

# Protecting the McKenzie Watershed: Eugene's Sole Source Of Drinking Water

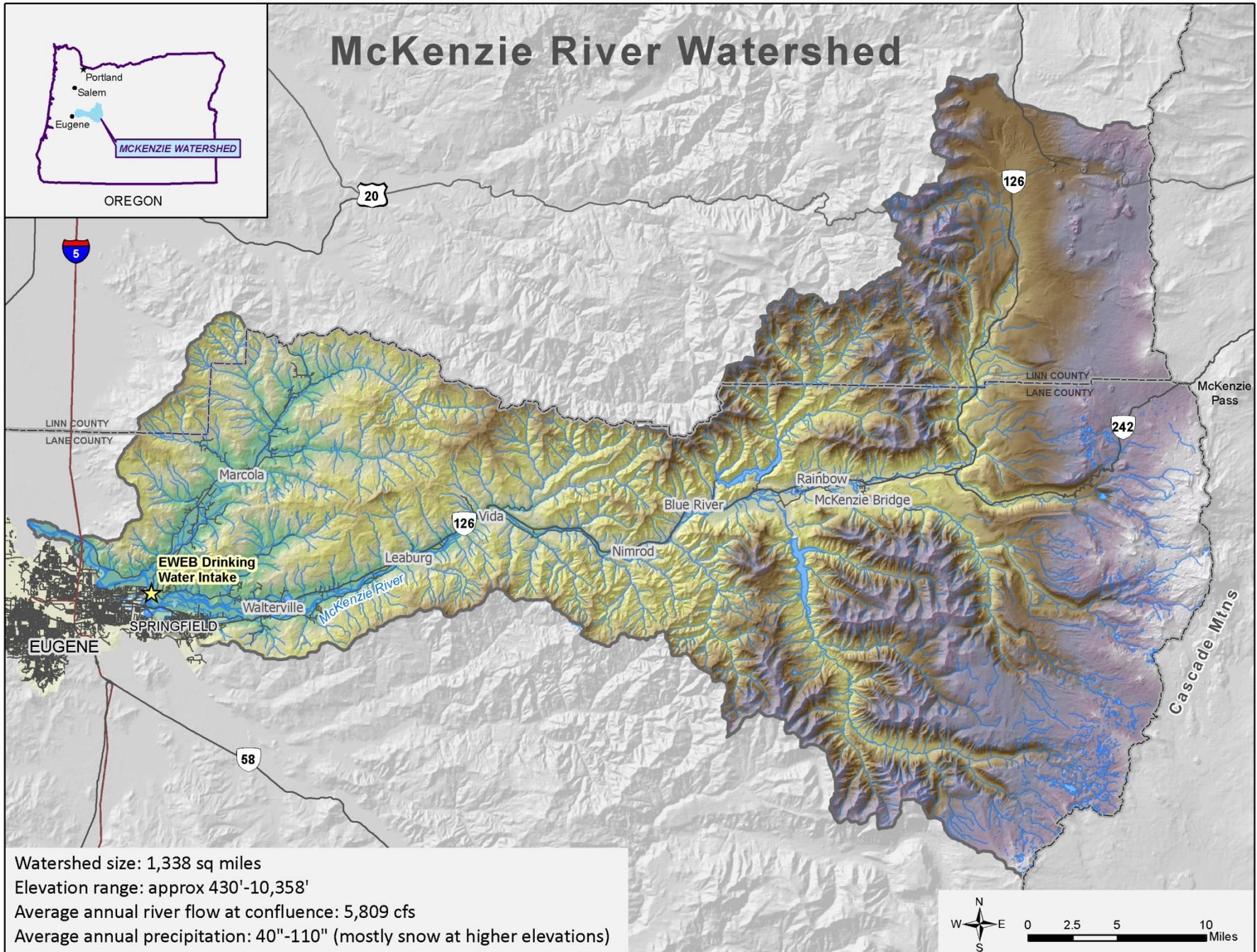
Karl Morgenstern, Eugene Water & Electric Board

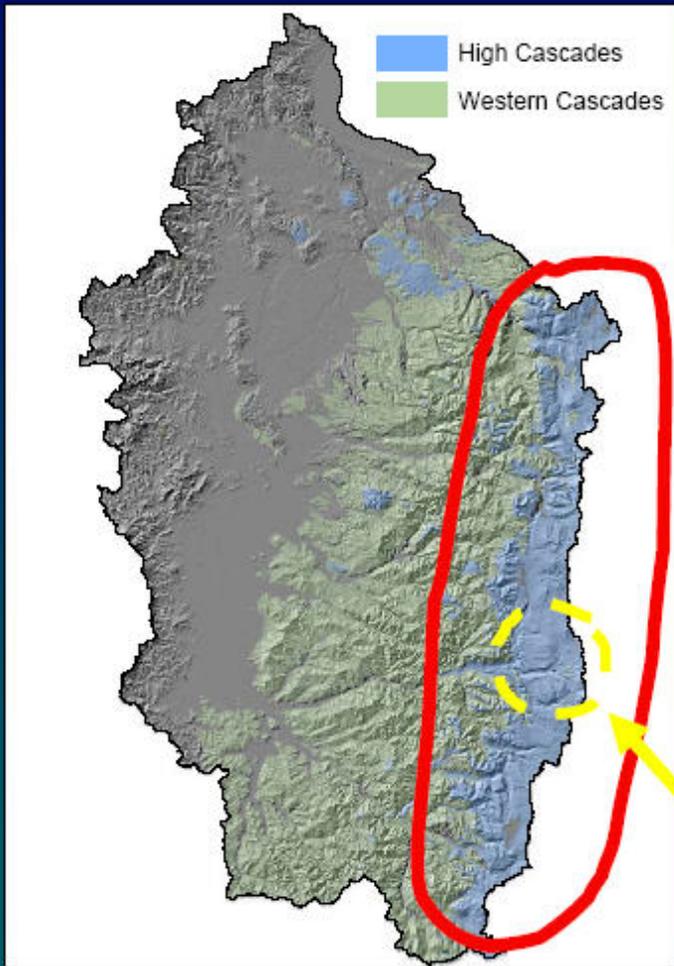


# Discussion Summary

- Importance of the McKenzie River
- Overview of Climate Change Impacts
- EWEB's Source Protection Program
  - Examples of Implementation
    - Agriculture
    - Hazardous Material Spill Response
    - Septic Systems

# McKenzie River Watershed





# 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

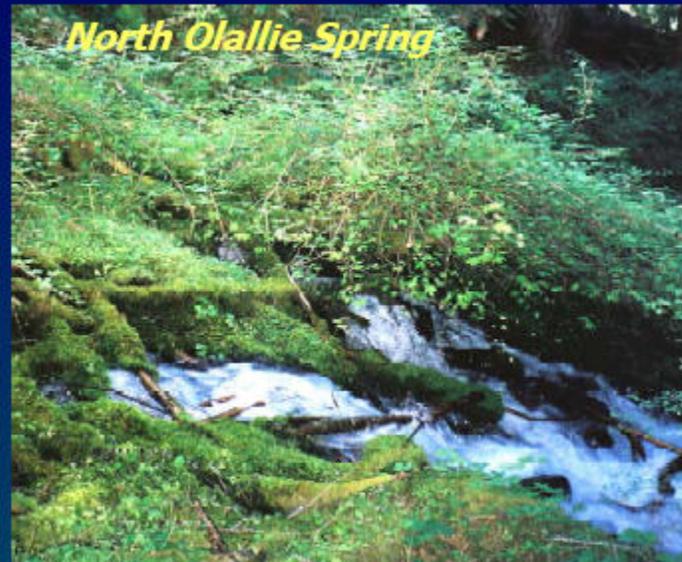


*Great Springs, Clear Lake*



*Tamolitch Pool, McKenzie River*

# Cascade Springs - GUSHERS!



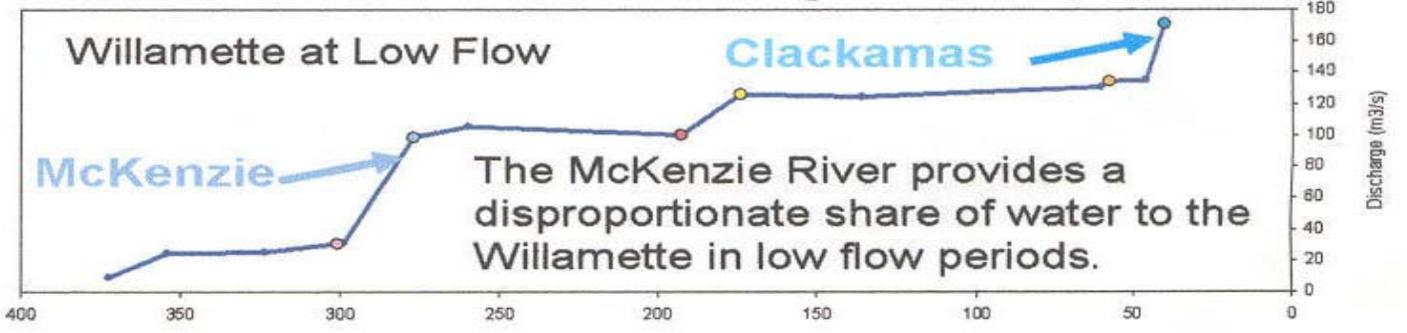
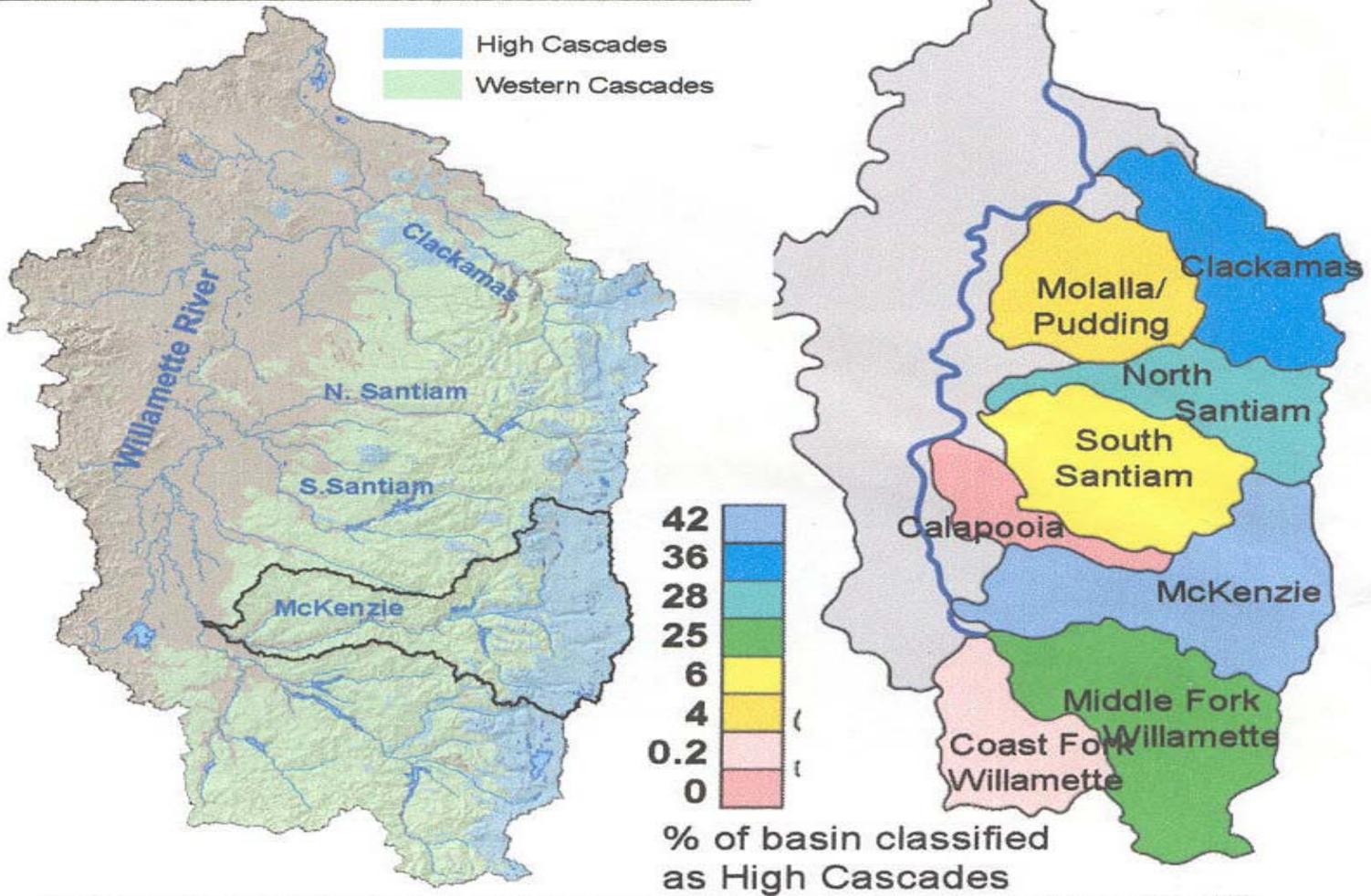
## Groundwater Residence Time

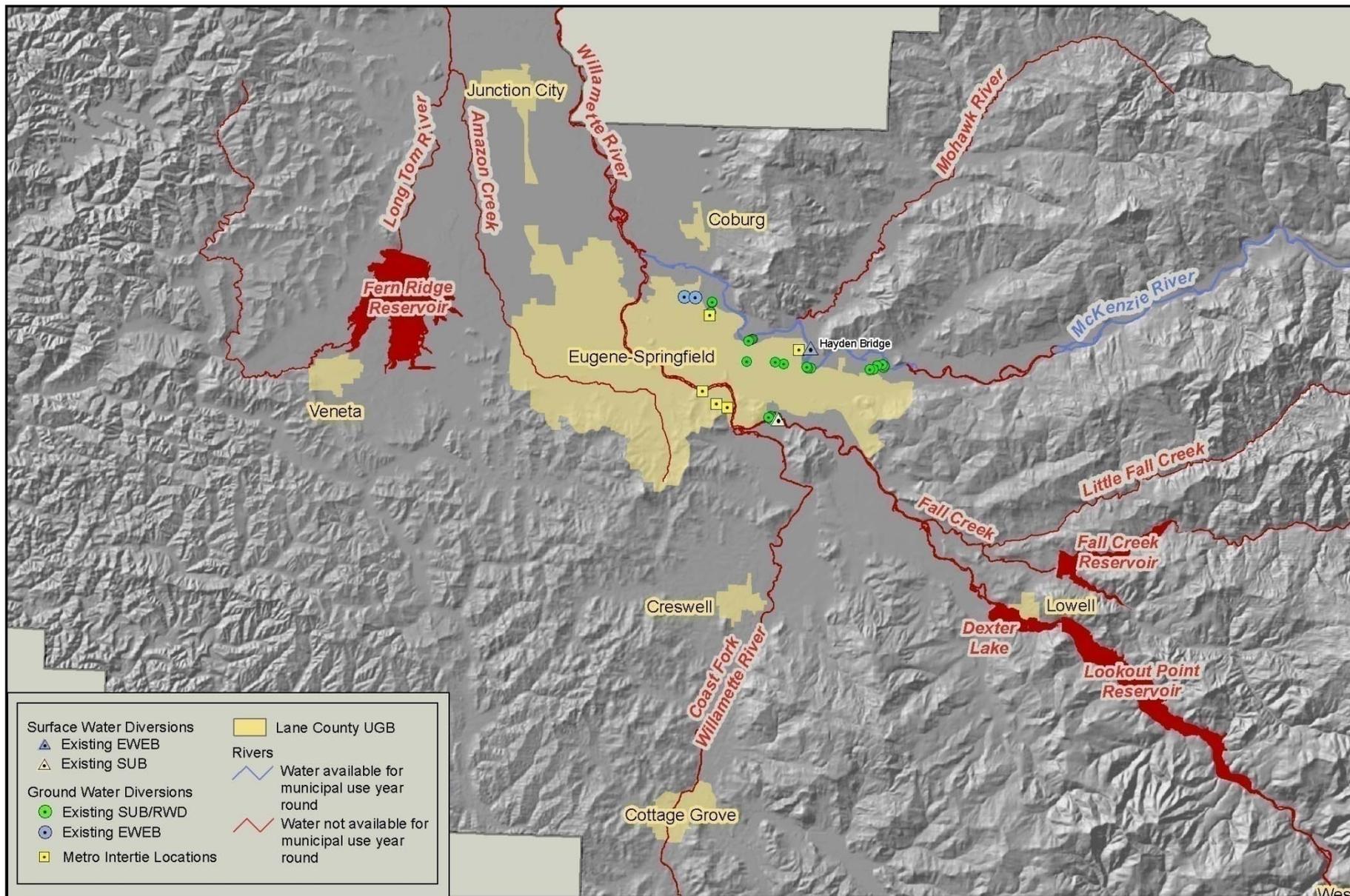


<5 – 10 years from  
snowfall to spring water



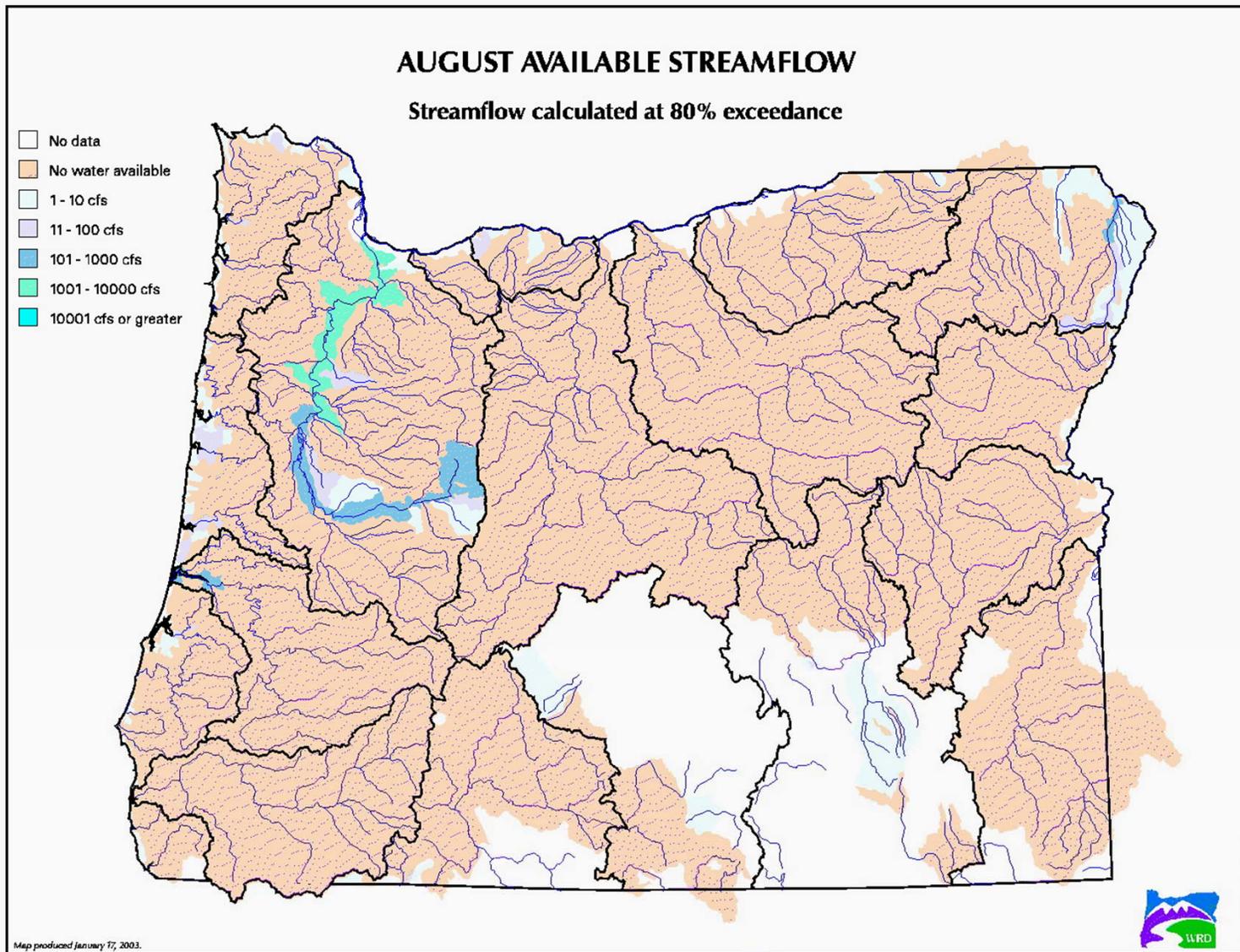
# Importance to the Willamette





Regional Water Availability

# Fully Appropriated Summer Flow



## News Focus

In a region already prone to water shortages, researchers now forecast that rising temperatures threaten the American West's hidden reservoir: mountain snow

# As the West Goes Dry



**MOUNT BACHELOR, OREGON**—Under the dome of a concrete-gray sky, Stan Fox assembles four pieces of aluminum tubing into a 3-meter-long hollow pipe. After standing it on end, he plunges it through more than 2 meters of snow at Dutchman Flat, an alpine meadow perched on the shoulder of this 3000-meter mountain. Fox, who heads the Oregon snow-survey program for the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), removes the tube and reads the snowpack depth, a measurement that has been tracked at nearby sites monthly since the 1930s. Today the snow is 250 centimeters deep, and by comparing the weights of the tube both filled and empty, Fox and a colleague determine that the snow contains about 30% liquid water. If all the snow were instantly liquified, the water would be nearly 1 meter deep. Not too bad. In a region prone to spikes in precipitation, Dutchman Flat is more than 15% above its 30-year average. "The snow in these mountains is a virtual reservoir," Fox says. As the snow melts in the spring and summer, it will slowly release that water, filling streams and reservoirs, which provide lifeblood to the region during the normally bone-dry summer months.

But indications are that this age-old cycle is beginning to change. New assessments of decades' worth of snowpack measurements show that snowpack levels have dropped considerably throughout the American West in response to a 0.8°C warming since the 1950s. Even more sobering, new studies re-

veal that if even the most moderate regional warming predictions over the next 50 years come true, this will reduce western snowpacks by up to 60% in some regions, such as the Cascade Mountains of Oregon and Washington. That in turn is expected to reduce summertime stream flows by 20% to 50%. "Snow is our water storage in the West," says Philip Mote, a climatologist at the University of Washington (UW), Seattle, who leads a team that has produced much of the new work. "When you remove that much storage, there is simply no way to make up for it."

The impacts could be profound. In the parched summer months, less water will likely be available for everything from agriculture and hydropower production to sustaining fish habitats. Combined with rising temperatures, the dwindling summertime water could also spell a sharp increase in catastrophic fires in forests throughout the West. With much of the current precipitation headed downstream earlier in the winter and spring, the change is also likely to exacerbate the risk of floods.

For resource managers already struggling to apportion limited water supplies throughout the West, the predictions are grave. "If that's true, it would have a huge impact," says Christopher Furey, a policy analyst with the Bonneville Power Administration in Portland, Oregon, which markets electricity from over a dozen power-generating dams in the Columbia River Basin that provide power to millions of people. In a region

where farmers, fishers, recreationalists, and municipalities already compete for water, climate change may be setting the stage for an entirely new round of conflicts. "We think of the water wars in the past," says Fox, referring to the epic battles over rerouting western waters in the early 20th century. "In the future they will probably be more peaceful but much more prevalent."

### Too wet, too soon

The root of the problem is easy to state: The semiarid West has too little water, spread too unevenly throughout the year. Most of Montana sees less than 46 centimeters of precipitation a year. Even rainy Portland receives only about one-tenth of its annual 91 centimeters of precipitation during the summer. For most of California the fraction is even smaller. Philadelphia, by contrast, typically receives 102 centimeters of annual precipitation, 30% of which comes in the summer.

Thanks to massive dam-building in the first half of the 20th century, more than 60 million people—roughly one-fifth of the U.S. population—now live in the Pacific and Intermountain West. Those tens of millions of people are dependent not just on water, but on snow. Snowmelt makes up 75% of all water in streams throughout the West. If that snow falls as rain or melts too early, there will be little water left in the virtual reservoir come late summer and fall. Unfortunately, that is just what appears to be happening.

Back down the mountain in a conference

# Register-Guard

WEDNESDAY, MAY 7, 2014

\$1.00



By AP/WIDEWORLD/The Associated Press, 2013

An airplane drops fire retardant on a burning ridge west of Cleveland, Ohio. A new climate change assessment says the risk of wildfires is increasing.



TONY GOODMAN/The Associated Press, 2012

The remains of a carp rest on the dry bed of O.C. Fisher Lake in San Angelo, Texas. The report says extreme weather is affecting daily lives.

# REPORT: WARMING IS TOUCHING US ALL

Climate change's effects are growing, scientists say

By SEITH BORENSTEIN  
The Associated Press

**WASHINGTON** — Most Americans already are feeling non-macho global warming. From heat waves to wild storms to longer allergy seasons. And it is likely to get worse and more expensive, says a new federal report that is heating up political debate along with the

### temperature.

Shortly after the report came out Tuesday, President Obama spoke to several television weather reporters to make his point about the bad weather news and a need for action to curb carbon pollution before it is too late.

"We want to emphasize to the public, this is not some distant problem of the future. This is a problem that is affecting Ameri-

cans right now," Obama told "Today" show weathercaster Al Roker. "Whether it means increased flooding, greater vulnerability to drought, more severe wildfires — all these things are having an impact on Americans as we speak."

Climate change's asserted harms "are expected to become

Turn to CLIMATE, Page A21



SEITH BORENSTEIN/The Seattle Times, 2012

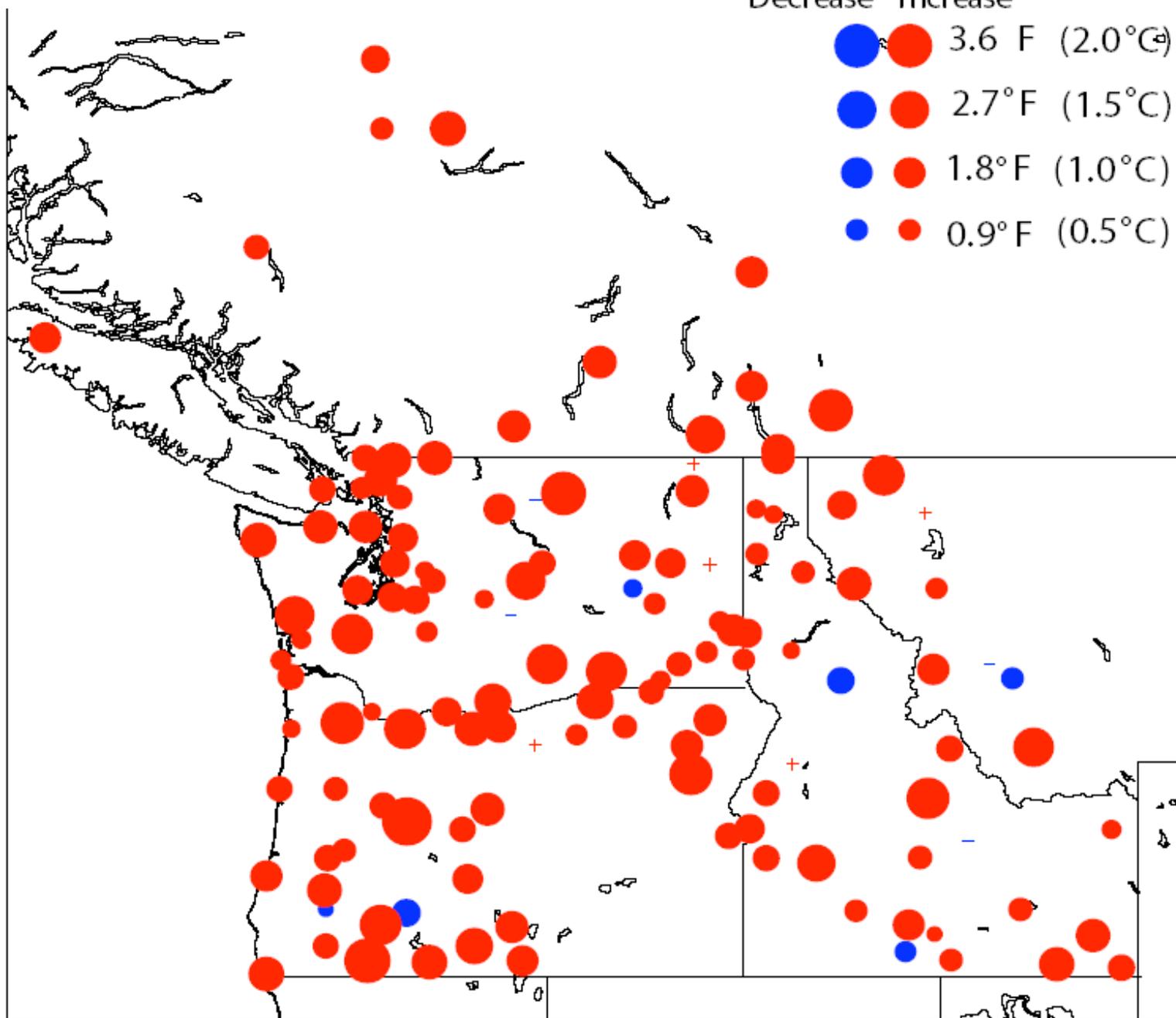
Pine trees are damaged by bark beetles in the North Cascades, Wash. The beetles are harming high-altitude forests, though mostly safe from bugs.



CHRISTOPHER BAX ANTHONY/The Associated Press, 2012

Floodwaters surround homes in Minot, N.D. A report says warming is turning America the beautiful into America the stormy, sneaky and dangerous.

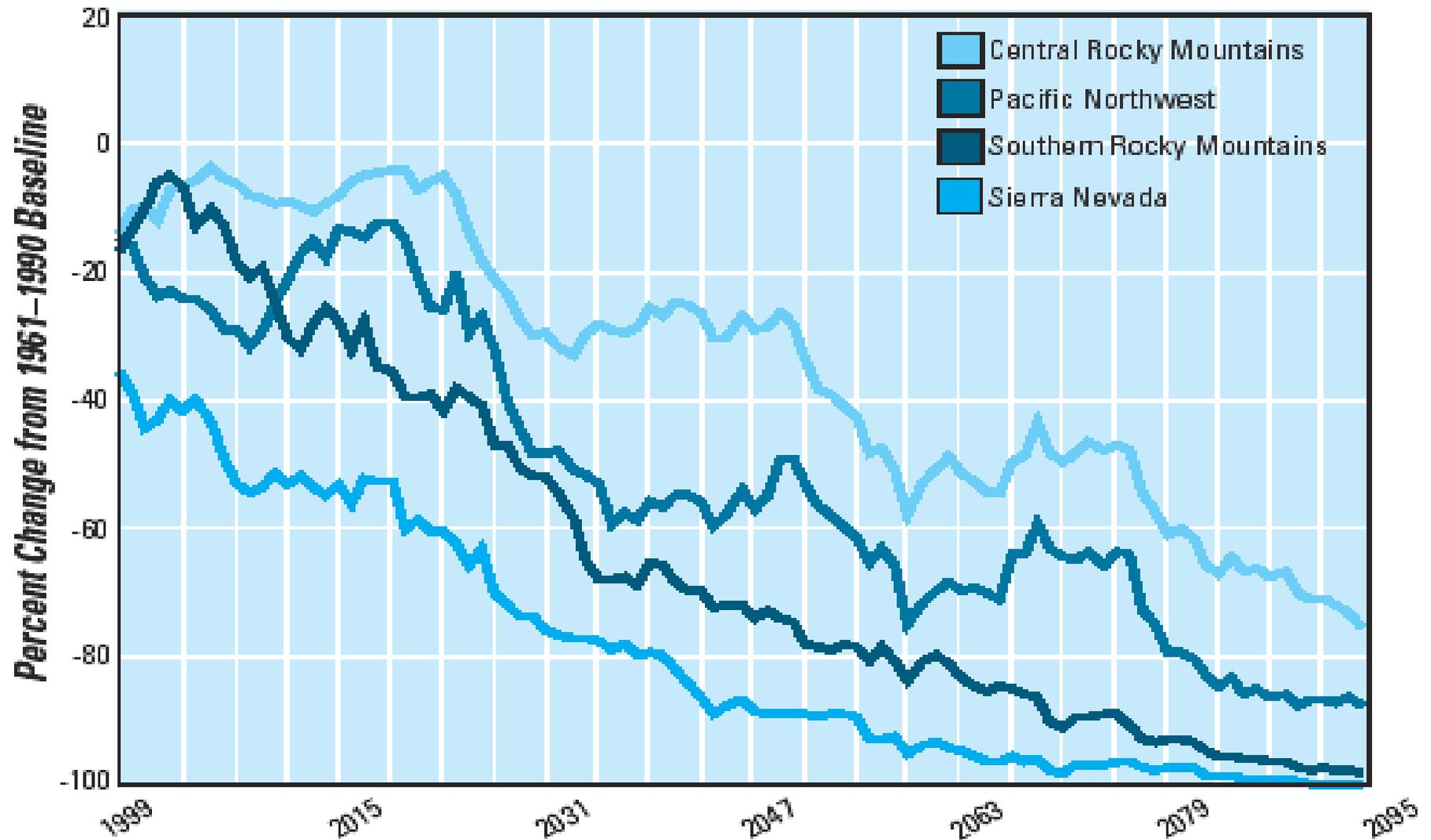
# Temperature Trends 1920-2000



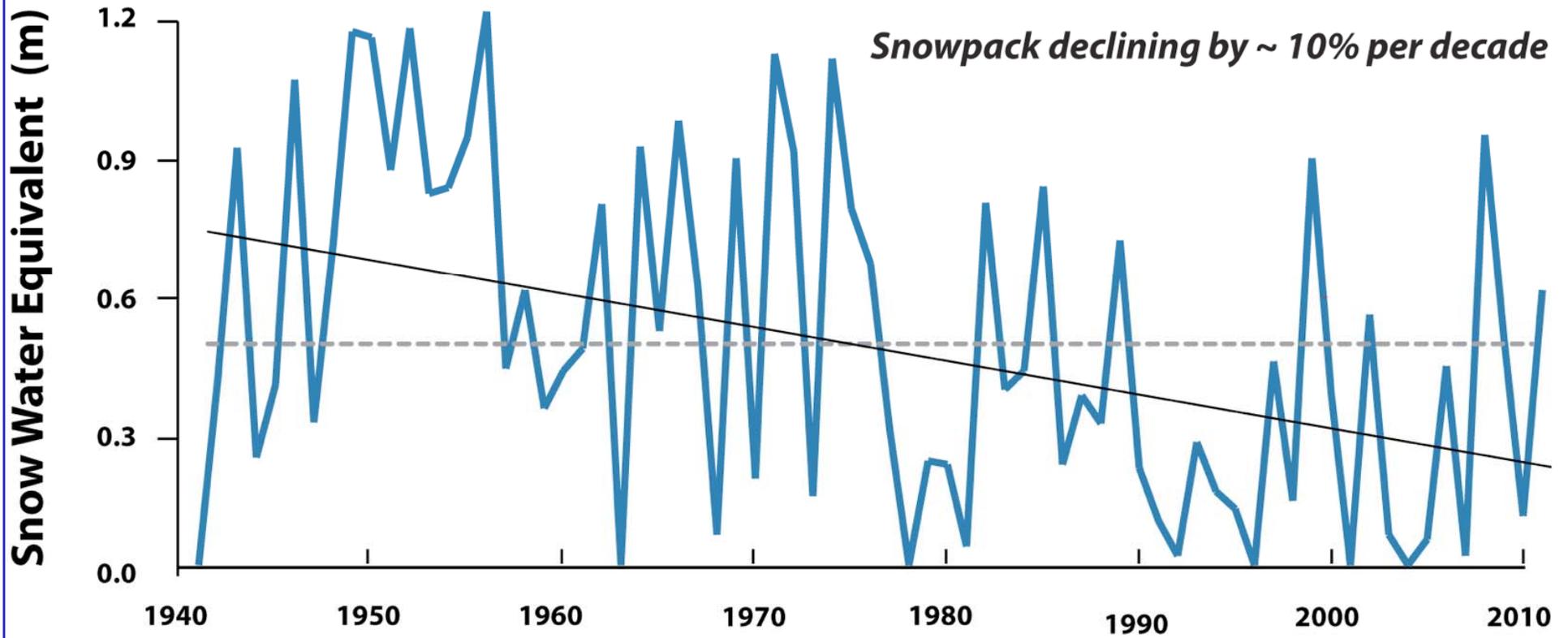
Source: Climate Impacts Group, University of Washington

