Clackamas Nursery Growers' IPM Workshop

February 3, 2015

Clackamas Pesticide Stewardship Partnership Water Monitoring

2014 Review and Historical Summary

Overview

- Overview of Pesticide Stewardship Partnership Program
- Clackamas Watershed Pesticide Monitoring
  - Major findings from 2014 monitoring
  - Historical comparisons and trends
- Summary Points

Pesticides in Oregon
Multiple Products

Over 900 registered active ingredients

insecticides, fungicides, herbicides, antimicrobials……

Over 12,000 registered pesticide products

agricultural pesticides, home products, pet products, mosquito repellents, cleaners, pool/spa chemicals, etc….

a.i. Bifenthrin in
> 150 products

a.i. Fipronil in
> 160 products

Pesticide Movement in the Environment

The Source is Often Hard to Trace

Multiple Routes of Entry

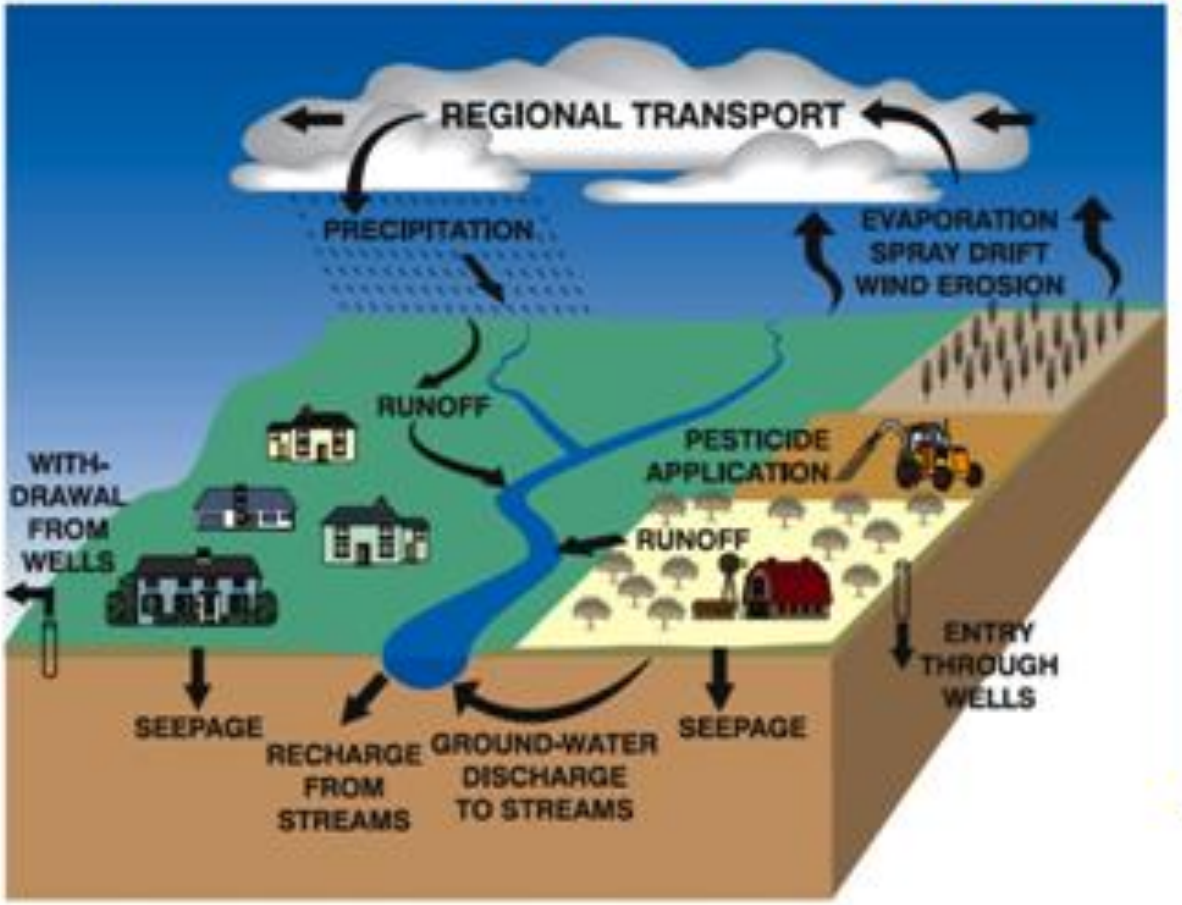


Figure 1. Pathways of pesticide movement in the hydrologic cycle (modified from Barbash and Resek, 1996).

Non-Point Sources

- Wide area
- Drift
- Runoff
- Leaching

Point Sources

- 1-2 locations
- Disposal sites
- Wells, sinkholes
- Storm drains

Pesticide Stewardship Partnerships (PSPs)

Key Steps in Partnership Projects

Monitor for current use pesticides in surface waters from drift & runoff

↓

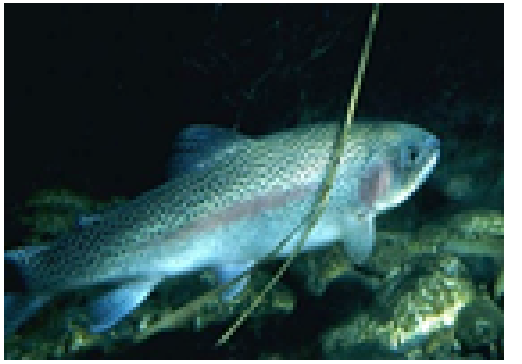
Identify streams with elevated pesticide concentrations or high # of detections

↓

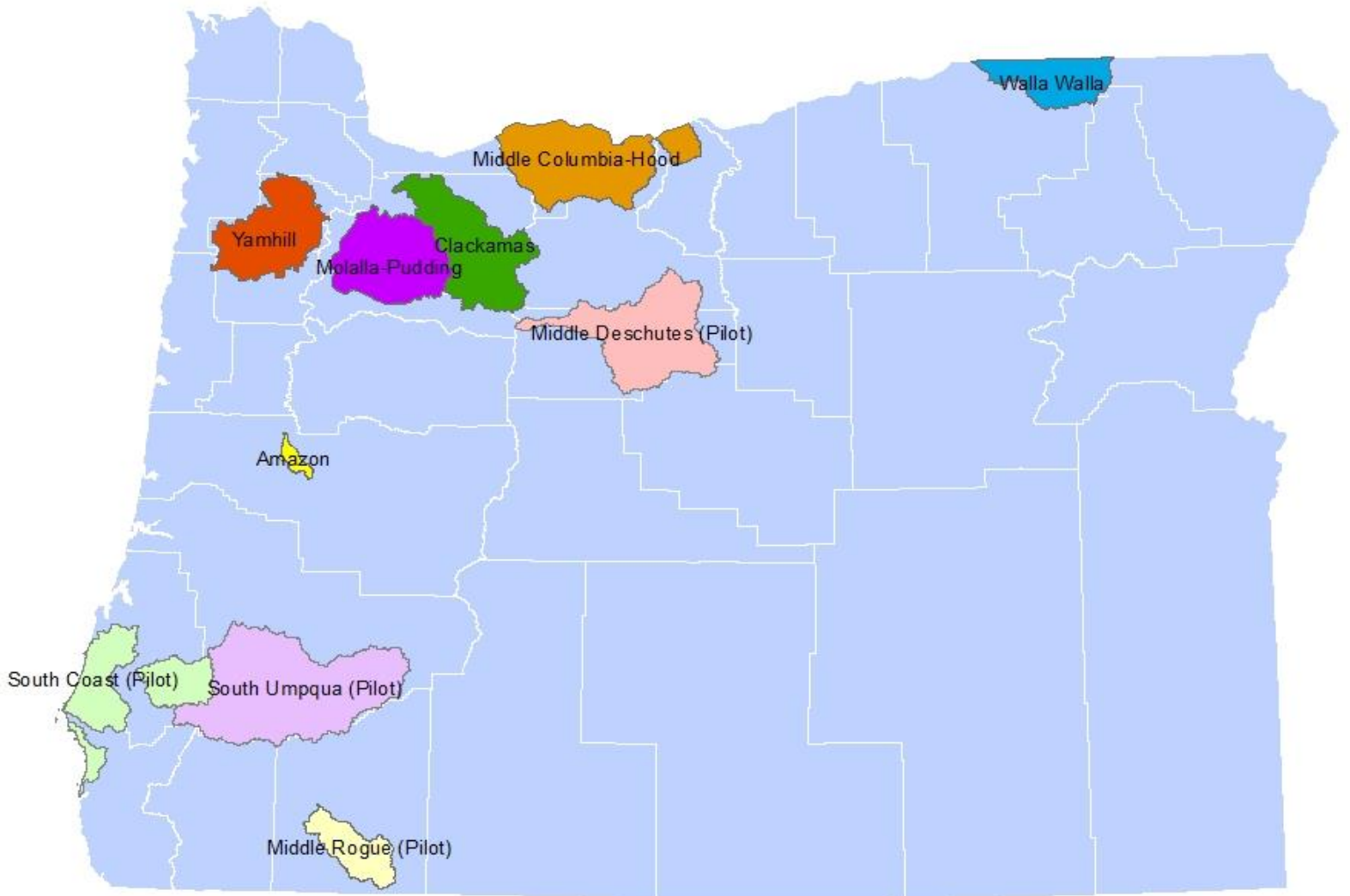
Collaborate to implement voluntary management practices

