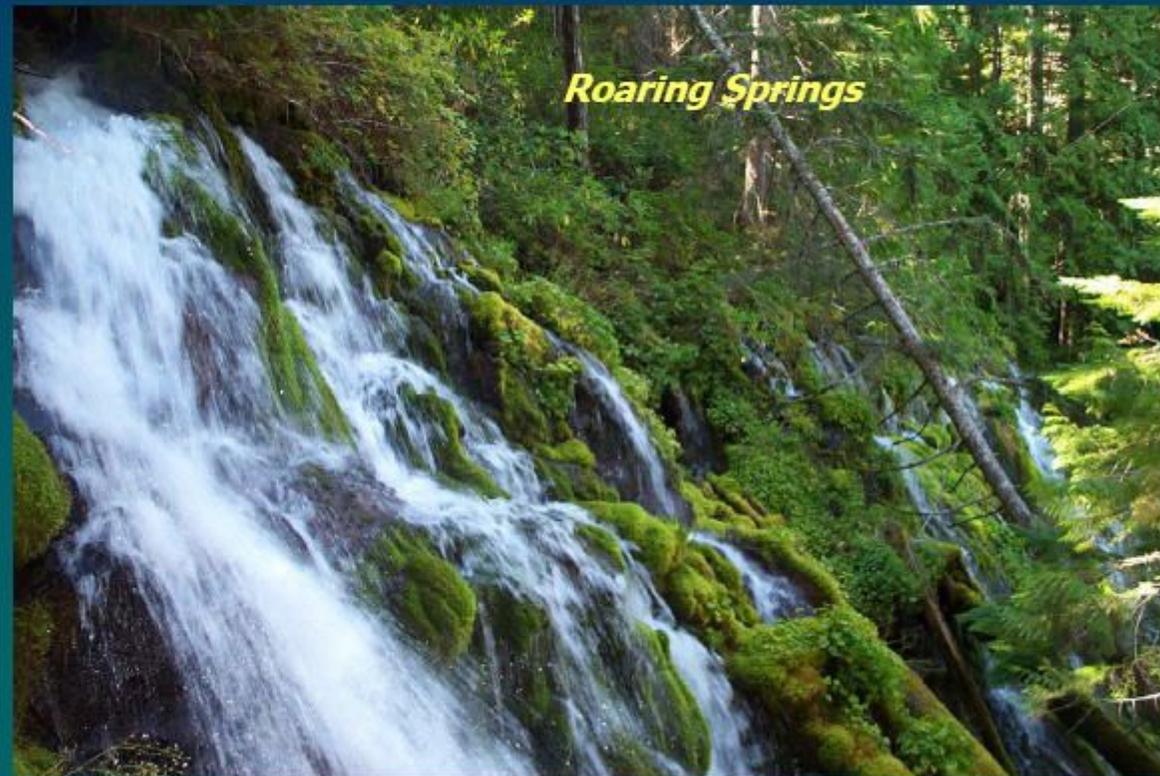
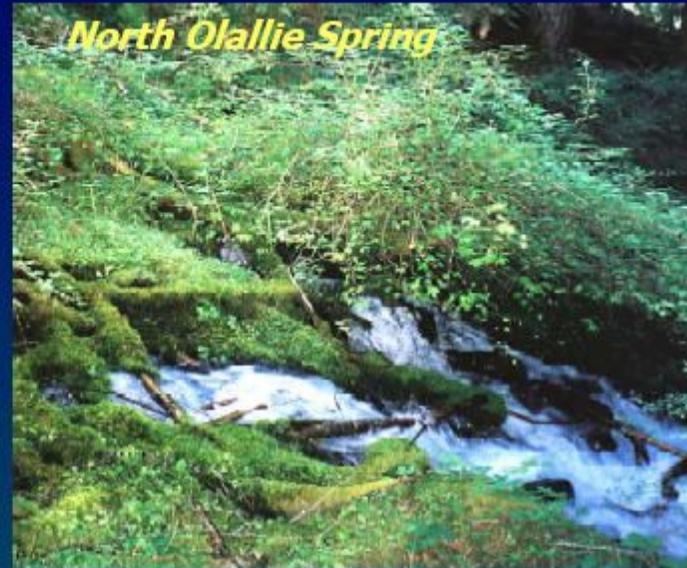
*Great Springs, Clear Lake*



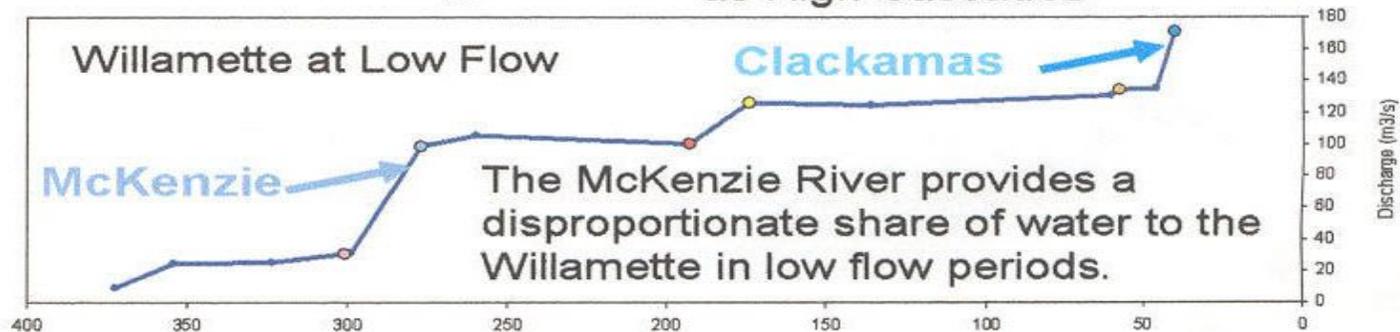
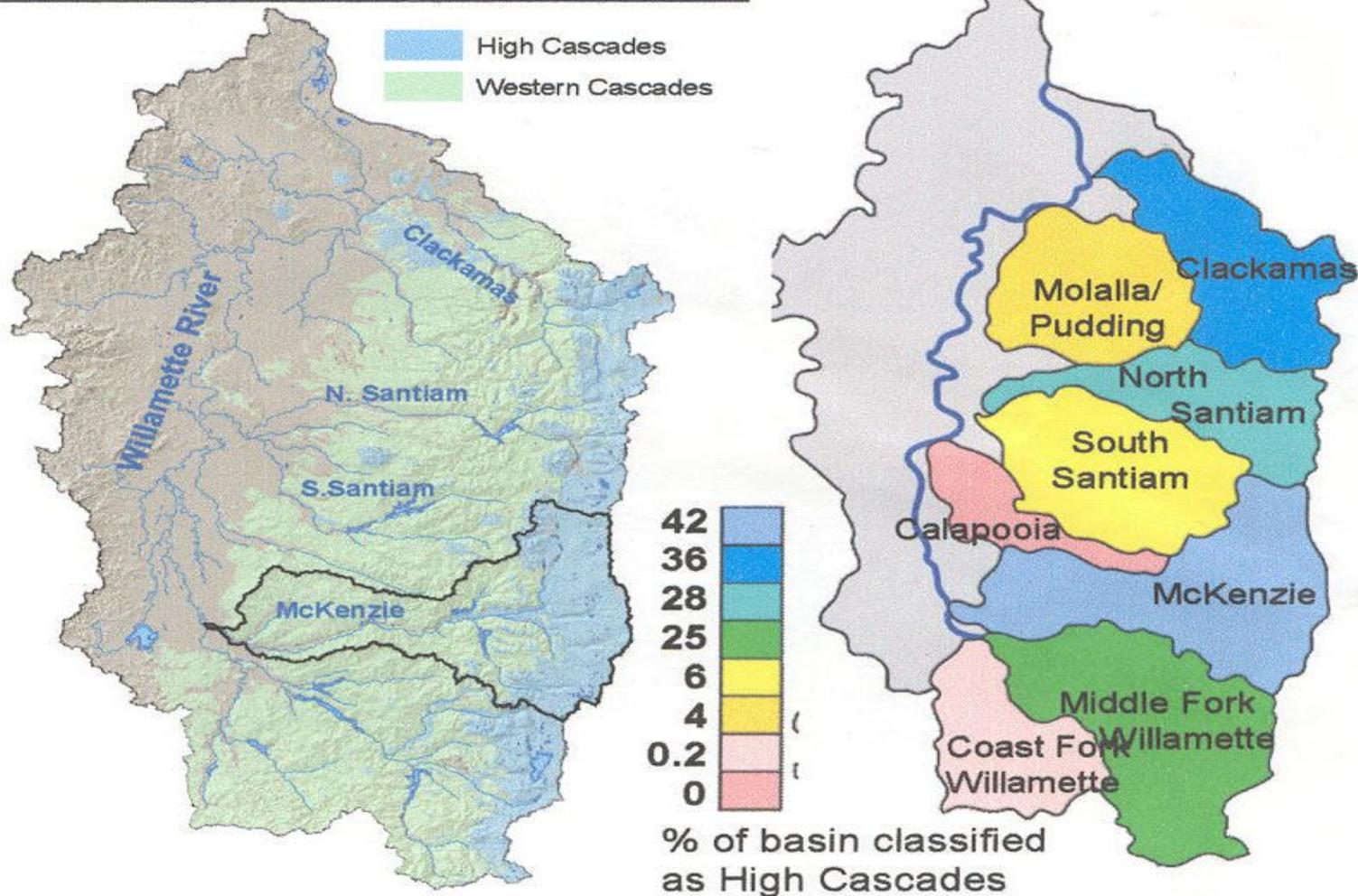
*dry  
channel*

