



State of Oregon  
Department of  
Environmental  
Quality

# Clackamas Technical Working Group

## Clackamas Pesticide Stewardship Partnership Water Monitoring



### 2017 Review and Historical Trends

### March 2018





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Department of  
Environmental  
Quality

# Clackamas PSP: Pesticide Monitoring Overview

- Typical Monitoring Timeframes
  - Every other week in Spring and Early Summer
  - Once a month in Late Summer and Fall
- What Pesticides Are Analyzed?
  - 2005 - 2008 → 15 organophosphate insecticides & triazine herbicides
  - 2009 - Present → 130+ insecticides, herbicides and fungicides



# What New Pesticide Analytes Have Been Added Recently?

- Since 2011, these common pesticides were added to the DEQ analytical suite:
  - *Oxyfluorfen (Goal)*
  - *Sulfometuron-methyl (Oust)*
  - *Metsulfuron-methyl (Escort)*
  - *Glyphosate & AMPA (Roundup)*
  - *Dimethenamid-P (Outlook, Tower, Frontier)*
  - *Dichlobenil & 2,6-Dichlorobenzamide (Casoron)*
  - ***Acephate***
  - ***Azoxystrobin***
  - ***Pyraflufen-ethyl***
  - ***Trifloxystrobin***
  - *Plus, lower detection limits for phenoxy herbicides (e.g., 2,4-D, triclopyr)*

Bold = those added in 2017

# 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



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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  
*(Not active)*