↓

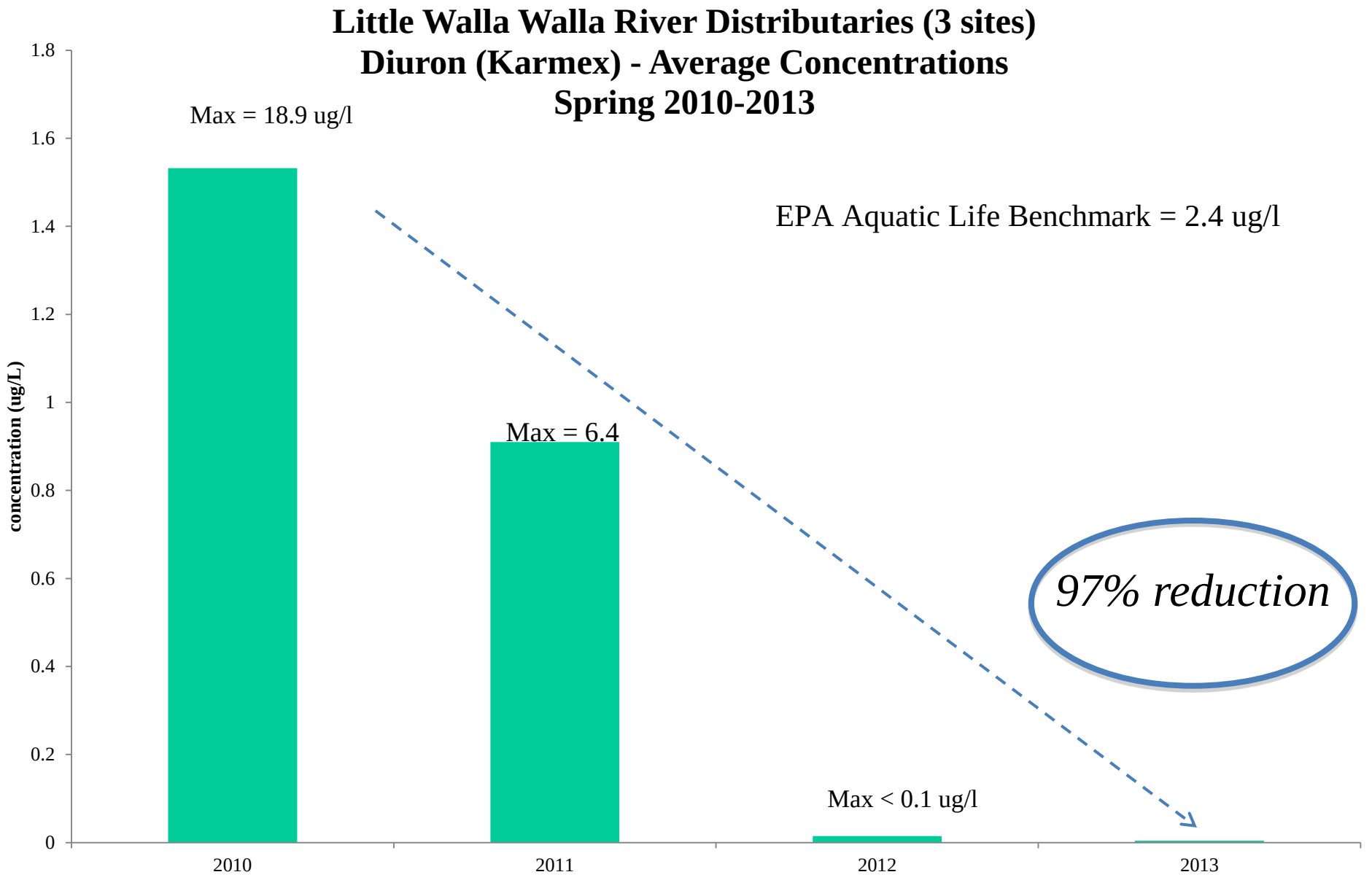
Follow-up monitoring to determine improvements over time



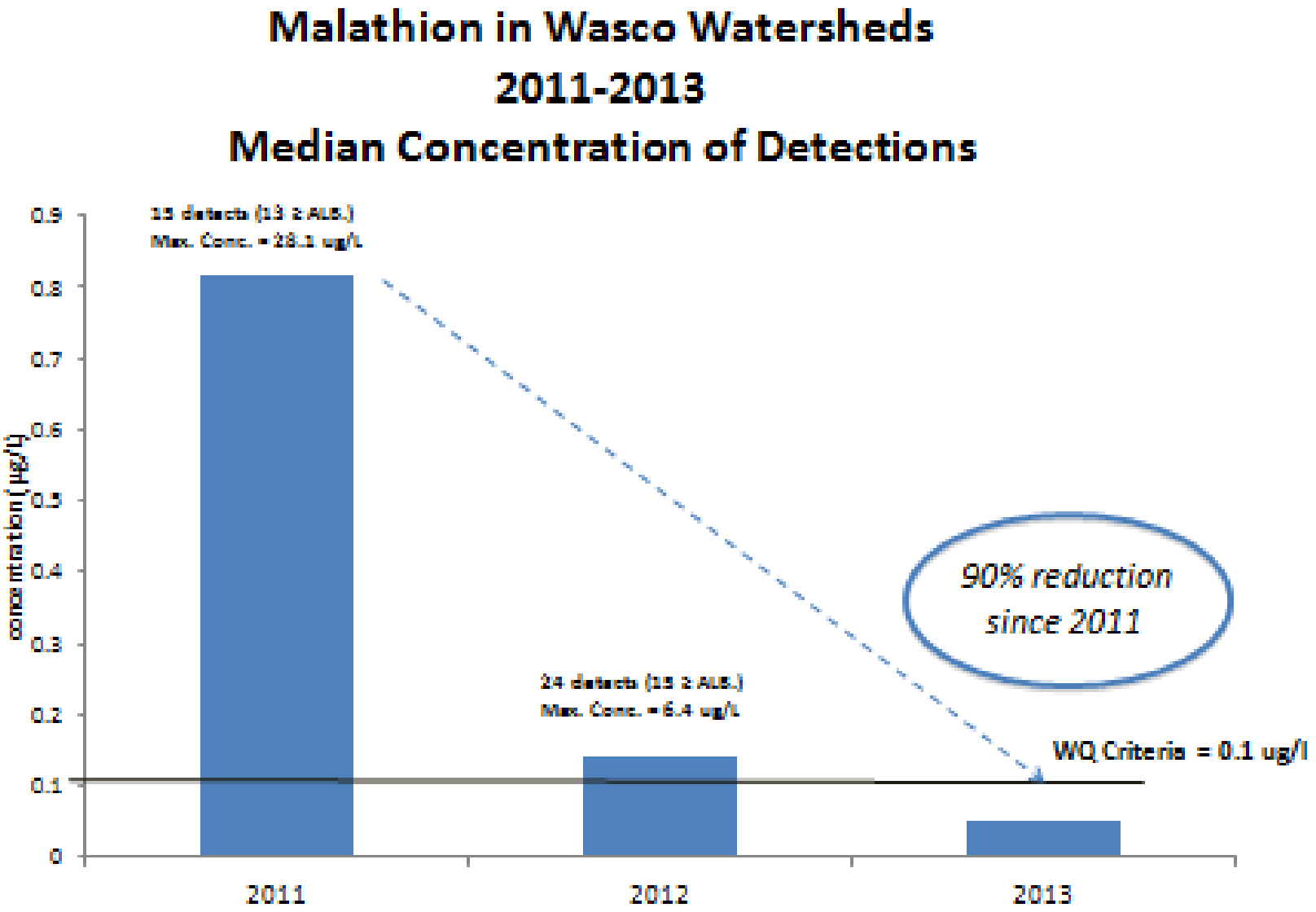
Oregon Pesticide Stewardship Partnerships
Existing and Pilot Watersheds: 2014-2015



What's the goal of the PSP program



What's the goal of the program?