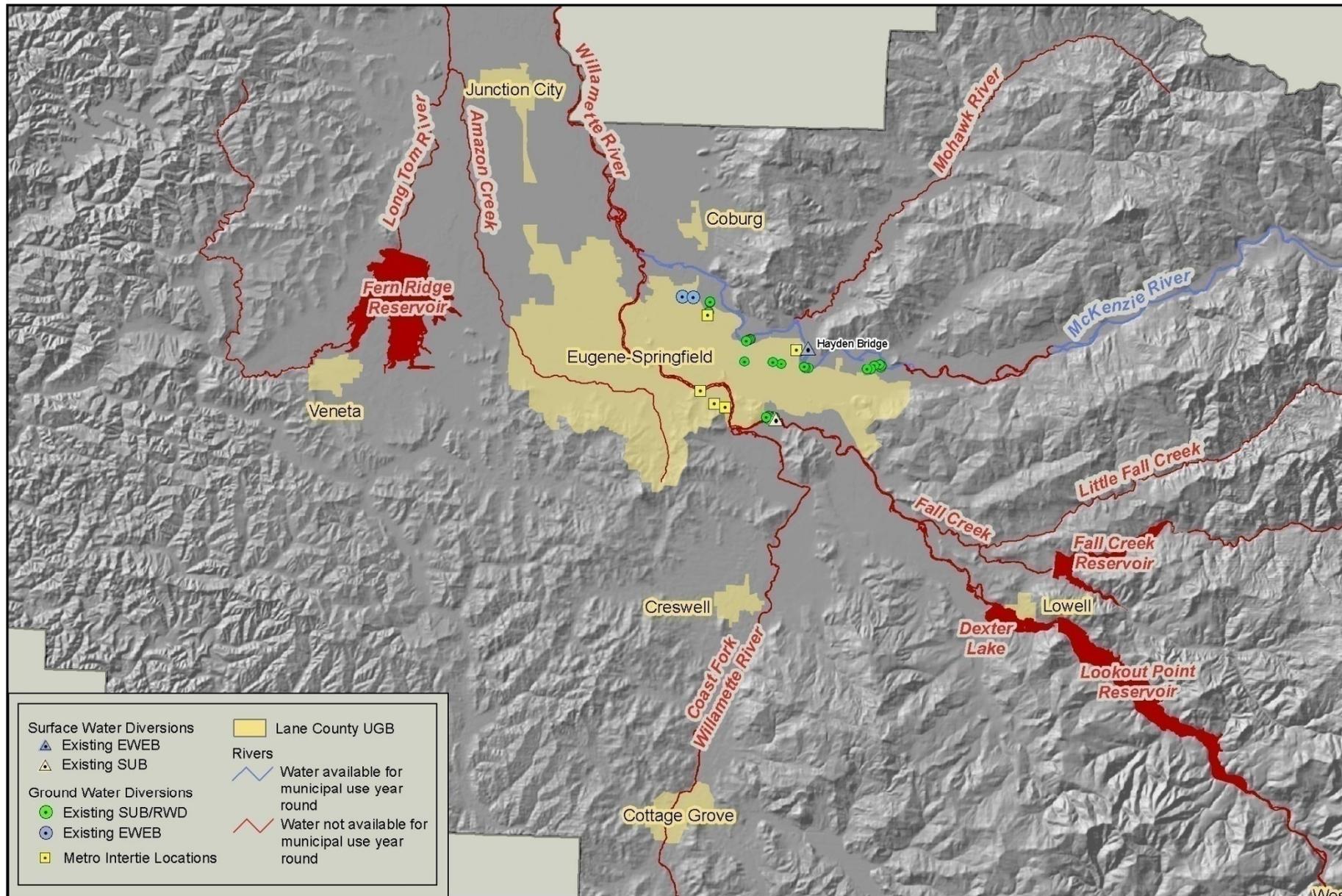
*Tamolitch Pool, McKenzie River*

# Cascade Springs - GUSHERS!



# Importance to the Willamette

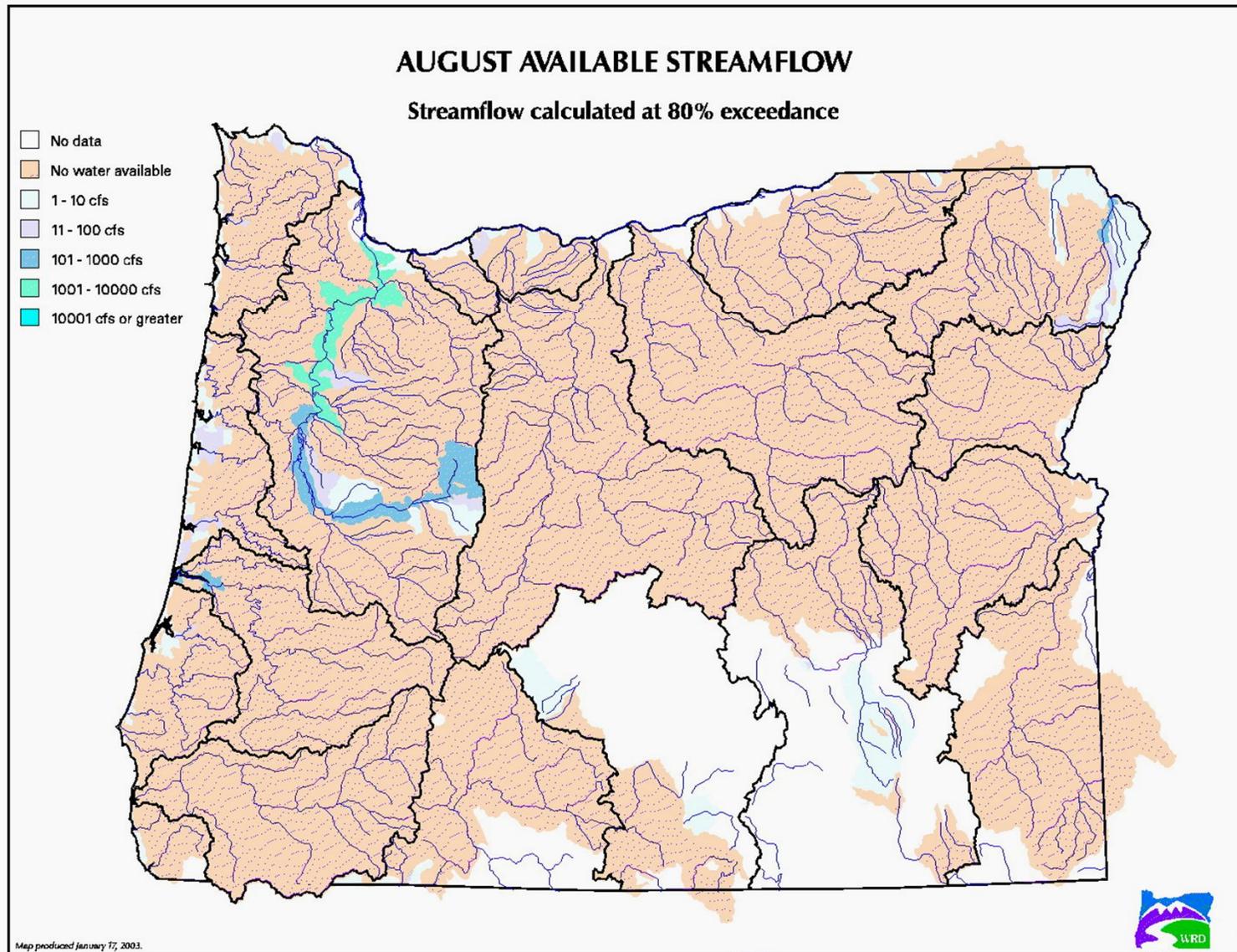




Regional Water Availability



# Fully Appropriated Summer Flow

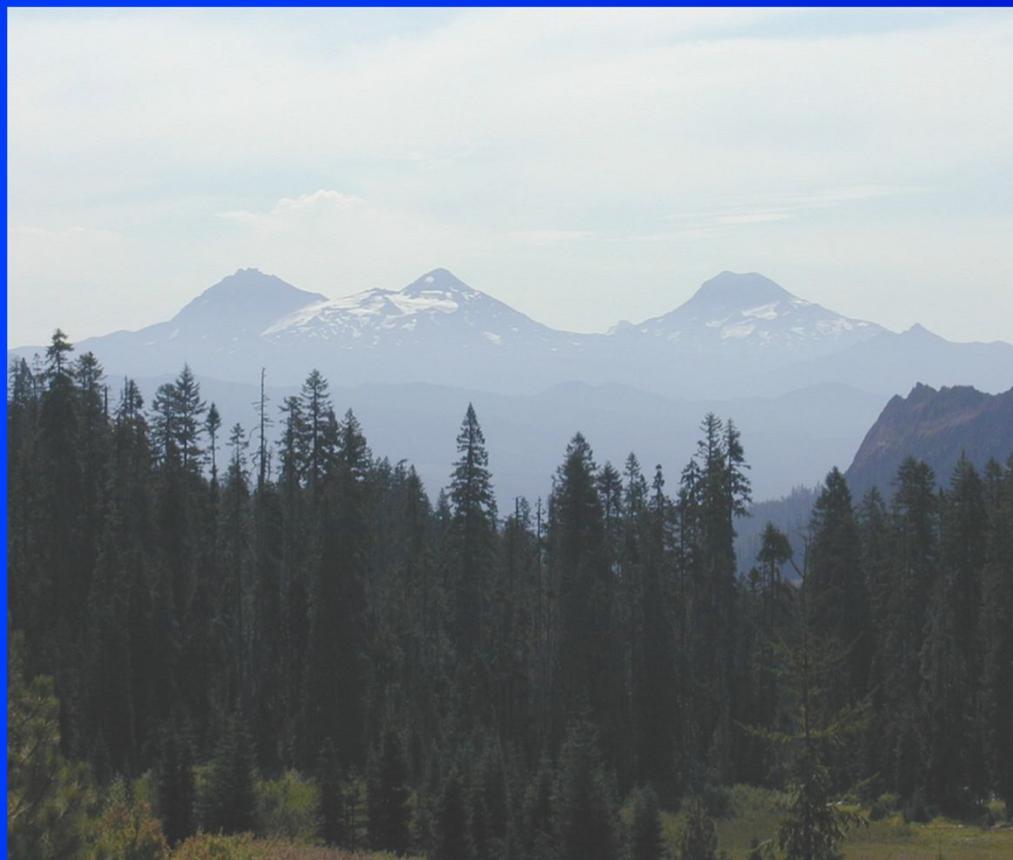


# EWEB's Drinking Water Source Protection Program

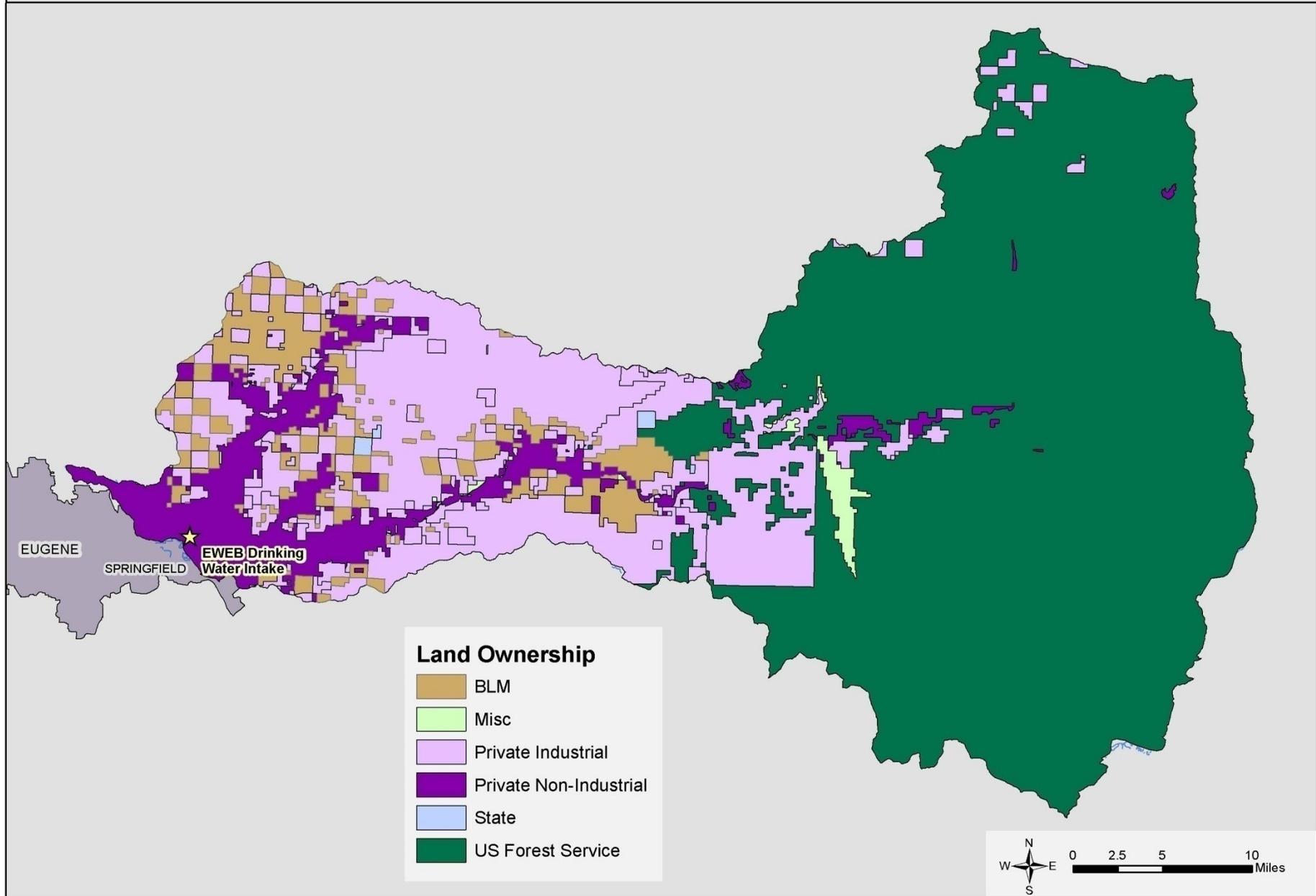


# Source Protection Program Objective

- To measure the balance between watershed health and human use over time and to implement actions that maintain a healthy balance for production of exceptional water quality.