Sieben Creek  
at Hwy 212

Happy Valley

Damascus

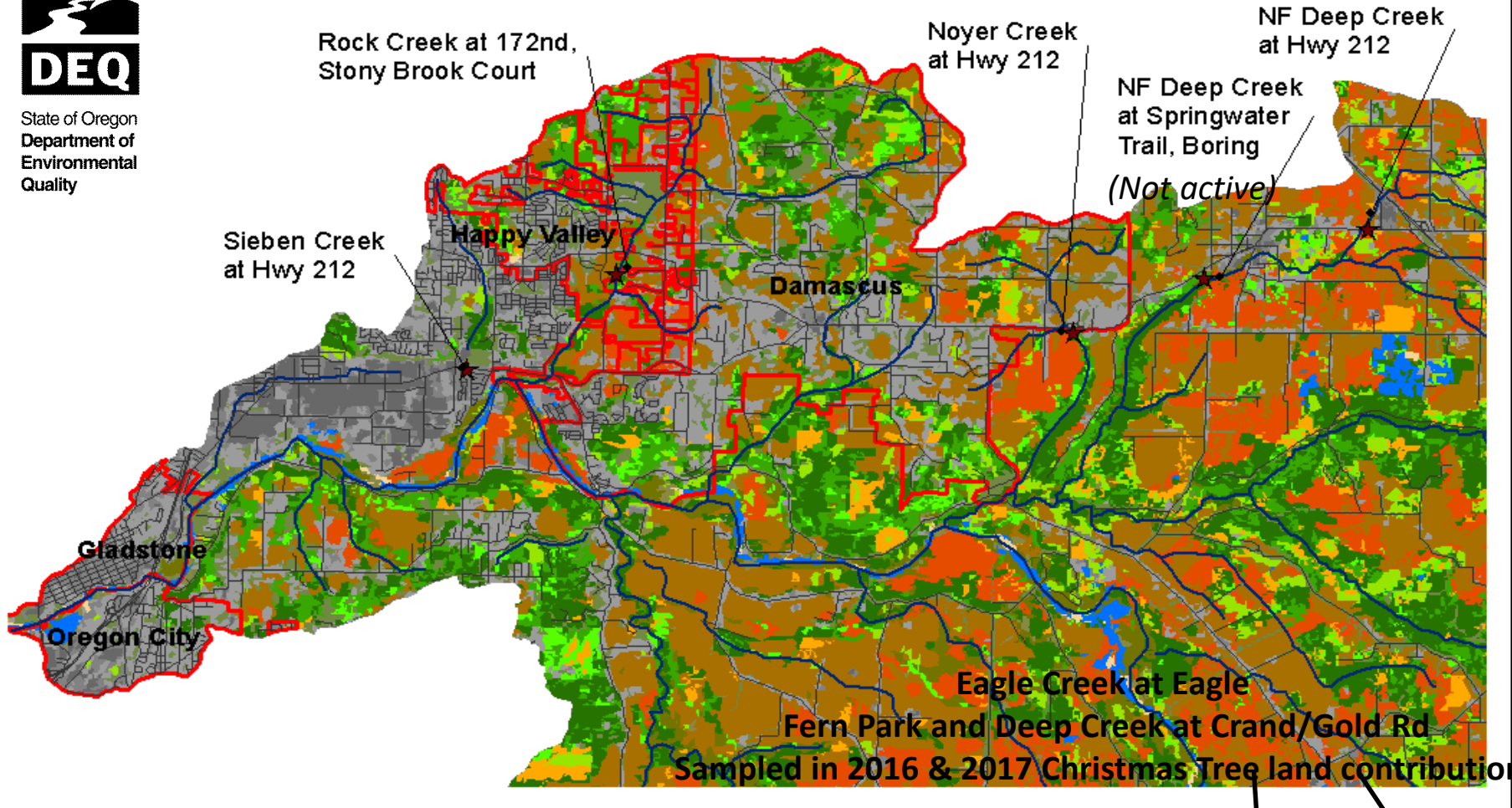
Gladstone

Oregon City

Eagle Creek at Eagle

Fern Park and Deep Creek at Crand/Gold Rd

Sampled in 2016 & 2017 Christmas Tree land contributions



# 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



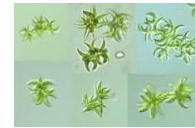
Fathead  
minnow



Bluegill  
sunfish



*Daphnia  
magna*



Green  
algae



Duckweed

## 2. Aquatic Life Ratio:

Detected Concentration (ug/L) / Lowest Acute or Chronic ALB  
Values  $\geq 1.0$  indicates further attention required

## 3. Other “weight-of-evidence” factors:

- Frequency of detections & Number of Pesticides in a Sample
- Pesticide’s chemical & physical properties

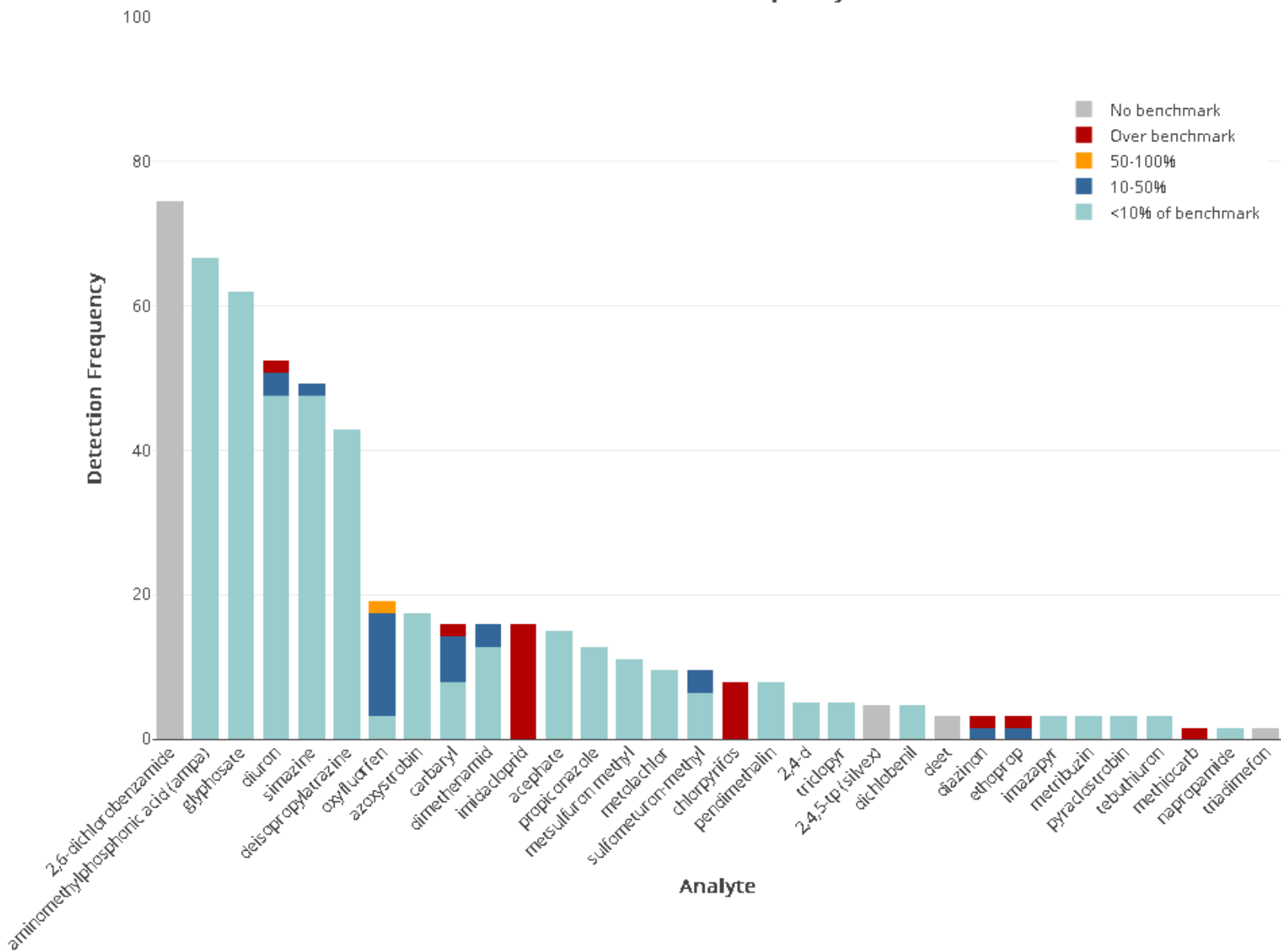
# Commonly-Detected Pesticides in Clackamas Streams