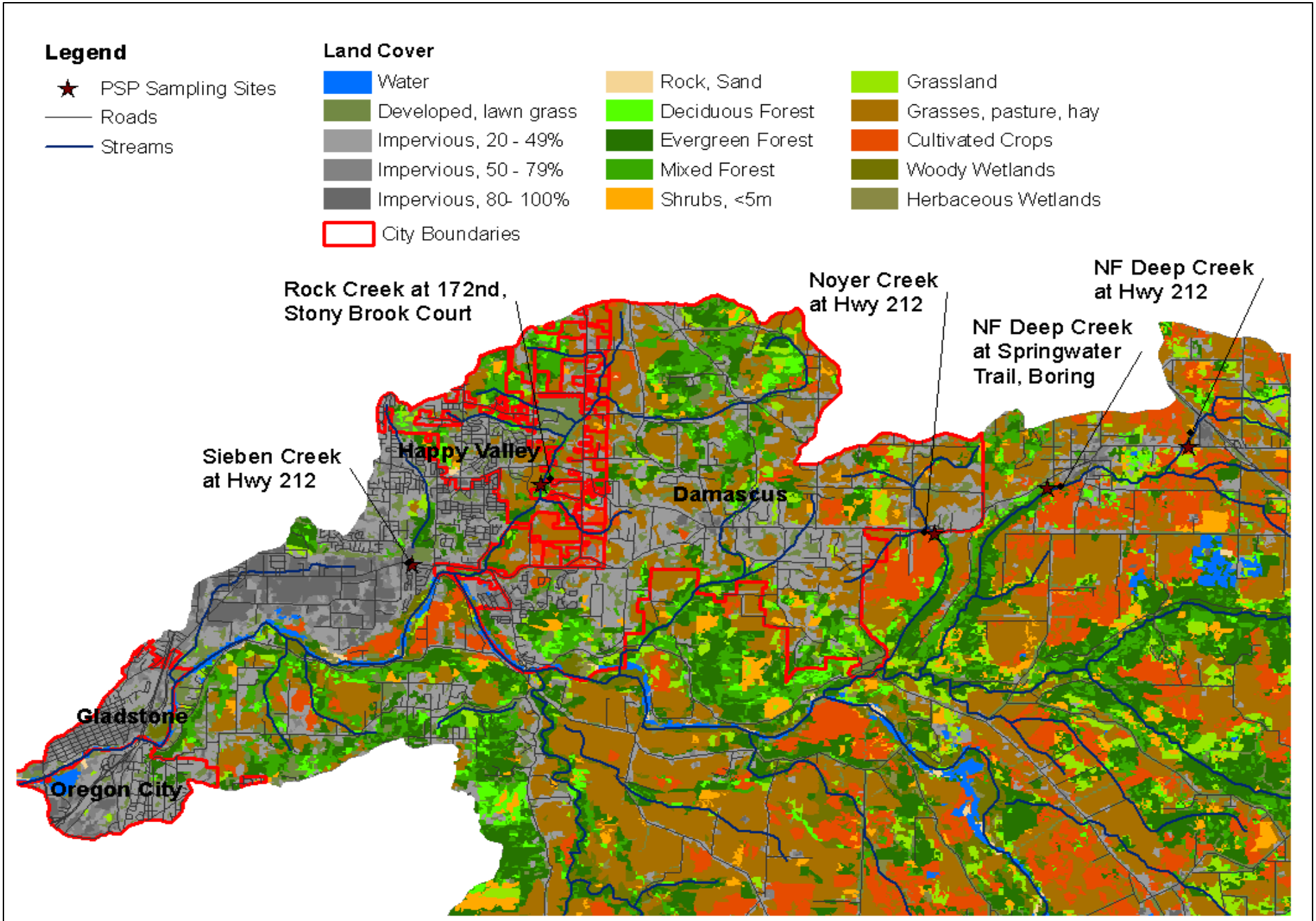
What Types of Actions Have Been Implemented to Produce Results?

- *Spray Drift Reduction Trainings & Practices*
- *Installation of Weather Stations*
- *Use of Biological Controls (e.g., mating disruption)*
- *Integrated Pest Management Training & Technical Assistance*

- *Use of Less Toxic Pesticides*
- *Buffer Strips & Minimize Spraying near Streams*

Clackamas PSP – Partners

- Clackamas Soil and Water Conservation District
- Clackamas River Basin Council
- Clackamas River Water Providers
- OSU Extension Service, IPPC and NWREC
- Grower Groups (OAN, Christmas Tree Growers)
- Oregon Environmental Council
- Oregon Department of Environmental Quality
- Oregon Department of Agriculture
- Ag Chemical Distributors


Legend
PSP Sampling Sites
Roads
Streams
Land Cover
Water
Developed, lawn grass
Impervious, 20 - 49%
Impervious, 50 - 79%
Impervious, 80- 100%
City Boundaries
Rock, Sand
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrubs, <5m
Grassland
Grasses, pasture, hay
Cultivated Crops
Woody Wetlands
Herbaceous Wetlands
Rock Creek at 172nd, Stony Brook Court
Noyer Creek at Hwy 212
NF Deep Creek at Hwy 212
NF Deep Creek at Springwater Trail, Boring
Sieben Creek at Hwy 212
Happy Valley
Damascus
Gladstone
Oregon City

Clackamas PSP: Pesticide Monitoring Overview

- Typical Clackamas Monitoring Timeframes
  - Late March to Late June → every other week
  - Monthly monitoring September to November
- What Pesticides Are Analyzed?
  - 2005-2008 → organophosphate insecticides & triazine herbicides only
  - Since 2009 → Over 100 insecticides, herbicides and fungicides
  - A few new chemicals added since 2011 (e.g., oxyfluorfen, glyphosate, dimethenamid)

Clackamas PSP Monitoring: Recent Summary

- Total of 25-30 pesticides detected at all sites over past few years
- Noyer Creek improvement between 2013 and 2014
  - Significant reduction in the number of chemicals detected and concentrations of other key pesticides
- N.F. Deep Creek between 2013 and 2014
  - Higher concentrations of two pesticides of interest
  - Similar mix of pesticides detected
- Multiple herbicides detected at high frequencies at mixed use locations

Evaluation of Monitoring Data by Inter-Agency Team

1. EPA Aquatic Life Benchmarks (ALB) in ug/L (ppb)

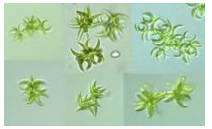
- **Most sensitive acute & chronic toxicity data for each group of organisms (e.g fish) represented for EPA risk assessments**
- **Helps ID and prioritize pesticides & locations**