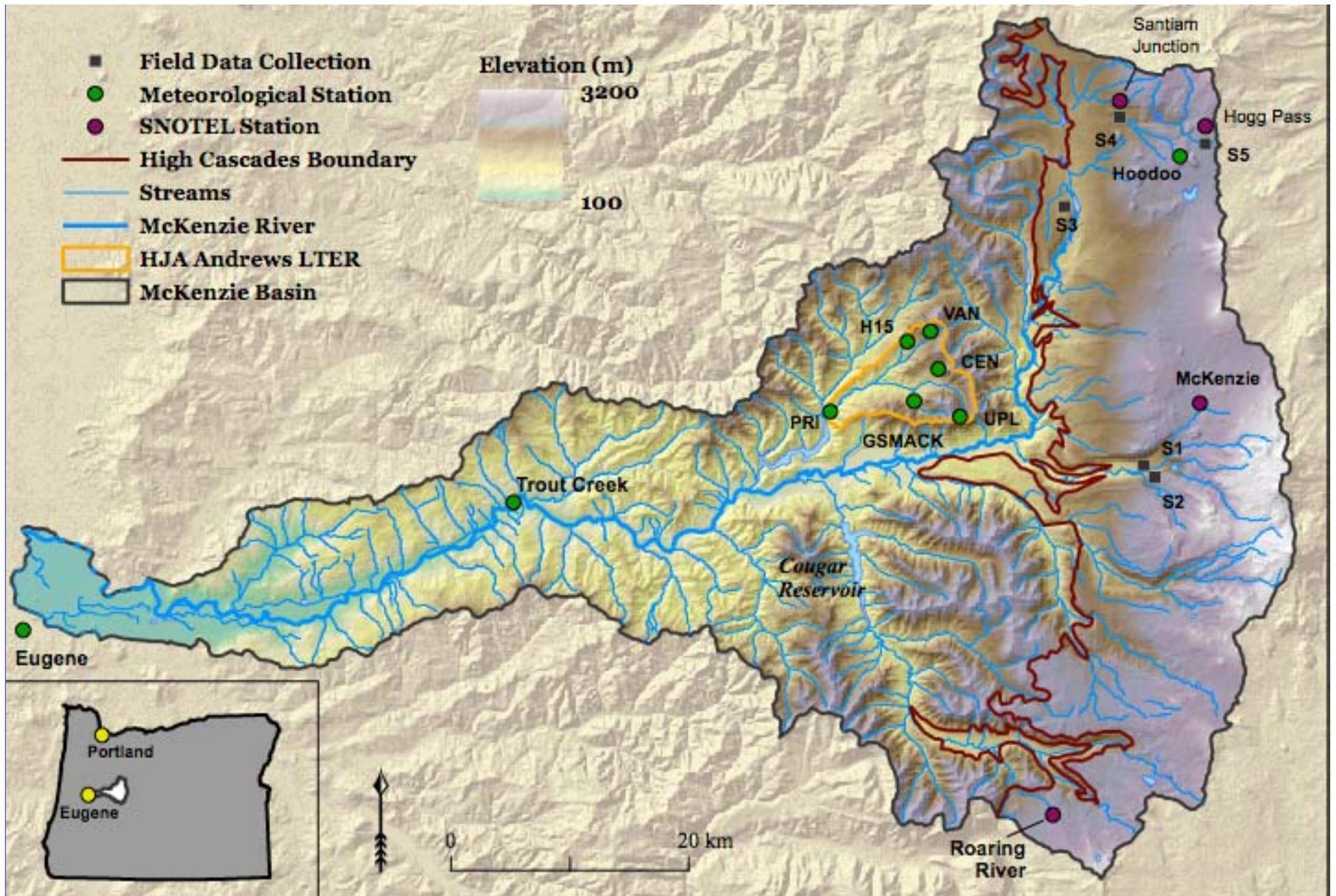
# Implications and Long Term Trends

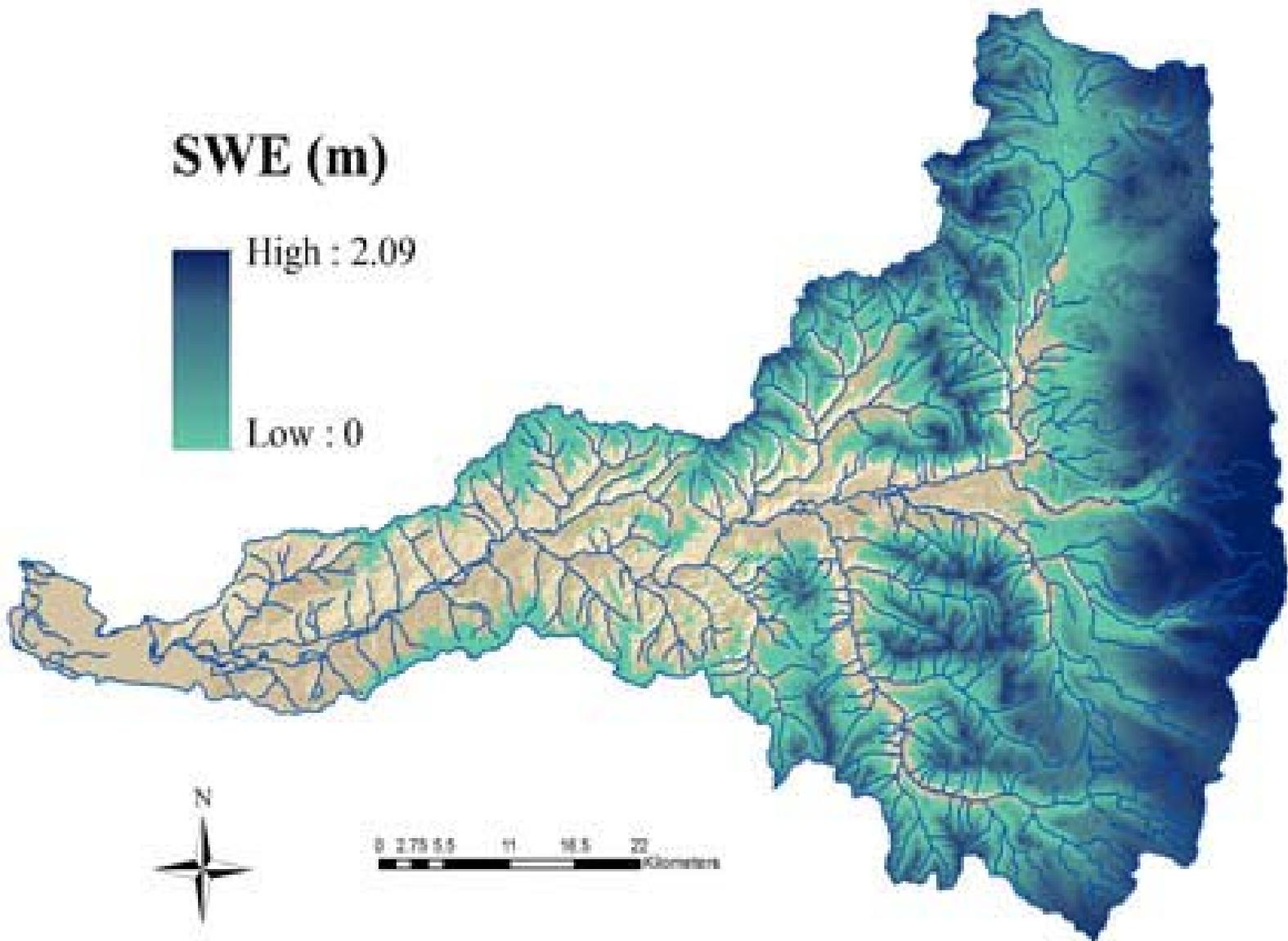
*Canadian Model*

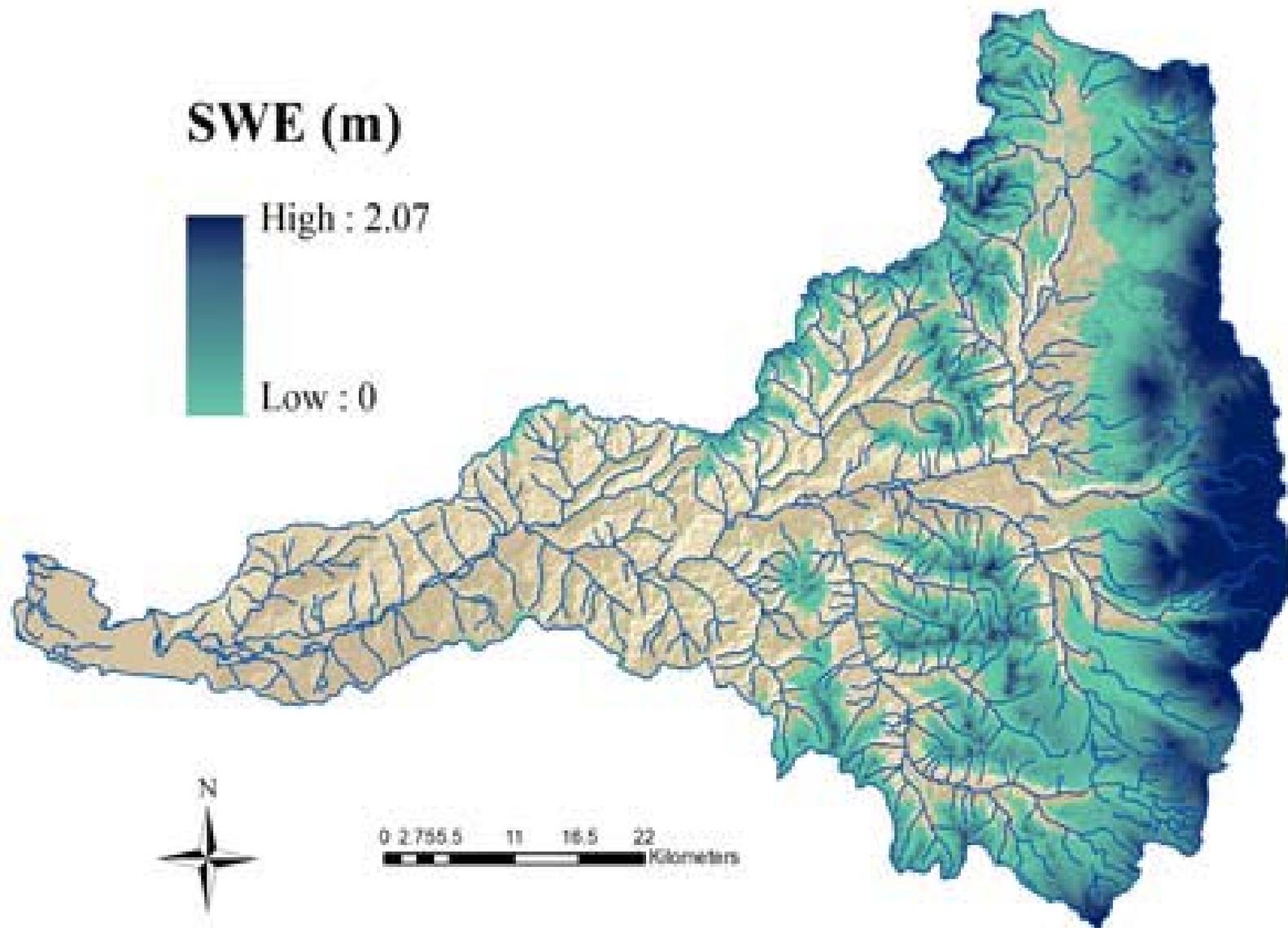


## Santiam Junction on April 1st (1941 - 2011)

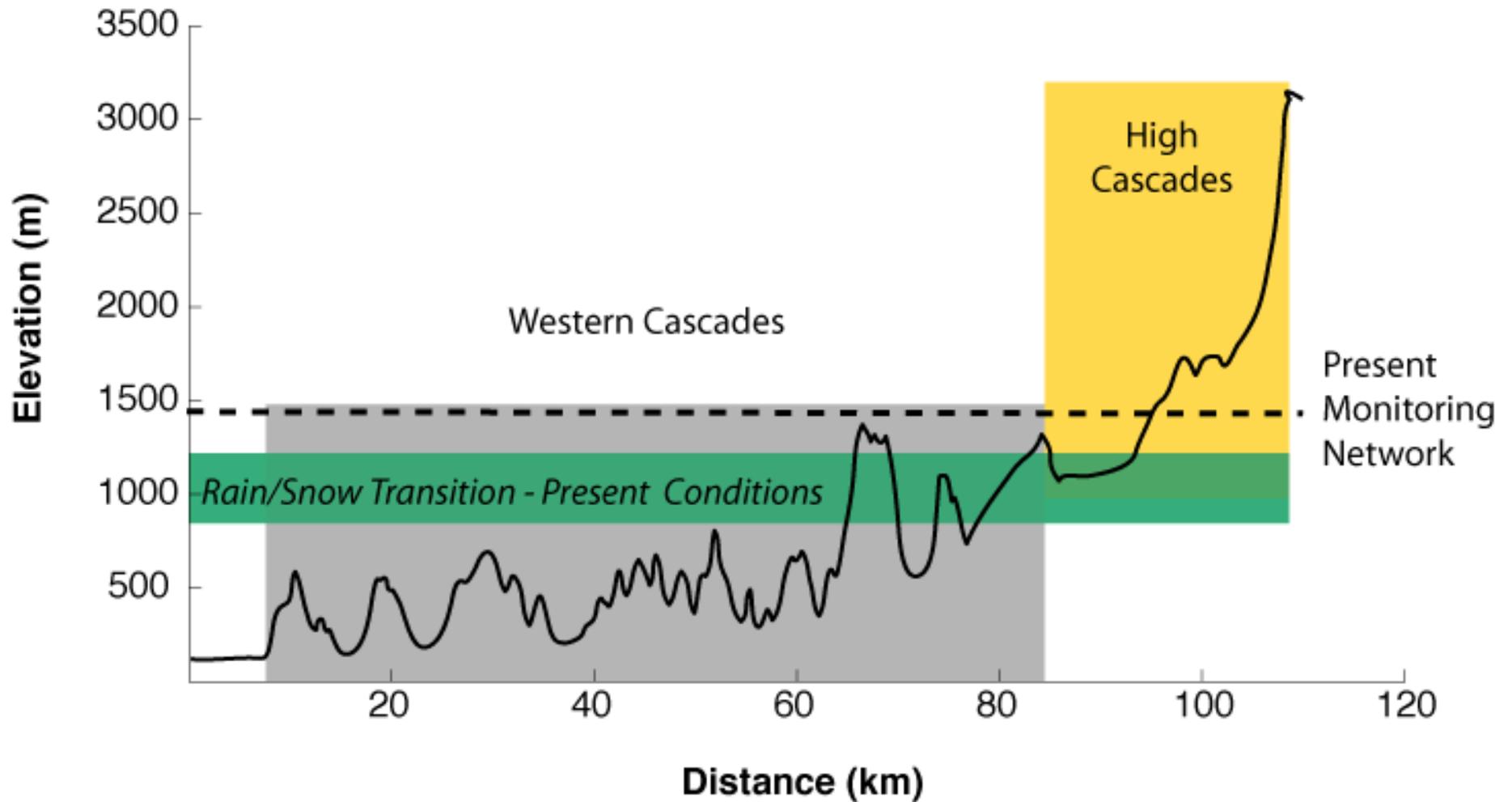




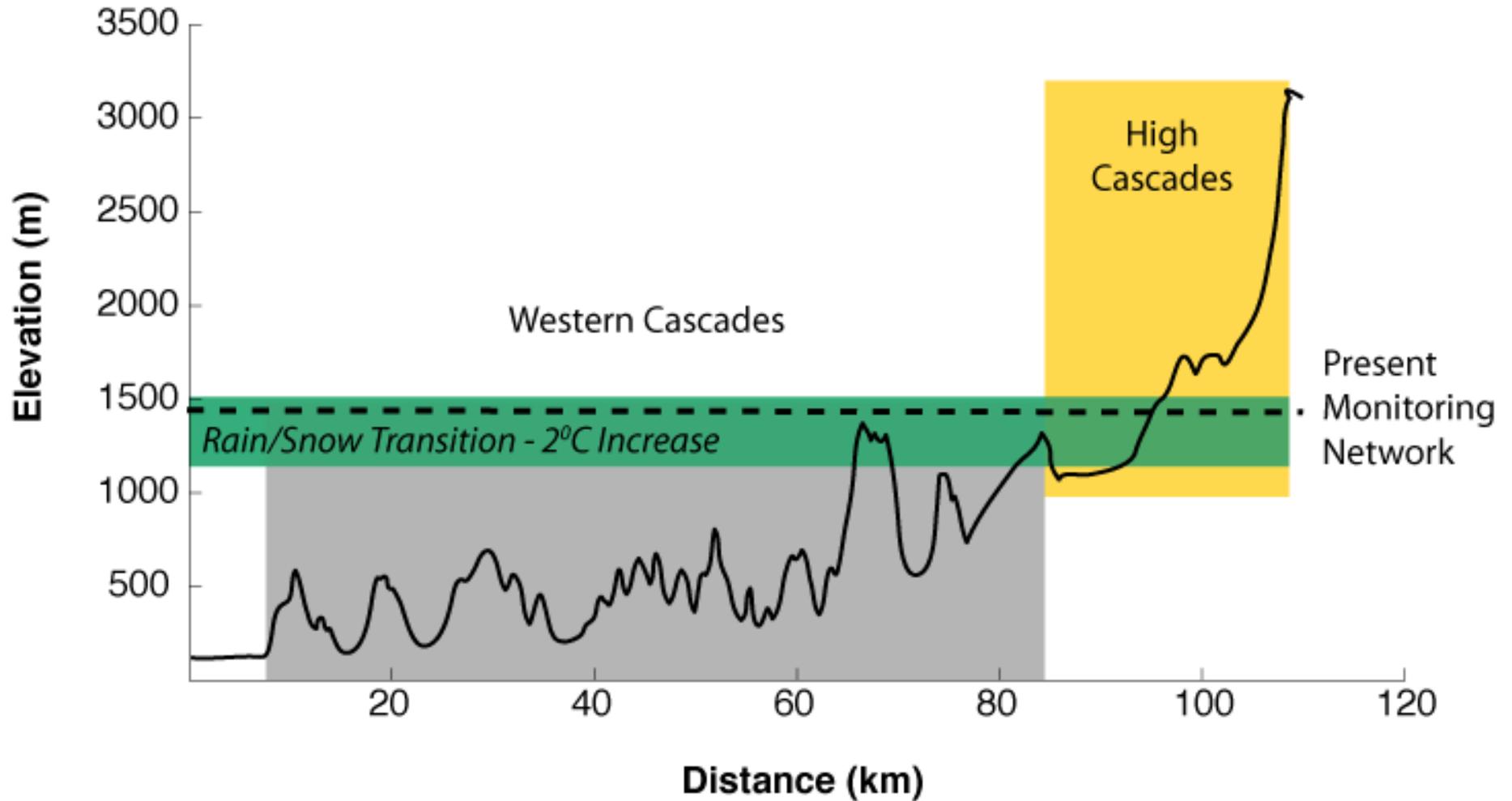




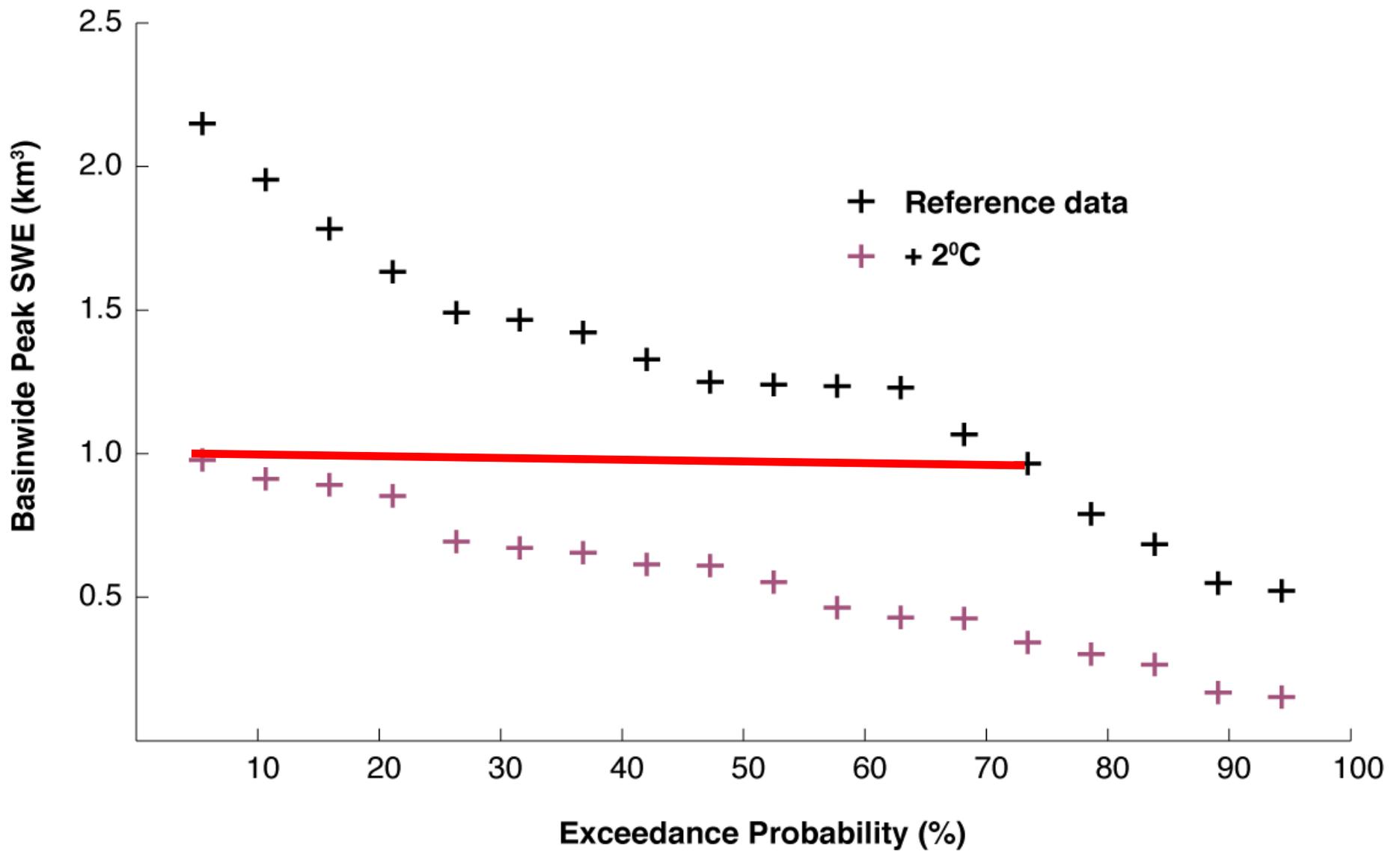
## Elevational Profile of the McKenzie River Basin



## Elevational Profile of the McKenzie River Basin



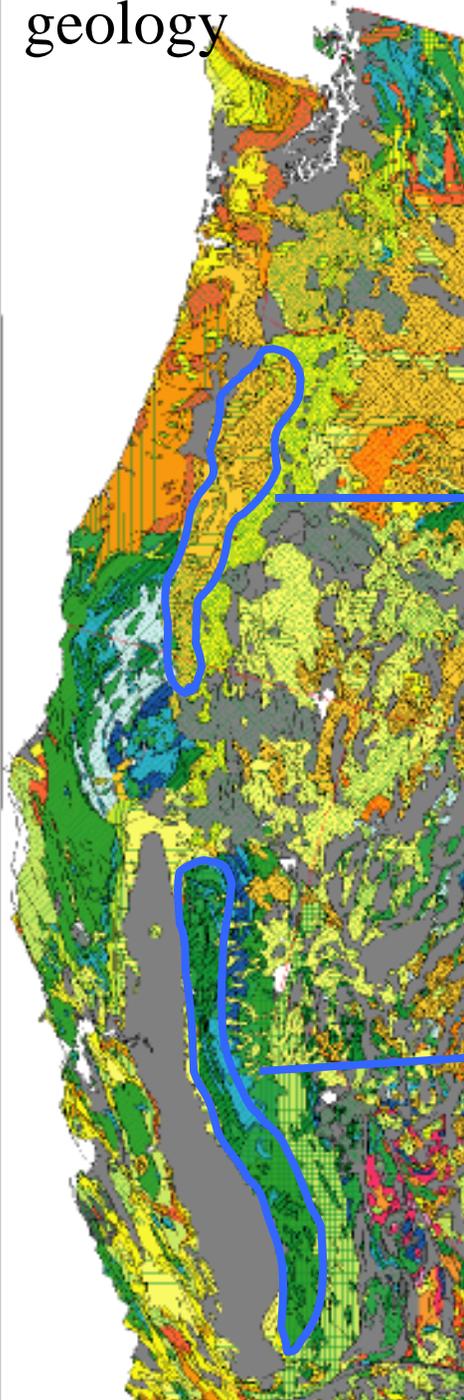
## Exceedance Probability for Basinwide SWE



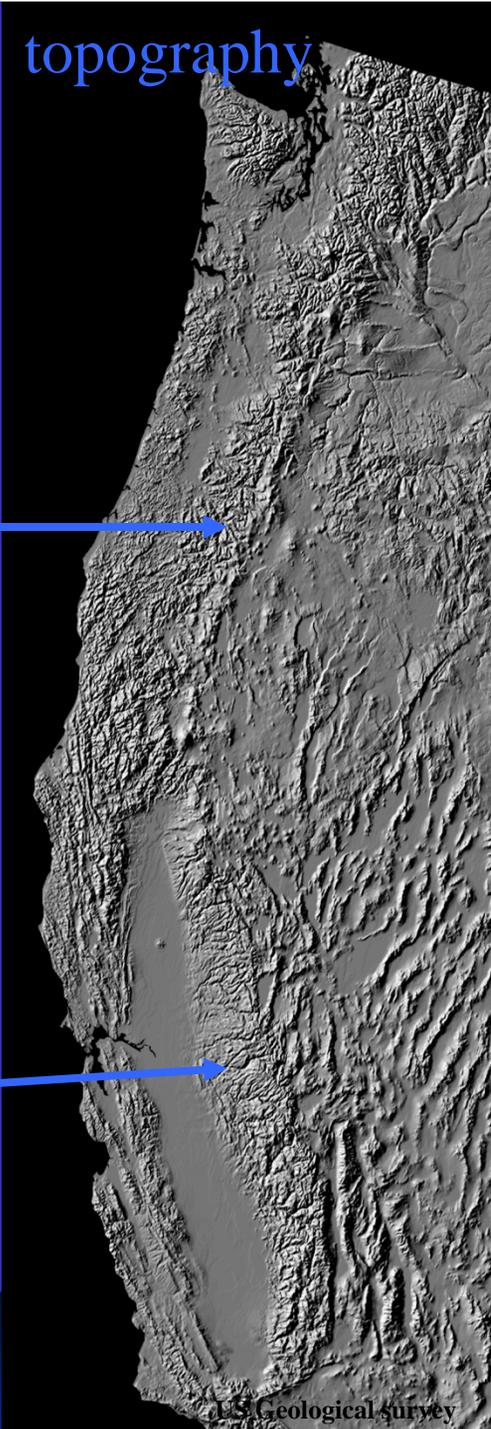
# Climate Change Impacts to McKenzie SWE

- Loss of snow pack in 3,000' to 4,500' zone
  - 56% of volume of water currently stored as snow
  - Equivalent of twice the volume of Cougar Reservoir or 400,000 acre feet
  - More rain on snow events – winter flooding
- Peak spring snow melt/runoff happens 12 days earlier

geology



topography



Likely future  
summer water  
supply:

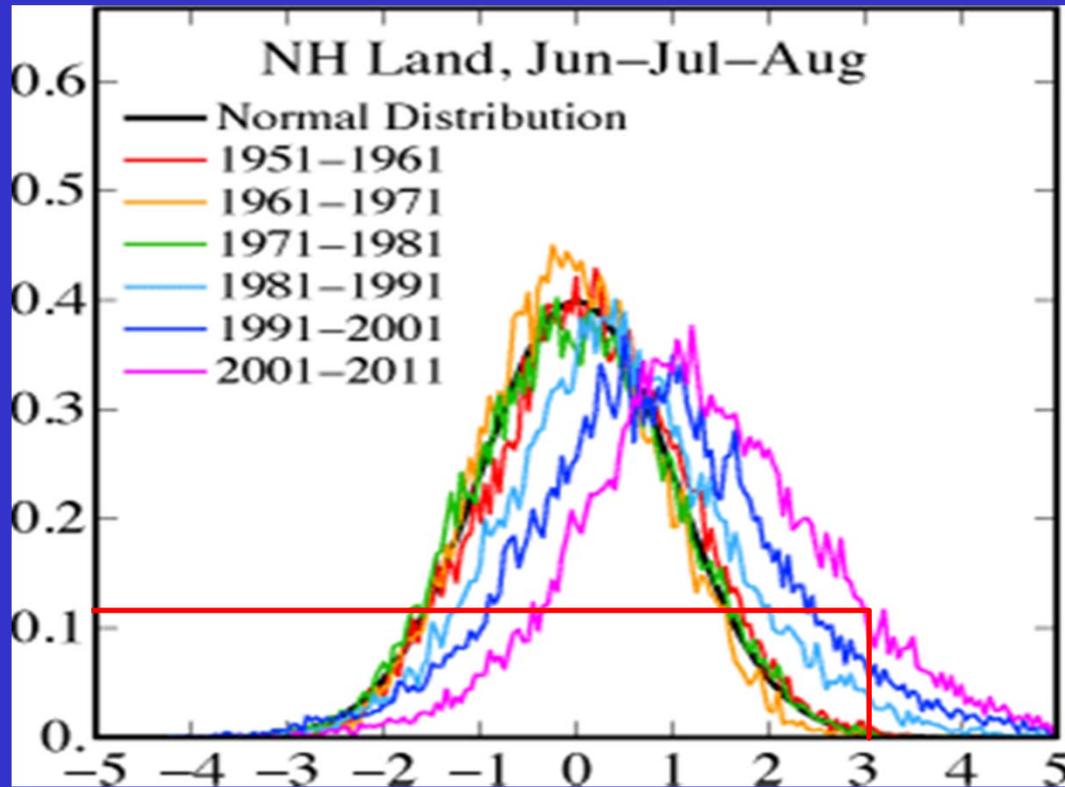
**Cascades:**

Sustained, due to  
groundwater storage

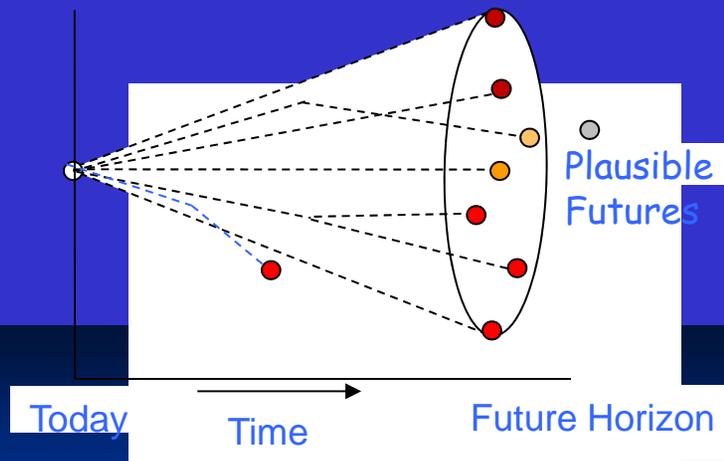
**Sierra:**

Greatly diminished, due  
to loss of snowpack

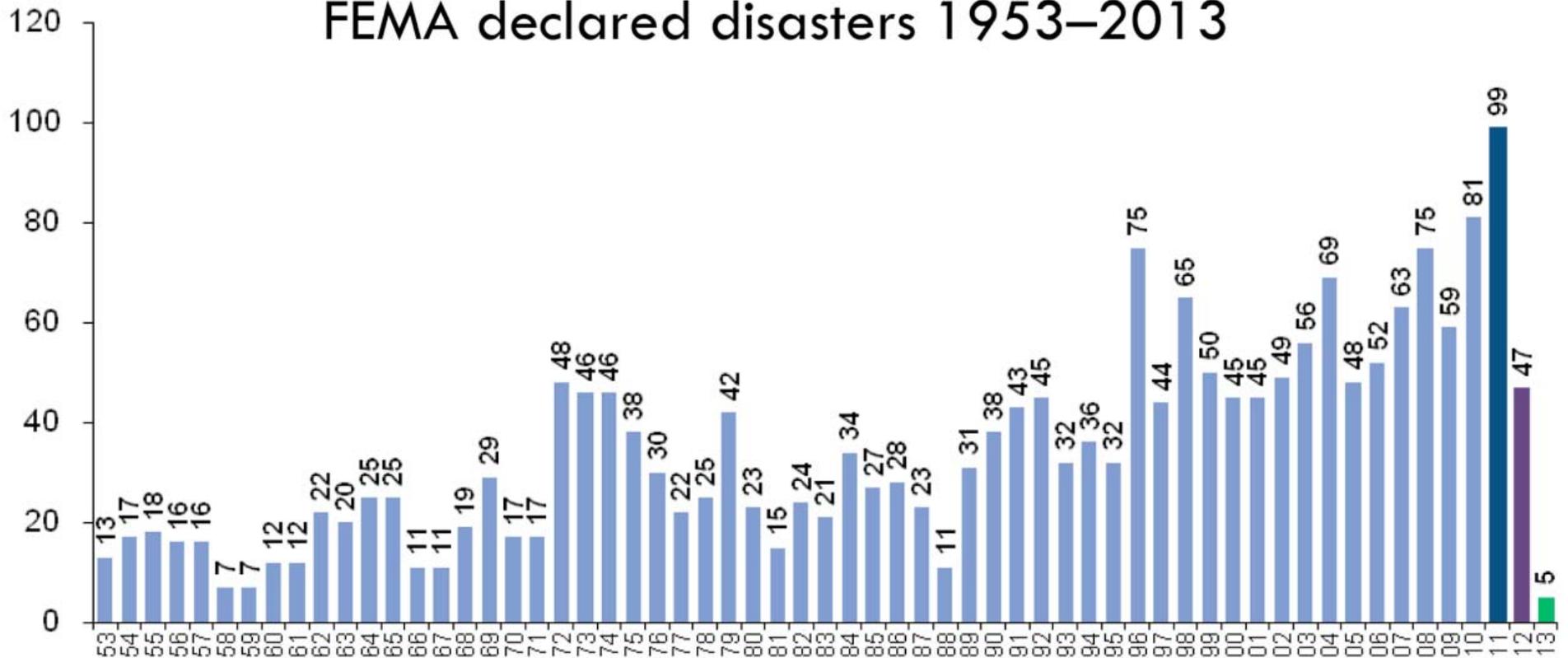
Frequency of Occurrence



Standard Deviation – Extreme Hot Weather



## FEMA declared disasters 1953–2013



2013 data is through February 24

Data source: FEMA

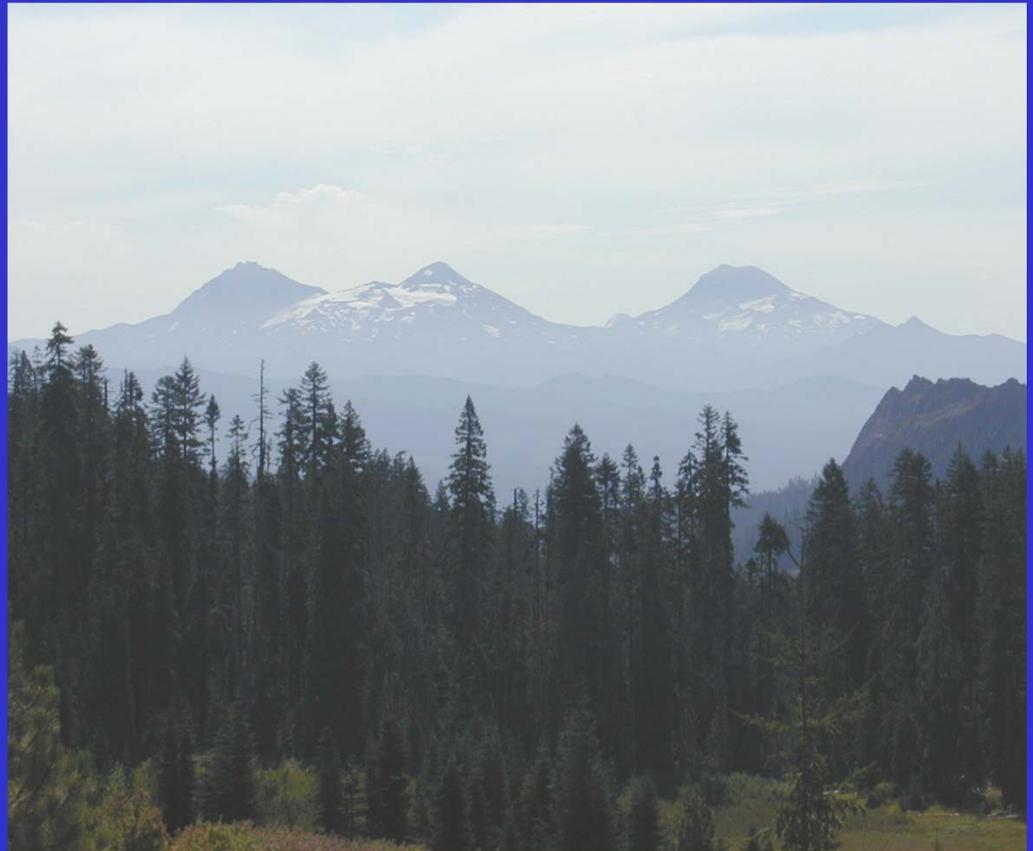
Image courtesy of Franklin Nutter's Senate Testimony