# Land Ownership in the McKenzie River Watershed



# Increase economic viability while reducing chemical use/increase buffers



Development on River



Urban Runoff



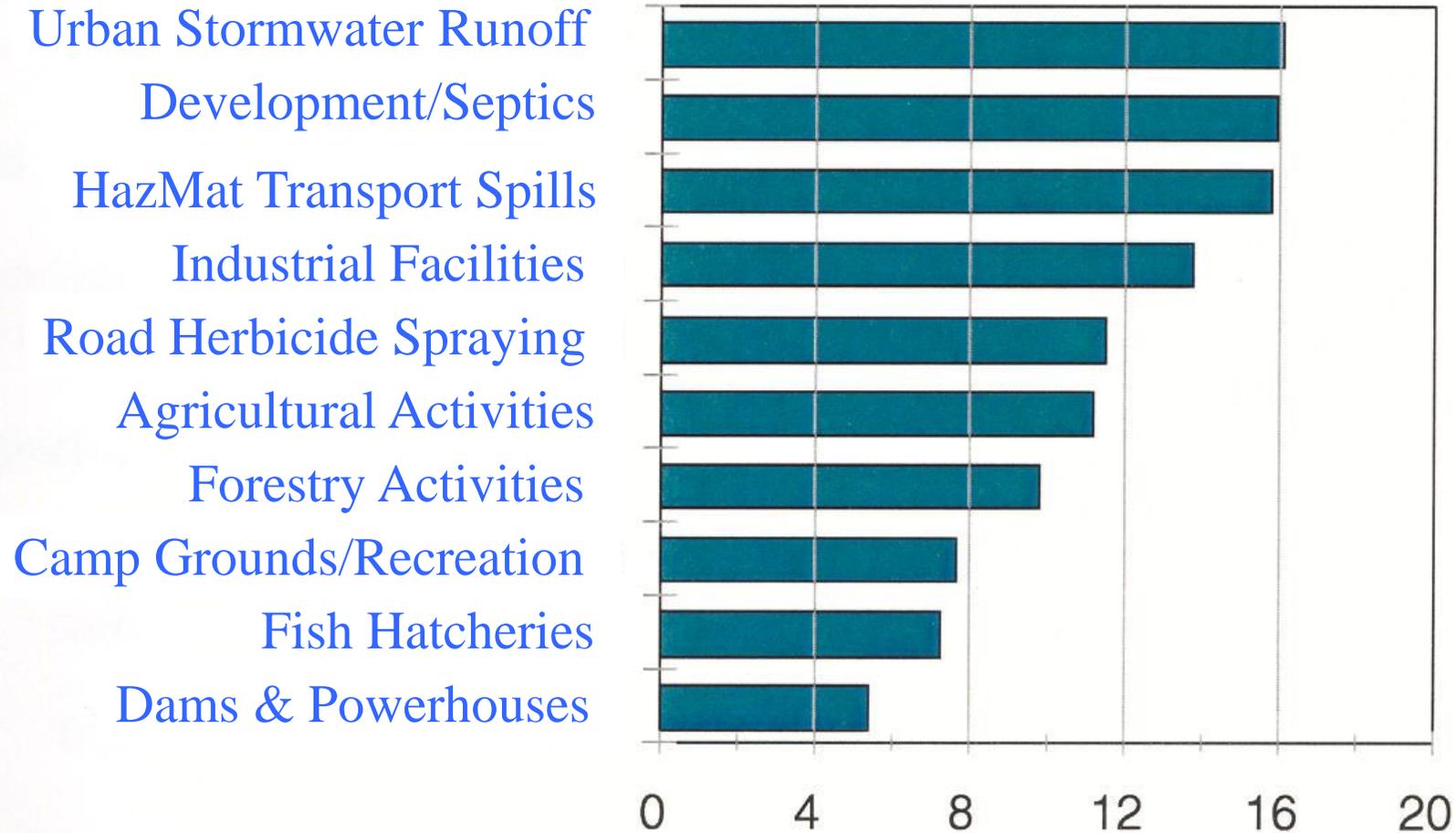
Industry



Hazardous Material Spills

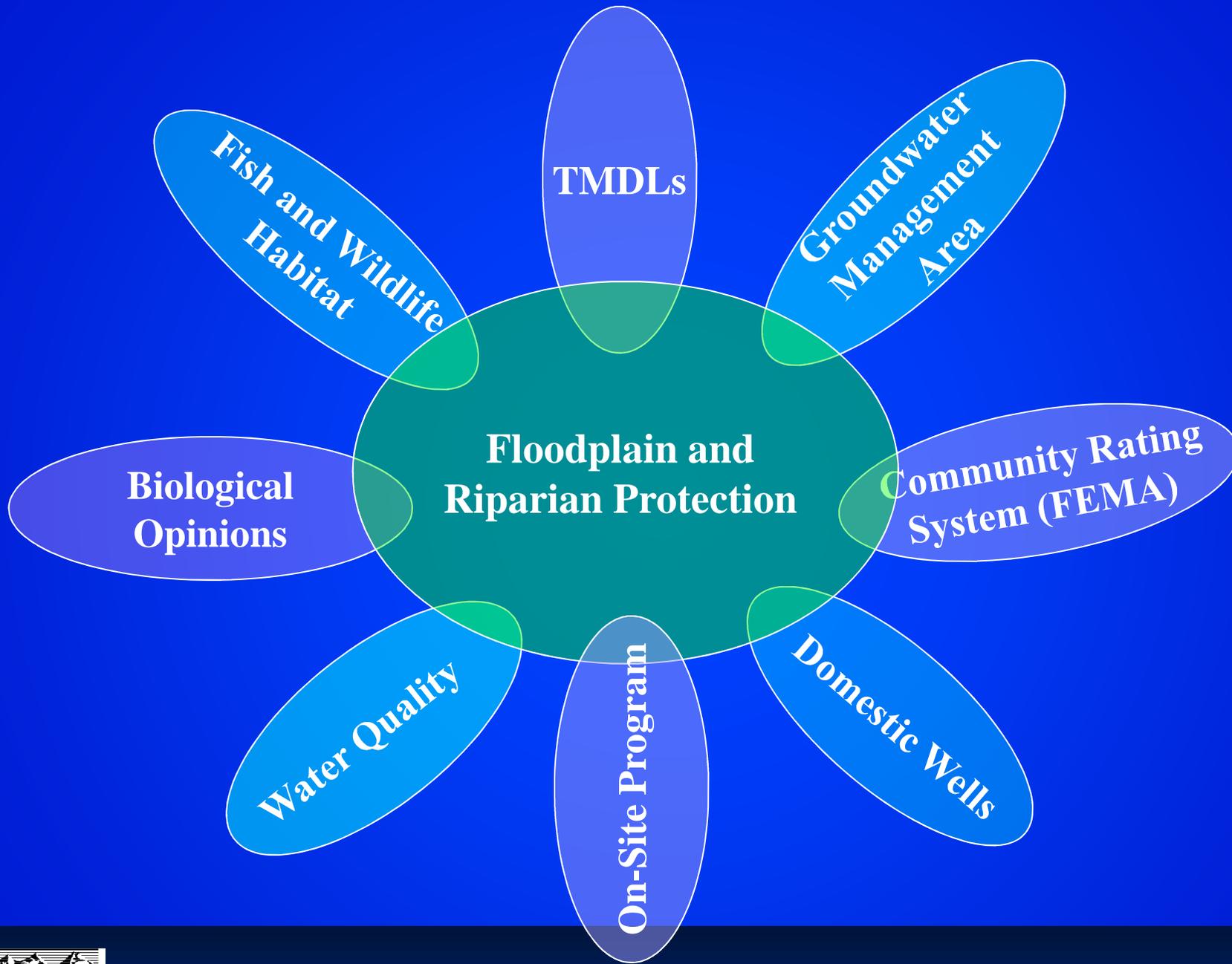


## RISK CATEGORIES RANKED BY AVERAGE SCORE



# Elements of Source Protection Program

- Comprehensive Monitoring
- Disaster Preparedness and Response
- Point Source Evaluation and Mitigation
- Nonpoint Source Evaluation and Mitigation
- Education and Research Assistance
- Land Acquisition and Conservation Easements