Rainbow trout


Fathead minnow


Bluegill sunfish


Daphnia magna


Green algae


Duckweed

2. Aquatic Life Ratio:

Detected Concentration (ug/L) / Lowest Acute or Chronic ALB

Values ≥ 1.0 indicates further attention required

3. Other "weight-of-evidence" factors:

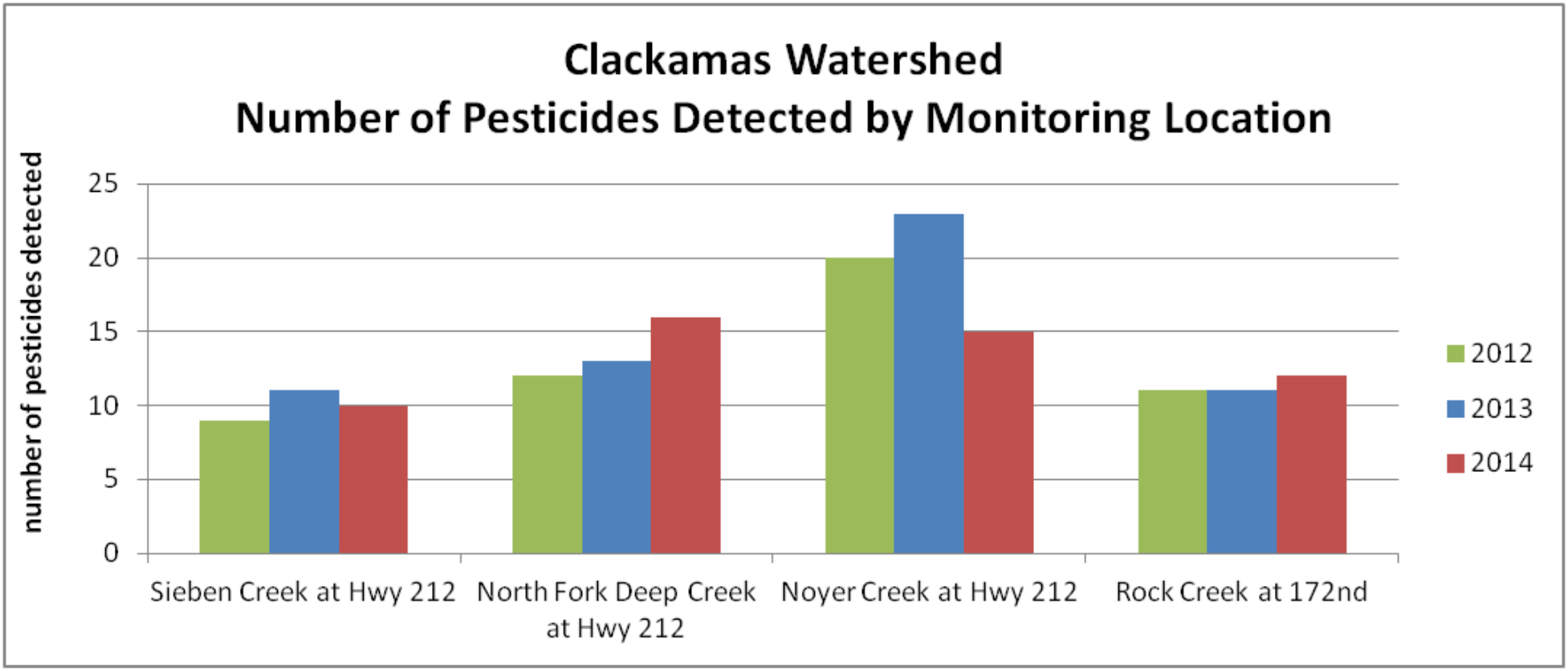
- Frequency of detections
- Mixtures
- Pesticide's chemical & physical properties

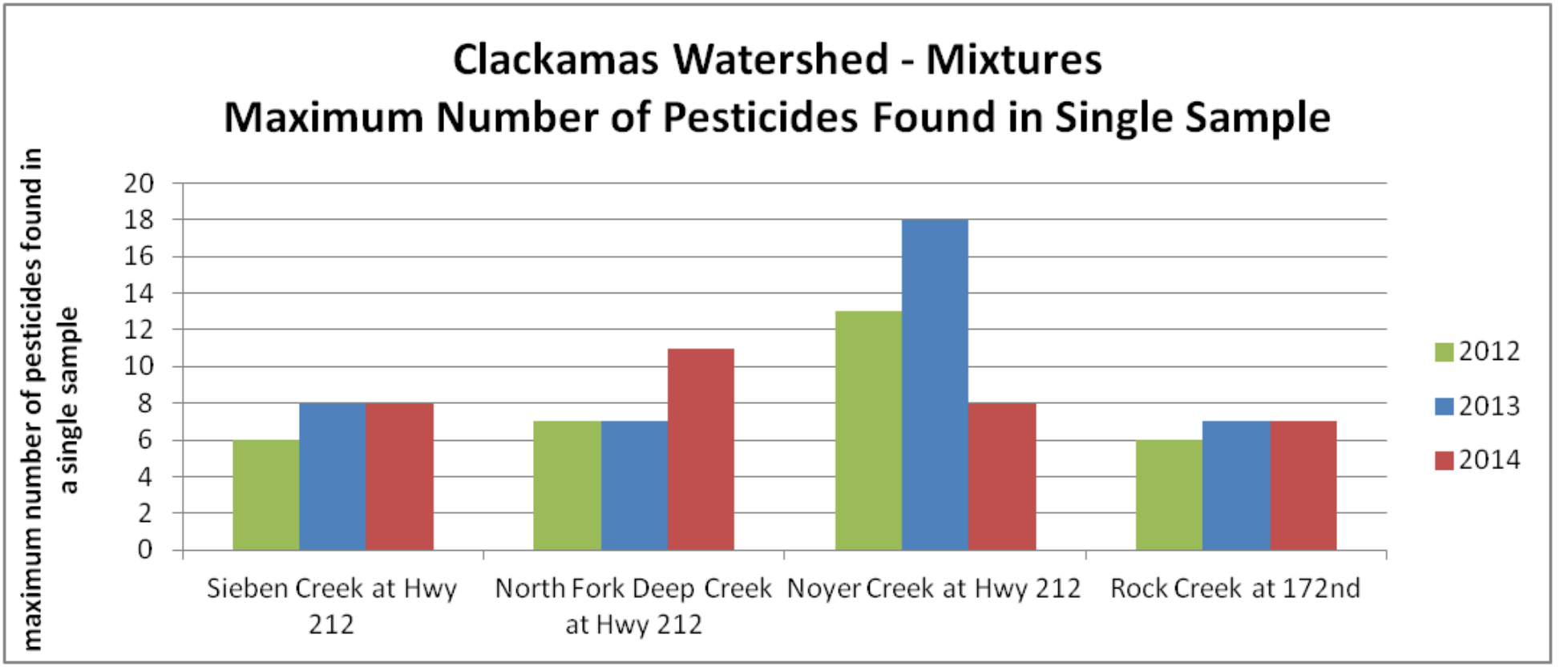
Commonly-Detected Pesticides in Clackamas Streams