# EWEB's Drinking Water Source Protection Program

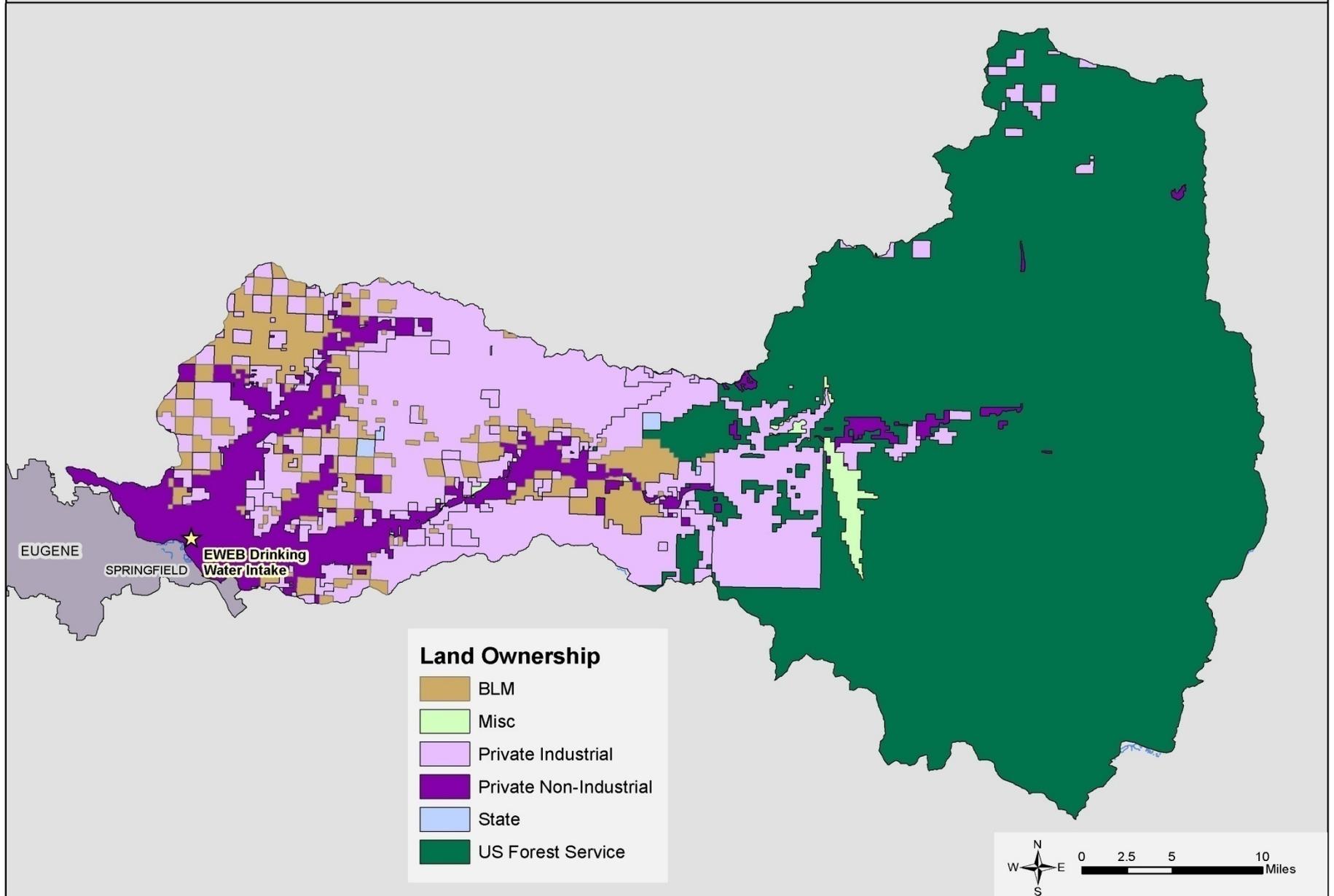


# Source Protection Program Objective

- 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



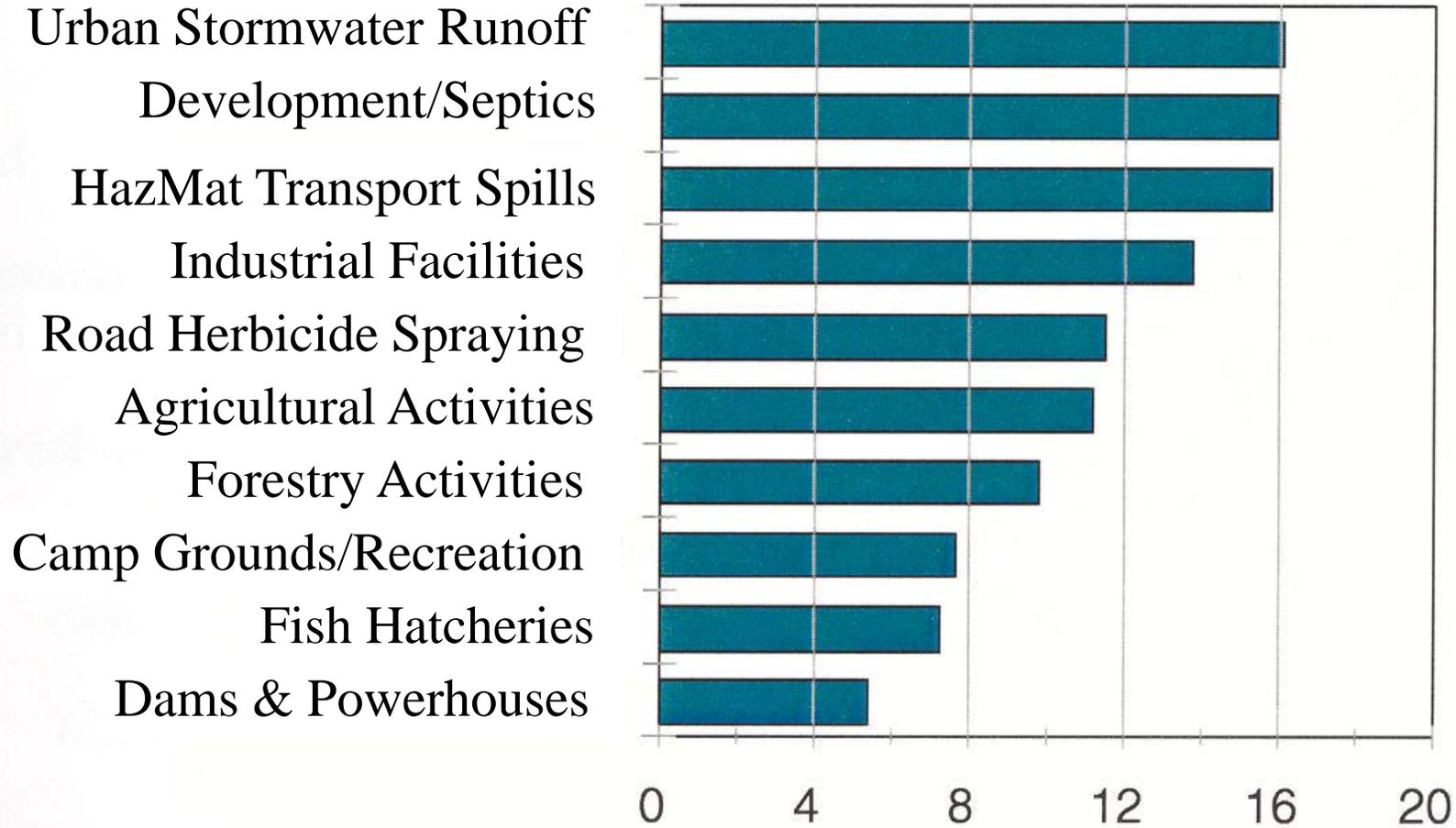
Industry



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 & Conservation Easements
- Watershed Land Use Tracking and Management
- Public Outreach and Information Sharing

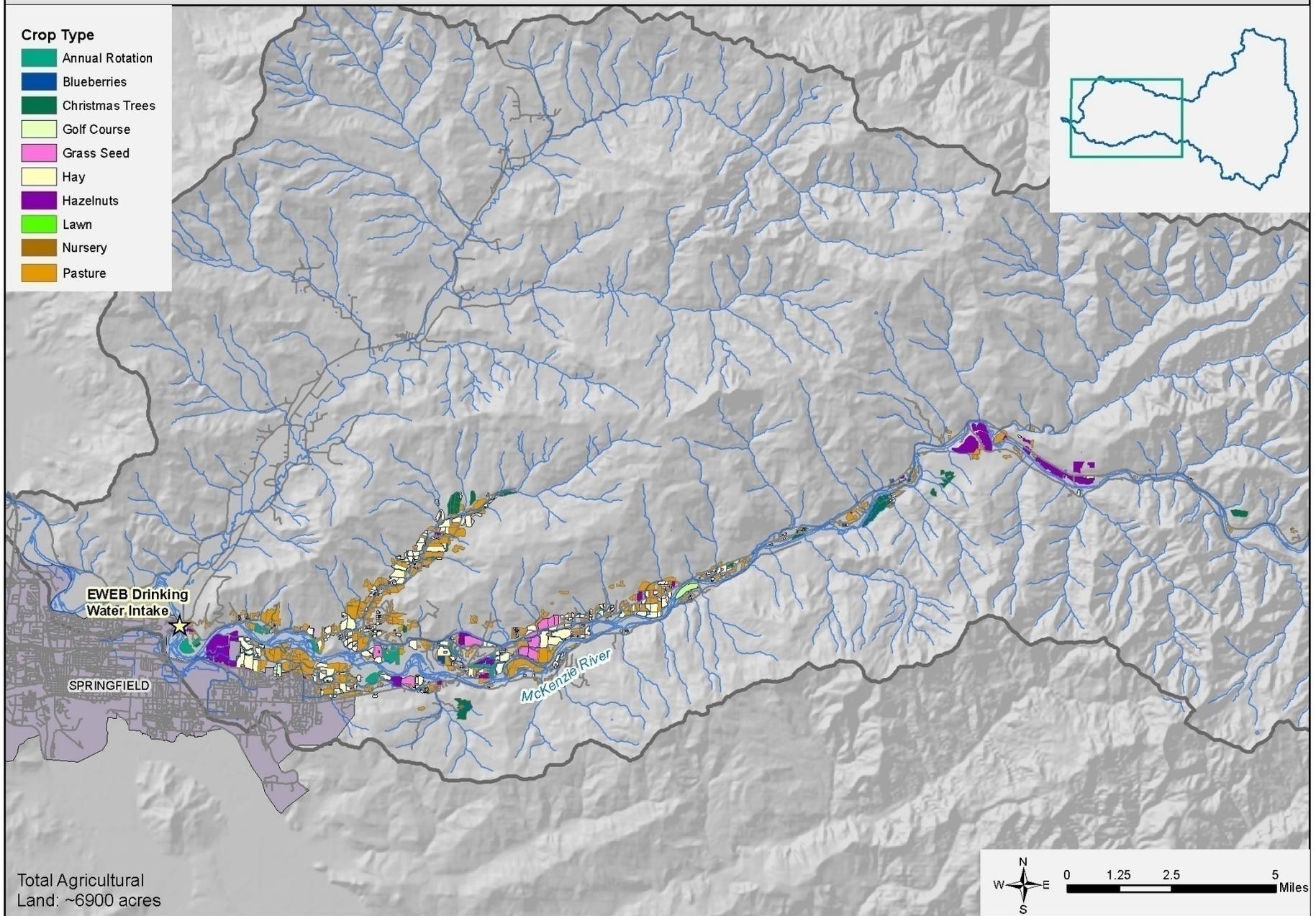
# Major Initiatives Include:

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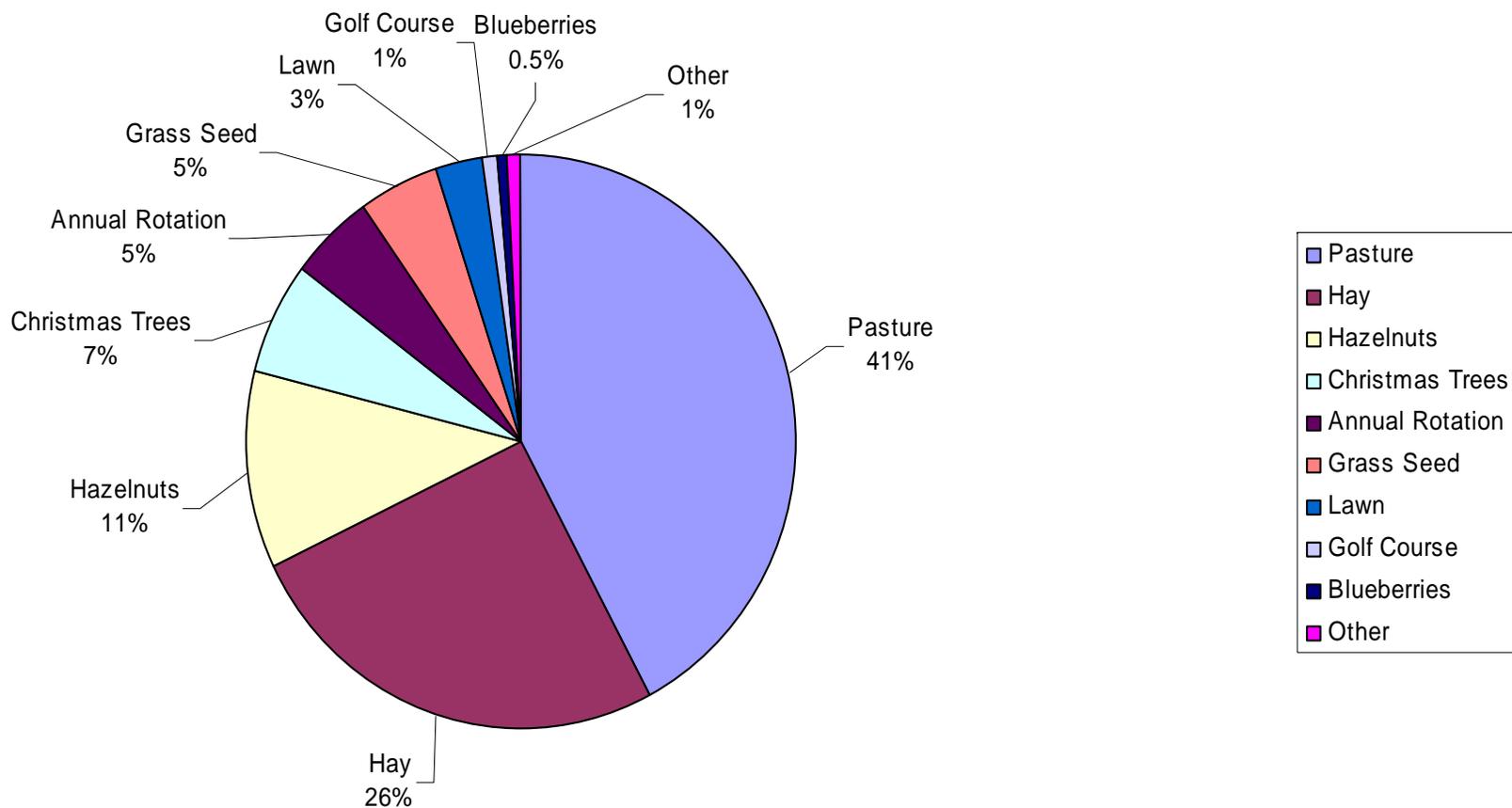
- **Watershed Emergency Response System**
- Comprehensive Water Quality Monitoring
- **Septic System Assistance program**
- **Healthy Farms Clean Water Program**
- Berggren Demonstration Farm
- Leaburg Demonstration Forest
- Voluntary Incentives Program
- Pollution Prevention/Ecobiz Certification

# Agriculture as a water quality concern

# Agricultural Land in the McKenzie River Watershed, Upstream of EWEB's Drinking Water Intake



# Distribution of Crops in the McKenzie

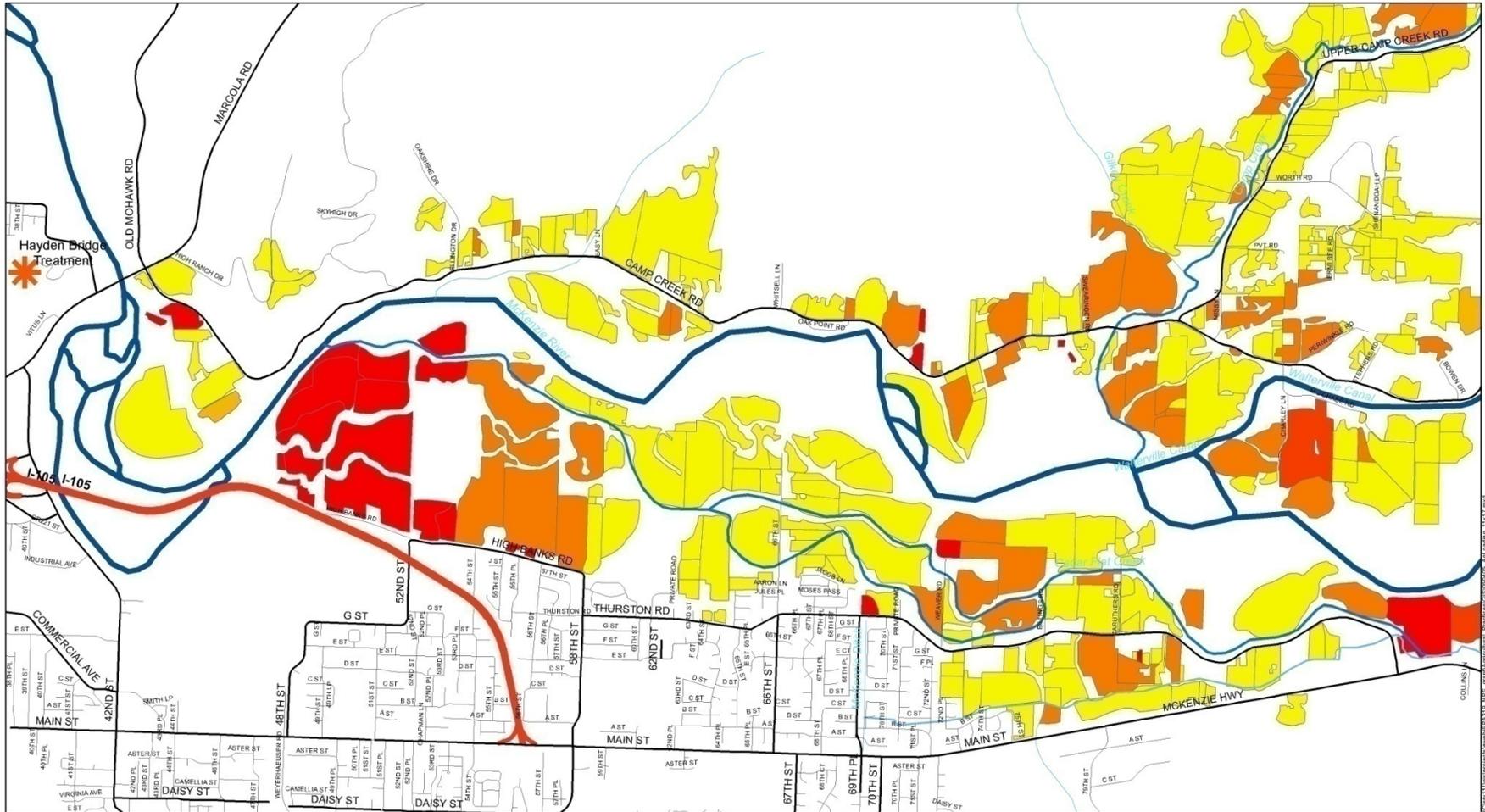


# Back of Envelope Assessment

- Used U.S. Geological Survey 1997-98 study of Willamette Valley typical pesticide use by crop type.
- Applied typical pesticide use to crop types in McKenzie.
- Initial evaluation of potential threat from runoff from agricultural fields.
- Approx. 6,700 lbs pesticides applied annually.

# Annual Pesticide Use By Crop/Acre

Crop Type	Total lbs Pesticide/acre
Hazelnuts	3.8
Nursery	3.8
Blueberries	3.7
Grass Seed	2.5
Hay	1.2
Pasture	.8
Christmas Trees	.5



**McKenzie Watershed  
Agricultural Census**

**Total Pounds Per Acre of Pesticide Application**

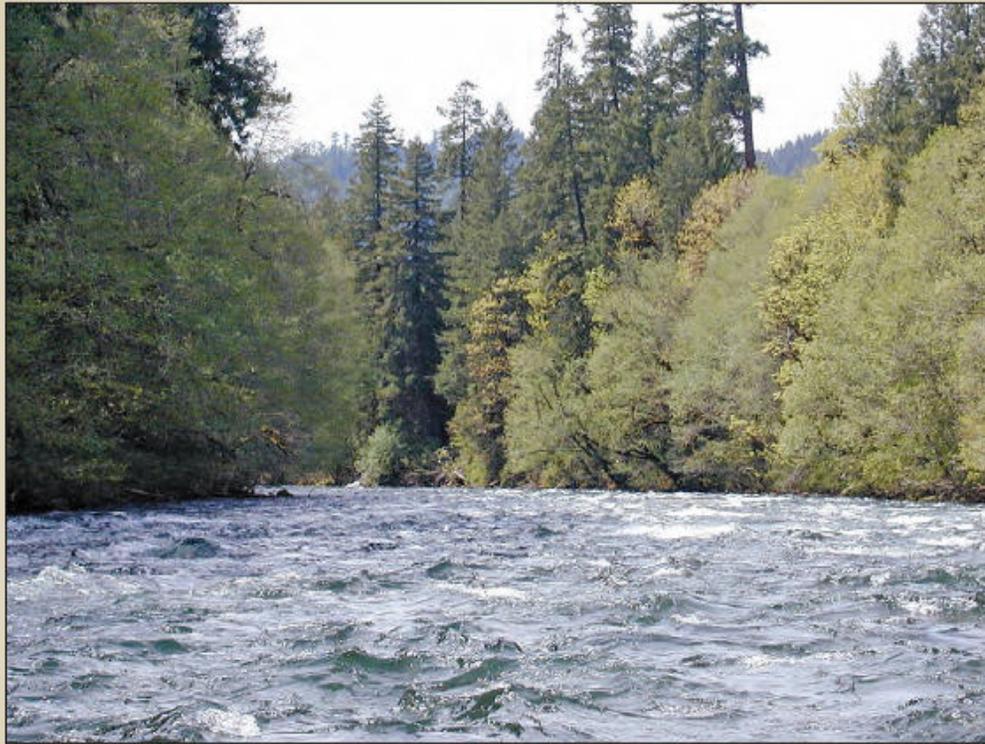


**Sheet 1**



Prepared in cooperation with Eugene Water and Electric Board

## Reconnaissance of Land-Use Sources of Pesticides in Drinking Water, McKenzie River, Oregon



### Study Statistics:

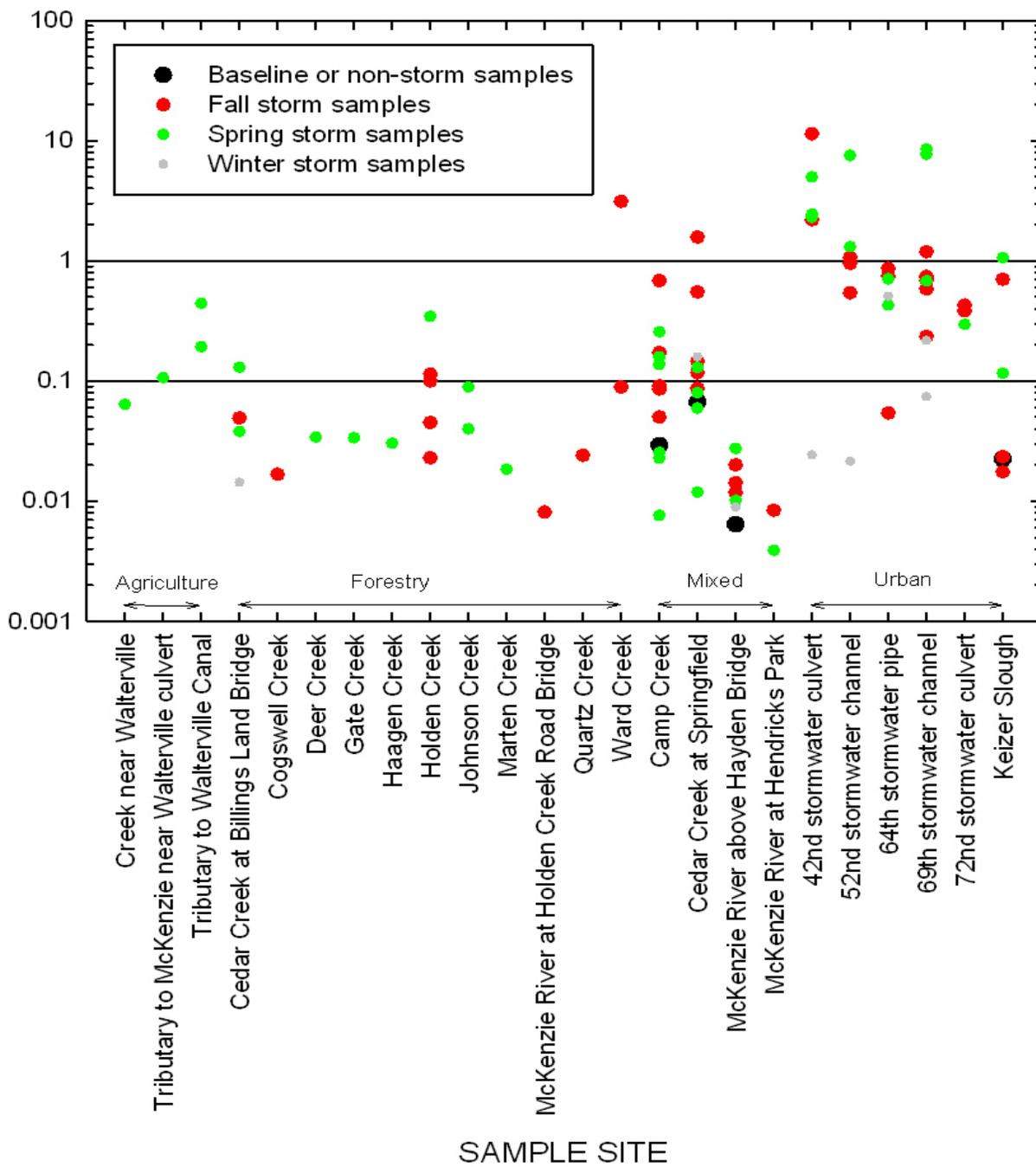
- 10 Years
- 13 Storms
- 2 Non-Storms
- 135 Samples
- 175 Compounds/Sample
- 28 Monitoring Sites
- \$690,000 (EWEB)
- \$344,000 (USGS)

# Storm Event Equipment





TOTAL CONCENTRATION, IN MICROGRAMS PER LITER



Prevalent caffeine detections – human waste indicator

Increased development = Increased pesticides

# Agriculture is still a preferred use to development, which brings with it:

- Higher density of structures and impervious surfaces
- Household chemical use
- Septic systems
- Vegetation removal
- Impacts that are ‘harder to reverse’



# Long-term solution: watershed protection through community support of agriculture

*Increase economic viability of farming while reducing chemical use... by reducing farm operating costs and increasing income diversity and opportunities.*



# Healthy Farms Clean Water Program

**Healthy Farms Clean Water Program Goal:**  
to assist farmers in protecting water quality  
while increasing farm revenue through a  
variety of programs



# Healthy Farms Clean Water Program



## Program Menu:

- **Chemical Use Reduction**
- Organic Certification
- Nutrient Management
- **Ag Chemical Disposal**
- On-Farm Renewable Energy
- Energy/Irrigation Efficiency
- Local Market Access
- Habitat Restoration
- Ag/Conservation Easements

11 project partners provided one-on-one assistance to farmers.

# Funding Sources \$

- Eugene Water & Electric Board
- Oregon Governor's Fund for the Environment (grant)
- Oregon Dept of Environmental Quality (grant)
- Bonneville Power Administration
- Oregon Hazelnut Commission
- Oregon State University
- US Dept of Agriculture

# EWEB funds partners to work w/farmers

Grant, 2010-2012

Activity	Partner	# of Farms
Nutrient Management	Upper Willamette SWCD	14
Agricultural Chemical Removal	Lane County Waste Management	11
Reduce Chemical Use	OSU Extension Service, Oregon Tilth, Northwest Center for Alternatives to Pesticides	11
Energy/Irrigation Efficiency	Cascade Pacific RC&D	4
Access Local Food Markets	Willamette Farm & Food Coalition, Ecotrust	3
Habitat Restoration	McKenzie Watershed Council	2
Conservation Easement	McKenzie River Trust	1



**\* Total of 68 farms have participated since HFCW Program started in 2006**

# Chemical Use Reduction



- Free Organic Certification
- Help growers use less toxic chemicals and/or target their applications
  - ✓ Mummy Berry Project
  - ✓ Hazelnut Growers Project

# Mummy Berry Disease

ORGANIC BLUEBERRY PRODUCTION WORKSHOP

SAVE THE DATE!!!