- Watershed Land Use Tracking and Management
- Public Outreach and Information Sharing



# Healthy Riparian areas and Floodplains Provide Critical WQ Functions

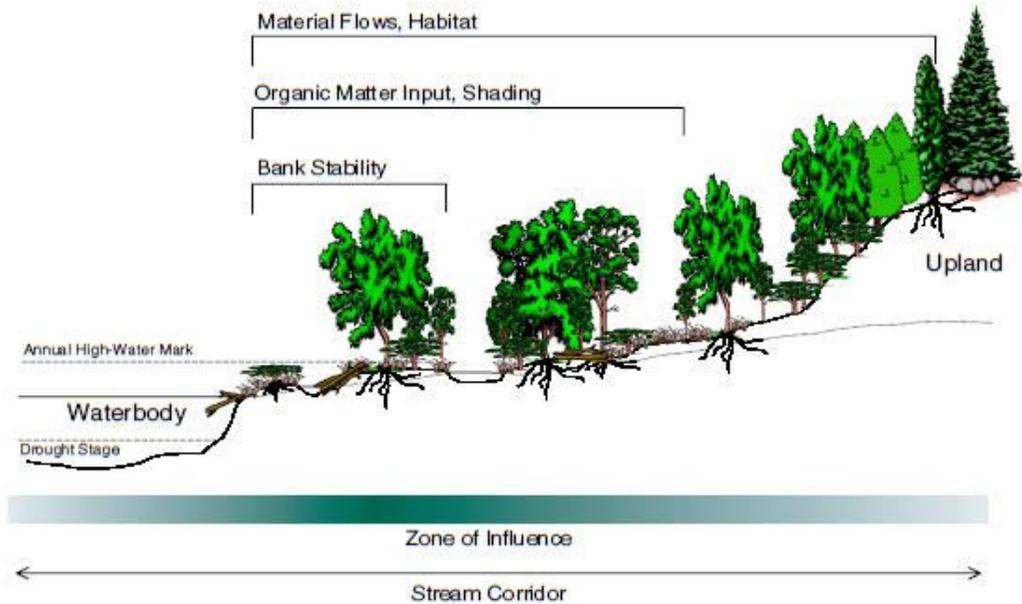


FIGURE ES-1 Schematic of a generic riparian area showing a zone of influence relative to aquatic and upland areas. The intensity of riparian influence is depicted with shading. "Material flows" refers to energy, organic matter, water, sediment, and nutrient flow.

## Large River

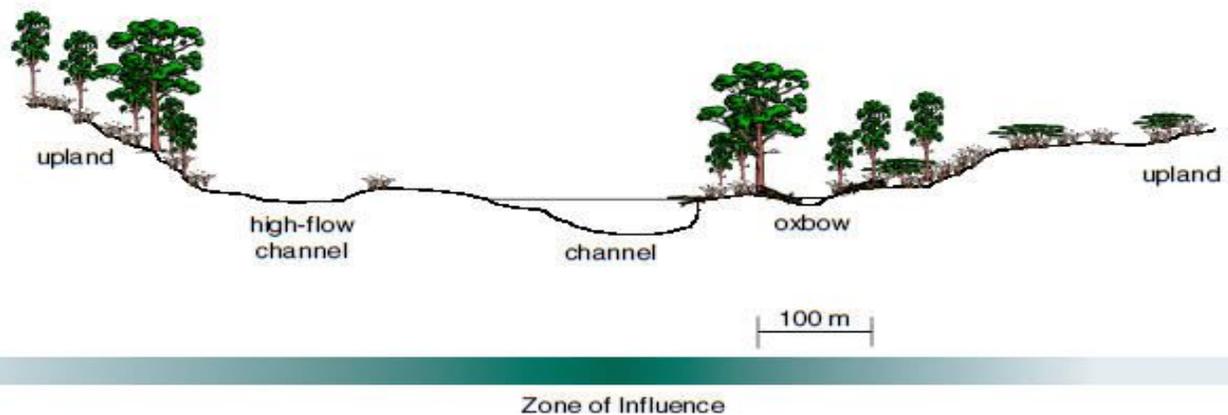
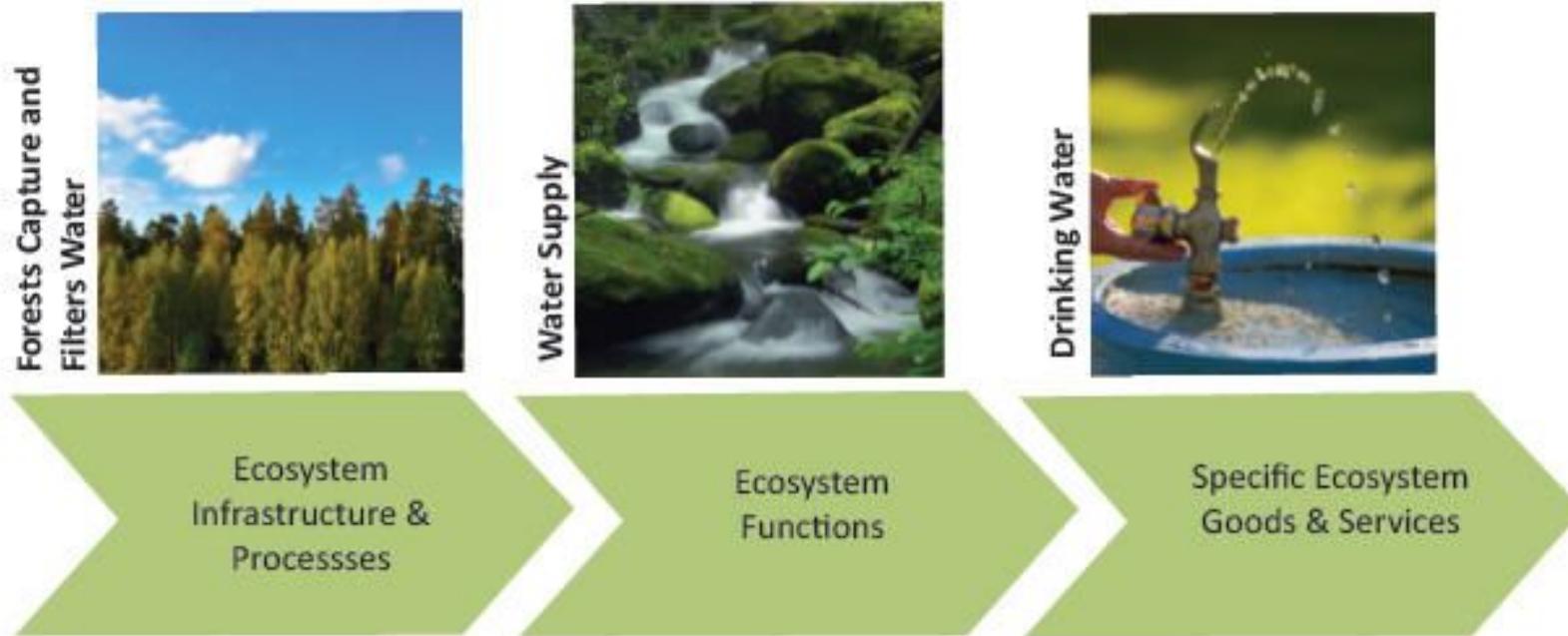