PSP Monitoring 2005-2014

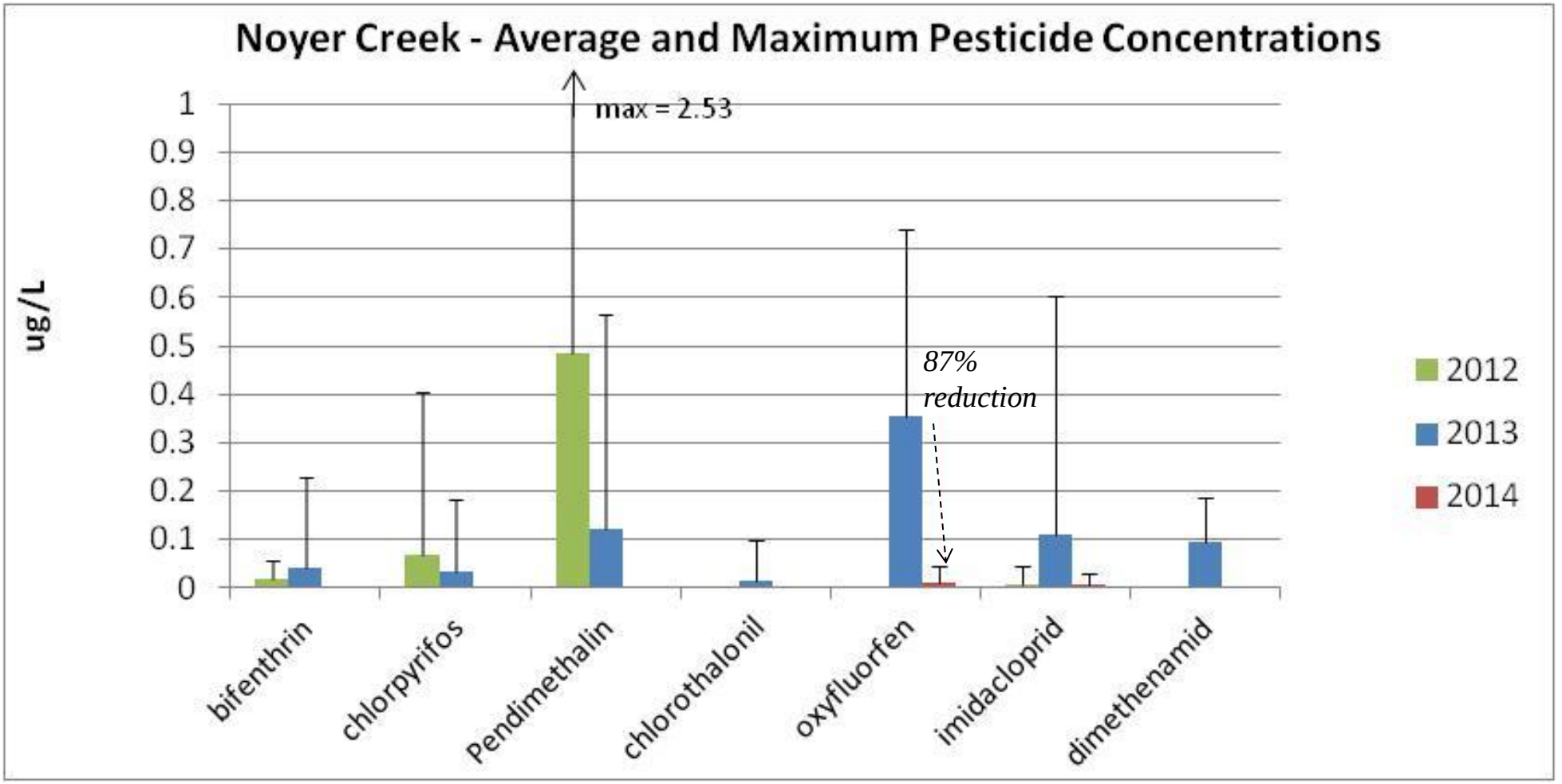
INSECTICIDES	HERBICIDES	FUNGICIDES
Chlorpyrifos *(Lorsban)*	**Oxyfluorfen *(Goal)***	**Chlorothalonil *(Bravo)***
Bifenthrin *(Brigade)*	**Diuron *(Karmex)***	Pyraclostrobin *(Headline)*
Diazinon *(Knox Out)*	Simazine *(Princep)*	Propiconozole *(Propimax)*
Ethoprop *(Mocap)*	Metolachlor *(Parallel)*	
Imidacloprid *(Admire)*	Sufometuron-methyl *(Oust)*	
Carbaryl *(Sevin)*	Pendimethalin *(Prowl)*	
Endosulfan Sulfate *(Thionex)*	Trifluralin *(Treflan)*	
	Dichlobenil *(Casoron)*	
	Dimethenamid *(Frontier, Outlook)*	

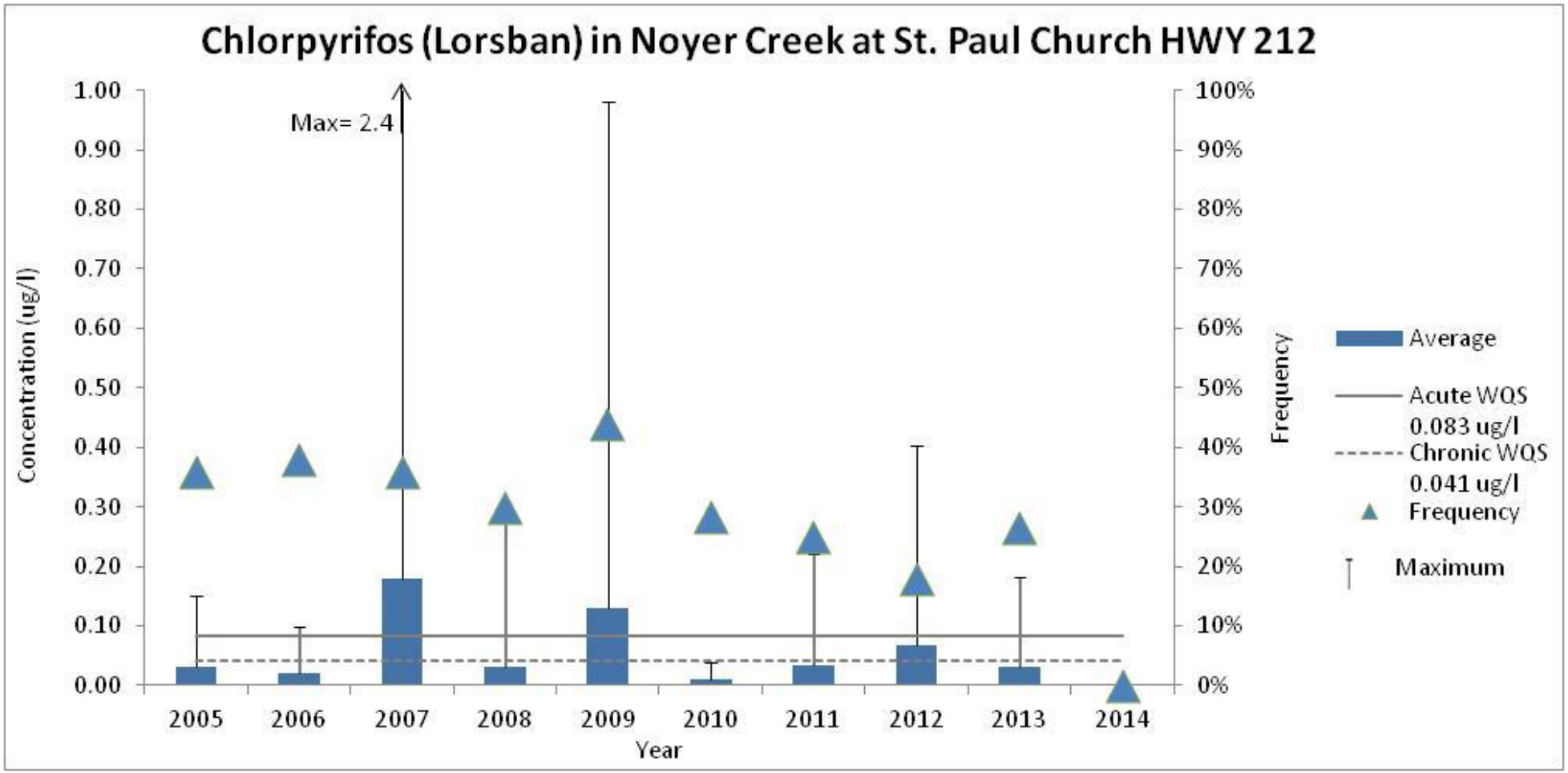
Pesticides in bold have been detected over EPA/State benchmarks