## MUMMY BERRY MANAGEMENT

FEBRUARY 21, 2012, 9:30AM-2:45PM

EUGENE WATER & ELECTRIC BOARD  
500 EAST 4TH AVE  
EUGENE, OR 97401

More info at [www.pesticide.org](http://www.pesticide.org) or  
contact Kim Leval:  
541-344-5044 x 15

PRESENTED BY:



NORTHWEST CENTER FOR  
ALTERNATIVES TO PESTICIDES



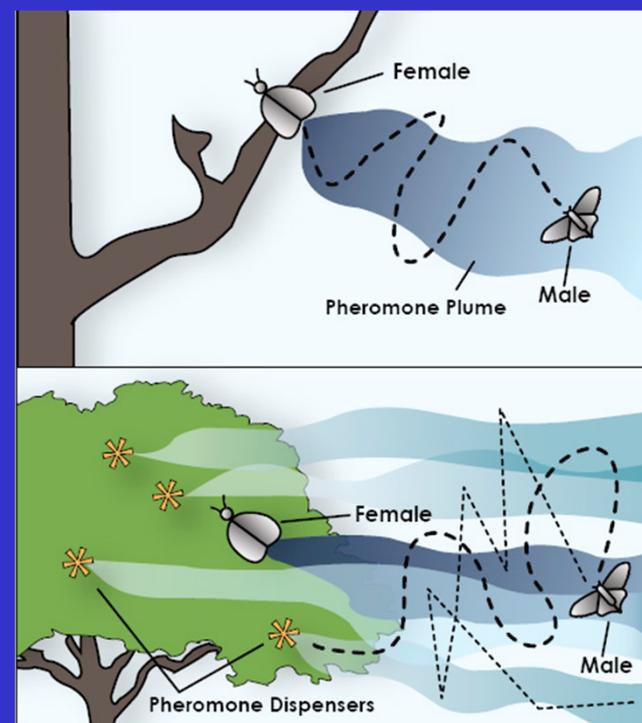
# Hazelnut Mating Disruption Project

**Purpose:** to evaluate the use of mating disruption techniques and ‘soft’ pesticides as a way to reduce the detrimental effects of filbert worm on crops and reduce the need for more toxic pesticide applications

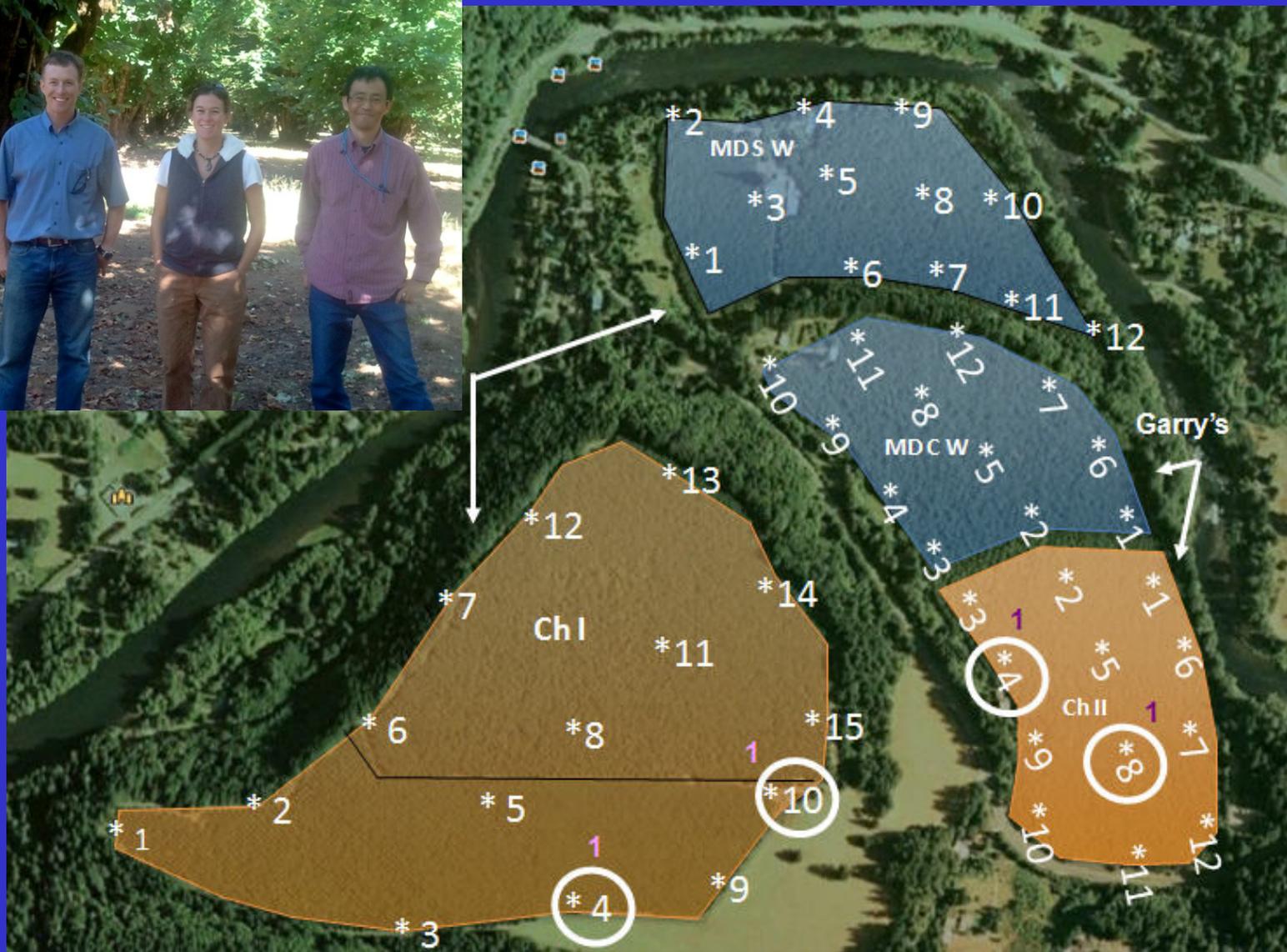
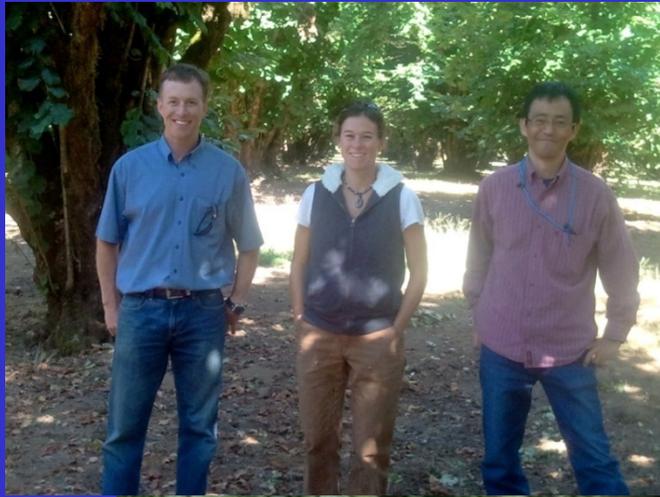
**Partners:** McKenzie hazelnut growers (270 acres), Oregon Hazelnut Commission, Oregon State University (OSU) Horticulture, OSU Extension, Upper Willamette Soil & Water Conservation District

# Hazelnut Mating Disruption Project

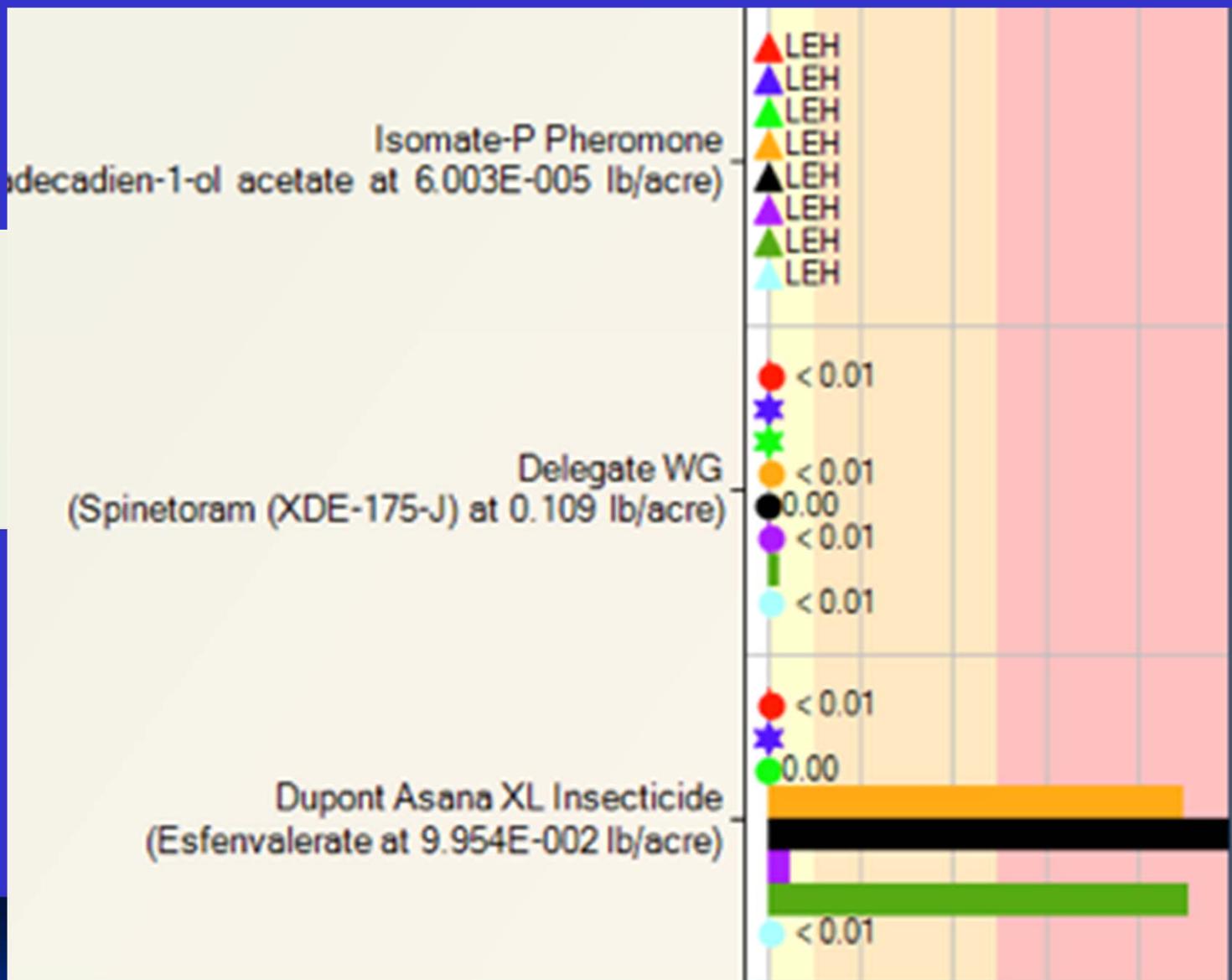
- Disrupt moth mating patterns to prevent filbert worm
- 3-year study costs: \$58,500 (EWEB) \$102,000 (Hazelnut Commission)
- Years 1-2: No pesticides used (280 gallons active ingredient) on 270 acres/\$13,000 savings to growers.



# Hazelnut Mating Disruption Project



- Avian Acute
- Avian Reproductive
- Small Mammal Acute
- Earthworm
- Fish Chronic
- Aquatic Algae
- Aquatic Invertebrates
- Inhalation



# Agricultural Chemical Collection



# Removing old farm chemicals: Protects kids, pets, livestock and water quality



# Status of Farm Chemicals



# Assistance



# Collection



Lane County Household Hazardous Waste Collection Center

Total pesticides and other farm chemicals collected during 2006-2007 grant = 44 tons (126 area farms in two watersheds)



Repeated in 2011-2012: over 3,200 pounds removed – 14 farms

# McKenzie Watershed Spill Response



## Spill Hazard Assessments

- Truck Transport on Hwy 126
- Vehicle Accident Hot Spots
- Historic Spill Locations
- Industrial Chemical Use

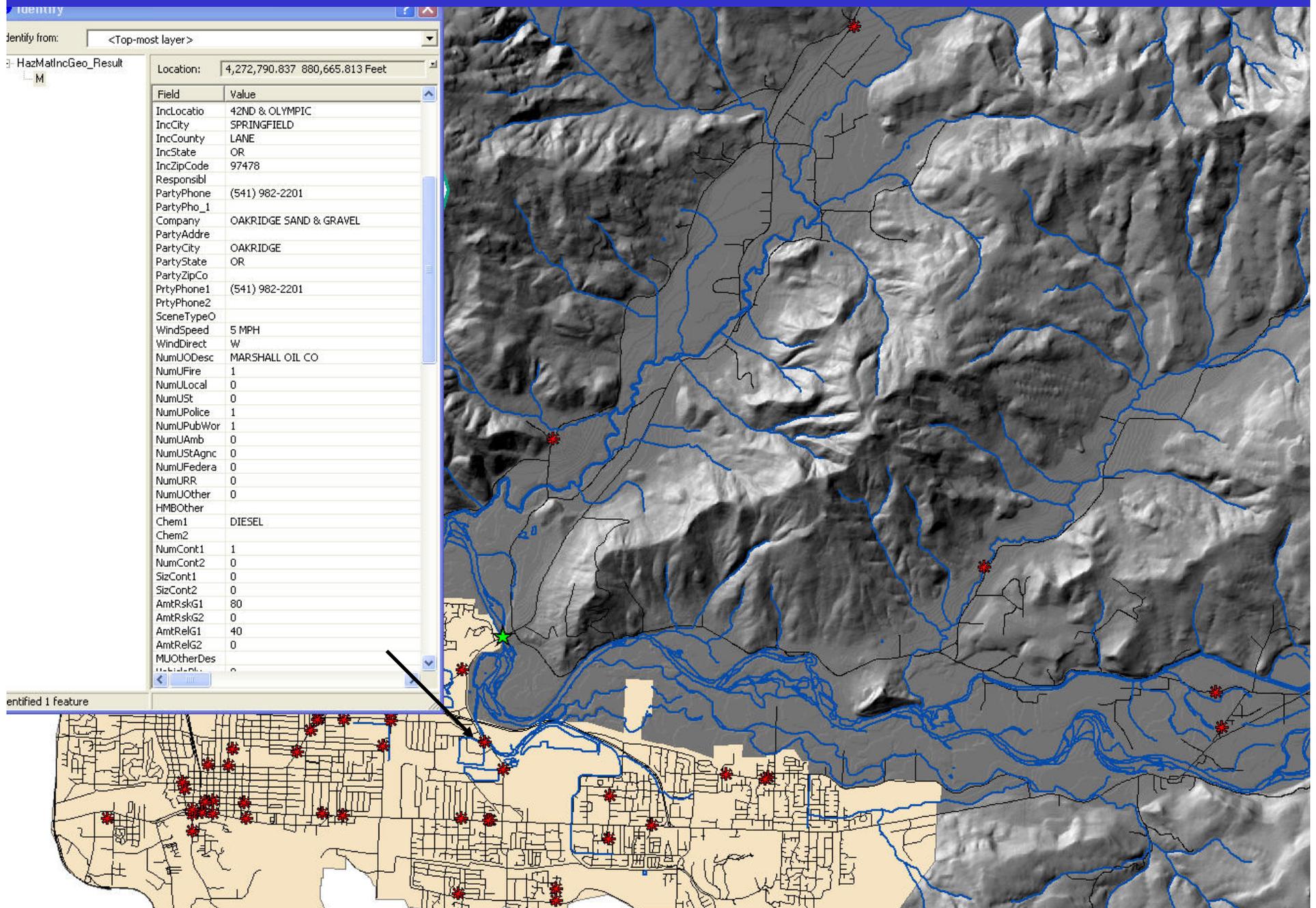
In McKenzie: 500 Trucks/day with  
3-5% carry hazardous materials  
(source: ODOT Freight Survey)



# Vehicle Accident “Hot Spots”



# HazMat Spill Incidents (1982 – 2002), Lower McKenzie Watershed

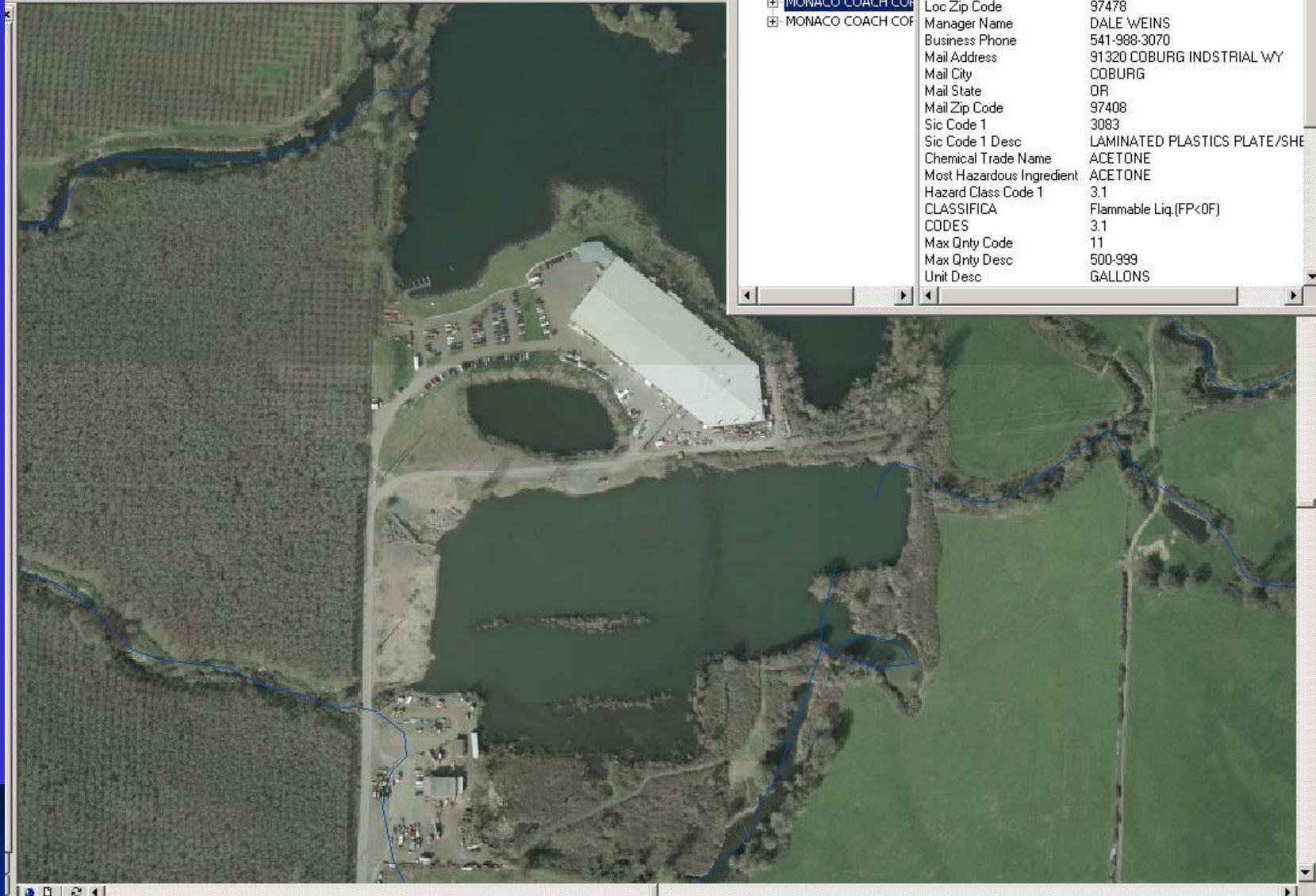


View  
Tools Window Help MWERS

Create New Feature Target:

100%

Insert Vertex Snapping... Set Selectable Layers...



Quantity Results

Layers: <Top-most layer>

Location: (4280712.256865 880619.563714)

Field	Value
Emp File Number	080599
Company Name	MONACO COACH CORPORATION
Reportable Qtyts	Y
EHS Chemicals	N
Location Address	5280 HIGH BANKS RD
Loc City	SPRINGFIELD
Loc County	LANE
Loc State	OR
Loc Zip Code	97478
Manager Name	DALE WEINS
Business Phone	541-988-3070
Mail Address	91320 COBURG INDUSTRIAL WY
Mail City	COBURG
Mail State	OR
Mail Zip Code	97408
Sic Code 1	3083
Sic Code 1 Desc	LAMINATED PLASTICS PLATE/SHE
Chemical Trade Name	ACETONE
Most Hazardous Ingredient	ACETONE
Hazard Class Code 1	3.1
CLASSIFICA	Flammable Liq.(FP<0F)
CODES	3.1
Max Qty Code	11
Max Qty Desc	500-999
Unit Desc	GALLONS

<b>Hazardous Material Category</b>	<b>Average Quantity Stored<sup>1</sup></b>	<b>Number of Facilities</b>
Gasoline	140,000 Gallons	15 Locations/23 Tanks
Diesel	117,000 Gallons	19 Locations/26 Tanks
Transformer Oil (Hydroelectric)	75,000 Gallons	4 Locations
Fertilizer	39,000 Pounds	4 Locations
Pesticides	11,200 Gallons <sup>2</sup>	84 Locations
Solvents	5,200 Gallons	3 Locations
Propane	5,100 Gallons	6 Locations
Motor Oil	3,600 Gallons	10 Locations
Waste Oil	1,200 Gallons	3 Locations
Formaldehyde	900 Gallons	2 Locations
Hydraulic Oil	750 Gallons	4 Locations
Oil-Based Paint	200 Gallons	2 Locations



Facility hazmat storage that would need deliveries thru McKenzie

<b>Chemical Type</b>	<b>Quantity<sup>1</sup></b>
Urea Fertilizer	10.5 Million Pounds
Sodium Hydroxide	16.5 Millions Gallons
Formaldehyde	500,000 Gallons
Calcium Hydroxide	500,000 Gallons
Pentane	250,000 Gallons
Sodium Magnesium Aluminosilicate	75,000 Gallons
Methanol	50,000 Gallons
Sulfuric Acid	50,000 Gallons
Naphtha	50,000 Gallons
Other Acids (Muriatic, adipic, acetic)	35,000 Gallons
Sodium Hypochlorite	10,000 Gallons
Potassium Hydroxide	10,000 Gallons
Aluminum Sulfate	10,000 Gallons
Herbicides/Pesticides	5,000 Pounds
Chlorine	5,000 Gallons
Cyclohexylamine	5,000 Gallons
Dipropylene Glycol Methyl Ether	5,000 Gallons
Bromochlorodifluoromethane	5,000 Gallons
Ethyl Vinyl Acetate	5,000 Gallons
Sodium Dioxide	5,000 Millicures
Acetone	2,500 Gallons
Herbicides/Pesticides	1,500 Gallons

<b>Type of Threat</b>	<b>Most Probable Chemicals</b>
Truck Transport	Petroleum Products
	Fertilizers
	Pesticides
Helicopter Transport	Fertilizers
	Pesticides
Accidents/HazMat Spills	Petroleum Products
Fixed Facilities Near River	Petroleum Products
	Fertilizers
	Sodium Hydroxide



# OBJECTIVES

- To recognize and be prepared for events that have a low likelihood of occurring, but would cause extensive problems to Eugene's water supply.



# MWERS Provides Responders With:

- Response Information (GIS): compiled and updated from partner agencies and easily accessible for first responders (\$65,000 in grants).
- Response Equipment and Resources: inventoried from 27 federal, state, and local agencies (\$441,000 in grants for 3 response trailers, laptops, handhelds, mobile color printers, GIS software, GPS units)
- Interagency Training/Drills: conducted 19 trainings and drills involving 428 people from 33 agencies and organizations (\$177,000 in grants)

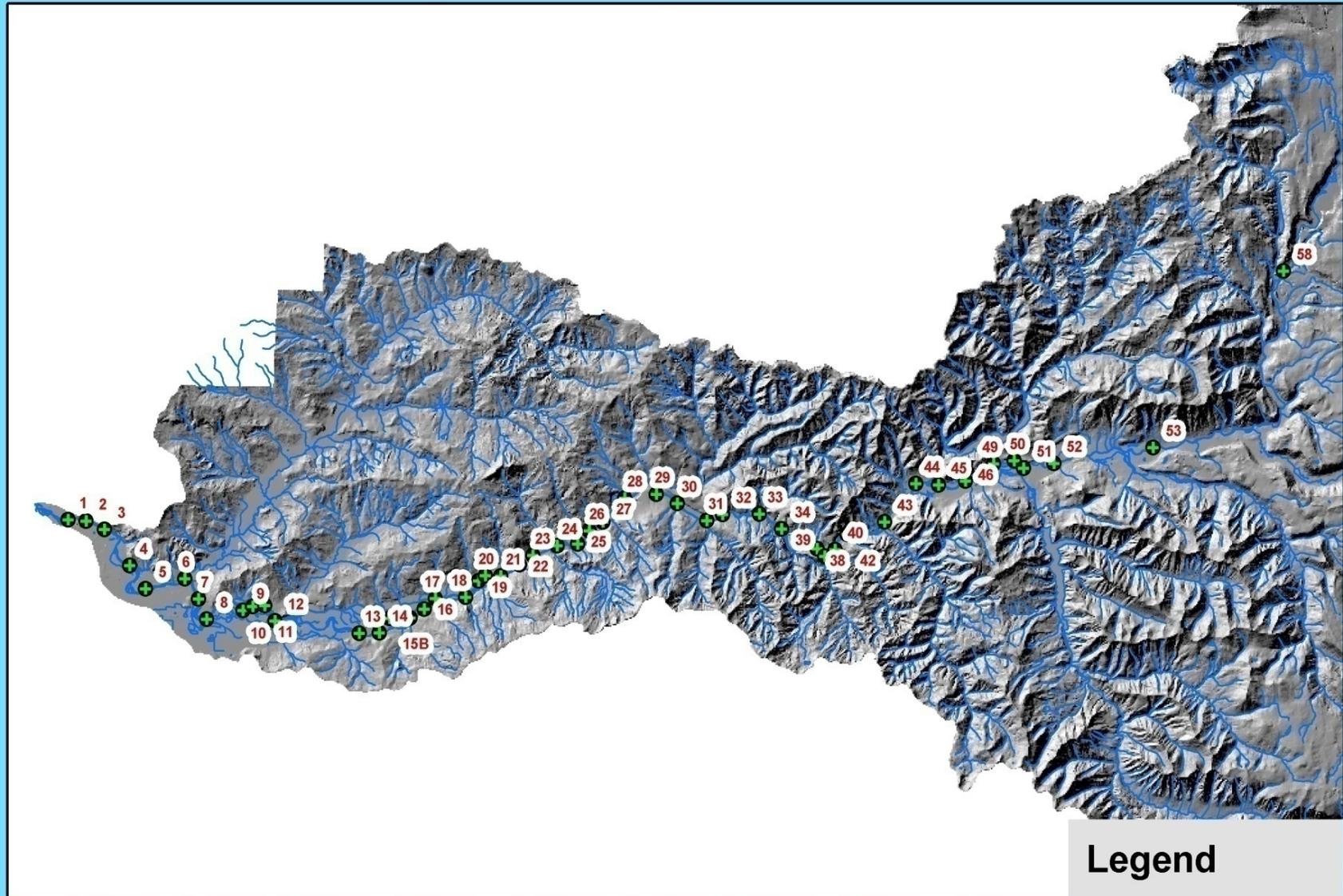
# Participating Agencies

- **McKenzie Fire & Rescue**
- McKenzie Watershed Council
- Mohawk Rural Fire
- Upper McKenzie Rural Fire
- **Springfield Fire & Life Safety**
- **Springfield Public Works**
- **Springfield Environ Srvcs**
- **Eugene Fire & EMS**
- **Lane County Public Works**
- **Lane County Sheriff**
- **Springfield Utility Board**
- **Rainbow Water District**
- **Region 2 HazMat Team**
- Lane Council of Governments
- Lane Air Pollution Authority
- Oregon DEQ
- Oregon Health Division
- **Oregon DOT**
- Oregon Fish & Wildlife
- Oregon State Police
- Oregon Water Master
- Weyerhaeuser
- **US EPA**
- **Army Corps of Engineers**
- **US Forest Service**
- US BLM

# Response Strategies

- Most likely threat to the watershed is petroleum (86% of chemicals stored, used, transported, spilled are petroleum products).
- Mapped “slow water” areas on river (helicopter & boat).
- Developed 49 response strategies in the watershed at accessible areas w/slow water.

# Location of Response Strategies, McKenzie Watershed

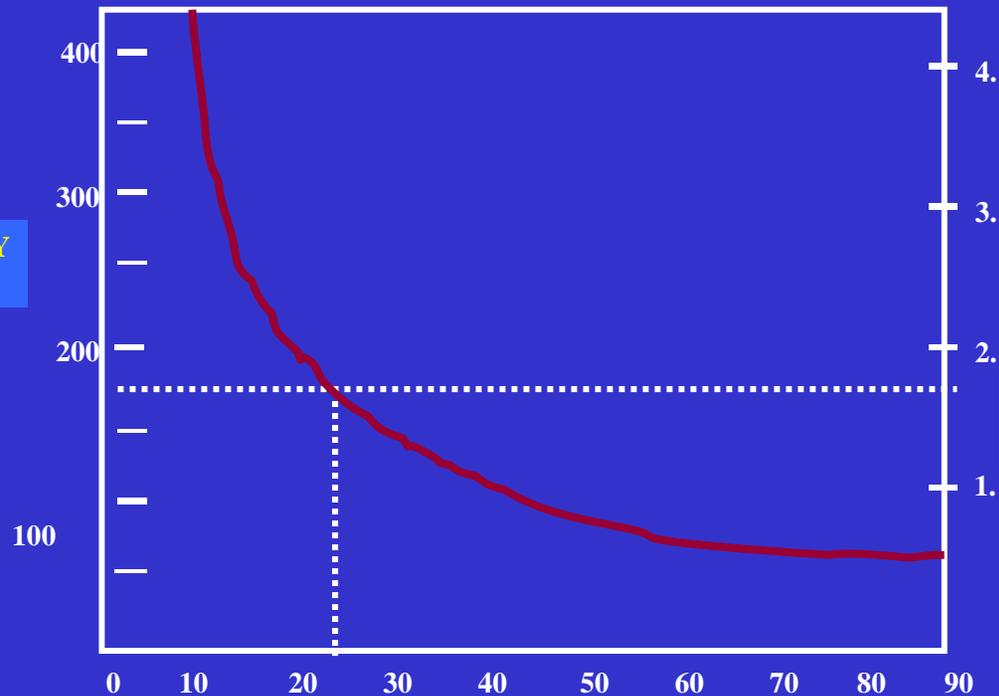


**Legend**

- ➕ Strategies
- hydrography

## BOOM ANGLES for VARIOUS CURRENT SPEEDS CHART

WATER VELOCITY  
(feet per minute)

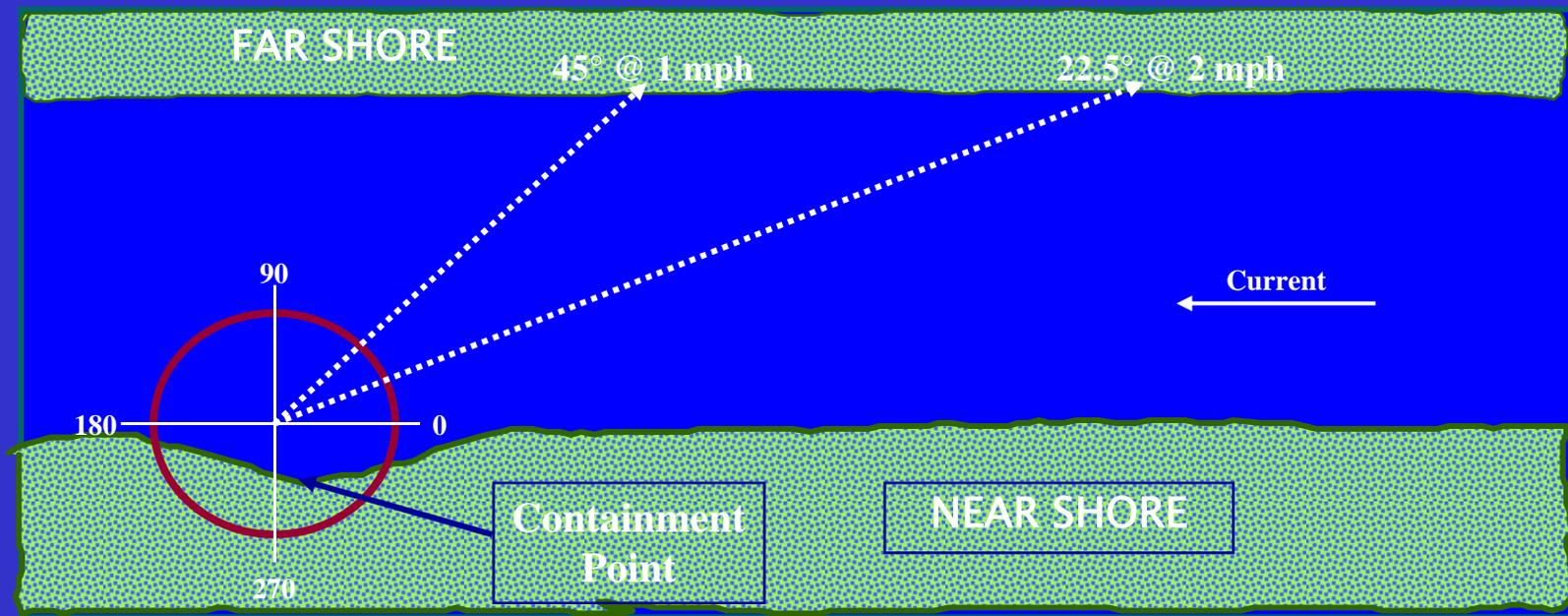


WATER VELOCITY  
(knots)

BOOM ANGLE to RIVER CURRENT (In Degrees)

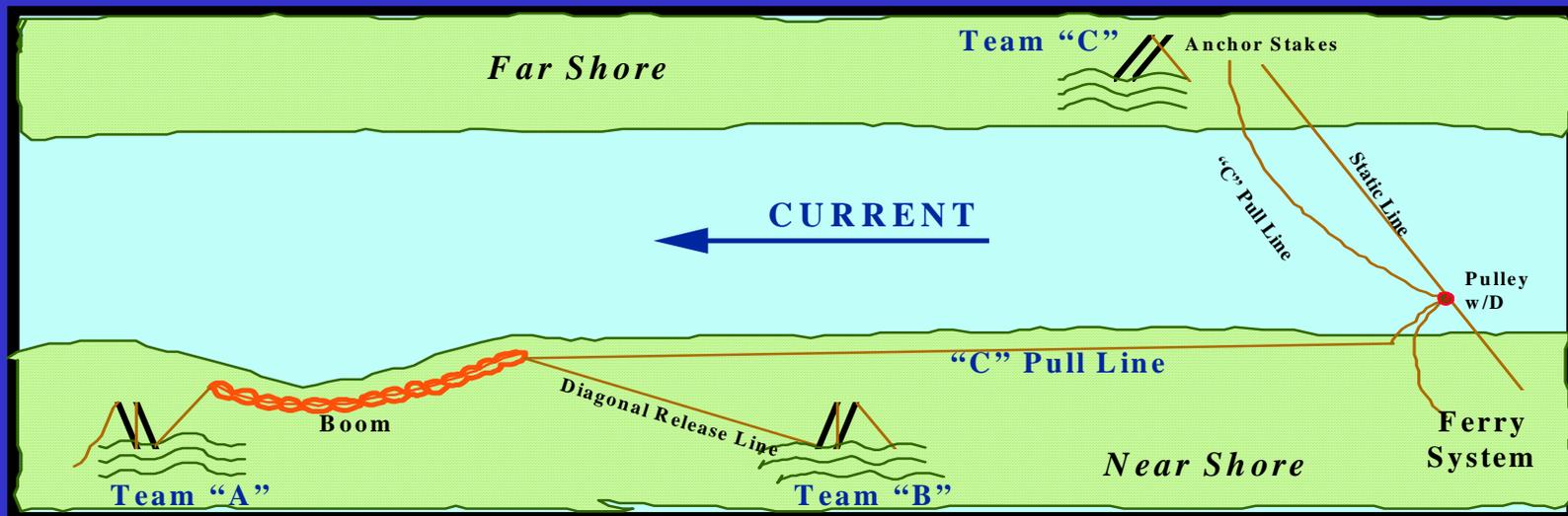
*Plot of the Maximum Angle for Boom Deployment at Increasing Current Velocities.*

# DETERMINING ANGLE TO DEPLOY BOOM IN FAST FLOWING RIVERS



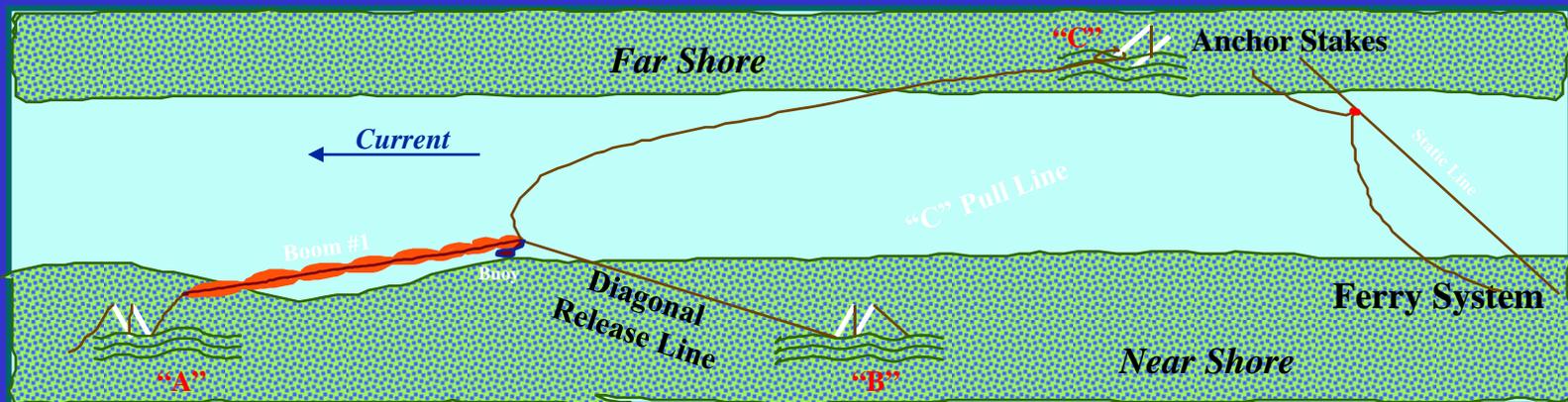
# Fast River Boom Deployment

Step 1.