## PSP Monitoring 2005-2017

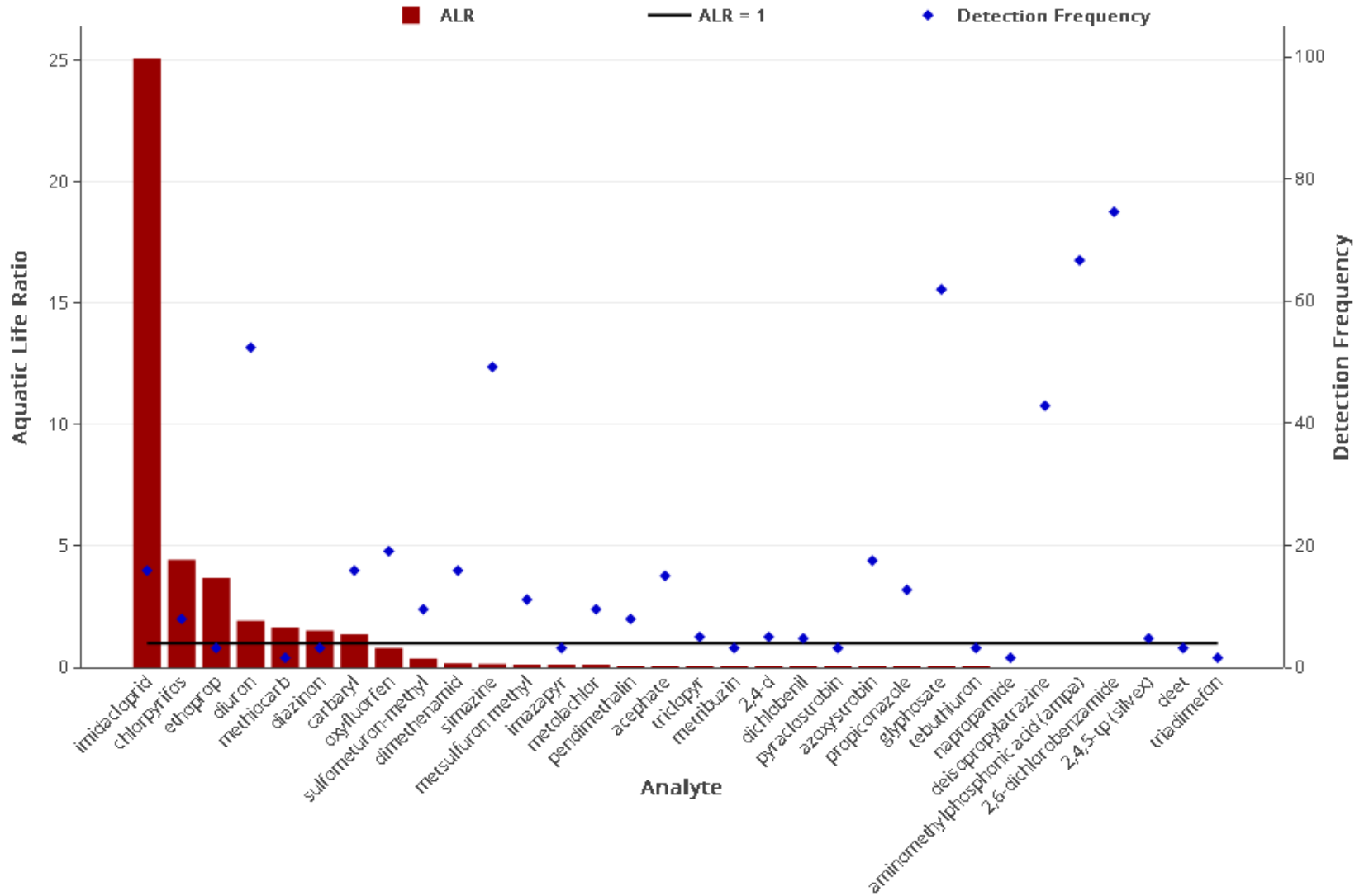
INSECTICIDES	HERBICIDES	FUNGICIDES
<b>Chlorpyrifos (Lorsban)</b>	<b>Oxyfluorfen (Goal)</b>	<b>Chlorothalonil (Bravo)</b>
<b>Bifenthrin (Brigade)</b>	<b>Diuron (Karmex)</b>	Pyraclostrobin (Headline)
<b>Diazinon (Knox Out)</b>	<b>Dimethenamid (Frontier, Outlook, Tower)</b>	Propiconazole (Propimax)
<b>Ethoprop (Mocap)</b>	Metolachlor (Parallel)	
<b>Carbaryl (Sevin)</b>	Sufometuron-methyl (Oust)	
<b>Imidacloprid (Admire)</b>	Pendimethalin (Prowl)	
Endosulfan Sulfate (Thionex)	Trifluralin (Treflan)	
	Dichlobenil (Casoron) and degradate	
	Simazine (Princep) & degradate	
	Metsulfuron-methyl (Escort)	