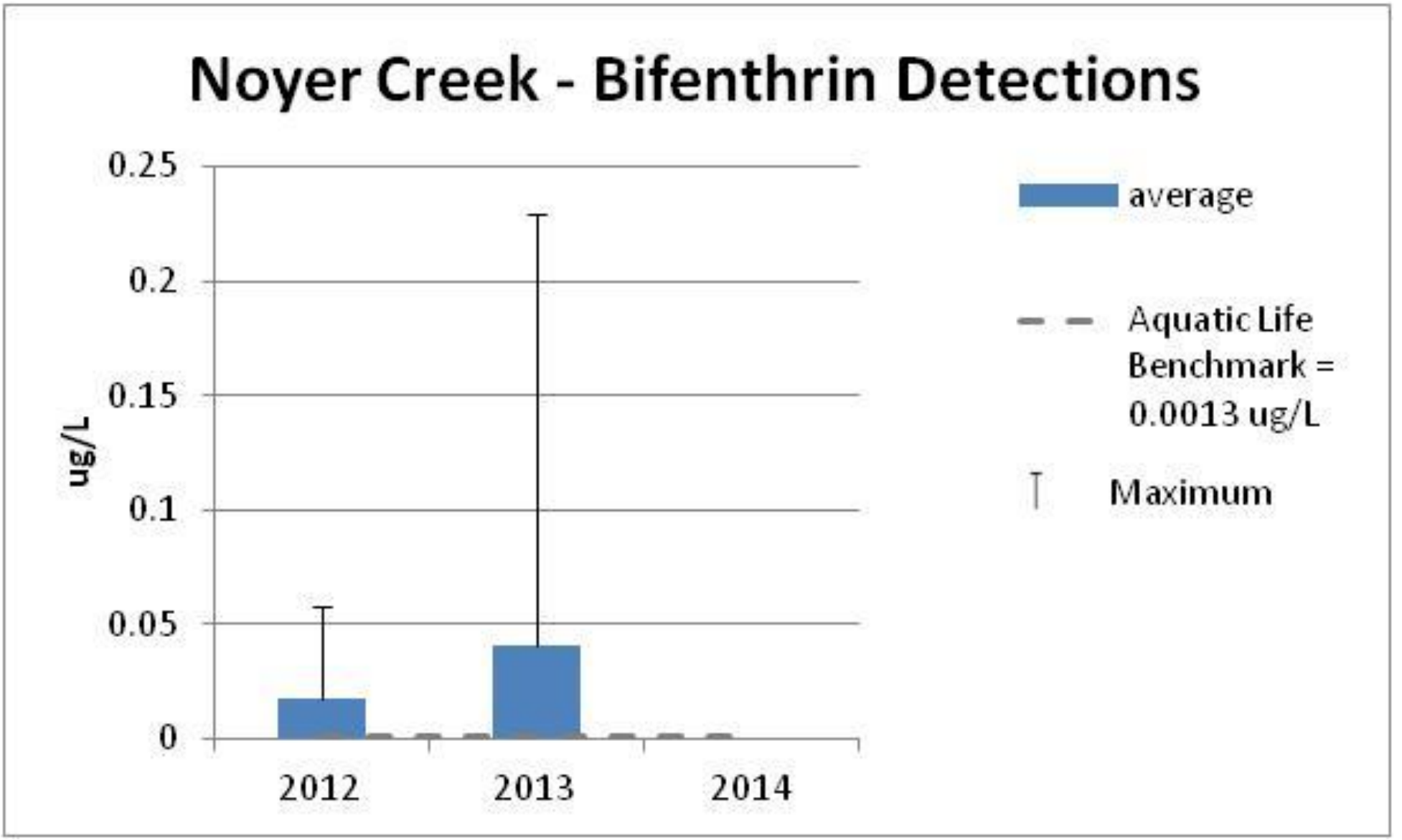

Clackamas Watershed
Number of Pesticides Detected by Monitoring Location
number of pesticides detected
25
20
15
10
5
0
Sieben Creek at Hwy 212
North Fork Deep Creek at Hwy 212
Noyer Creek at Hwy 212
Rock Creek at 172nd
2012
2013
2014

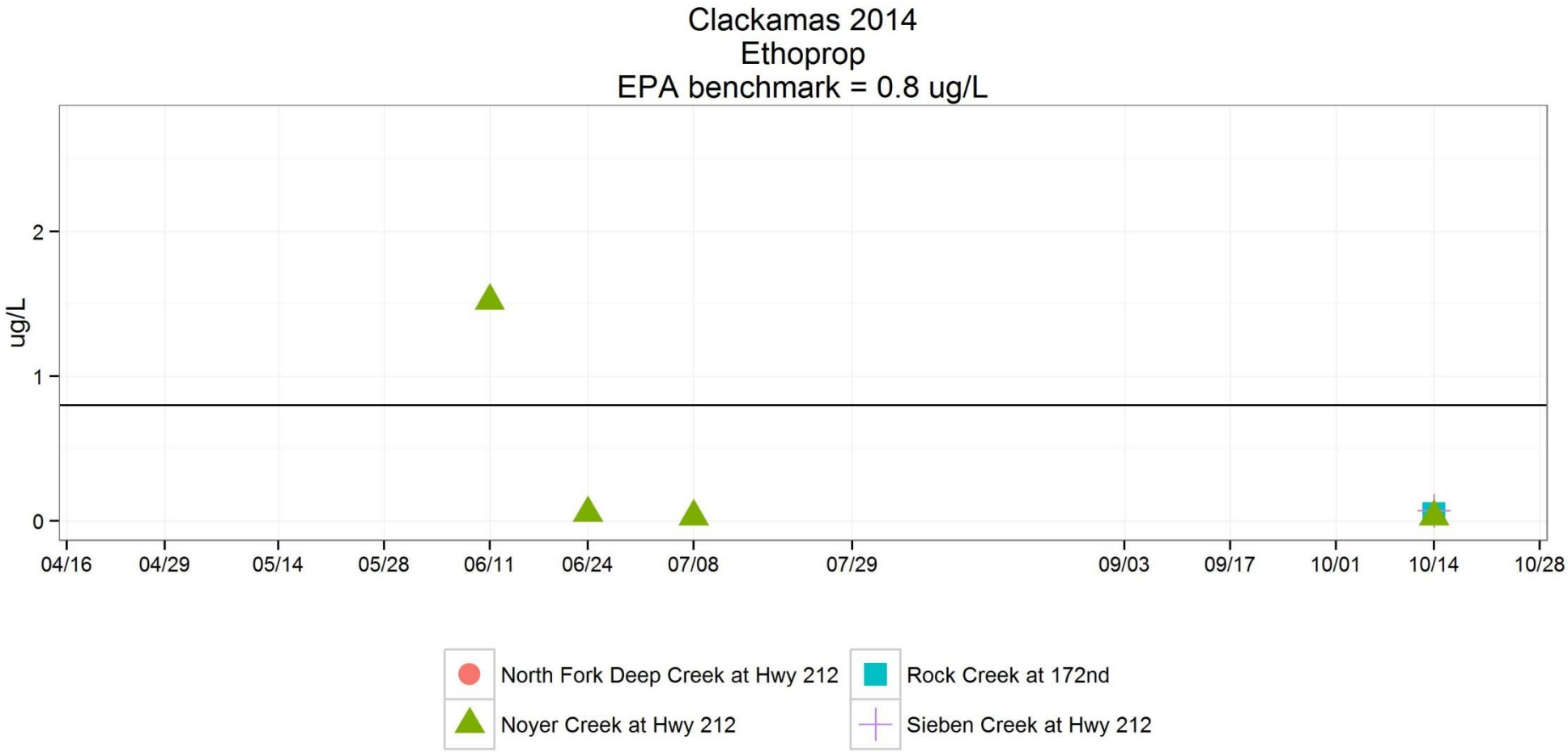

Clackamas Watershed - Mixtures
Maximum Number of Pesticides Found in Single Sample
maximum number of pesticides found in a single sample
20
18
16
14
12
10
8
6
4
2
0
Sieben Creek at Hwy 212
North Fork Deep Creek at Hwy 212
Noyer Creek at Hwy 212
Rock Creek at 172nd
2012
2013
2014