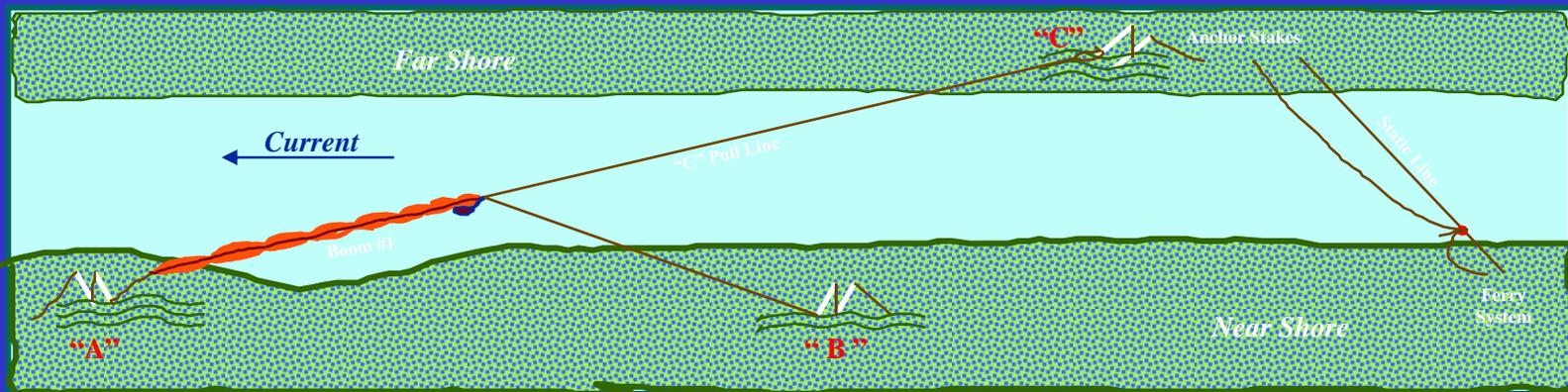
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



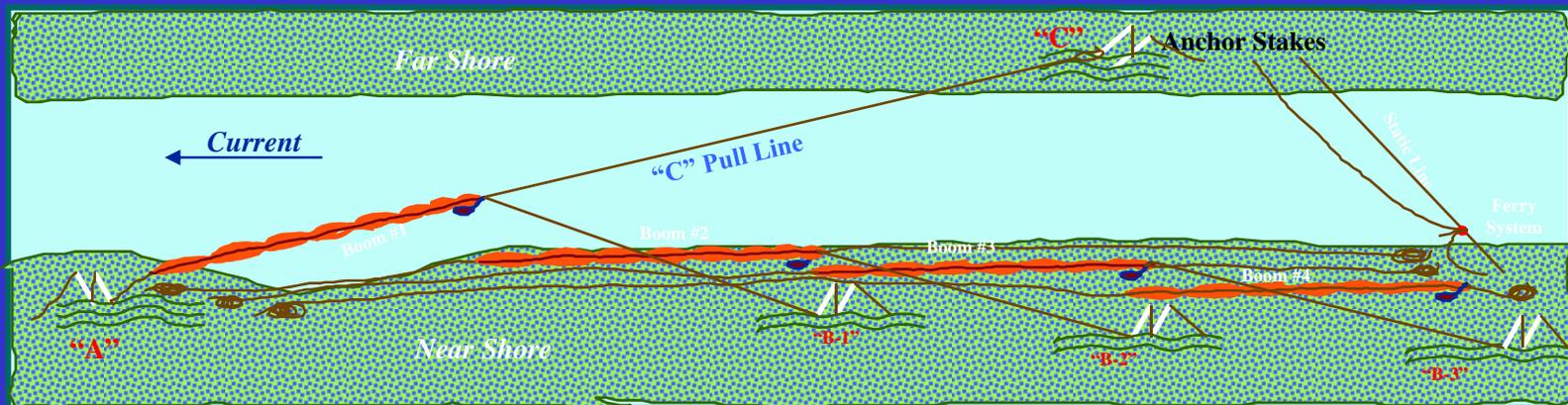
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



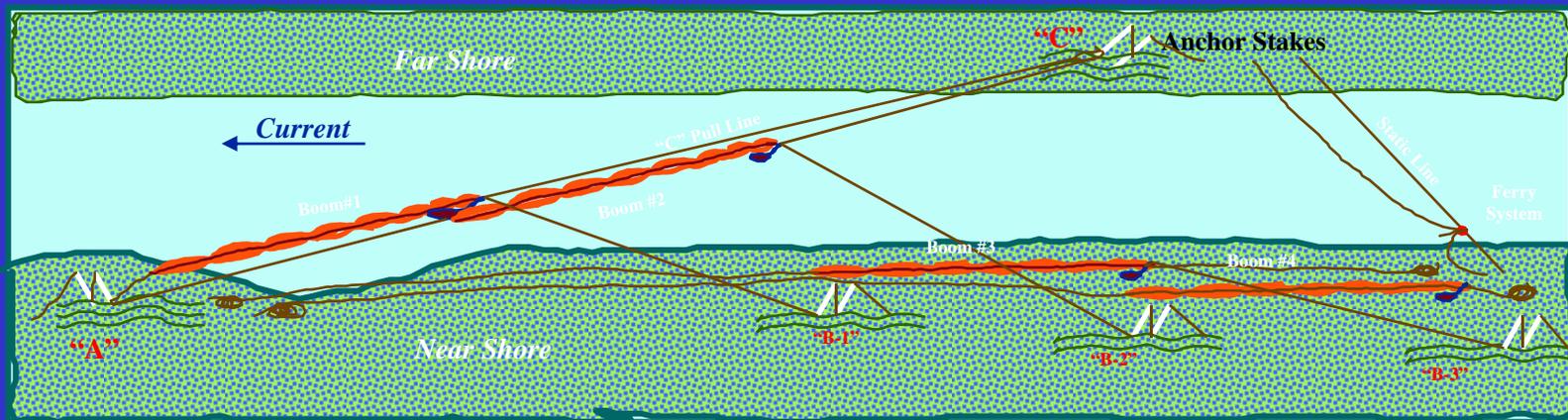
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



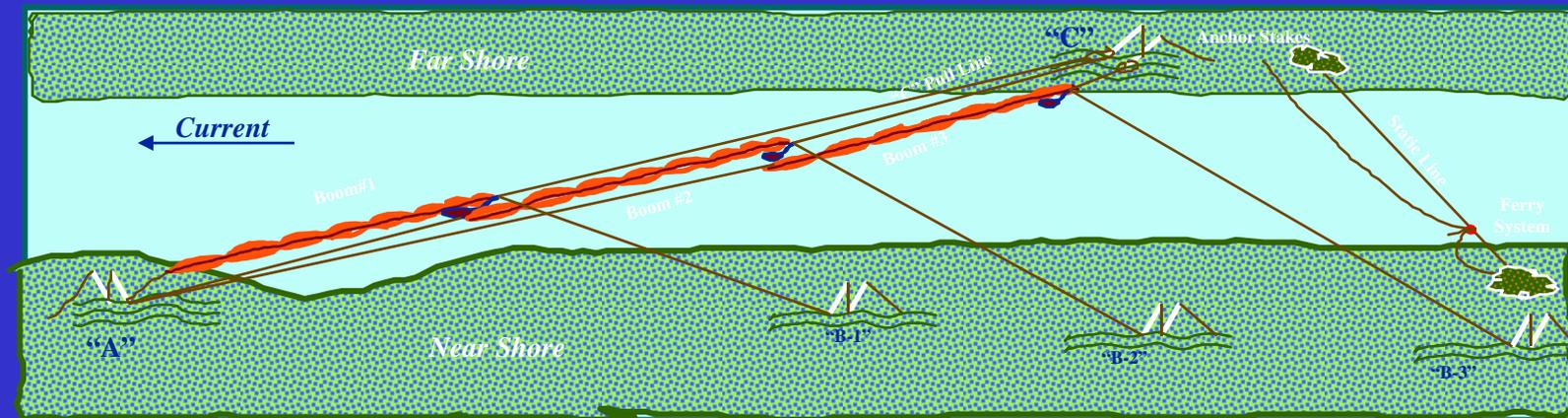
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



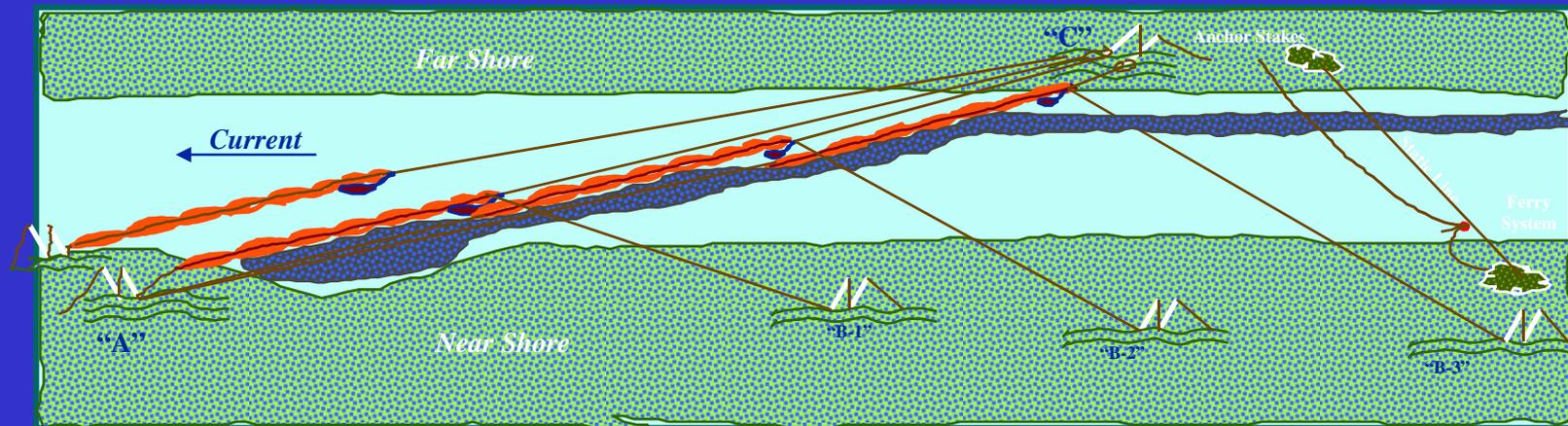
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



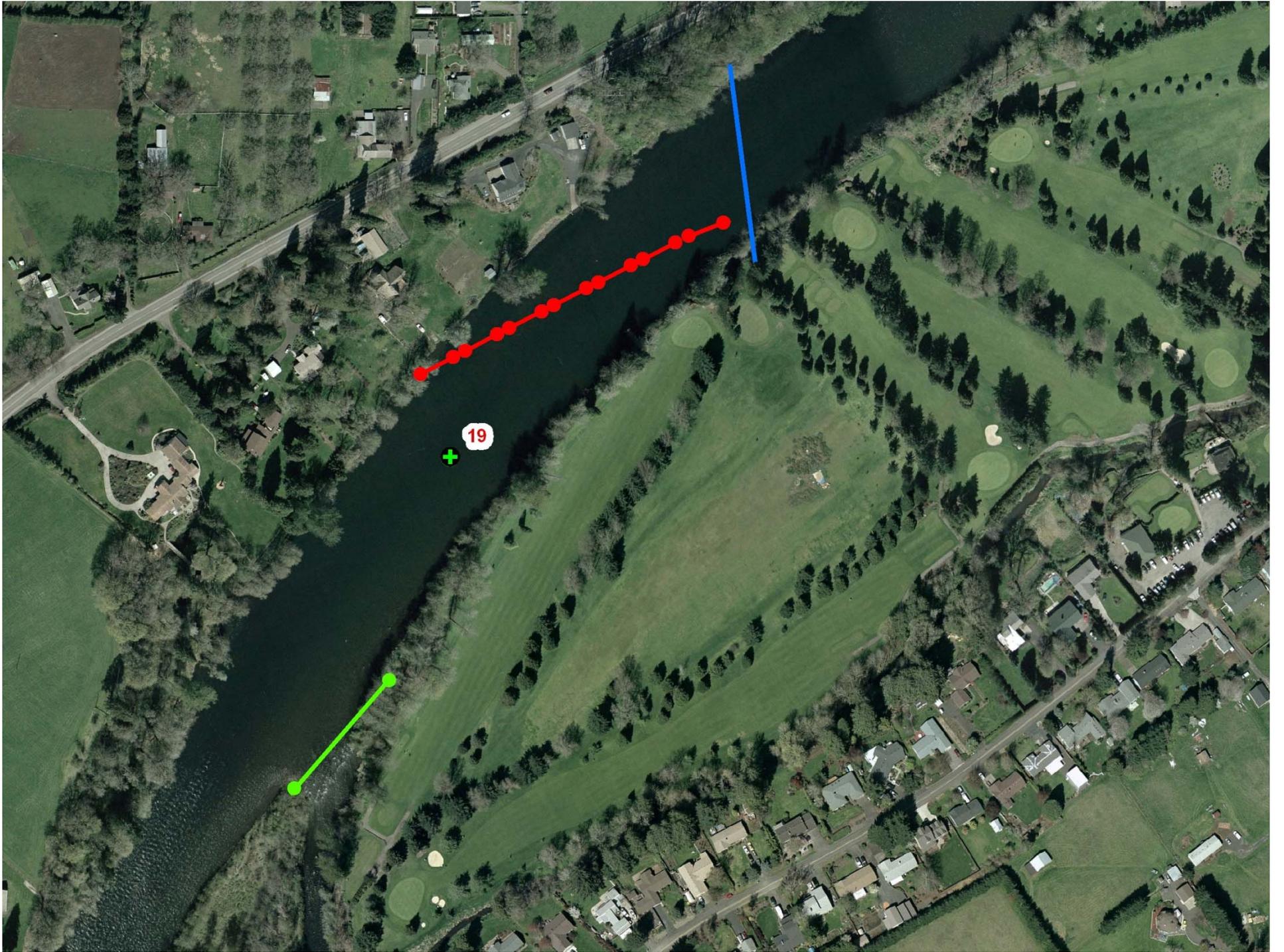
*Bank to Bank Rope Anchor System*

# Fast River Boom Deployment



*Bank to Bank Rope Anchor System*





	BOOM_NUM	SEG_NUM	CLINE	BLINE	ALINE	SEGLNGTH
	B1	B1-3	670	120	150	100
	B1	B1-4	570	160	250	100
	B1	B1-5	470	175	350	100
		0				
	B1	B1-1	920	40	0	100
	B1	B1-2	820	140	100	100
	B1	B1-3	720	220	200	100
	B1	B1-4	620	250	300	100
	B1	B1-5	520	260	400	100
		0				
		0				
		0				
		0				
	B1	B1-1	1350	90	0	100
	B1	B1-2	1250	115	100	100
	B1	B1-3	1150	180	200	100
	B1	B1-4	1050	240	300	100
	B1	B1-5	950	300	400	100
	B1	B1-6	850	330	500	100
	B1	B1-7	750	275	600	100
		0				
						400
	B1	B1-1	900	40	0	100
	B1	B1-2	800	80	100	100
	B1	B1-3	700	140	200	100



Insert Vertex Snapping... Set Selectable Layers...

Locate Incident Tool

- Layers
  - incident
  - Incident Rings
  - Strategies
  - Critical Resources
  - Response Resources
  - Threats
  - Basemap
  - McKenzie\_watershed
  - Census\_blocks
  - USGS Topo
  - Aerial Photo\_6inch
  - Aerial Photo\_2foot
  - Shaded Relief

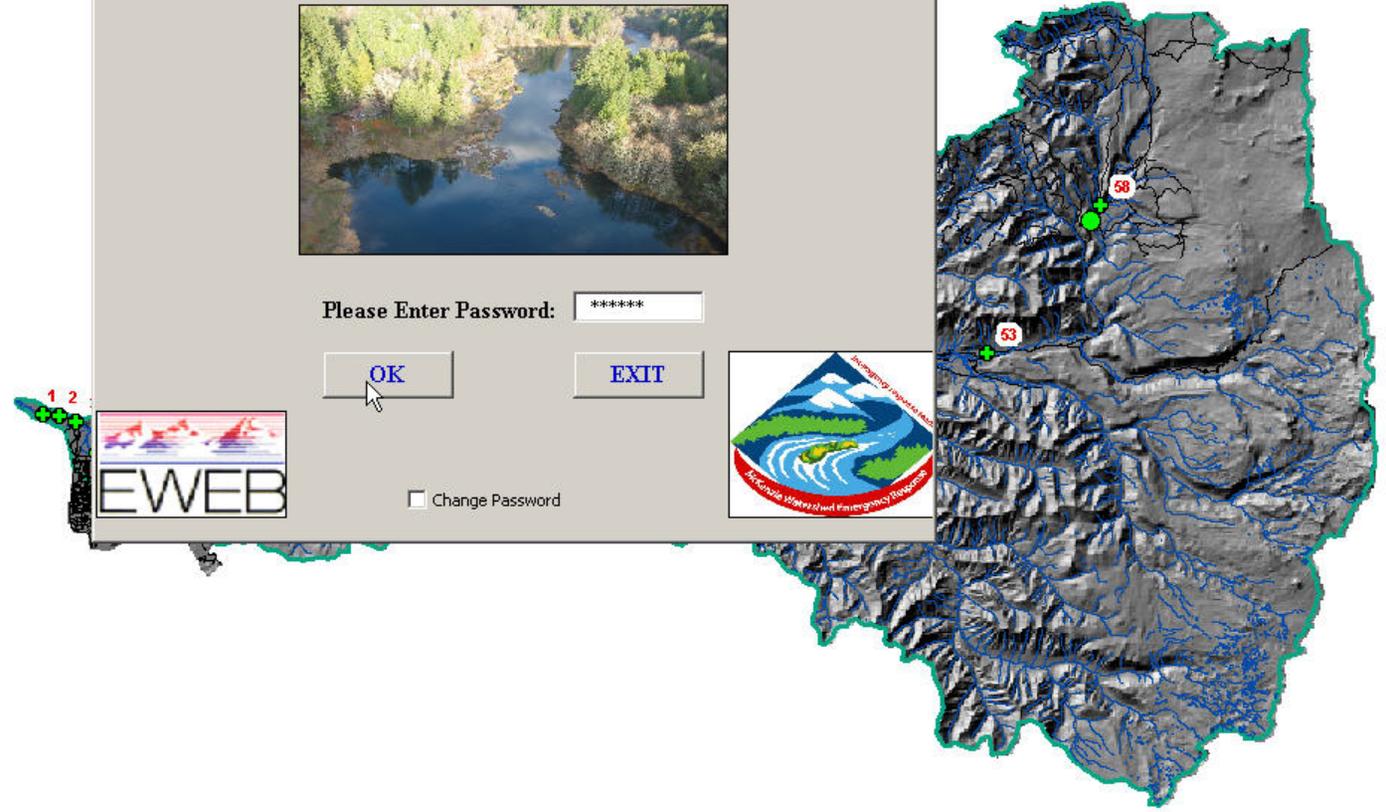
Welcome

### Welcome to the McKenzie Watershed Emergency Response System



Please Enter Password:

Change Password





Editor Task: Create New Feature



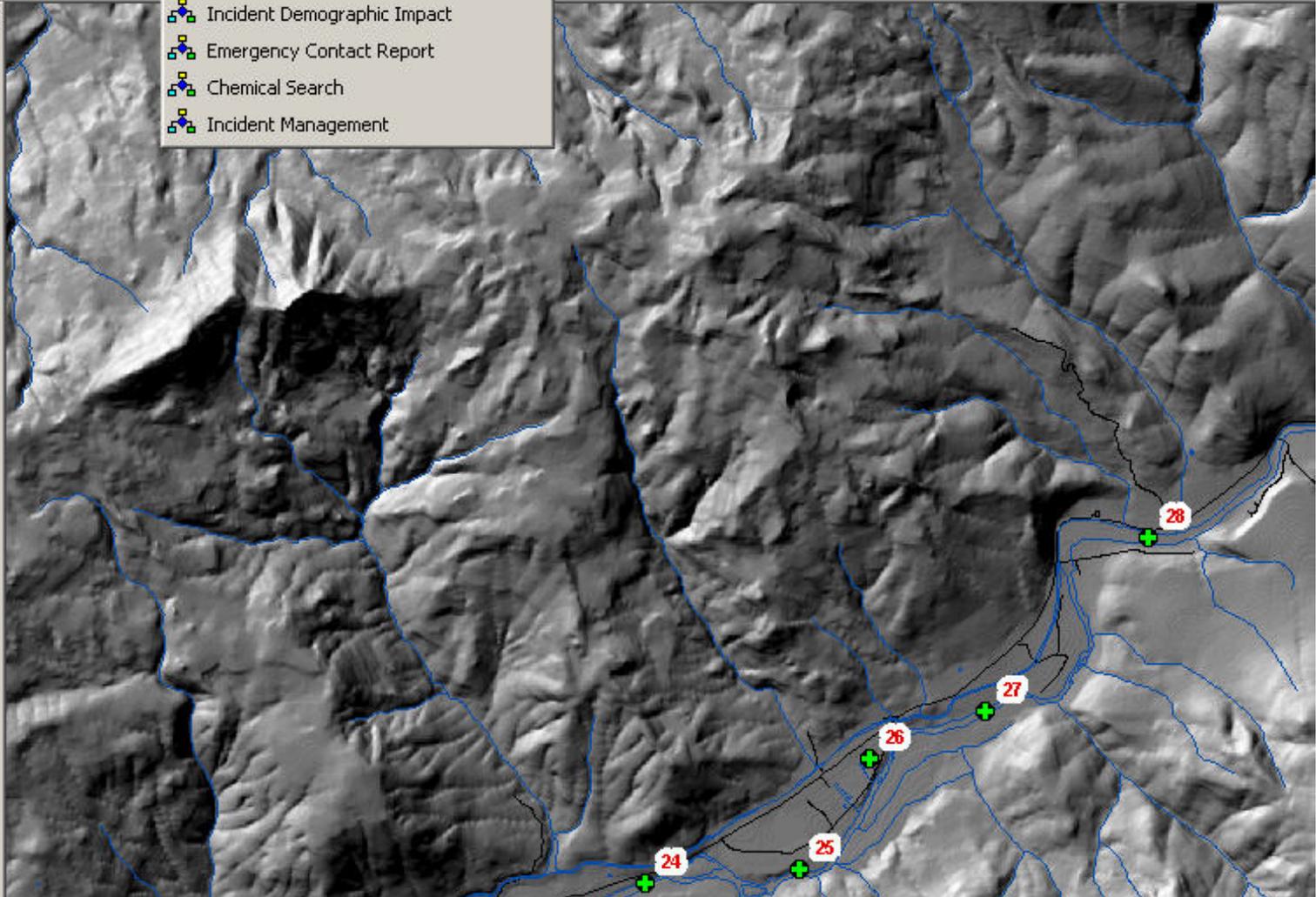
Locate Incident Tool

- Enter Incident
- Incident Reports by River Mile
- Incident Reports by Radial Distance
- Strategy Reports
- Equipment Search
- Incident Maps
- Radial Distance Rings
- Incident Demographic Impact
- Emergency Contact Report
- Chemical Search
- Incident Management

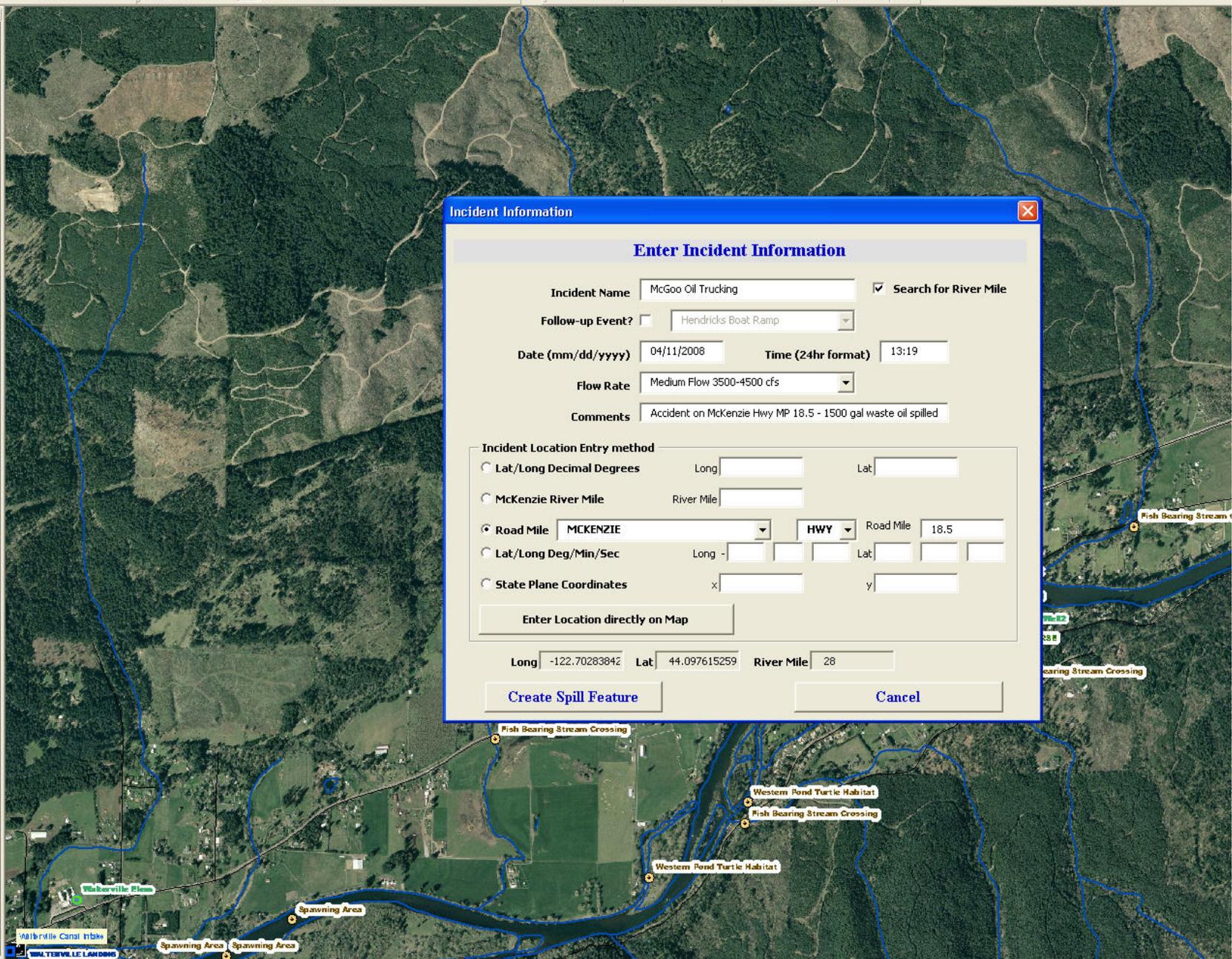


Set Selectable Layers...

- Layers
- incident
  - Incident Rings
  - Strategies
  - Critical Resources
  - Response Resources
  - Threats
  - Basemap
  - McKenzie\_watershed
  - Census\_blocks
  - USGS Topo
  - Aerial Photo\_6inch
  - Aerial Photo\_2foot
  - Shaded Relief



- Layers
  - All\_monitoring\_sites\_200
  - incident
  - Metro\_Lots
  - McKenzie\_towns
  - Incident\_Rings
  - Strategies
  - Critical\_Resources
    - Surface\_Water\_Intake
    - Wells
    - Fish\_and\_Wildlife
    - Private\_Intakes
  - Response\_Resources
    - warehouses
    - boatlaunch
    - recsites
    - booms
  - OBJECTIVE
    - Collection
    - Diversion
    - Protection
    - Static\_Line
  - CULVERTS
  - Dams
  - FireHydrants
  - USGS\_Gauging\_Station
  - Threats
  - Basemap
  - McKenzie\_watershed
  - Census\_blocks
  - USGS\_Topo
  - Aerial\_Photo\_1foot
  - Aerial\_Photo\_6inch
  - Aerial\_Photo\_2foot
  - Shaded\_Relief



### Incident Information

#### Enter Incident Information

Incident Name:   Search for River Mile

Follow-up Event?

Date (mm/dd/yyyy):  Time (24hr format):

Flow Rate:

Comments:

Incident Location Entry method

Lat/Long Decimal Degrees Long:  Lat:

McKenzie River Mile River Mile:

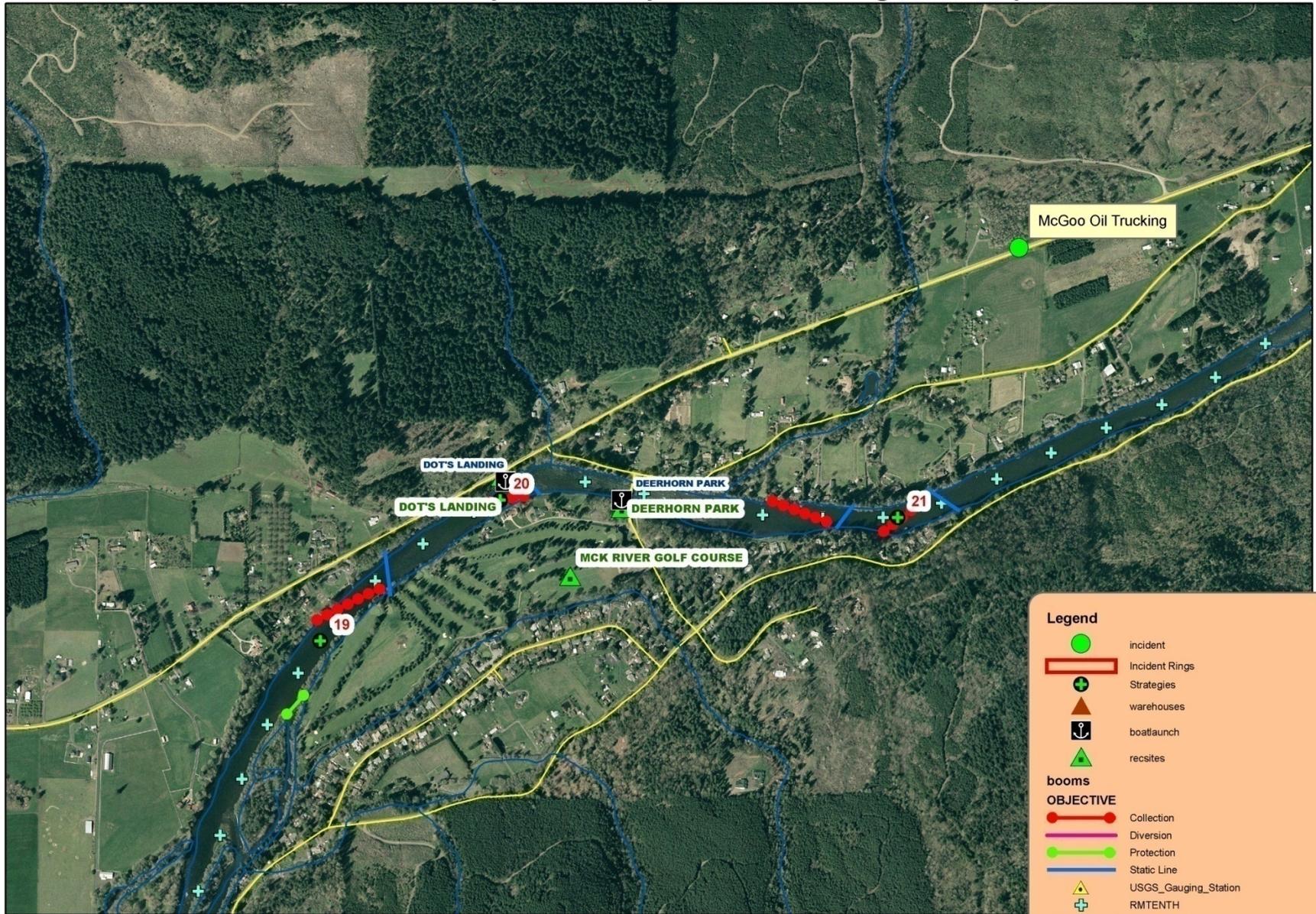
Road Mile   Road Mile:

Lat/Long Deg/Min/Sec Long:    Lat:

State Plane Coordinates x:  y:

Long:  Lat:  River Mile:

# McGoo Oil Spill - Response Strategies Map



**Legend**

- incident
- Incident Rings
- + Strategies
- ▲ warehouses
- ⚓ boatlaunch
- ▲ recsites

**booms**

**OBJECTIVE**

- Collection
- Diversion
- Protection
- Static Line
- ▲ USGS\_Gauging\_Station
- + RMTENTH
- Streams\_line
- Lane\_roads
- Linn\_roads
- McKenzie\_watershed

- Layers
  - All\_monitoring\_sites\_200
  - incident
  - Metro\_Lots
  - McKenzie\_towns
  - Incident Rings
  - Strategies
  - Critical Resources
  - Response Resources
    - warehouses
  - boatlaunch
  - recsites
  - booms
  - CULVERTS
  - Dams
  - FireHydrants
  - USGS\_Gauging\_Station
  - Threats
  - Basemap
  - McKenzie\_watershed
  - Census\_blocks
  - USGS Topo
  - Aerial Photo\_1foot
  - Aerial Photo\_6inch
  - Aerial Photo\_2foot
  - Shaded Relief