Figure 1 - The Link between Natural Infrastructure and Ecosystem Goods and Services



[www.eartheconomics.org](http://www.eartheconomics.org)

Table 5 - Ecosystem Services Valued and/or Identified in the Skykomish Watershed

	Agricultural Lands	Forest	Grasslands	Lakes/Rivers	Pasture	Riparian Buffer	Shrub/Scrub	Urban Green Space	Wetland
<b>Provisioning Services</b>									
Food		X	X						X
Raw Materials		X							X
Genetic Resources		X							
Medicinal Resources						X			
Ornamental Resources		X							
<b>Regulating Services</b>									
Gas Regulation	X	X	X			X	X	X	X
Climate Regulation	X	X	X			X	X	X	X
Disturbance Prevention	X	X				X			X
Soil Retention	X	X	X				X		
Water Regulation		X	X			X	X	X	X
Water Supply		X		X		X			X
Biological Control	X	X	X		X		X		
Water Quality, Waste Treatment		X	X						X
Soil Formation	X	X	X		X		X		
Nutrient Regulation	X	X							X
Pollination	X	X	X		X		X		
<b>Habitat Services</b>									
Habitat and Biodiversity		X		X		X	X		X
Nursery		X		X		X	X		X
<b>Information Services</b>									
Aesthetic Information	X	X		X	X	X	X	X	X
Recreation		X		X	X	X	X		X
Cultural and Artistic Information						X			
Science and Education		X					X	X	
Spiritual and Historic Information						X			

Key:

	Ecosystem service produced by land cover but not valued in this report
X	Ecosystem service produced by land cover and valued in this report
	Ecosystem service not produced by land cover

Shrub/Scrub

Disturbance Regulation	Rein, F. A.	\$8.15	\$253.97
Gas & Climate Regulation	local estimate	\$99.00	\$990.00
Habitat Refugium & Nursery	Amigues, J. P., et. al.	\$37.80	\$1,494.89
	Haener, M. K. and Adamowicz, W. L.	\$1.52	\$10.42
	Shafer, E. L. et. al.	\$2.98	\$2.98
	Knowler, D. J. et al.	\$26.95	\$123.53
Water Regulation	Faux et al.	\$39.92	\$197.02
Water Supply	Gramlich, F. W.	\$221.01	\$221.01
	Oster, S.	\$15.16	\$15.16
	Ribaudo, M. and Epp, D. J.	\$1,395.98	\$1,770.14
	Rich, P. R. and Moffitt, L. J.	\$5.16	\$5.16
	Rein, F. A.	\$41.81	\$185.36
	Lant? - IL water qual study	\$182.23	\$182.23
	Berrens, R. P., et al.	\$2,268.02	\$2,268.02
	Mathews, L. G., et al.	\$14,022.28	\$14,022.28
Medicinal Resources	local estimate	\$11.98	\$383.59
Aesthetic & Recreational	Bennett, R., et. al.	\$182.22	\$182.22
	Bishop, K.	\$1,776.78	\$1,991.64
	Boxall, P. C., McFarlane, B. L. and Gartrell, M.	\$ .19	\$ .19
	Haener, M. K. and Adamowicz, W. L.	\$ .22	\$ .22
	Maxwell, S.	\$12.69	\$12.69
	New Jersey Type A Studies	\$13.07	\$1,091.89
	Prince, R. and Ahmed, E.	\$1.61	\$2.05
	Willis, K.G.	\$ .45	\$205.41
	Shafer, E. L., et al.	\$580.70	\$580.70
Biological Control	Costanza et al.	\$15.65	\$15.65
Soil Erosion Control	Costanza et al.	\$19.30	\$19.30
Gas & Climate Regulation	local estimate	\$6.68	\$73.30
	New Jersey Type A Studies	\$5.29	\$6.67
	Costanza et al.	\$4.66	\$4.66
Habitat Refugium & Nursery	Haener, M. K. and Adamowicz, W. L.	\$1.33	\$9.11
	Kenyon, W. and Nevin, C.	\$538.95	\$538.95
	New Jersey Type A Studies	\$ .53	\$271.71
	Shafer, E. L. et. al.	\$3.21	\$3.21
Pollination		\$1.13	\$5.67
Soil Formation	Costanza et al.	\$ .66	\$ .66
Water Regulation	Costanza et al.	\$2.00	\$2.00
Science and Education	Bishop, K.	\$36.42	\$62.92

EWEB data shows direct correlation between increased turbidity and treatment costs

Ecosystem Service	Riparian Buffer	
	Low Value (\$/acre/year)	High Value (\$/acre/year)
Aesthetic & Recreational	76.90	1169.41
Biological Control		
Disturbance Regulation	43.31	3884.40
Food Provisioning		
Gas & Climate Regulation	381.28	381.28
Genetic Resources		
Habitat Refugium & Nursery	0.41	59.96
Nutrient Cycling		
Pollination	413.50	413.50
Raw Materials		
Science and Education		
Soil Erosion Control	0.10	84.33
Soil Formation		
Waste Treatment	47.96	455.93
Water Regulation		
Water Supply		
<b>TOTAL</b>	<b>1030.66</b>	<b>6716.62</b>

McKenzie Draft ESV Riparian Buffer Value = \$1,031 to \$6,717/ac/yr



**MITIGATION FUNDS**

Developers  
ODOT  
Permits  
Hydroelectric

**CORPORATIONS**

Offsets  
Sponsorship

**SWCD**

% of tax base

**Program Infrastructure**

Riparian Health Assessment  
Landowner Agreement  
Fiscal Mngt/Accounting  
Monitoring & Planning  
Agreement Enforcement  
Education/Outreach/Marketing