2014 Clackamas Basin PSP Monitoring: Sampling Sites with Greater Agricultural Influence

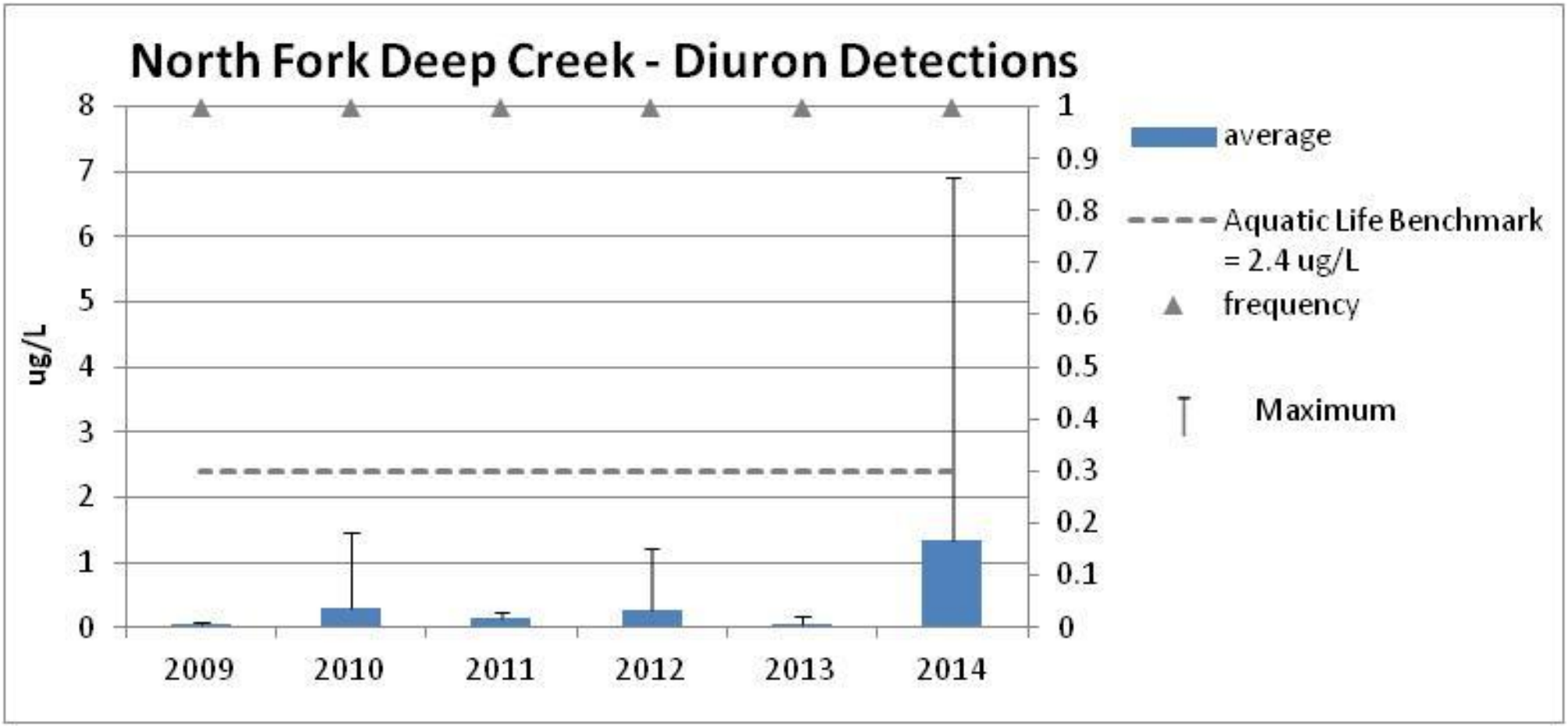

Noyer Creek - Average and Maximum Pesticide Concentrations
ug/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
max = 2.53
87% reduction
2012
2013
2014
bifenthrin
chlorpyrifos
Pendimethalin
chlorothalonil
oxyfluorfen
imidacloprid
dimethenamid

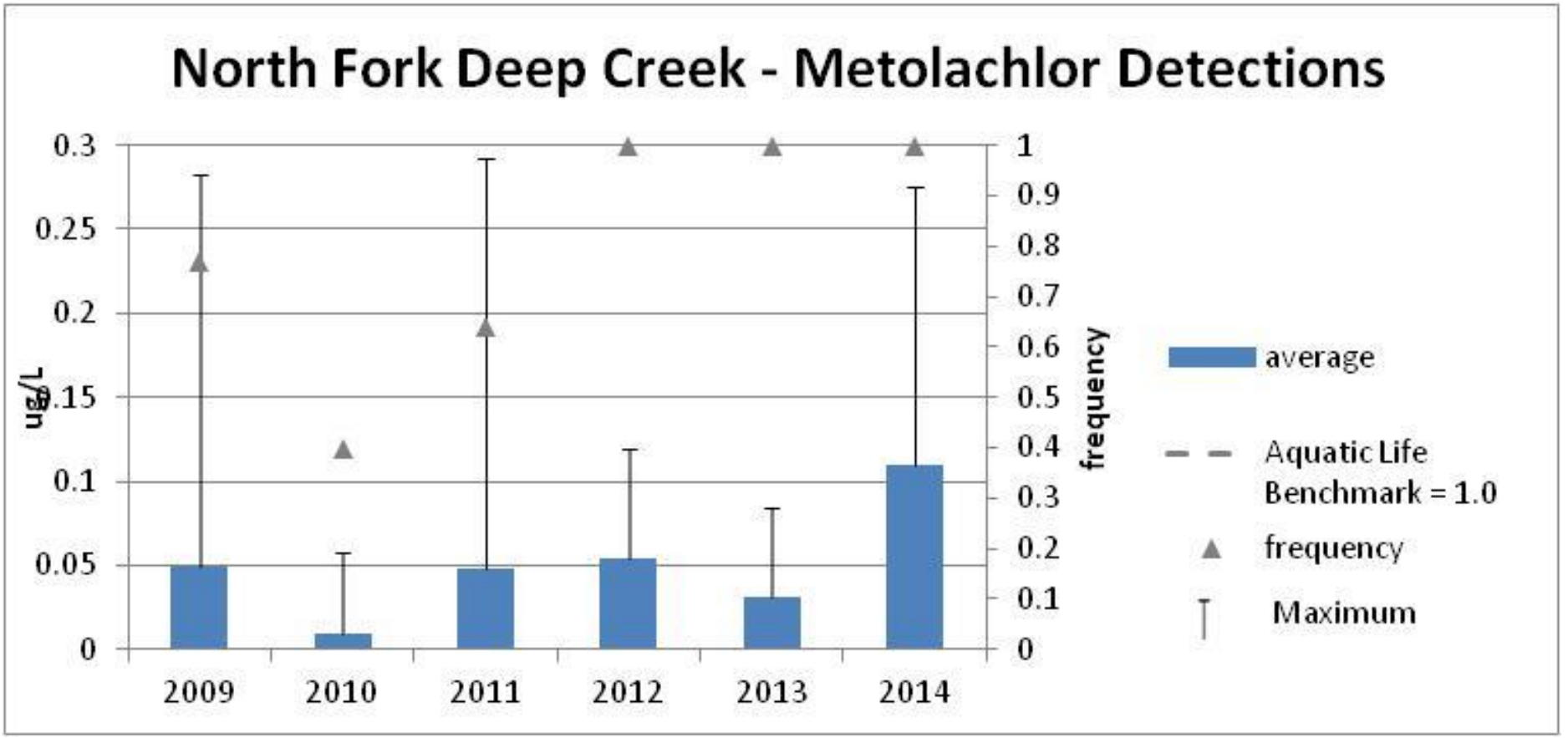

Chlorpyrifos (Lorsban) in Noyer Creek at St. Paul Church HWY 212
Max= 2.4
Concentration (ug/l)
Frequency
Year
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Average
Acute WQS
0.083 ug/l
Chronic WQS
0.041 ug/l
Frequency
Maximum


Noyer Creek - Bifenthrin Detections
0.25
0.2
0.15
0.1
0.05
0
ug/L
2012
2013
2014
average
Aquatic Life Benchmark = 0.0013 ug/L
Maximum