Identify

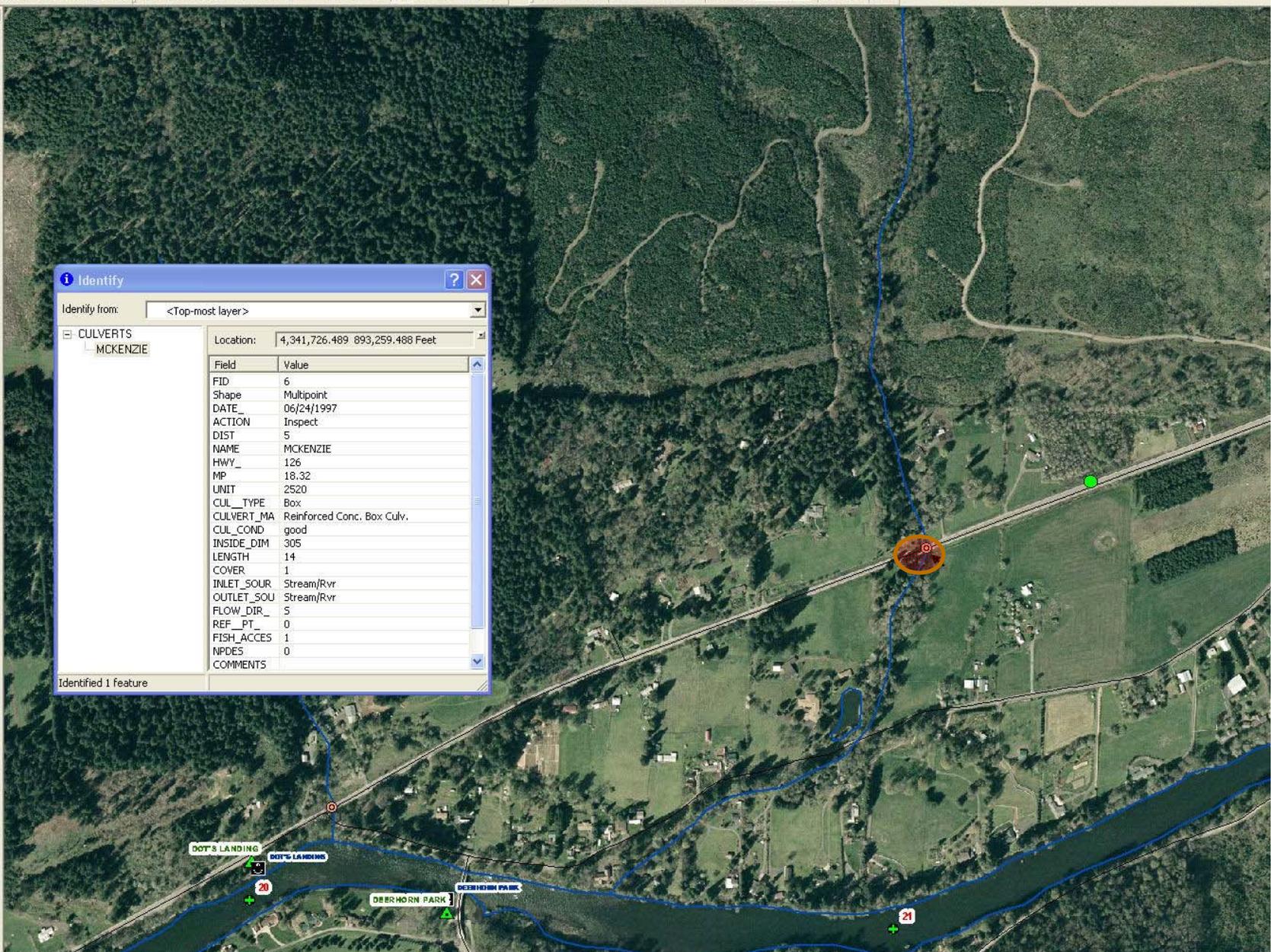
Identify from: <Top-most layer>

- CULVERTS
  - MCKENZIE

Location: 4,341,726.489 893,259.488 Feet

Field	Value
FID	6
Shape	Multipoint
DATE_	06/24/1997
ACTION	Inspect
DIST	5
NAME	MCKENZIE
HWY_	126
MP	18.32
UNIT	2520
CUL_TYPE	Box
CULVERT_MA	Reinforced Conc. Box Culy.
CUL_COND	good
INSIDE_DIM	305
LENGTH	14
COVER	1
INLET_SOUR	Stream/Rvr
OUTLET_SOU	Stream/Rvr
FLOW_DIR_	S
REF_PT_	0
FISH_ACCES	1
NPDES	0
COMMENTS	

Identified 1 feature



MWERS311.mxd - ArcMap - ArcView

File Edit View Insert Selection Tools Window

Locator Incident Tool

- incident
- Incident Rings
- Strategies
- Critical Resources
  - Surface Water Intakes
  - Fish and Wildlife
  - Public Wells
  - SUB Wells
  - Private Intakes
- Response Resources
  - warehouses
  - boatlaunch
  - recsites
  - booms
- OBJECTIVE
  - Collection
  - Diversion
  - Protection
  - Static Line
- CULVERTS
- Dams
- FireHydrants
- USGS\_Gauging\_Station
- Threats
- Basemap
  - Quarter Mile MPs
  - RMTENTH
  - RiverMile
  - USGS\_RiverMile

Display Selection Source Map Book

USGS Real-Time Water Data for USGS 14162500 MCKENZIE RIVER NEAR VIDA, OR - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address: <http://waterdata.usgs.gov/or/nwis/uv?14162500>

### Discharge, cubic feet per second

Most recent value: 5,800 11-15-2005 16:00

#### USGS 14162500 MCKENZIE RIVER NEAR VIDA, OR

Download a [presentation-quality graph](#) Parameter Code 00060; DD 03

#### Daily mean flow statistics for 11/15 based on 81 years of record in ft<sup>3</sup>/sec

Current Flow	Minimum	Mean	Maximum	80 percent exceedance	50 percent exceedance	20 percent exceedance
5,800	1,360	4,098	20,200	2,144	3,220	5,338

Percent exceedance means that 80, 50, or 20 percent of all daily mean flows for 11/15 have

waterdata.usgs.gov/or/nwis/uv?14162500

**MWERS Report Viewer by River Mile**

1. Choose a Report: Response Strategy Summary

2. Choose an Incident: McGoo Oil Trucking 5

3. Enter Flow Estimate\*: Med-High Flow 4500-7500 cfs \*defaults to original estimate

4. Insert Map Image (optional)

Run the Report

Cancel

85% | 1 of 2 | powered by crystal

Preview

### Response Strategy Summary Report

McGoo Oil Trucking 5 Time: 03/10/2004 11:54:00AM

@River Measure: 27.00 River Flow: Med-High Flow 4500-7500 cfs

Strategy Number	Strategy Name	Critical Resource Protected	Response Objective	Location/Access	River Measure	Travel Time(mins)	Impact
20	Dot's Landing Area	Western Pond Turtle; Spawning gravels	Collection	44:05' 29"N / 122:43' 05"W Dot's Landing; Walterville Landing	26.95	1	3/10 - 11:55
19	Community of Deerhorn/McKenzie River Golf Course	Western Pond Turtle; Spawning gravels	Collection & Protection	44:05' 15"N / 122:42' 28"W Walterville landing; Dot's Landing	26.60	8	3/10 - 12:02
18	East End Goat Island/Deerhorn Landing Area	Western Pond Turtle; Numerous spawning gravels	Diversion	44:04' 01"N / 122:55' 34"W Walterville landing; Dot's Landing	25.70	26	3/10 - 12:20
17	Walterville Landing/Walterville Canal Head Gates	EWEB Walterville Canal; Numerous spawning gravels	Collection & Protection	44:04' 36"N / 122:45' 46"W Walterville landing	24.20	56	3/10 - 12:50
16	Partridge Drive/Emmerich Landing Area	Western Pond Turtle; Spawning gravels	Collection	44:04' 12"N / 122:46' 14"W Emmerich BR; Hendricks Park BR	23.70	66	3/10 - 13:00
15A	East End McNutt Island Area	Western Pond Turtle; Spawning gravels	Collection & Diversion	44:03' 43"N / 122:47' 01"W Hendricks Park BR; Emmerich Landing	22.80	84	3/10 - 13:18
15B	North Channel McNutt Island Area	Western Pond Turtle; Spawning gravels	Collection & Protection	44:03' 51"N / 122:47' 59"W Hendricks Park BR; Emmerich Landing	21.80	104	3/10 - 13:38
14	West End McNutt Island Area	Western Pond Turtle in side channels	Diversion/Collection	44:03' 18"N / 122:48' 32"W Hendricks Park BR; Emmerich Landing	21.22	116	3/10 - 13:49
13	Hendricks Bridge Area	Cedar Creek Head Gates/Intake; Western Pond Turtle	Diversion; Protection & Collection	44:03' 22"N / 122:49' 44"W Hendricks Park BR	20.30	134	3/10 - 14:08
12	Weaver Lane/Thurston Wellfield	SUB Thurston Wellfield; Western Pond Turtle	Protection	44:03' 40"N / 122:53' 57"W Belling Landing; Hendricks Park BR	16.30	214	3/10 - 15:28
11	Belling Landing Area	Western Pond Turtle in side	Collection		15.30	234	3/10 - 15:48

**Strategy Number 19**  
**Community of Deerhorn/McKenzie River Golf Course Area**



**Response Objectives:**

- Collection
- Protection

**Critical Resources to be Protected:**

- Western pond turtle habitat in side channels along the south channel.
- Spawning area west of boom placement area.

**Location:**

- Community of Deerhorn/McKenzie River Golf Course area is located 2.4 miles west of Leaburg. McKenzie River Golf Course is along south bank of boom placement area and can be accessed by taking Holden Creek Lane off (south) of McKenzie Highway at mile post 17.6, cross bridge and golf course is to the west.
- North bank of boom placement area is approximately 550 feet south of McKenzie Highway milepost 17 behind residences.
- 44° 05' 15"N / 122° 43' 28"W
- River Mile: 30.9 (USGS) or 26.5 (Measured)

**Description of Response Tactics:**

- Deploy 400 feet of 4x6 solid containment boom from south bank across side channel and anchor west end of boom on island to protect critical habitat in side channel.
- Deploy 700 feet of 4x6 solid containment boom at an angle of 22-30 degrees SE from the spilled product collection and recovery area (north bank behind residence).
- At product collection and recovery area protect shoreline with additional solid containment boom, sorbent boom/pads and poly sheeting. Collect product with oil recovery skimmer and pump into waste pools or other temporary storage units.

**Access Areas:**

- Closest down river access is Walterville Landing boat ramp (north bank of north channel around Goat island) at 2.3 miles west of the boom placement area via boat (or 2.1 miles by vehicle).
- Deerhorn boat ramp is also located down river along the south bank of the south channel around Goat Island approximately 1.3 miles via boat and 1.5 miles by vehicle off of Deerhorn Road.
- Closest up river access point is Dot's Landing boat ramp (north bank of river) 0.6 miles east on McKenzie Highway or 0.4 miles by boat at USGS river mile 31.3 or measured river mile 26.9.
- Access to north bank area is accessible at various areas behind residences. South bank is readily accessible from the golf course.

**Staging Areas:**

- Walterville Landing has some space for staging equipment and is a newly improved boat ramp.
- EWEB's Leaburg powerhouse complex (2.3 miles east on McKenzie Highway) is a potential equipment staging area that has open space to stage equipment, a nearby park for further staging, cabins for office space, water, electricity, and restrooms.
- Deerhorn Park is another close staging area with ample space, boat launch, and restrooms.
- Nearest equipment warehouse is EWEB's Leaburg Powerhouse (2.3 miles east on McKenzie Highway).

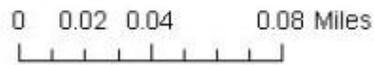
**Watercourse Description:**

- 1.5 m/s flow during high flow
- River width = 275-350 feet

**Equipment Needs:**

1,100 feet solid containment boom (w/8-9 tow bridles)  
Boom Deployment Equipment and 7 buoys  
Multiple Fence Posts w/hammer (used to anchor A, B, & C lines for boom deployment)  
300 feet sorbent boom (shoreline protection)  
300 feet solid containment boom (shoreline protection)  
200 feet x 50 feet of Poly sheeting (shoreline protection & decon area)  
12 bales sorbent pads  
Compressor  
Chemical Pump  
Generator  
1 Jet boat  
Decon equipment  
Pressure washer w/pump  
3-4 Decon waste pools within containment berm  
Oil Recovery Drum Skimmer (product recovery)  
11,000 feet of Rope (3/8" poly rope)

I



### Strategy 19: Community of Deerhorn-McKenzie River

**Legend**

- 📍 Strategy Number
- 🚤 Boat Ramp (Access)
- 🕸️ Culvert
- Boom Objective**
- 🔴 Collection
- 🟡 Diversion
- 🟢 Protection
- 🔵 Static Line
- ⊕ River Mile (1/10th)
- Water

Microsoft Excel - Equip-EWEB Leaburg.xls

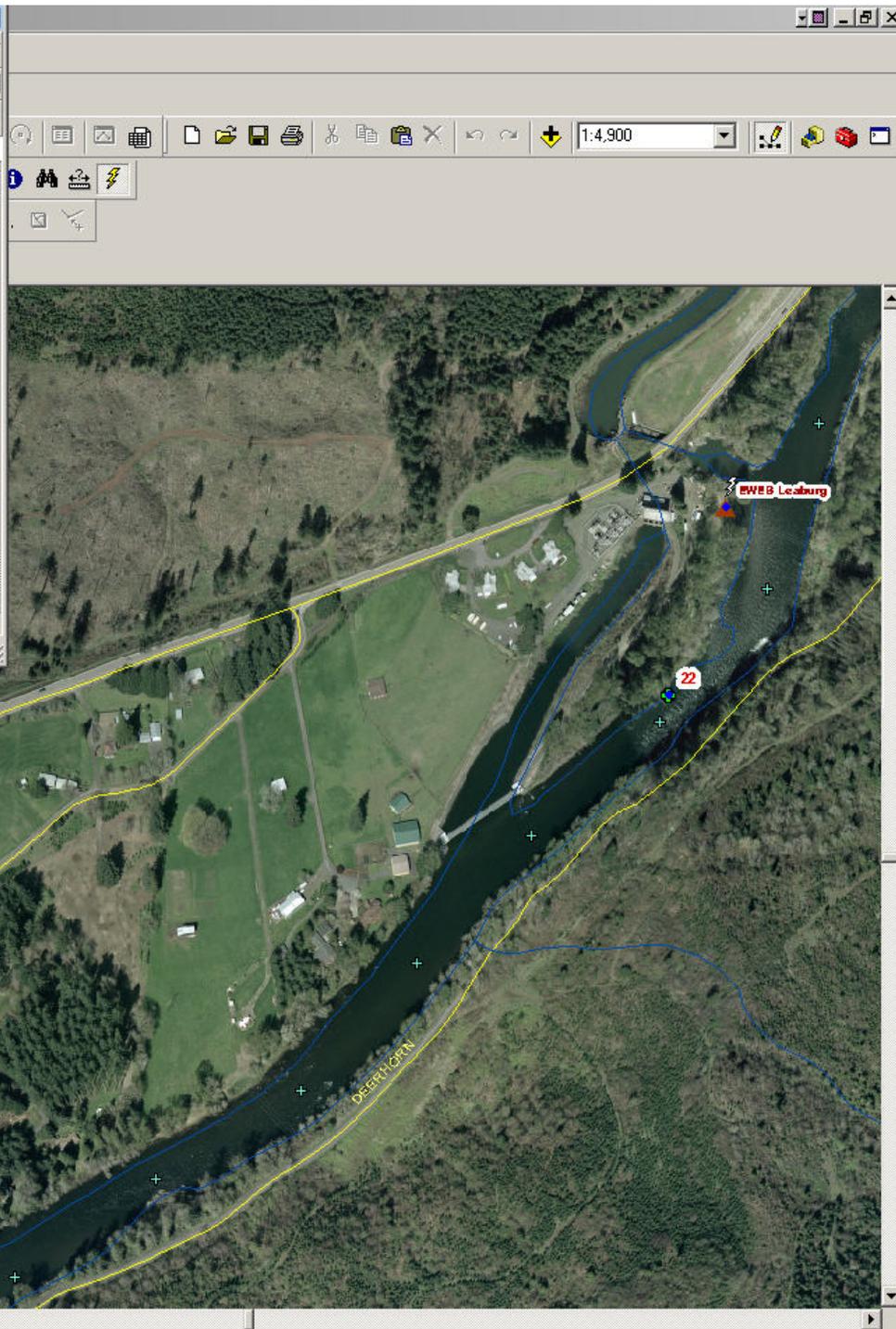
File Edit View Insert Format Tools Data Window Help

Editor A15 = Sorbent Boom

	A	B	C	D
1	<b>Equipment Name</b>	<b>Quantity</b>	<b>Units</b>	<b>Description</b>
2	Backhoe	1	ea	Backhoe with Trailer; Extend Reach
3	Dump Truck	1	ea	
4	Excavator	1	ea	
5	Flat Bed Trailer	1	ea	
6	Trailer House	1	ea	
7	Front End Loader	1	ea	E-Z Loader
8	Welder	1	ea	Welding System on Truck
9	Utility Trailer	1	ea	
10	Boat	1	ea	Fish Rite Boat w/Trailer
11	Water Pump	1	ea	
12	PPE			
13	Hose			
14	Sorbent Pad			
15	Sorbent Boom			
16	Pressure Washer			
17	Traffic Cones			
18	Traffic Signs			

Sheet1 Sheet2 Sheet3

Ready NUM



XTools Pro

Locate Incident

- Layers**
- Incident
  - Incident Rings
  - Strategies
  - Critical Resource
  - Surface Water
  - Wells
  - Fish and Wildlife
  - Private Intake
  - Response Resources
  - Threats
  - Basemap
  - McKenzie\_water
  - Census\_blocks
  - USGS Topo
  - Aerial Photo\_1fc
  - Aerial Photo\_6in
  - Aerial Photo\_2fc
  - Shaded Relief

### MWERS Equipment Search by Strategy

**1. Choose a Strategy** Strategy Number: 26

**2. Choose Equipment**

- Chemical Pump
- Compressor
- Jet Boat
- Oil Recovery Drum Skimmer
- Pressure Washer
- Pump
- Sorbent Boom
- Sorbent Pad

**3. Max Distance to Strategy** 5 miles

**4. Insert Map Image (optional)**

**5. Select Report Option** Strategy Equipment

**Warehouses**

- McKenzie Fire Station 3
- McKenzie Hatchery
- Leaburg Hatchery
- McKenzie Fire Station 4
- EWEB Leaburg

Buttons: Select All, Clear All, Run the Report, Cancel

---

#### Strategy Equipment Request Search

Strategy Number: 26  
Maximum Distance Search: 5 miles

Warehouse	Address	Contact Person	Office Phone Cell Phone	Home Phone Pager	Quantity	Strategy Distance
<b>Chemical Pump</b>						
McKenzie Hatchery	43863 Greer Leaburg	Kremers, Kurt	541-896-3513 541-915-1789	541-896-0448 or 746-	1.00 ea	0.22
Leaburg Hatchery	90700 Fish Hatchery Road Leaburg	Wright, Tim	541-896-3294 541-517-5670	541-517-5670	1.00 ea	1.62
<b>Jet Boat</b>						
McKenzie Fire Station 3	42870 Mckenzie Hwy Leaburg	Ledyard, Dale	541-746-6312 541-954-6408	541-896-3381 911 or 687-5899	1.00	2.26
<b>Pressure Washer</b>						
McKenzie Hatchery	43863 Greer Leaburg	Kremers, Kurt	541-896-3513 541-915-1789	541-896-0448 or 746-	2.00 ea	0.22
Leaburg Hatchery	90700 Fish Hatchery Road Leaburg	Wright, Tim	541-896-3294 541-517-5670	541-517-5670	4.00 ea	1.62
McKenzie Fire Station 3	42870 Mckenzie Hwy Leaburg	Ledyard, Dale	541-746-6312 541-954-6408	541-896-3381 911 or 687-5899	1.00 ea	2.26
EWEB Leaburg	Leaburg Power Plant Leaburg	Wilbanks, Jan	541-344-6311, x4549 541-954-1975	541-344-7098		3.03
<b>Pump</b>						
McKenzie Hatchery	43863 Greer Leaburg	Kremers, Kurt	541-896-3513 541-915-1789	541-896-0448 or 746-	2.00 ea	0.22
Leaburg Hatchery	90700 Fish Hatchery Road	Wright, Tim	541-896-3294	541-517-5670	4.00	1.62

Display Source Selection

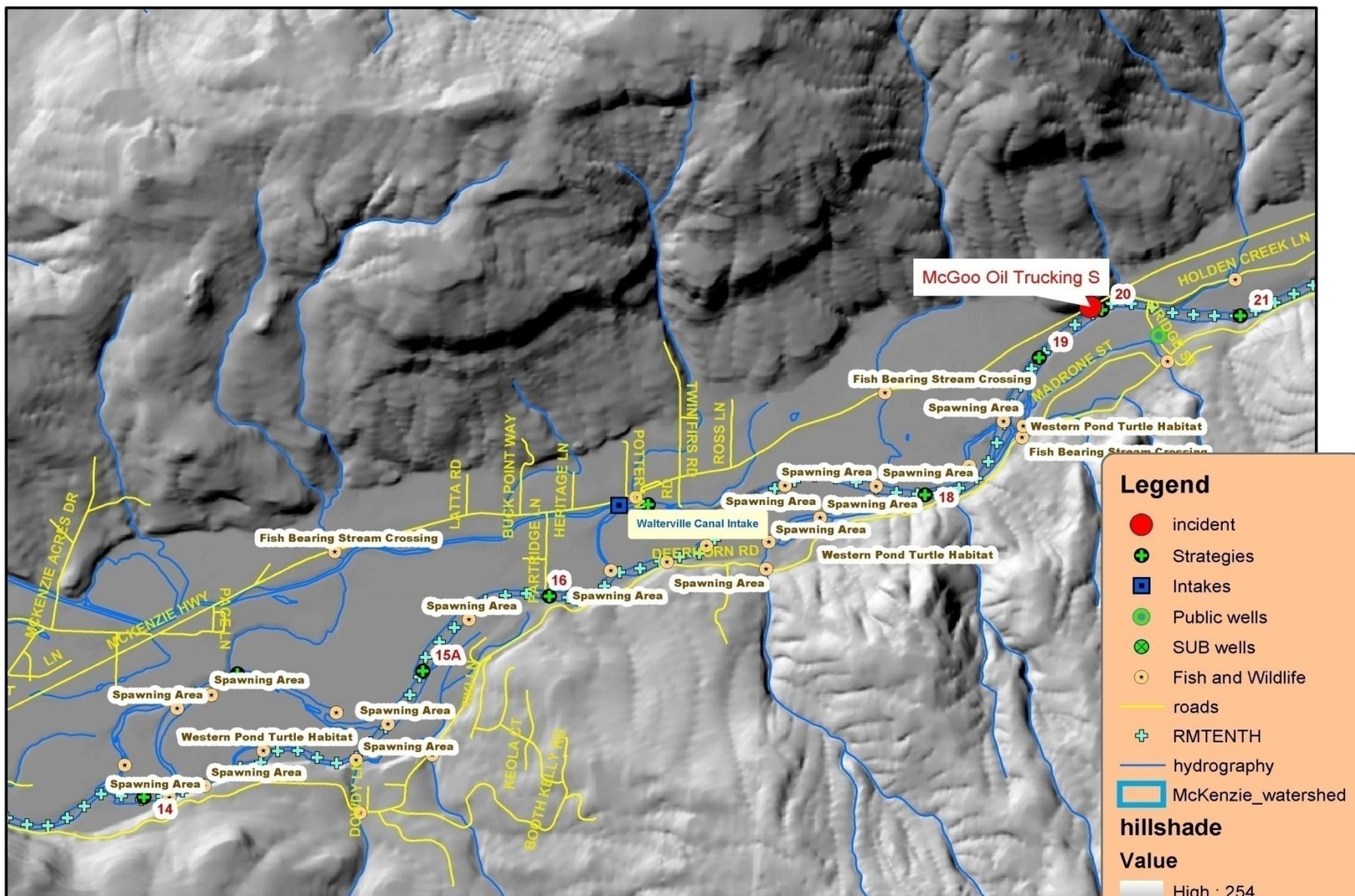
Drawing



**McKenzie Watershed Response Team**



# McGoo Spill Critical Resources Map



**Legend**

- incident
- ⊕ Strategies
- Intakes
- Public wells
- ⊗ SUB wells
- Fish and Wildlife
- roads
- ⊕ RMTENTH
- hydrography
- ▭ McKenzie\_watershed

**hillshade**

**Value**

- High : 254
- Low : 0



**MWERS Report Viewer by River Mile**

1. Choose a Report

4. Insert Map Image (optional)

Run the Report

2. Choose an Incident

Cancel

3. Enter Flow Estimate\*

\*defaults to original estimate

85% 1 of 6 powered by crystal

Preview

**Critical Resources Report** *sorted by distance*

**McGoo Oil Trucking 5 Time: 03/10/2004 11:54:00AM**

**@River Measure: 27.00 River Flow: Med-High Flow 4500-7500 cfs**

Critical Resource Priority	Description	Agency	Phone	Pager	Cell Phone	Home After	X/Longitude Y/Latitude	River Mile	Travel Time(mins)	Impact
----------------------------	-------------	--------	-------	-------	------------	------------	------------------------	------------	-------------------	--------

**Surface Water Intak**

Walterville Canal Intake	Medium	River diversion for power generat	Eugene Water & EI541-344-6311, x554		541-954-1975	541-344-7098	122.750 44.080	24.07	59	3/10 - 12:52
Cedar Creek Headgates	Medium	River diversion to Cedar Creek	Cedar Creek Asso541-747-1946				122.840 44.060	19.45	151	3/10 - 14:25
Keizer Slough	Medium	River diversion to Keizer Slough	Weyerhaeuser Cor541-554-6721		541-554-6721		122.950 44.060	12.31	294	3/10 - 16:47
Weyerhaeuser Intake	Medium	Industrial Intake on Keizer Sloug	Weyerhaeuser Cor541-554-6721		541-554-6721		122.960 44.060	12.02	300	3/10 - 16:53
Hayden Bridge Intake	High	EWEB Municipal Intake	Eugene Water & EI541-341-8552	541-341-7676	541-954-1118	541-461-6946	122.960 44.070	10.83	323	3/10 - 17:17
Smith Reservoir Inake	Medium	Intake for Power Generation	Eugene Water & EI541-344-6311, x553541-689-5186 (hc	541-313-8279	541-341-8573		122.040 44.310	0.00	540	3/10 - 20:54

**Public Wells**

Marcola Well 1	High	Shallow wells may be impacted from rive	Rainbow Water Dis:541-746-1676				-122.860 44.170	0.00	540	3/10 - 20:54
Marcola Well3	High	Shallow wells may be impacted from rive	Rainbow Water Dis:541-746-1676				-122.860 44.170	0.00	540	3/10 - 20:54
Marcola Well4	High	Shallow wells may be impacted from rive	Rainbow Water Dis:541-746-1676				-122.850 44.170	0.00	540	3/10 - 20:54
Marcola Well5	High	Shallow wells may be impacted from rive	Rainbow Water Dis:541-746-1676				-122.850 44.180	0.00	540	3/10 - 20:54

**Sub Wells**

Thurston #1(Depth_ft: 70)	High	SUB municipal well	Springfield Utility t541-744-3745		541-746-8451		368761.000 31818.000	16.11	218	3/10 - 15:31
---------------------------	------	--------------------	-----------------------------------	--	--------------	--	----------------------	-------	-----	--------------



W: 123° 01' 42.74"  
N: 644° 02' 56.95"



W:123°01'46.17"  
N:044°02'53.79"

## INTERAGENCY RESPONSE STRATEGY IMPLEMENTATION DRILLS



## INTERAGENCY RESPONSE STRATEGY IMPLEMENTATION DRILLS





## INTERAGENCY RESPONSE STRATEGY IMPLEMENTATION DRILLS



## INTERAGENCY RESPONSE STRATEGY IMPLEMENTATION DRILLS





# Our Goal

- Provide first responders with the tools they need to avoid confusion and implement response actions to stabilize an incident within the initial hours of a spill or chemical release.

# Real Spill Response Situations









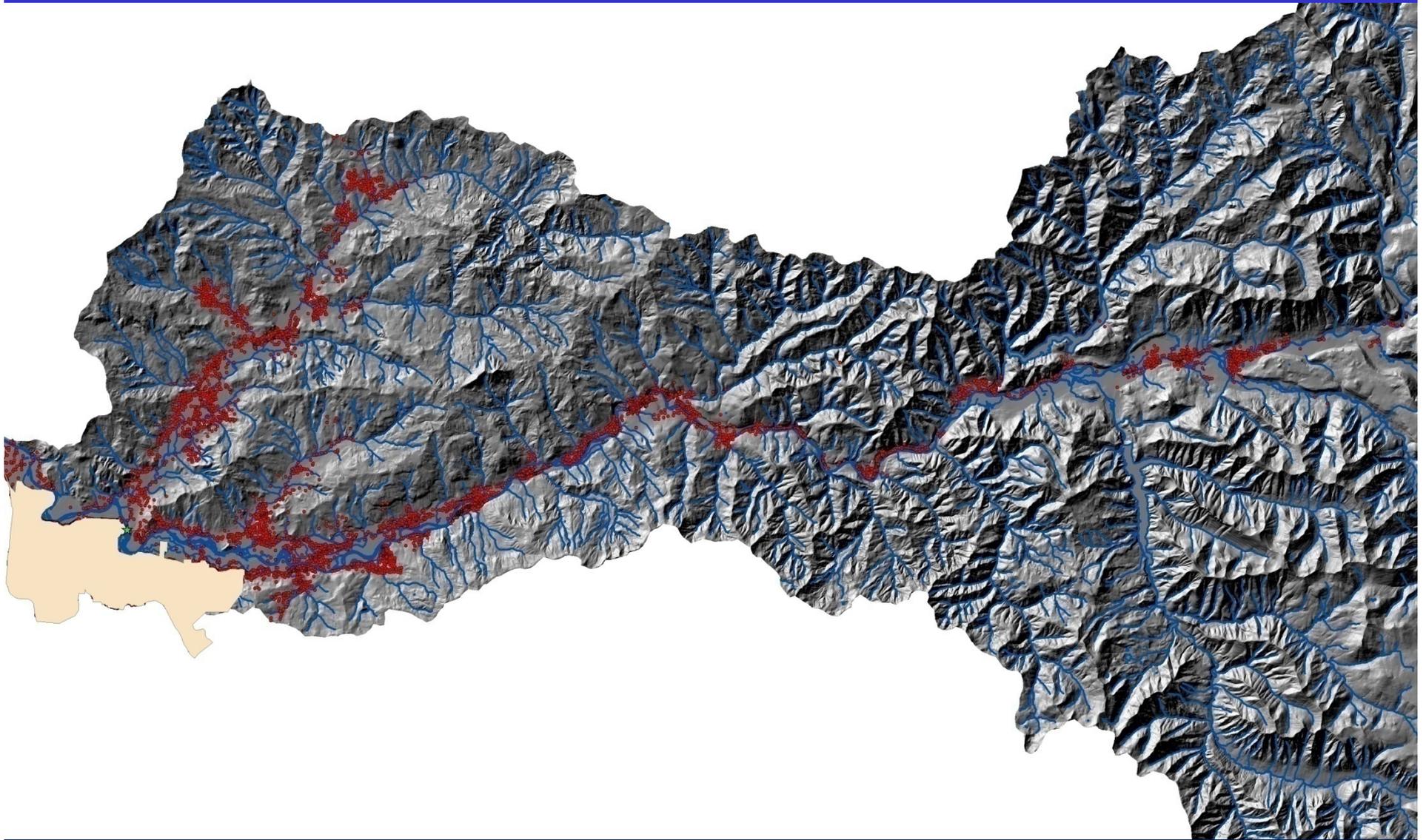


# McKenzie Watershed Septics



- Over 4,000 septic systems in the McKenzie Watershed upstream of EWEB's intake
- Septic systems in McKenzie release approx. 900,000 gallons/day (330 million/yr)
- Many residents in the watershed rely on private wells for their drinking water.