**EWEB**

Rate Payer Funds

**USFS**

Stewardship Contracting

**OWEB/DSL**

Restoration &  
Protection funds

**FEDS**

CREP +  
BPA  
Tax deductions

**Grants/Foundations**

One-Time Investments

**WATERSHED INVESTMENT FUND**

Payments for Services

Payments for Stewardship

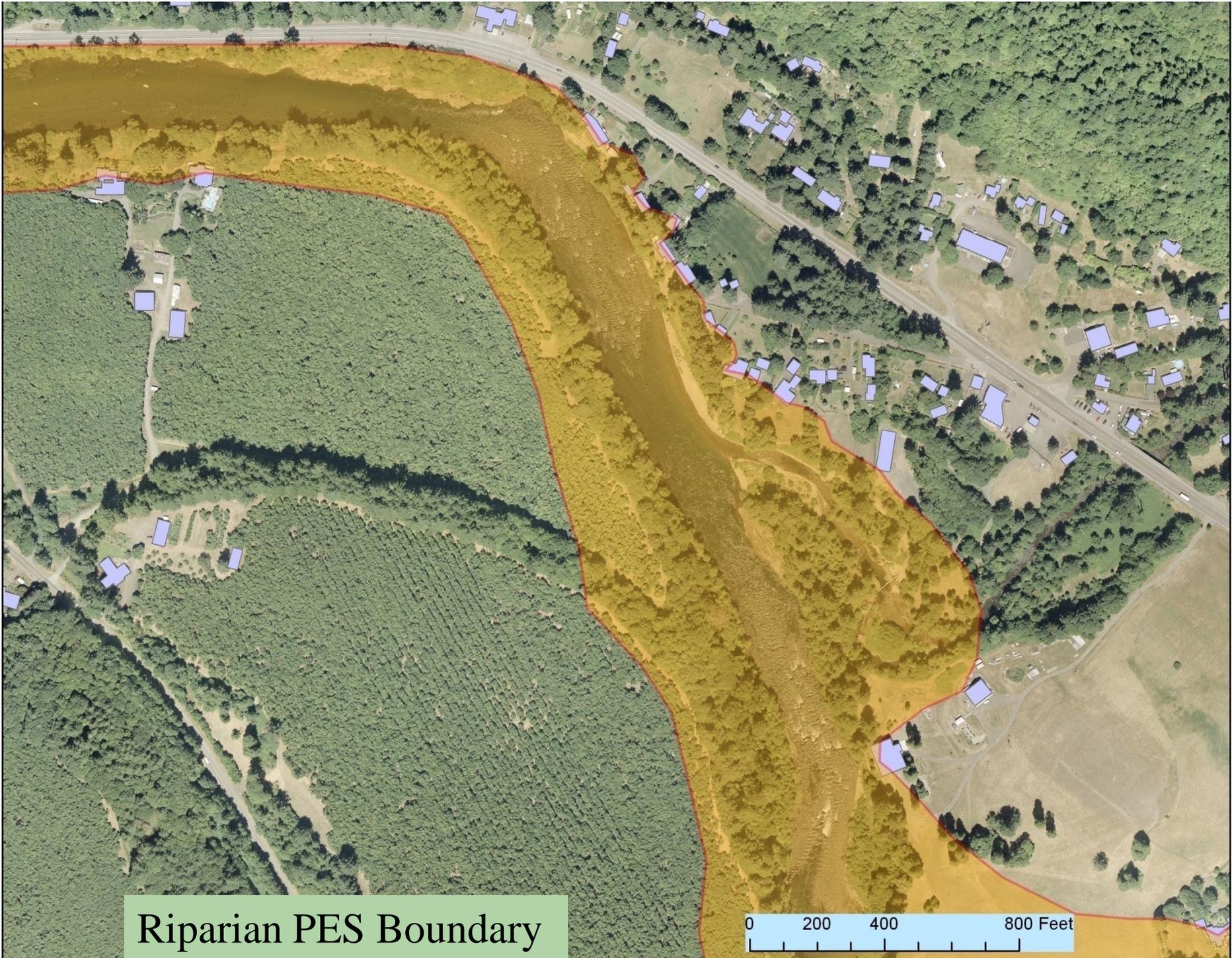
Grants/Funding for Restoration

- McKenzie River Trust
- McKenzie Watershed Councils
- Soil & Water Conservation Dist.
- Lane Council of Governments
- Cascade Pacific RC&D

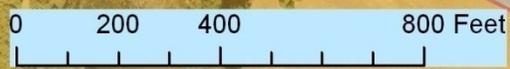
**LANDOWNERS**

Forestry (F2)  
Agriculture  
Residential  
Nonprofits  
Local Governments

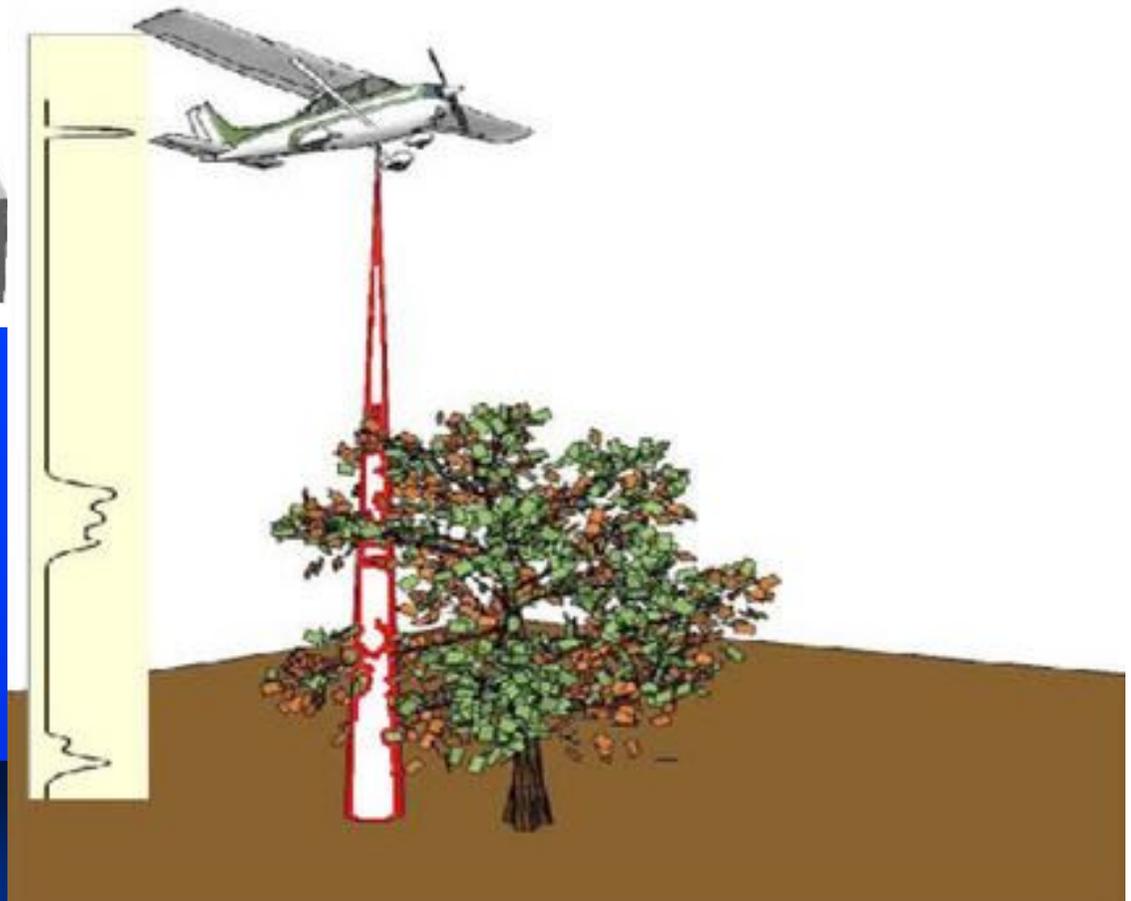
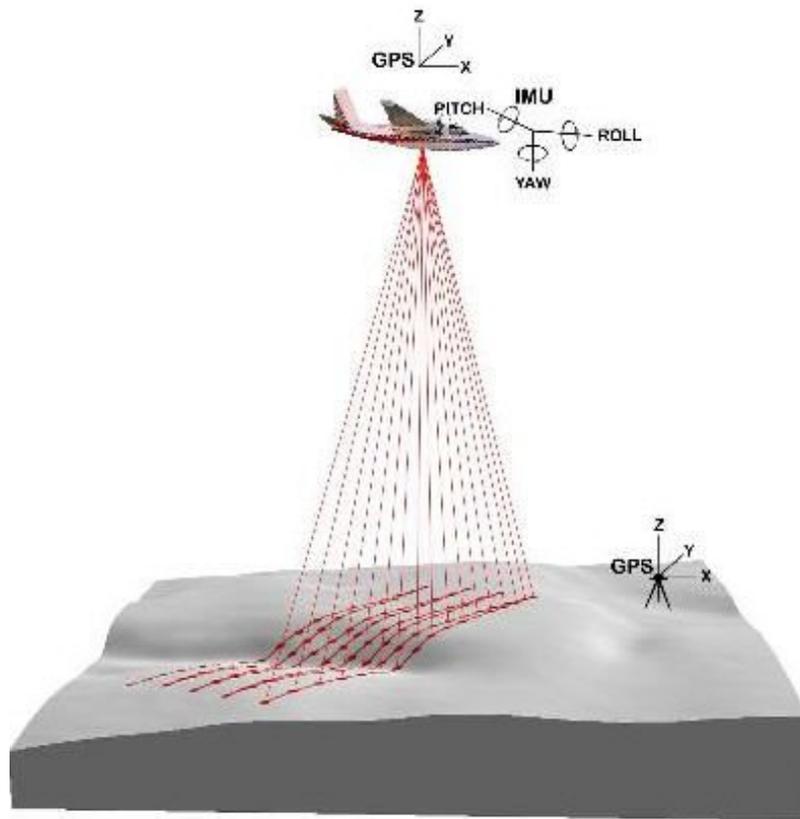