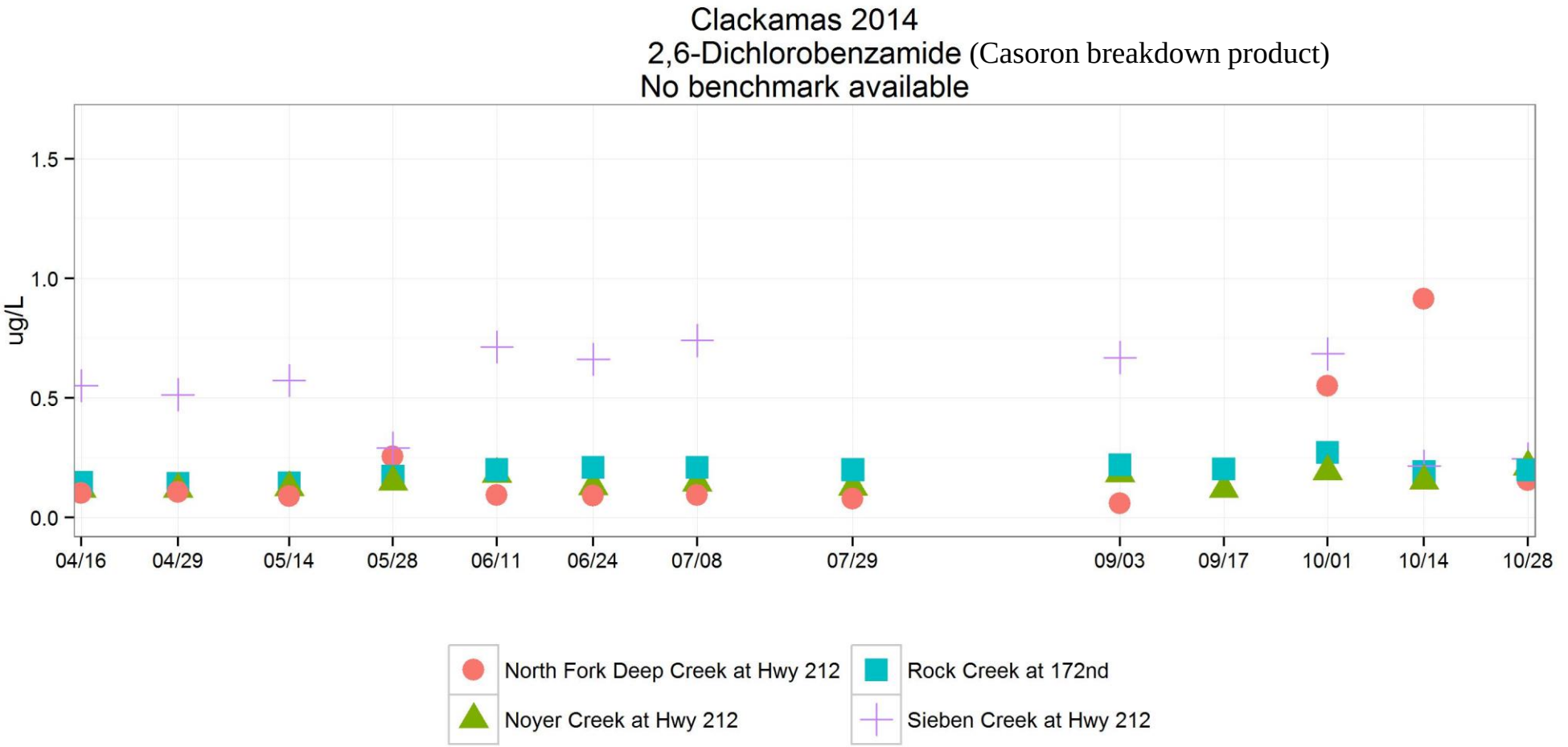


prepared by Julia Crown, ODEQ, 2015-01-24


North Fork Deep Creek - Diuron Detections
ug/L
8
7
6
5
4
3
2
1
0
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
2009
2010
2011
2012
2013
2014
average
Aquatic Life Benchmark = 2.4 ug/L
frequency
Maximum


North Fork Deep Creek - Metolachlor Detections
0.3
0.25
0.2
0.15
0.1
0.05
0
ug/L
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
frequency
2009
2010
2011
2012
2013
2014
average
Aquatic Life Benchmark = 1.0
frequency
Maximum

2014 Clackamas Basin PSP Monitoring: What About More General Use/Urban Pesticides?



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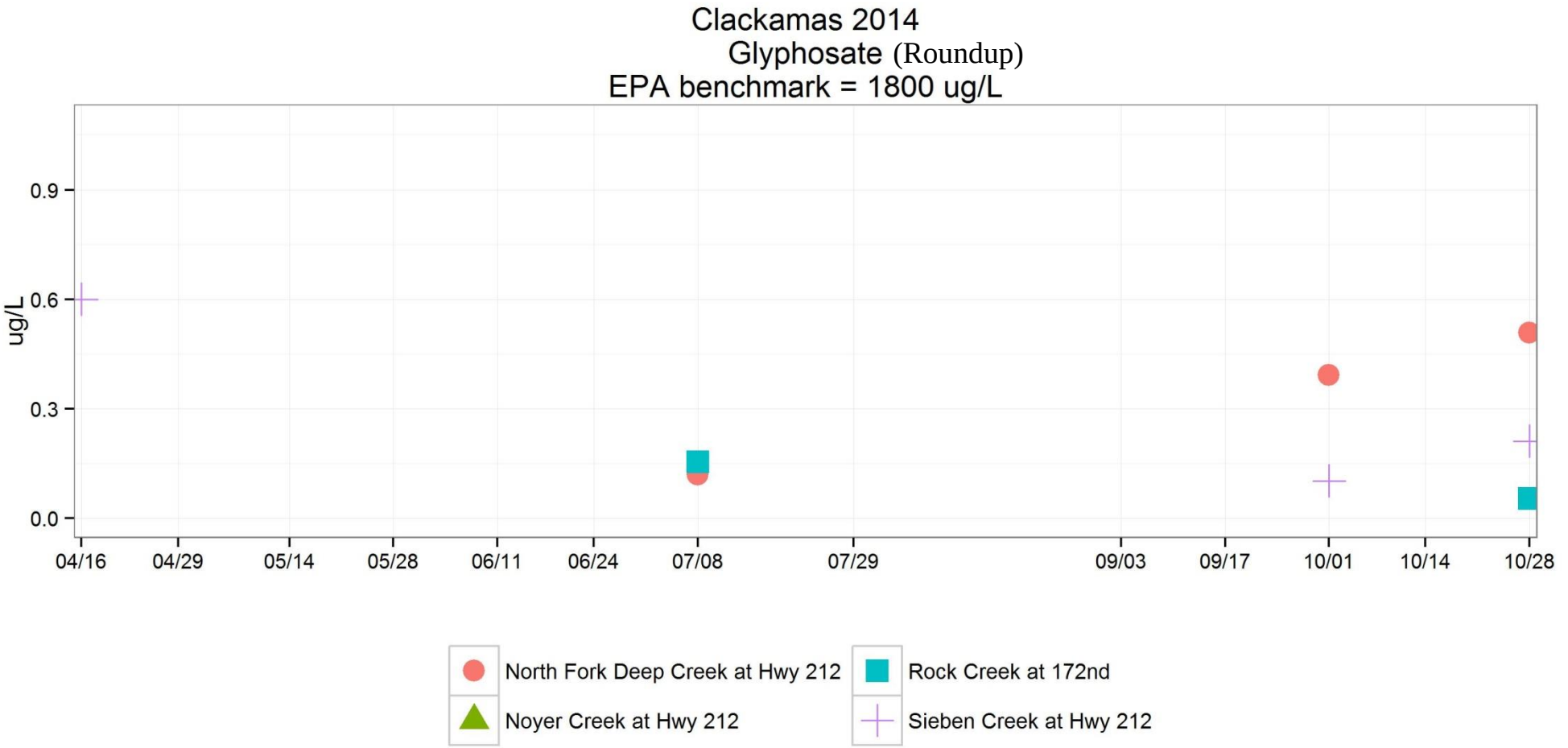

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Benefits of Monitoring under the PSP Approach

Data-driven →

- Creates Awareness (a feedback mechanism)
- Focus on pesticides & locations with greatest concerns, and…
- Shows where there are no problems
- Provides real-world data for decision-making and policy
- Clear environmental outcome measures

Watershed-based → Locally-customized and implemented solutions

- Most effective set of actions for the area
- Local ownership of projects
- Multiple partnerships lessens the burden on any one entity