# Septic Systems in McKenzie Watershed

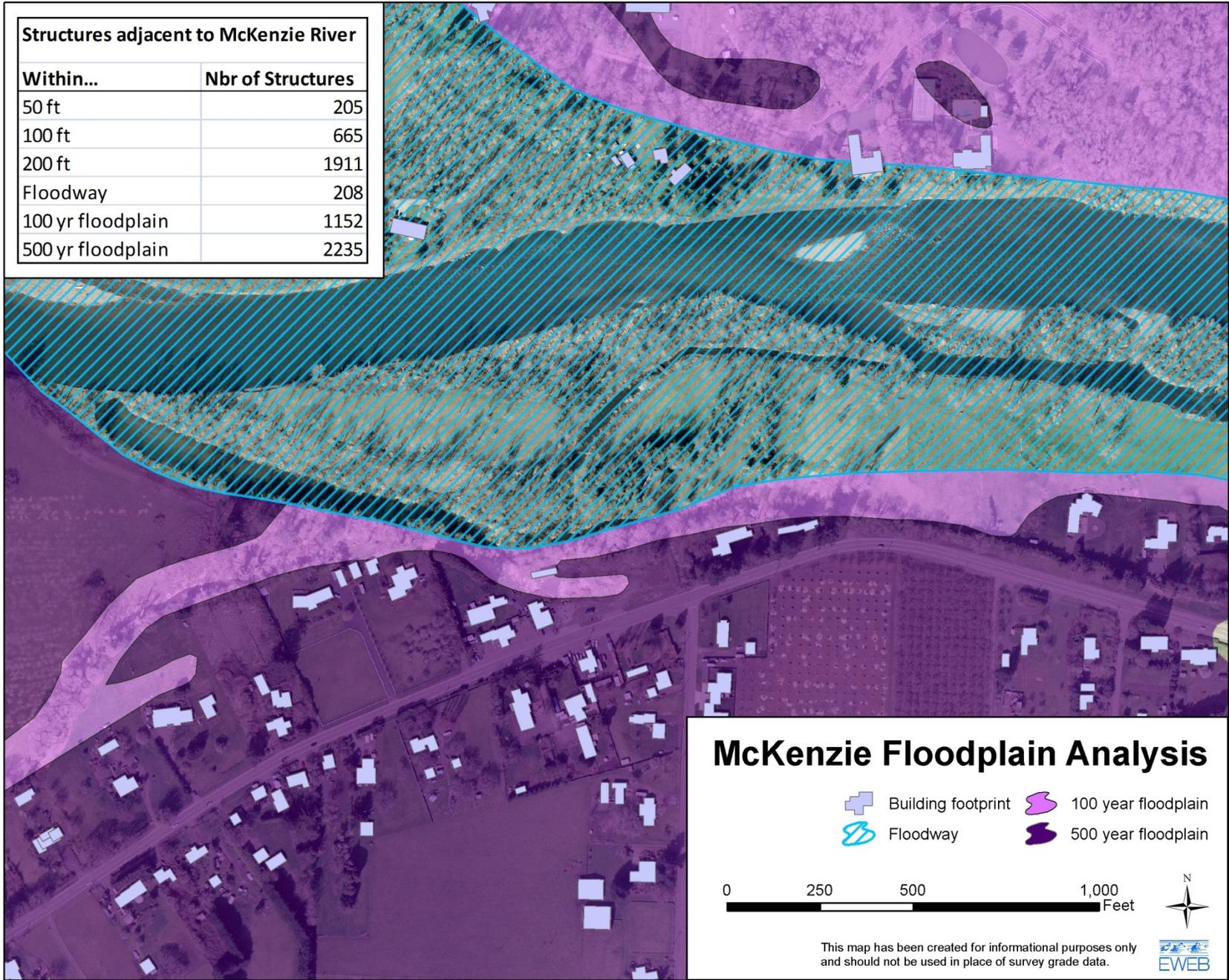


# Threats from Septic Systems



- 10-25% of septic systems fail (EPA)
- On-site systems release high concentrations of: organic matter, nutrients, bacteria, viruses, synthetic organics, metals, and pharmaceuticals to the groundwater

Structures adjacent to McKenzie River	
Within...	Nbr of Structures
50 ft	205
100 ft	665
200 ft	1911
Floodway	208
100 yr floodplain	1152
500 yr floodplain	2235



### McKenzie Floodplain Analysis

-  Building footprint
-  Floodway
-  100 year floodplain
-  500 year floodplain

0 250 500 1,000 Feet

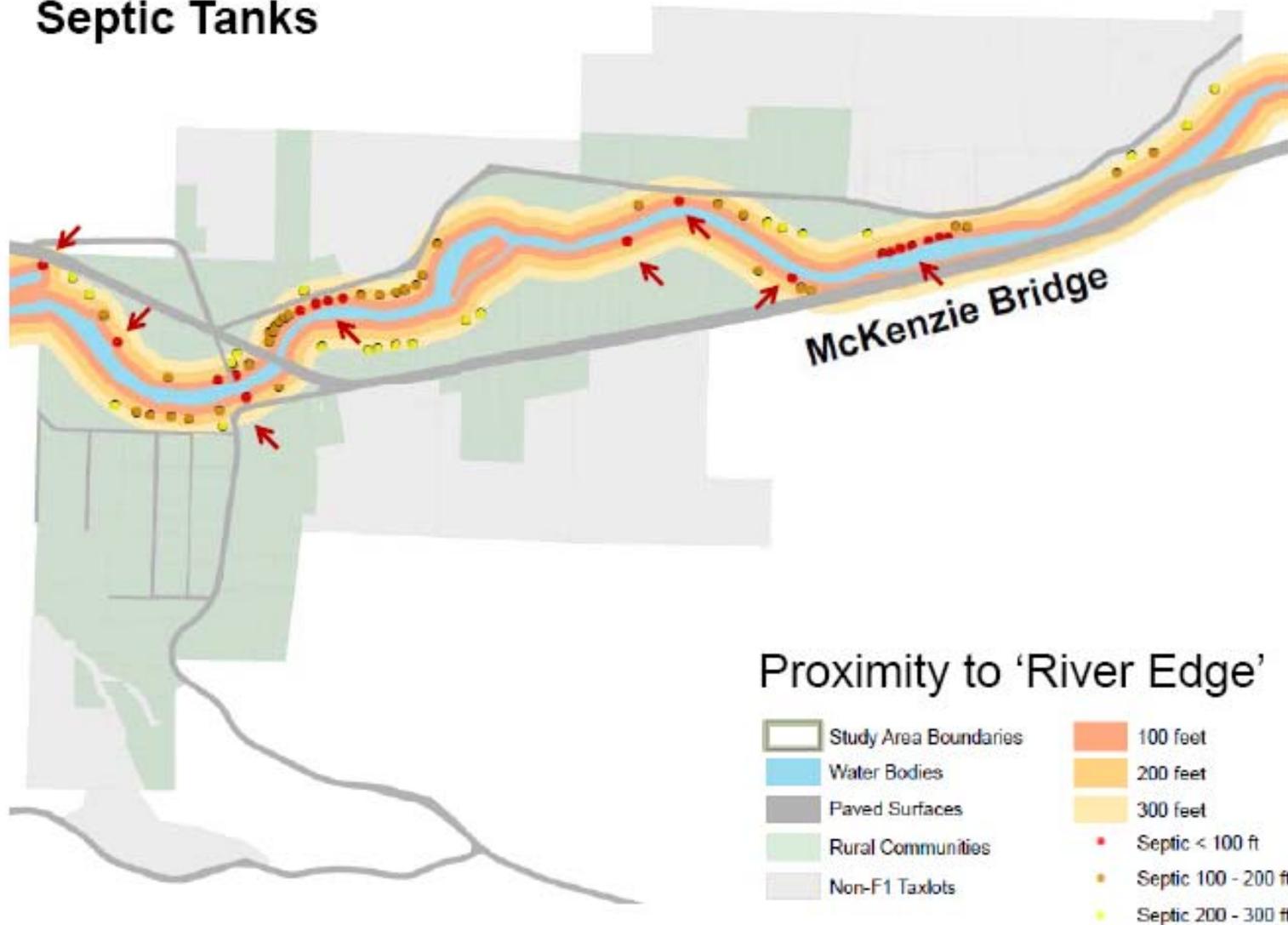


This map has been created for informational purposes only and should not be used in place of survey grade data.



# What about cumulative effects?

## Septic Tanks



**Residential (RR)**

Perform simple, constraints-based infill analysis for building out Rural Residential categories. Count small undeveloped lots.

**93** developable structures and **445** potential units on small undeveloped lots on RR-zoned lands .

**Forestry (F2)**

Use the F2 template criteria to perform a screening analysis for reasonable minimum and maximum sideboards of potential new structures on unaddressed lots .

Maximum of **232** & Minimum of **115** structures on existing non-M37 F2-zoned lots.

**Agriculture**

Count of unaddressed lots (1) meeting minimum lot-size requirements and (2) below minimum lot size as potential new structure sites.

Maximum of **155** & Minimum of **27** structures on existing non-M37 EFU-zoned lots.

**Measure 37 (M37)**

Count of lots with approved applications with three structures assumed per lot.

**54** additional structures on 95 existing lots.

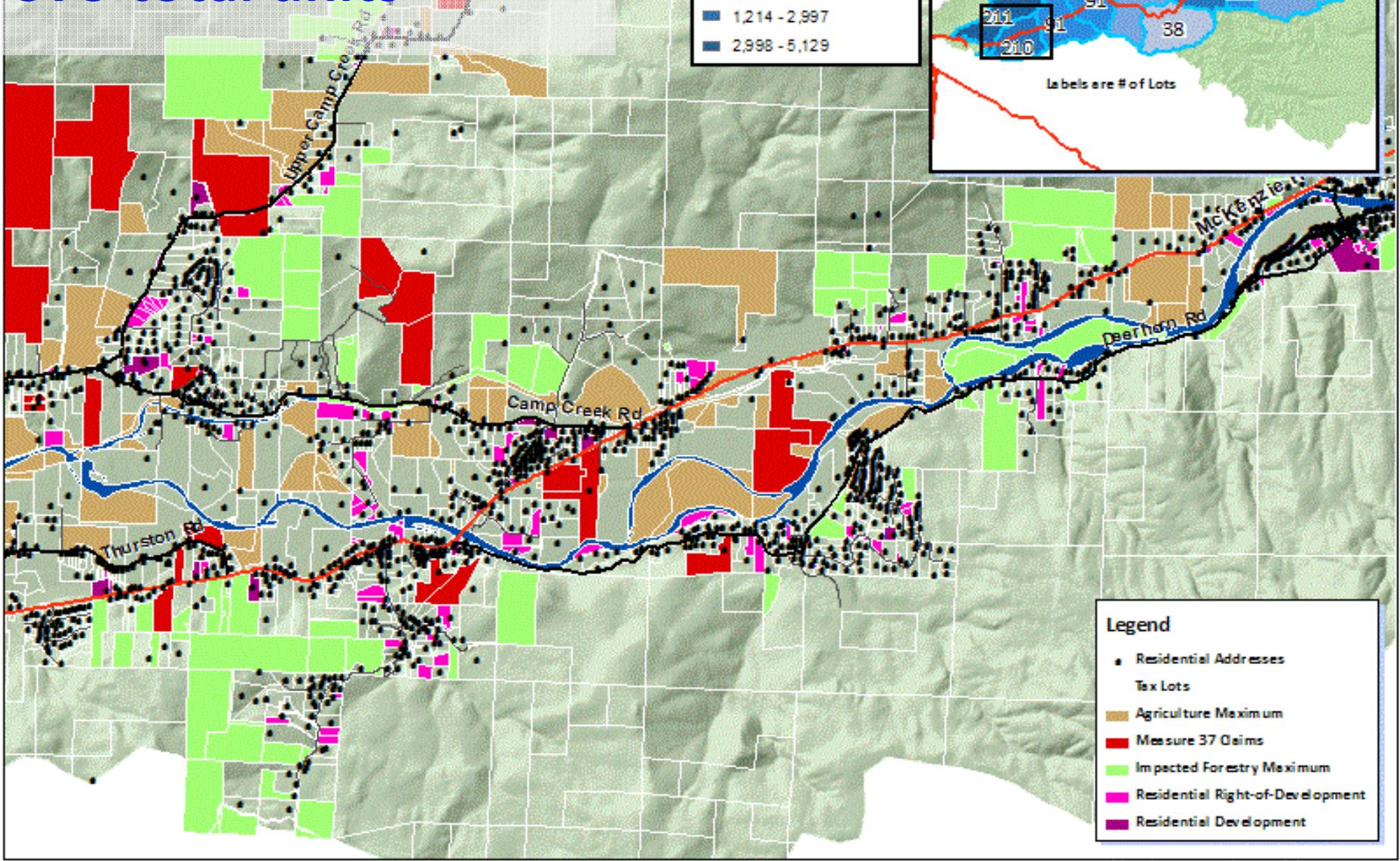
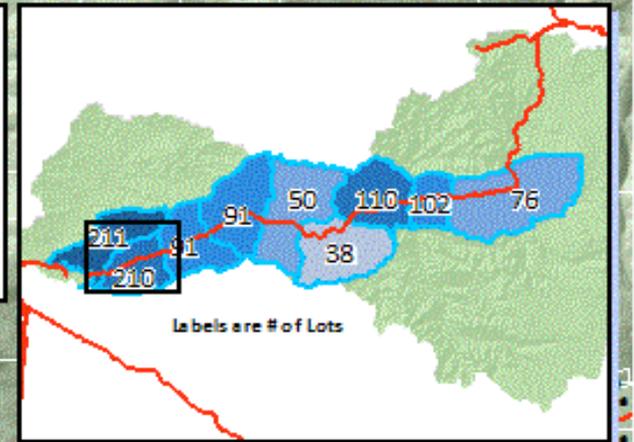
**Total of a maximum of 979 & minimum of 734 new structures**

# Combined Maximum: 979 total units

### Combined Maximum

Total Acres

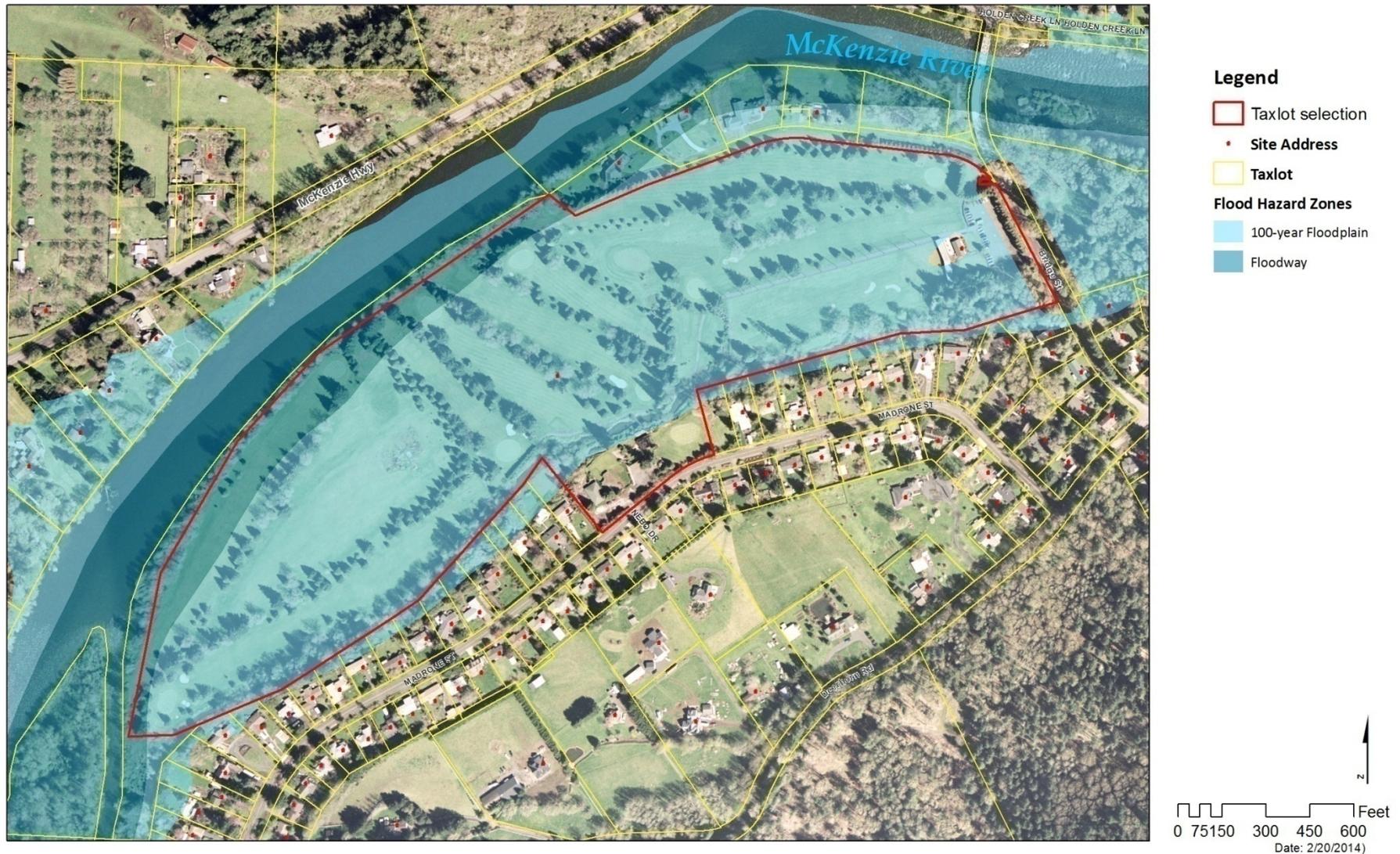
- 492
- 493 - 665
- 666 - 1,213
- 1,214 - 2,997
- 2,998 - 5,129



- ### Legend
- Residential Addresses
  - Tax Lots
  - Agriculture Maximum
  - Measure 37 Claims
  - Impacted For esty Maximum
  - Residential Right-of-Development
  - Residential Development

# McKenzie River Golf Course – proposed subdivision

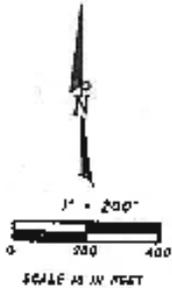
Floodplain at the McKenzie Golf Course



# MCKENZIE DEERHORN LANDING PRELIMINARY SUBDIVISION

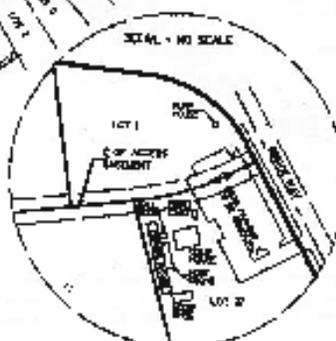
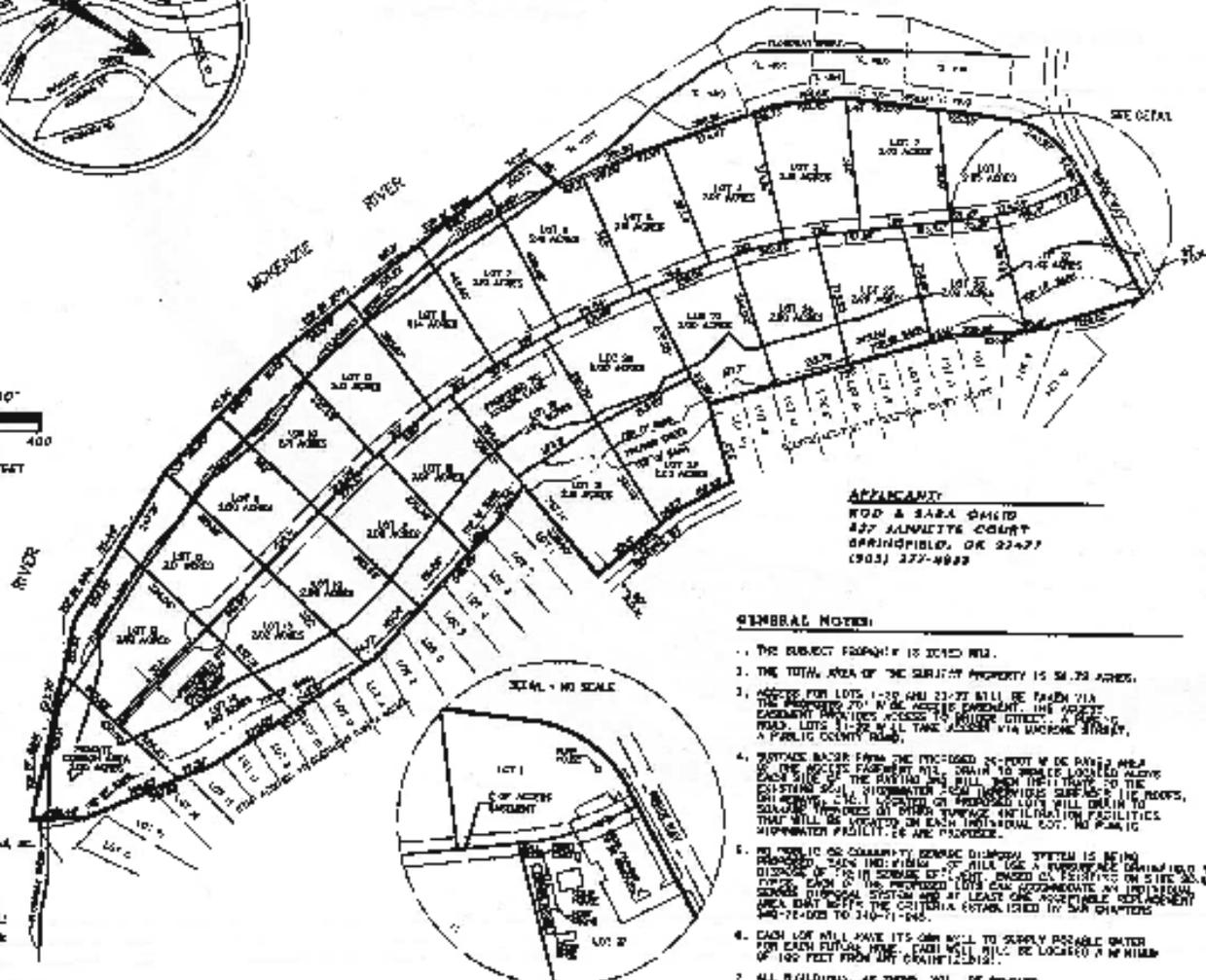
ASSESSOR'S MAP No. 17-16-17-8, TAX LOTS 800 & 801  
EUGENE, LANE COUNTY, OREGON

DECEMBER 12, 2013



**CIVIL ENGINEER:**  
TERRILL J. BROWN, P.E.  
1000 UNIVERSITY BLVD. SUITE 100  
EUGENE, OR 97401  
503-344-8840

**LAND USE PLANNER:**  
LARRY BEECH, LAND USE PLANNER  
1000 UNIVERSITY BLVD. SUITE 100  
EUGENE, OR 97401  
503-344-8840



**APPLICANT:**  
ROD & SARA SMITH  
427 JANNETTE COURT  
SPRINGFIELD, OR 97477  
(503) 377-4888

- GENERAL NOTES:**
1. THE SUBJECT PROPERTY IS ZONED R21.
  2. THE TOTAL AREA OF THE SUBJECT PROPERTY IS 54.73 ACRES.
  3. ACCESS FOR LOTS 1-20 AND 22-27 WILL BE TAKEN VIA THE PROPOSED 20' WIDE ACCESS EASEMENT. THE PROPOSED EASEMENT PROVIDES ACCESS TO HIGHWAY 99, A PUBLIC ROAD. LOTS 21-22 WILL TAKE ACCESS VIA MCKENZIE STREET, A PUBLIC COUNTY ROAD.
  4. SURFACE RUNOFF FROM THE PROPOSED 24'-FOOT WIDE PAVED AREA OF THE PROPOSED DRIVEWAY WILL DRAIN TO STORMCILES LOCATED ALONG EACH SIDE OF THE DRIVEWAY AND SHALL BE DISCHARGED TO THE EXISTING 24" DIAMETER STORM DRAINAGE SYSTEM. THE ROOFS, DRIVEWAYS, PATIOS OR OTHER PROPOSED LOTS WILL DRAIN TO STORMCILES LOCATED ON THE PROPERTY UNTIL FURTHER FACILITIES THAT WILL BE INSTALLED ON EACH INDIVIDUAL LOT. NO PUBLIC WASTEWATER FACILITIES ARE PROVIDED.
  5. NO PUBLIC OR COMMUNITY SEWER DISPOSAL SYSTEM IS BEING PROVIDED. EACH INDIVIDUAL LOT WILL USE A SEWERAGE TREATMENT DISPOSED OF TO ITS SOURCE OF TREATMENT OR DISPOSED ON SITE AS A SEWER DISPOSAL SYSTEM AND AT LEAST ONE NON-POTABLE DISPOSAL AREA THAT MEETS THE CRITERIA ESTABLISHED BY SW CHAPTERS 660-72-005 TO 72-009 TO 72-011-045.
  6. EACH LOT WILL HAVE ITS OWN WELL TO SUPPLY DRINKABLE WATER FOR EACH FUTURE HOME. EACH WELL WILL BE LOCATED 75 FEET MINIMUM OF 100 FEET FROM ANY CHAINLINK FENCE.
  7. ALL BUILDINGS, AS SHOWN, WILL BE PERMITTED.

REVISIONS	DATE	BY
1. PREPARED PRELIMINARY PLAN	12/12/13	TJB
2. 2400 CORRECTED PLAN	12/12/13	TJB
3. 2400 CORRECTED PLAN	12/12/13	TJB
4. 2400 CORRECTED PLAN	12/12/13	TJB
5. 2400 CORRECTED PLAN	12/12/13	TJB
6. 2400 CORRECTED PLAN	12/12/13	TJB
7. 2400 CORRECTED PLAN	12/12/13	TJB

AS NO. 802	DATE	BY
1000 UNIVERSITY BLVD. SUITE 100 EUGENE, OR 97401 503-344-8840	12/12/13	TJB
PROJECT: MCKENZIE DEERHORN LANDING SUBDIVISION, LANE COUNTY, OREGON		
SHEET TITLE: PRELIMINARY SUBDIVISION PLAN		

**POAGE ENGINEERING & SURVEYING, P.C.**  
1000 UNIVERSITY BLVD. SUITE 100  
EUGENE, OR 97401  
503-344-8840

**PROJECT:** MCKENZIE DEERHORN LANDING  
SUBDIVISION, LANE COUNTY, OREGON

**SHEET TITLE:** PRELIMINARY SUBDIVISION PLAN

1996 Flood



620 homes or 1,152 structures are located within the 100 year floodplain



What does  
increased flooding  
mean for septic  
systems?

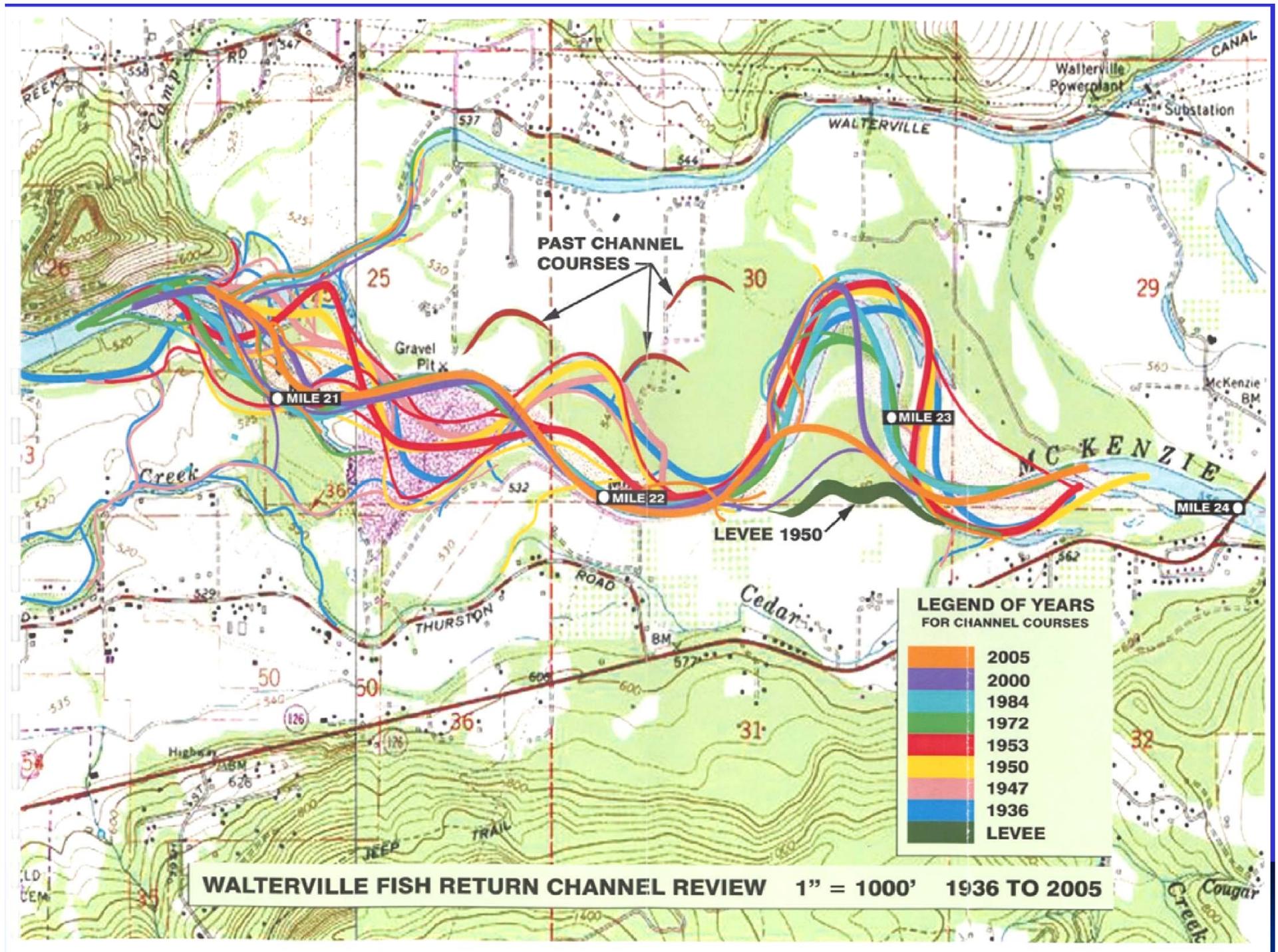
Sandy River – Jan 2011

*Source – Oregonian Newspaper*



Approved “Template Dwelling”  
Site on Ag land in floodplain &  
Floodway – Jan. 19, 2012







### Channel Changes Affecting Septic System Setback Distance

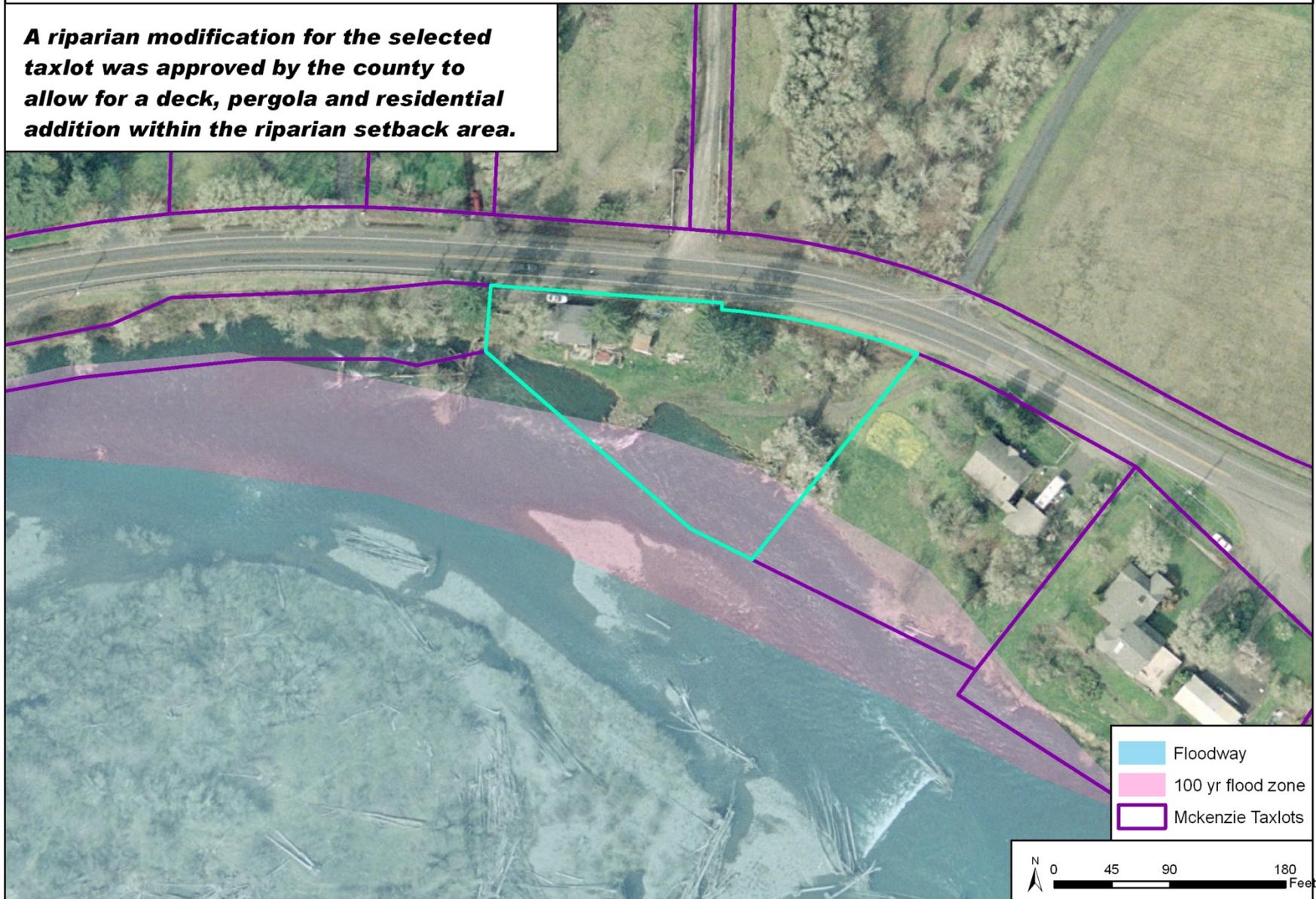
-  Approximate Location of Drainfield
-  Taxlot



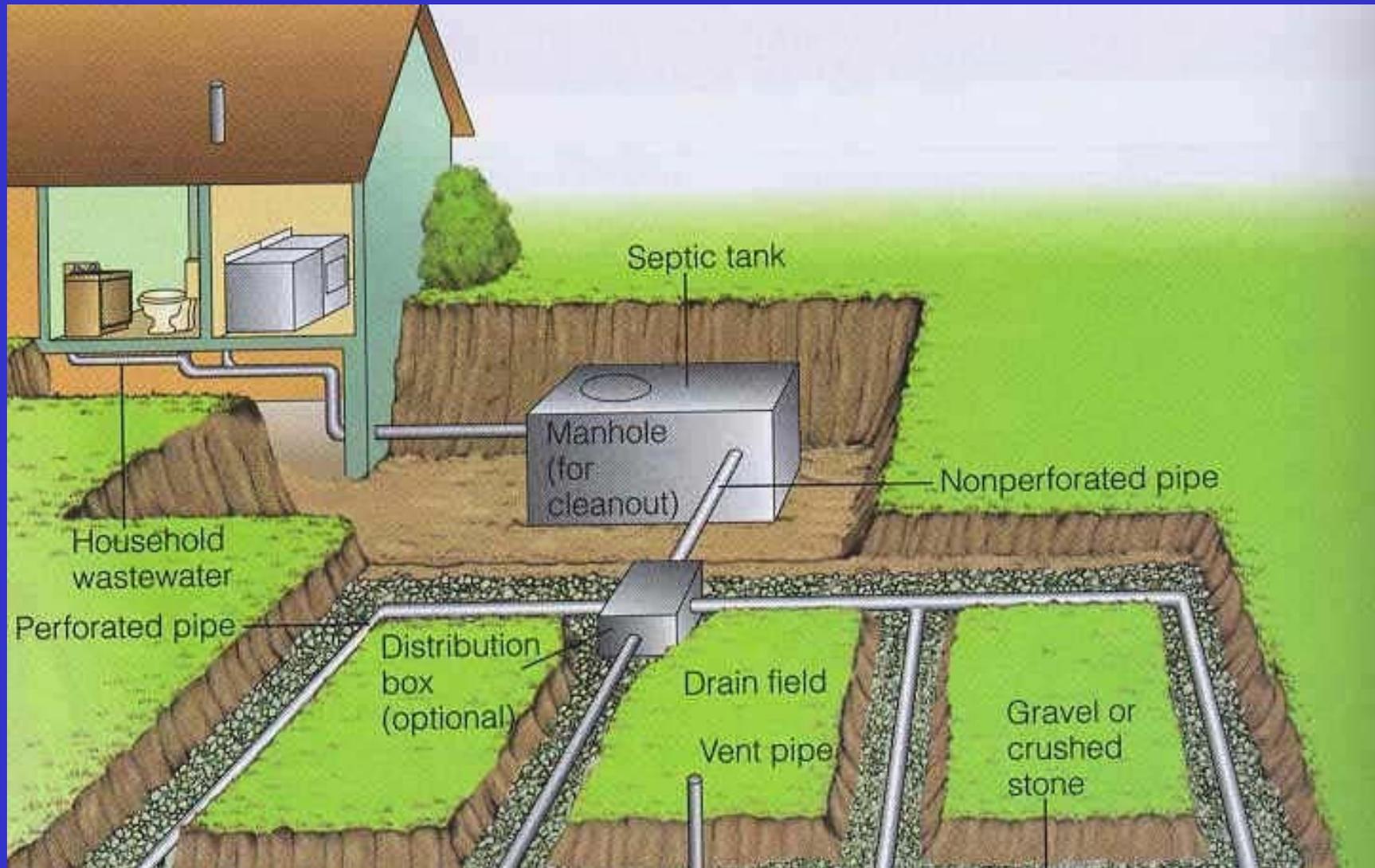
This map has been created for informational purposes only and should not be used in place of survey grade data.