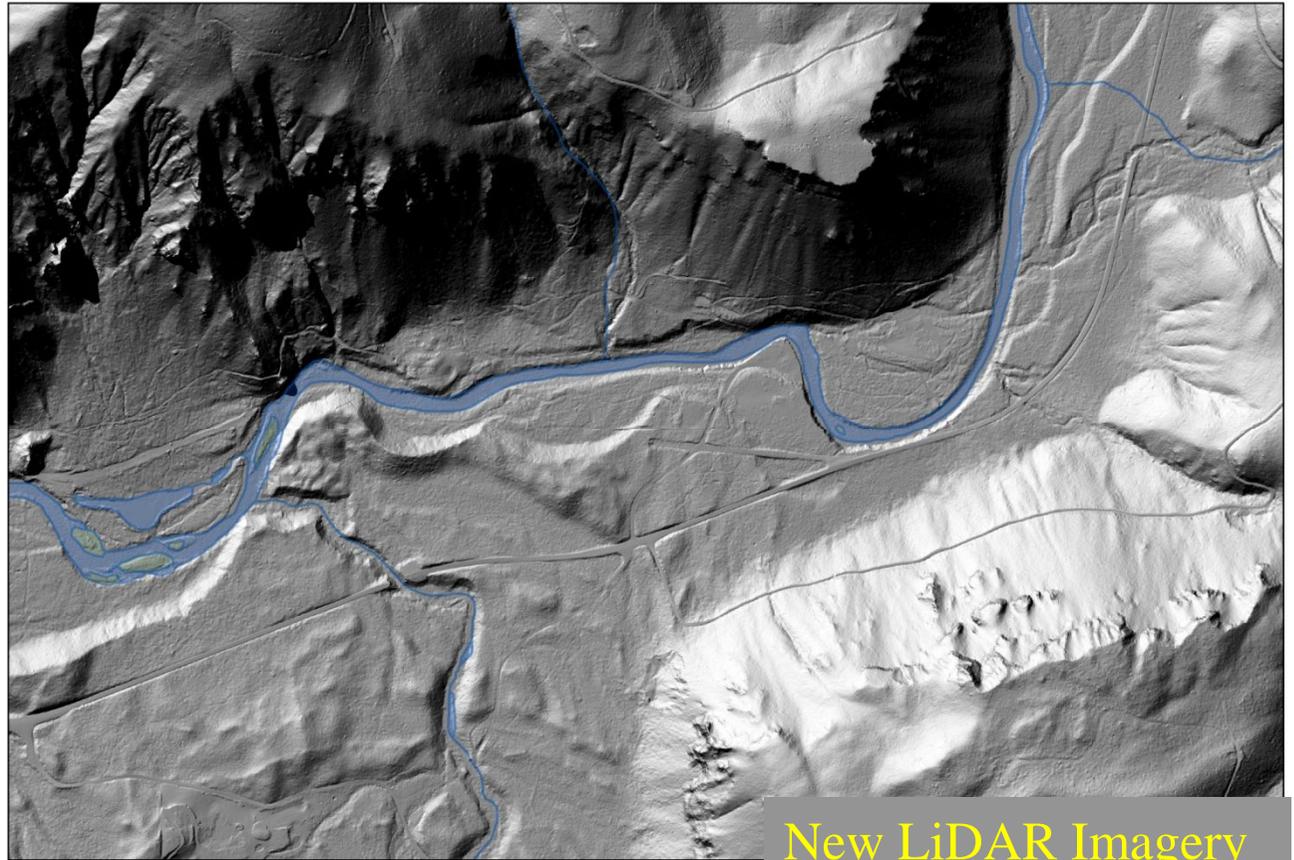
Riparian PES Boundary



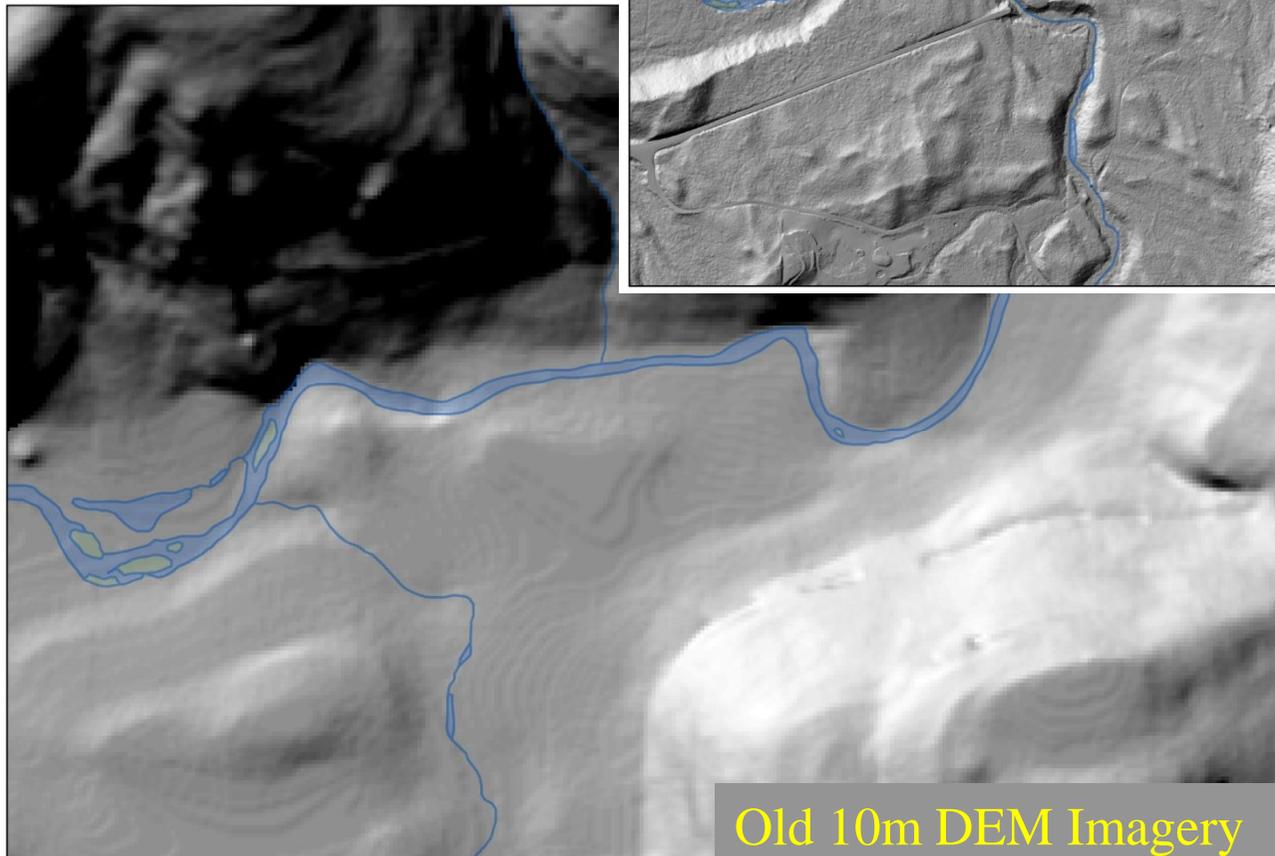
LIDAR sends out bursts of laser pulses. Laser pulses hit branches and leaves and some energy bounces back to a sensor... remaining energy from pulse hits ground & bounces back. Sensor records exact position, height and signal strength.



# Better Mapping of Channel Features



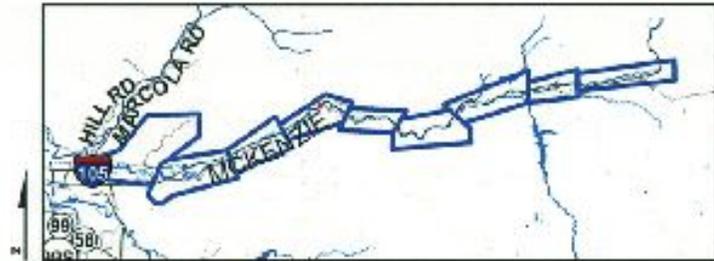
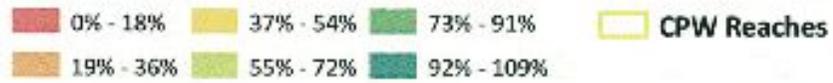
New LiDAR Imagery