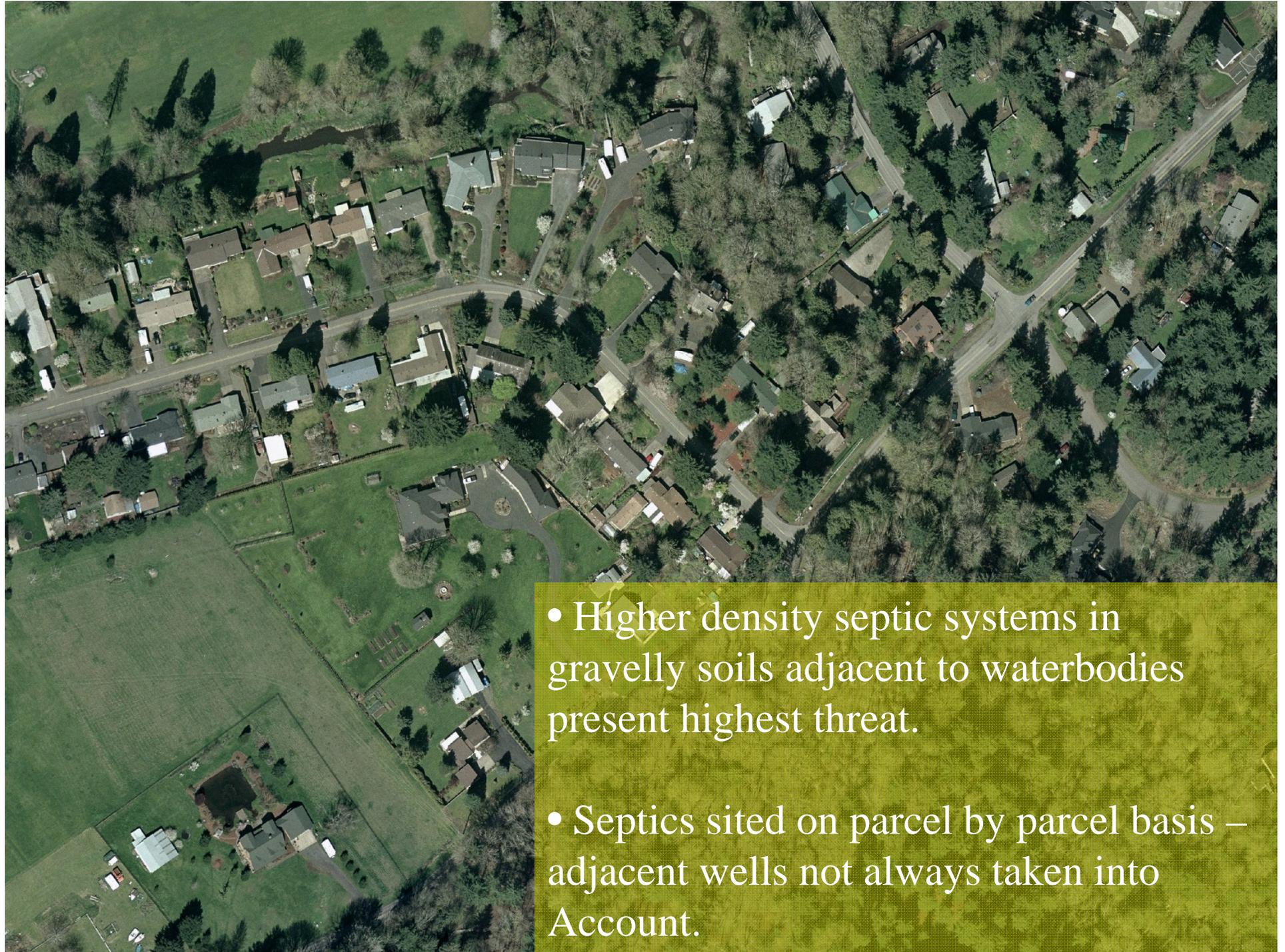
# Example of Riparian Modification Approval

***A riparian modification for the selected taxlot was approved by the county to allow for a deck, pergola and residential addition within the riparian setback area.***



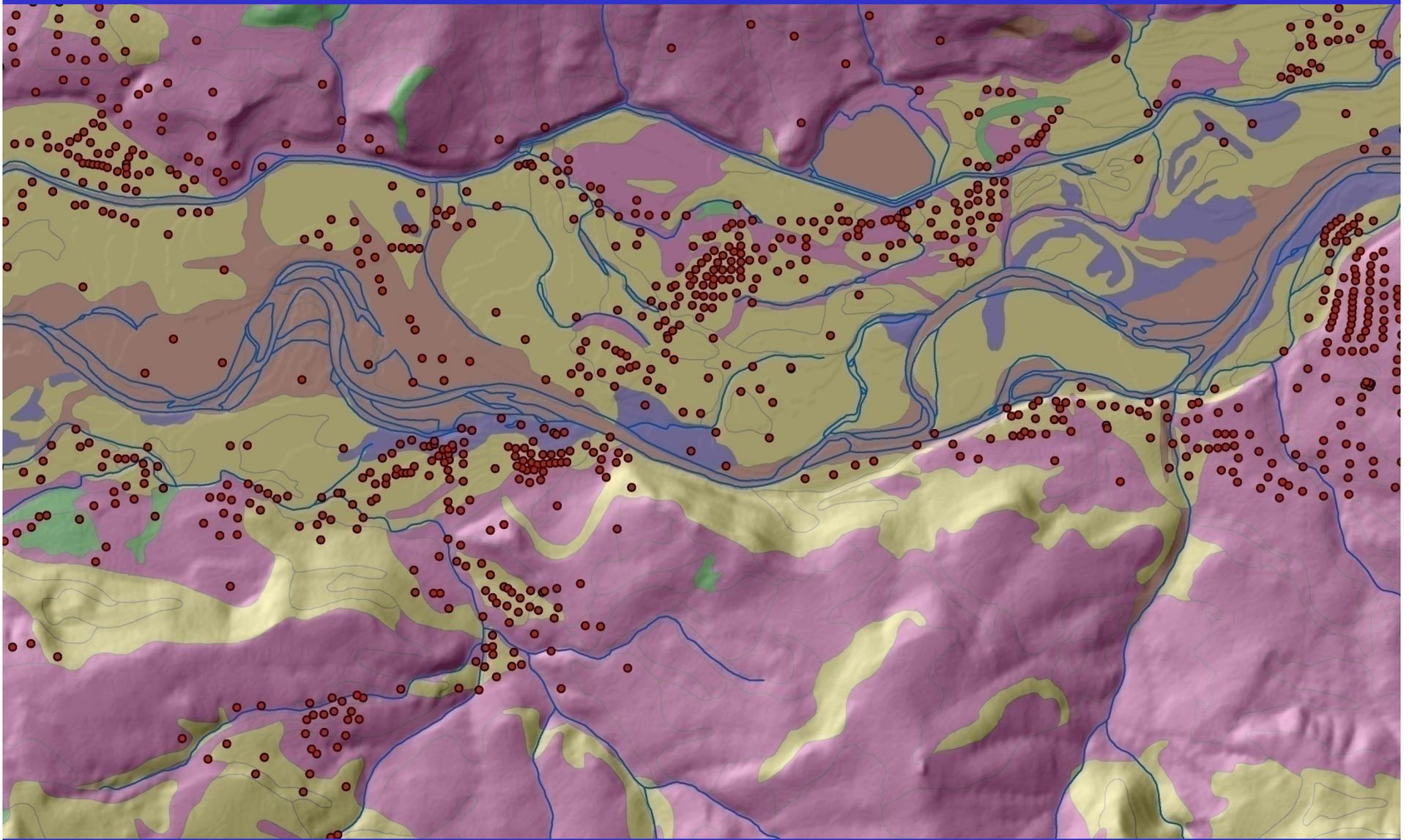
# Septic Systems





- Higher density septic systems in gravelly soils adjacent to waterbodies present highest threat.
- Septics sited on parcel by parcel basis – adjacent wells not always taken into Account.

# Septic Systems Overlaid on Soil Hydrologic Groups



Blue = Gravels / Green = Heavy Clays

# Cluster Area w/Soils Overlay

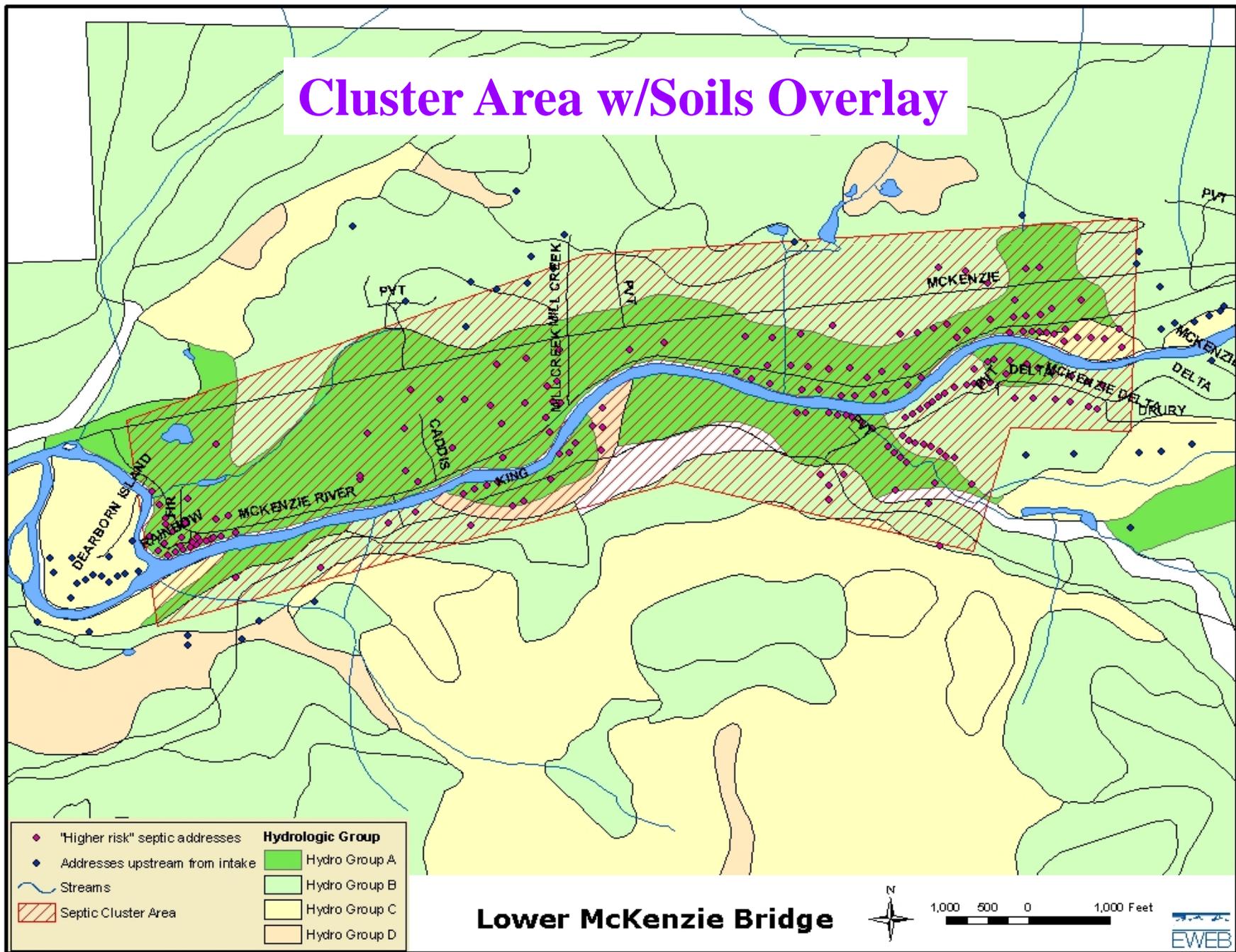
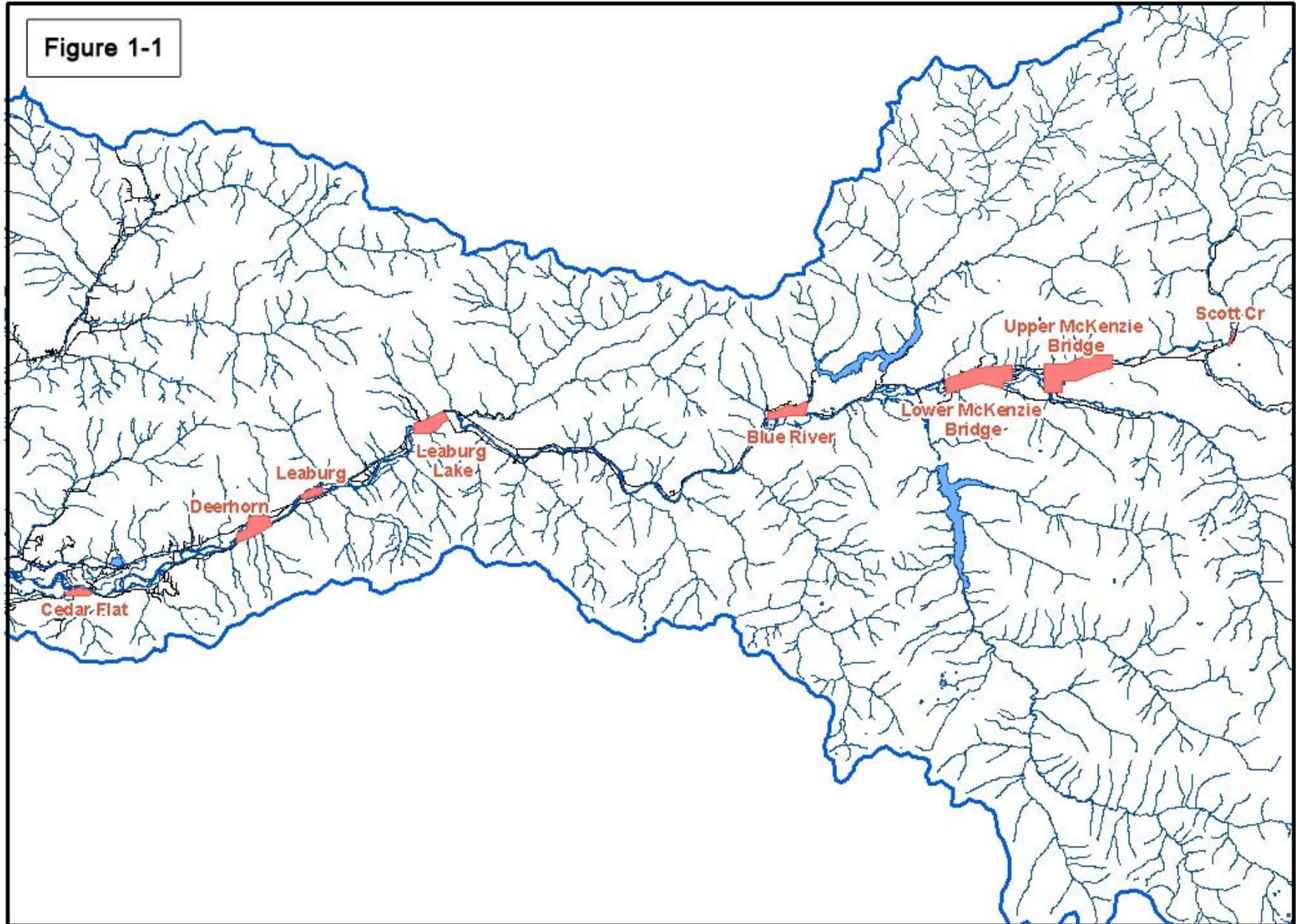


Figure 1-1

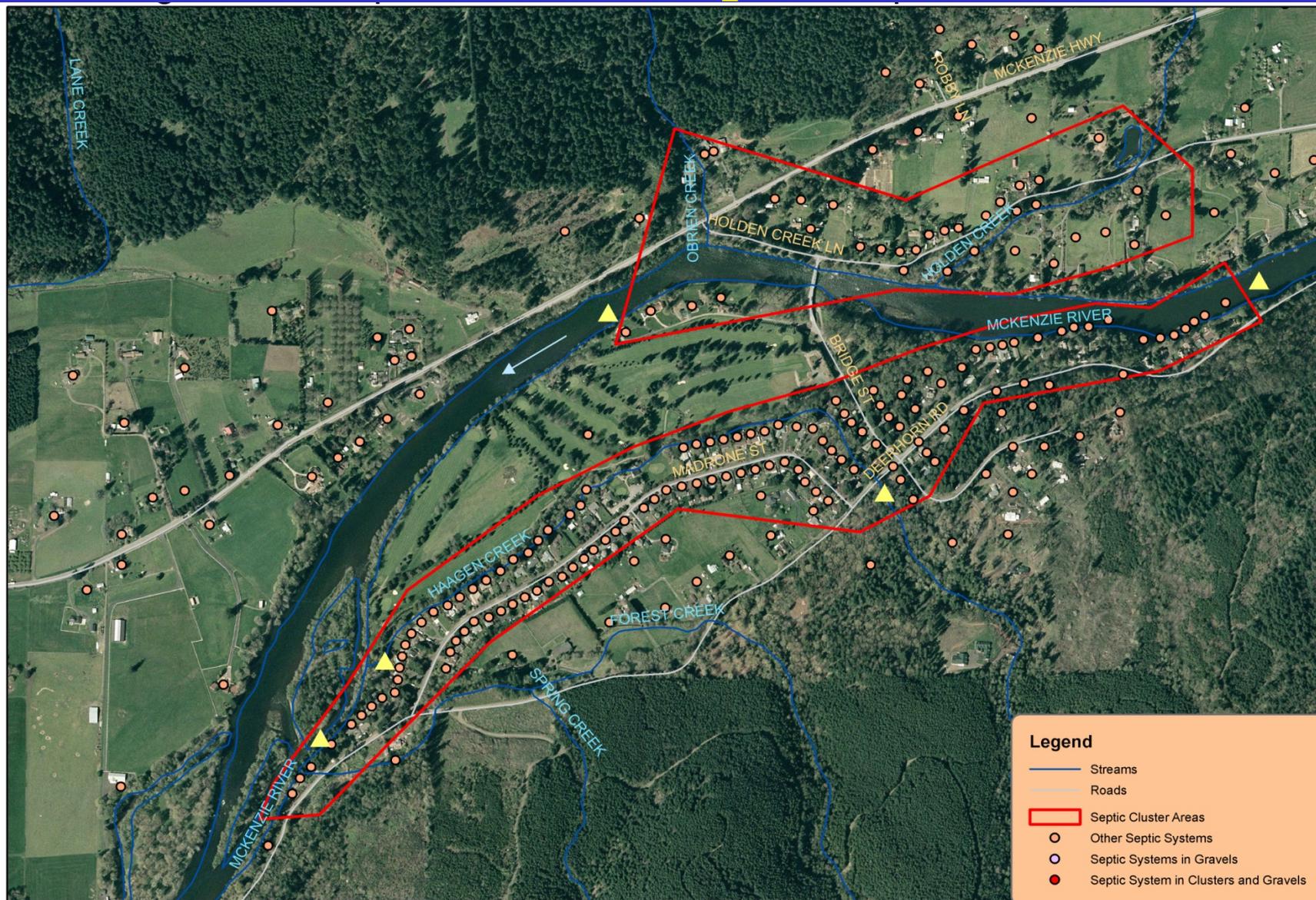


-  Streams
-  Septic Cluster Area

### Septic Cluster Areas



# Clusters of Septics

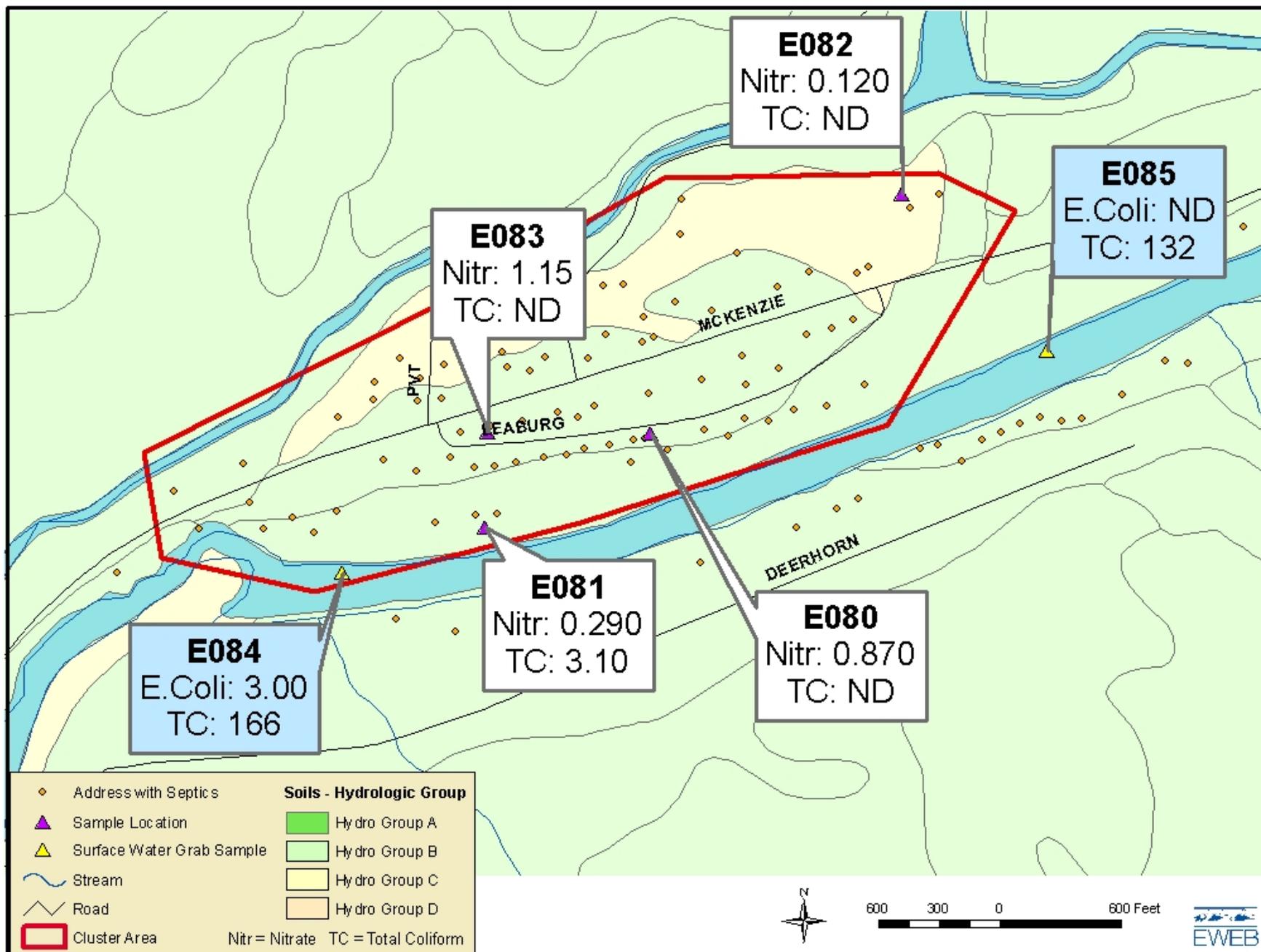


Water Grab Sample Locations

# Summary of Septic Cluster Data

Site Name	Manganese (ug/L)	Phosphorus (ug/L)	Nitrate/Nitrite (ug/L)	TOC (mg/L)	E. Coli (MPN/100ml)	Fecal Coliform (MPN/100ml)
<b>McKenzie Bridge Cluster Area</b>						
McKenzie River at McKenzie Bridge Boat Ramp (upstream)	< 2.0	36.50	< 5.0	< 1.0	2.00	ND
McKenzie River Upstream of Horse Creek (downstream)	< 2.0	40.20	< 5.0	< 1.0	1.00	ND
Horse Creek at Horse Creek Road Bridge (upstream)	< 2.0	46.10	< 5.0	< 1.0	ND	ND
Horse Creek at Confluence with McKenzie River (downstream)	< 2.0	46.10	< 5.0	< 1.0	5.20	9.00
<b>Blue River Cluster Area</b>						
McKenzie River at Forest Glen Boat Ramp Near Blue River (upstream)	< 2.0	33.30	5.69	< 1.0	2.00	ND
McKenzie River Upstream of Confluence with Blue River (downstream)	3.28	29.80	< 5.0	< 1.0	2.00	ND
McKenzie River Downstream of Confluence with Blue River (downstream)	3.68	23.20	< 5.0	< 1.0	4.10	ND
Blue River at Blue River Park Ballfield (upstream)	9.86	< 20.0	7.75	< 1.0	ND	ND
Blue River at McKenzie Hwy Bridge (downstream)	8.40	< 20.0	< 5.0	1.04	ND	ND
<b>Leaburg Lake Cluster Area</b>						
McKenzie River at Goodpasture Bridge (upstream)	5.22	21.40	< 5.0	1.04	11.00	4.00
McKenzie River at Leaburg Lake Upstream of Boat Ramp (downstream)	6.37	21.30	< 5.0	< 1.0	6.30	6.00
McKenzie River at Leaburg Lake Downstream of Boat Ramp (downstream)	9.66	< 20.0	6.55	< 1.0	25.30	13.00
<b>Mountain View Lane Cluster Area</b>						
McKenzie River Below Leaburg Dam (upstream)	5.56	20.57	< 5.0	< 1.0	1.00	2.00
McKenzie River Upstream of Confluence with Trout Creek (downstream)	5.54	21.20	< 5.0	< 1.0	8.50	8.00
McKenzie River at USGS Gauge Site Below Leaburg Dam (downstream)	5.15	24.20	< 5.0	< 1.0	6.30	4.00
<b>Greenwood Drive Cluster Area</b>						
McKenzie River at Greenwood Boat Ramp (upstream)	5.64	21.20	< 5.0	< 1.0	6.30	2.00
McKenzie River Downstream of Goose Creek (downstream)	4.89	22.60	< 5.0	< 1.0	6.30	4.00
McKenzie River Upstream of Richie Creek (downstream)	5.39	21.80	< 5.0	1.09	10.70	11.00
<b>Deerhorn Cluster Area</b>						
McKenzie River Upstream of Holden Creek Road Bridge (upstream)	4.78	20.90	< 5.0	< 1.0	11.00	11.00
McKenzie River Below Holden Creek Road Bridge (downstream)	5.63	21.40	< 5.0	< 1.0	9.70	30.00
Haagen Creek at Deerhorn Road Bridge (upstream)	5.18	< 20.0	210.00	1.03	5.20	8.00
Haagen Creek near Confluence with McKenzie River (downstream)	24.10	48.10	21.40	1.85	112.00	80.00
McKenzie River Downstream of Confluence with Haagen Creek (downstream)	5.22	21.50	20.10	< 1.0	13.50	8.00

# Well Water Samples - Leaburg

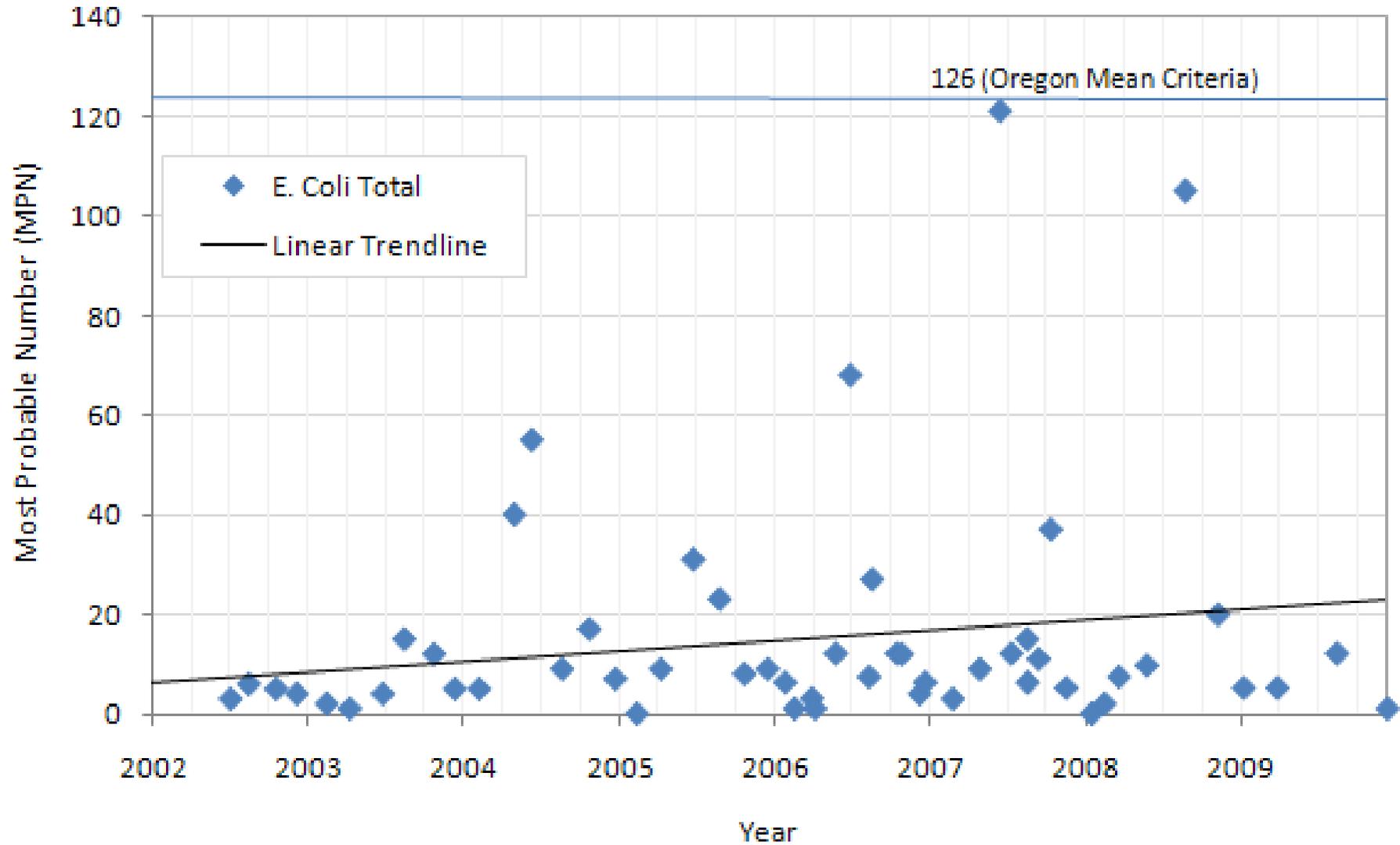


# Monitoring Results - Residences

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- Trace amounts of arsenic, barium, chromium, copper, manganese, nickel, lead, and zinc
- Nitrates and phosphorus also found, but not above the maximum contaminant level (MCL). Max nitrate value was 2.05 mg/L
- 5 residences had total coliforms detected in their water samples (highest was 66.3 MPN/100ml)
- Sent results to homeowners with explanations of MCLs and other health guidelines and directed them to additional resources.

### E. Coli Detections for Site E020



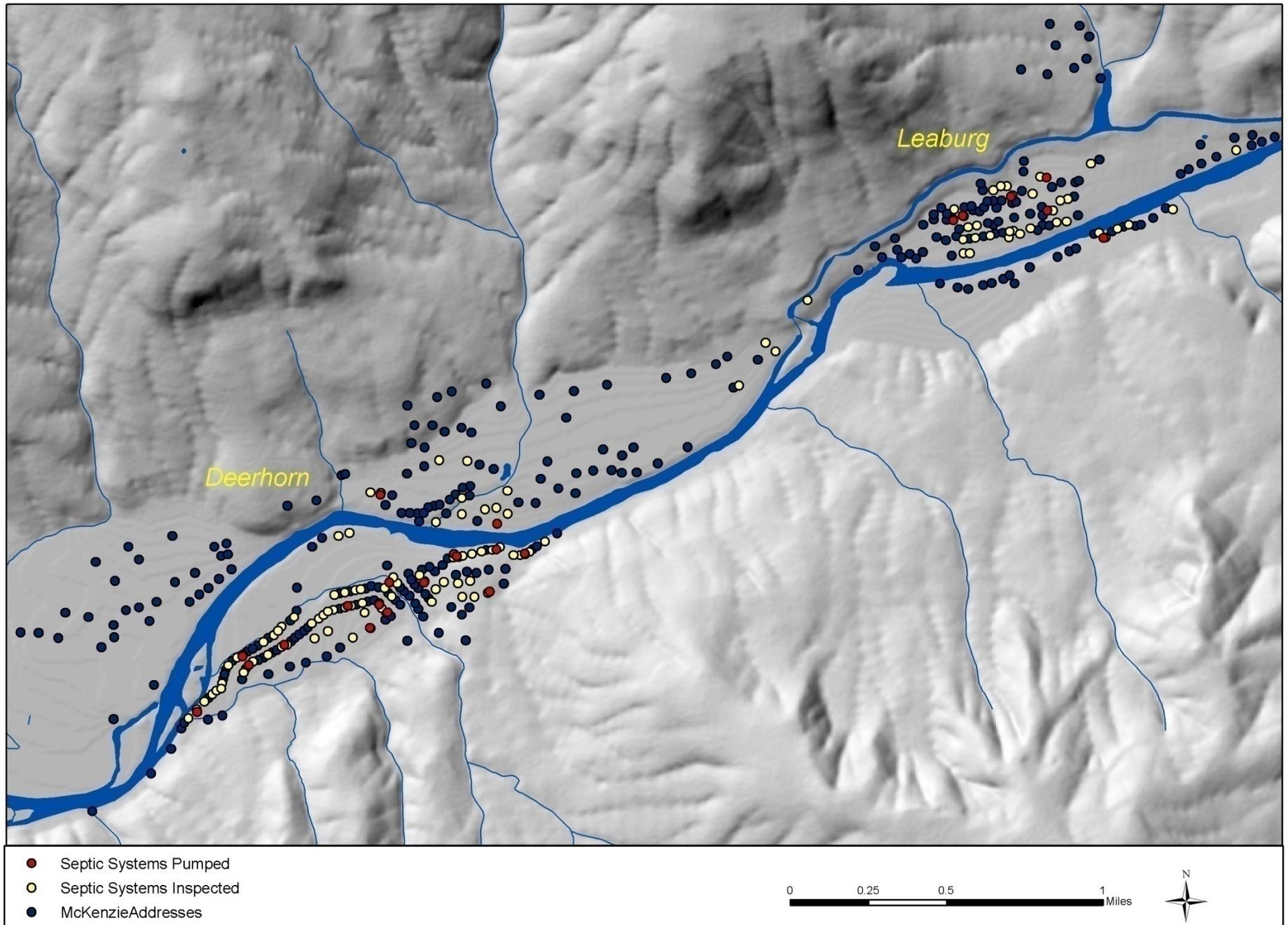
# USGS Clackamas River Basin Monitoring Study

2000-2005 (*K. Carpenter, et.al., USGS, 2008*)

---

- Raw Source Water Contaminants Detected
  - 63 pesticides
  - 16 fuel compounds/combustion by-products
  - **8 pharmaceuticals & personal care products**
  - 9 solvents
- Treated Drinking Water Results
  - 15 pesticides
  - 8 fuel compounds/combustion by-products
  - **4 pharmaceuticals & personal care products**
  - 3 solvents

Figure 4-2. Deerhorn and Leaburg Inspections and Pump-Outs





**Legend**

**Septic**

- distribution box
- ▨ septic tank
- ▩ Drainfield

# Overall Septic System Assistance Program Results

---

Almost **500 residents** have received assistance through the 2008-2009 grant program and ongoing septic system assistance program.

Overall, this has resulted in over **570 inspections** and over **240 pump-outs**. Over **80 systems (15%)** were found to be failing in some capacity.



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)