Old 10m DEM Imagery

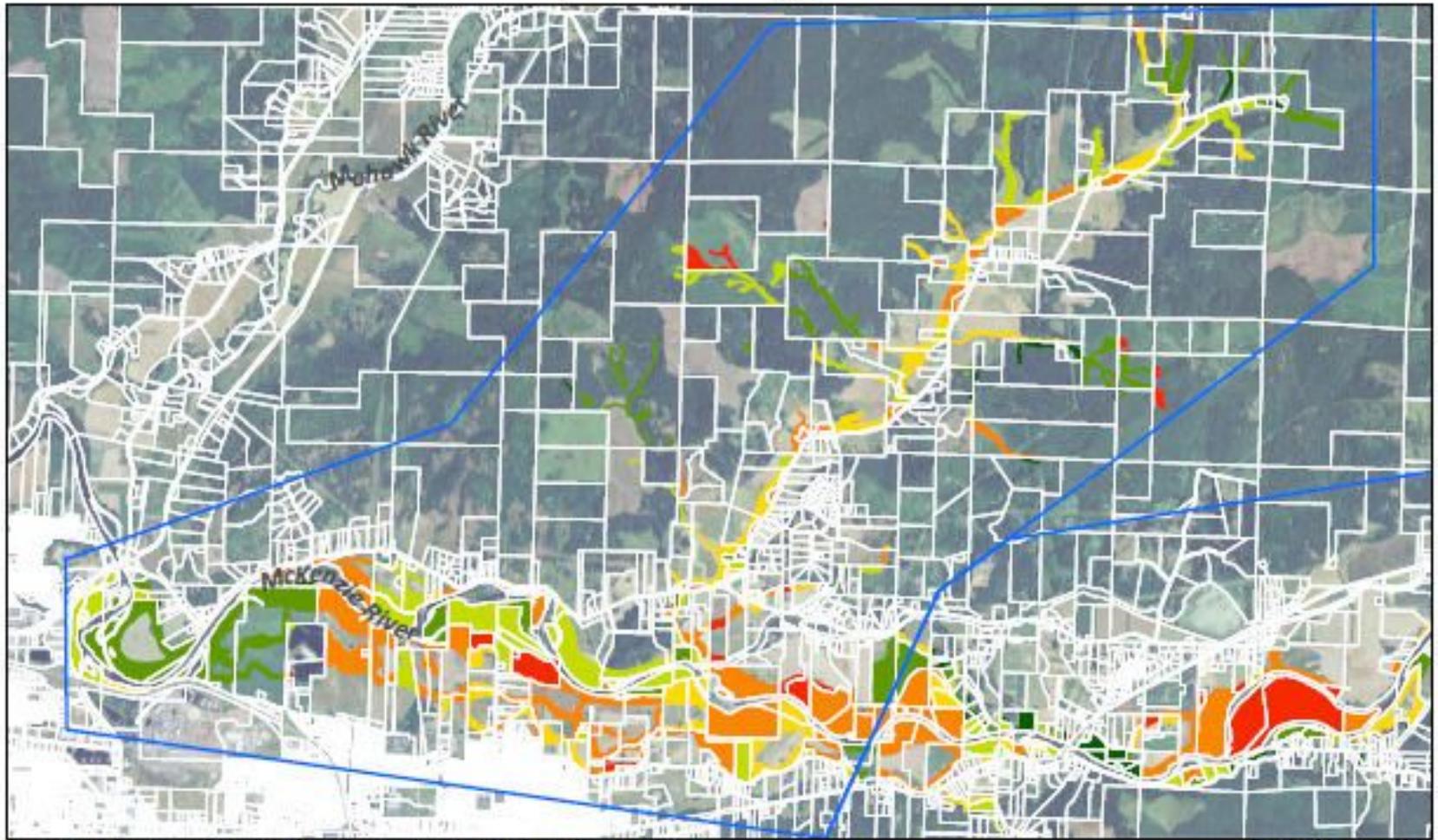
# 1625294001200

## Vegetation Percent cover by Diggle Taxlot Area



# Hayden Bridge

## Vegetation Percent cover by Eligible Taxlot Area

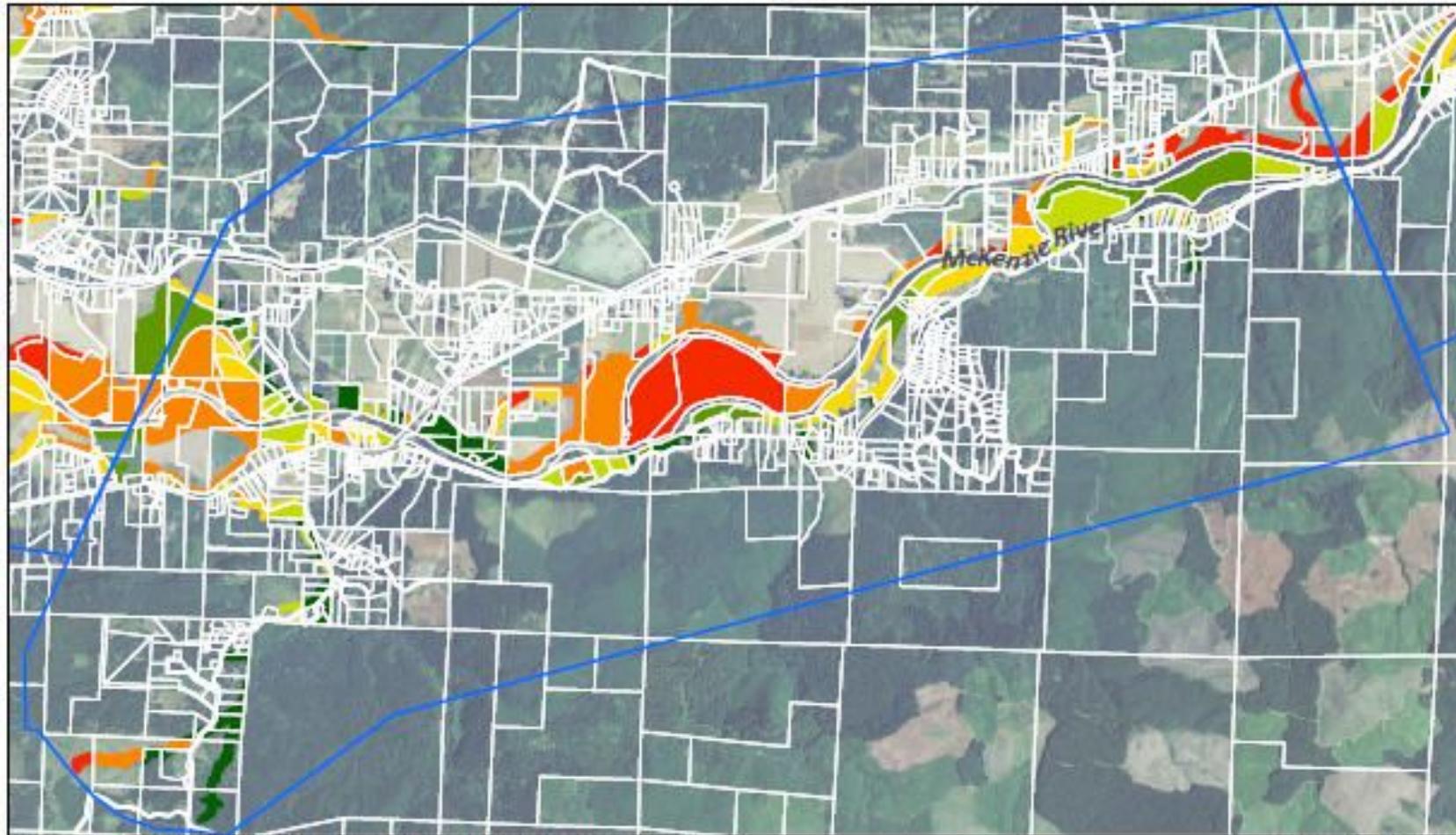
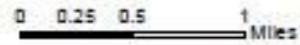


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Thursday, February 09, 2012

# Walterville

## Vegetation Percent cover by Eligible Taxlot Area



\\projects\Utility\Districts\eweb\DrinkingWater\Mapian\ecosystem\Marketplace\Lider\_Rebecca\Slide\_1111110.mxd

Thursday, February 09, 2012

## LiDAR Analysis – Healthy Riparian Forest Cover Summary

Percent Cover	Acres	Percent of Total Area
0-33%	1,664	25.7
34-66%	1,927	29.8
67-100%	2,872	44.4
Total Acres	6,463	

### Paying Dividends on Landowner's Natural Capital

$\$250,000/6,463 \text{ acres} = \$38.68/\text{ac}$

Year 1 – 300 acres enrolled = \$11,604 payout

$\$488,396/6,463 \text{ acres} = \$75.56/\text{ac}$

Year 2 – 600 acres enrolled = \$45,341 payout

$\$693,055/6,463 \text{ acres} = \$107.23/\text{ac}$

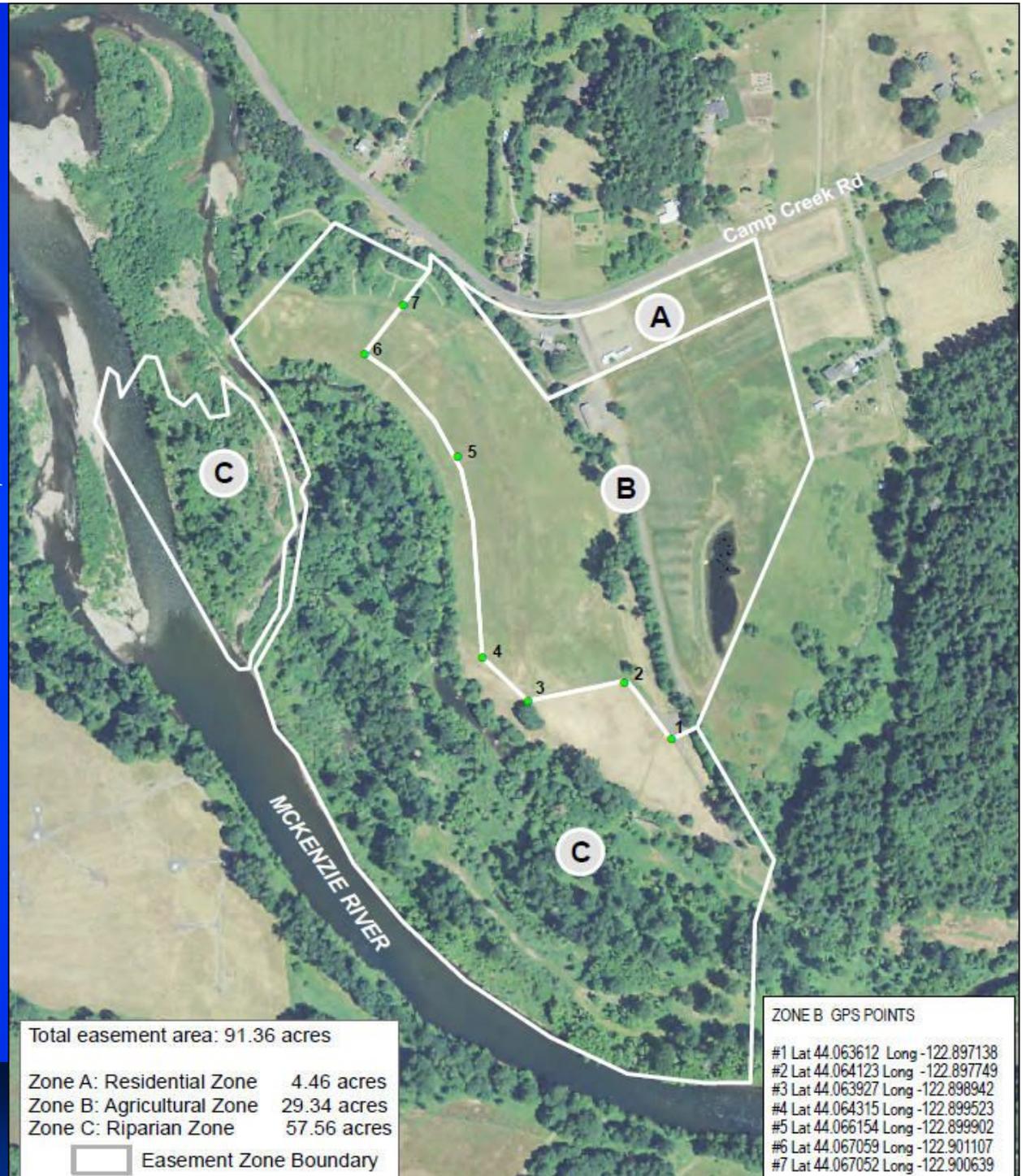
Year 3 – 1,000 acres enrolled = \$107,230 payout

$\$835,825/6463 \text{ acres} = \$129.32/\text{ac}$



# Demonstration Farm

- 13 Partners (same partners as with PES infrastructure)
- Demonstrate Riparian Market to Producers





Rely on us.

<http://www.eweb.org/waterquality/protection>



Contact Karl Morgenstern at:

(541) 685-7365 or via e-mail [Karl.morgenstern@eweb.org](mailto:Karl.morgenstern@eweb.org)