***Pesticides in bold have been detected over EPA/State benchmarks***

# Clackamas 2017 Detection Frequency

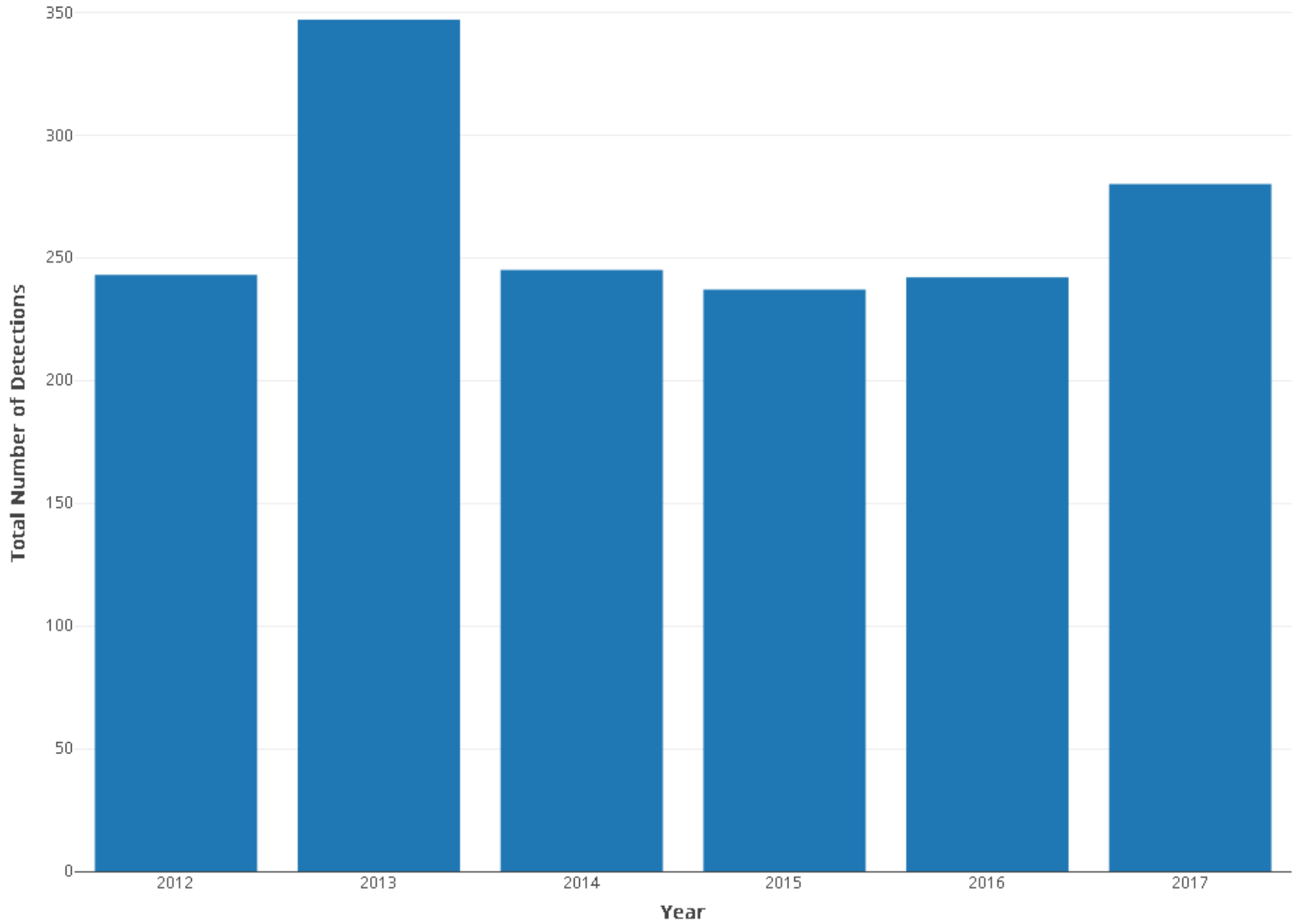


## Aquatic Life Ratio Detection Frequency: Clackamas Basin 2017

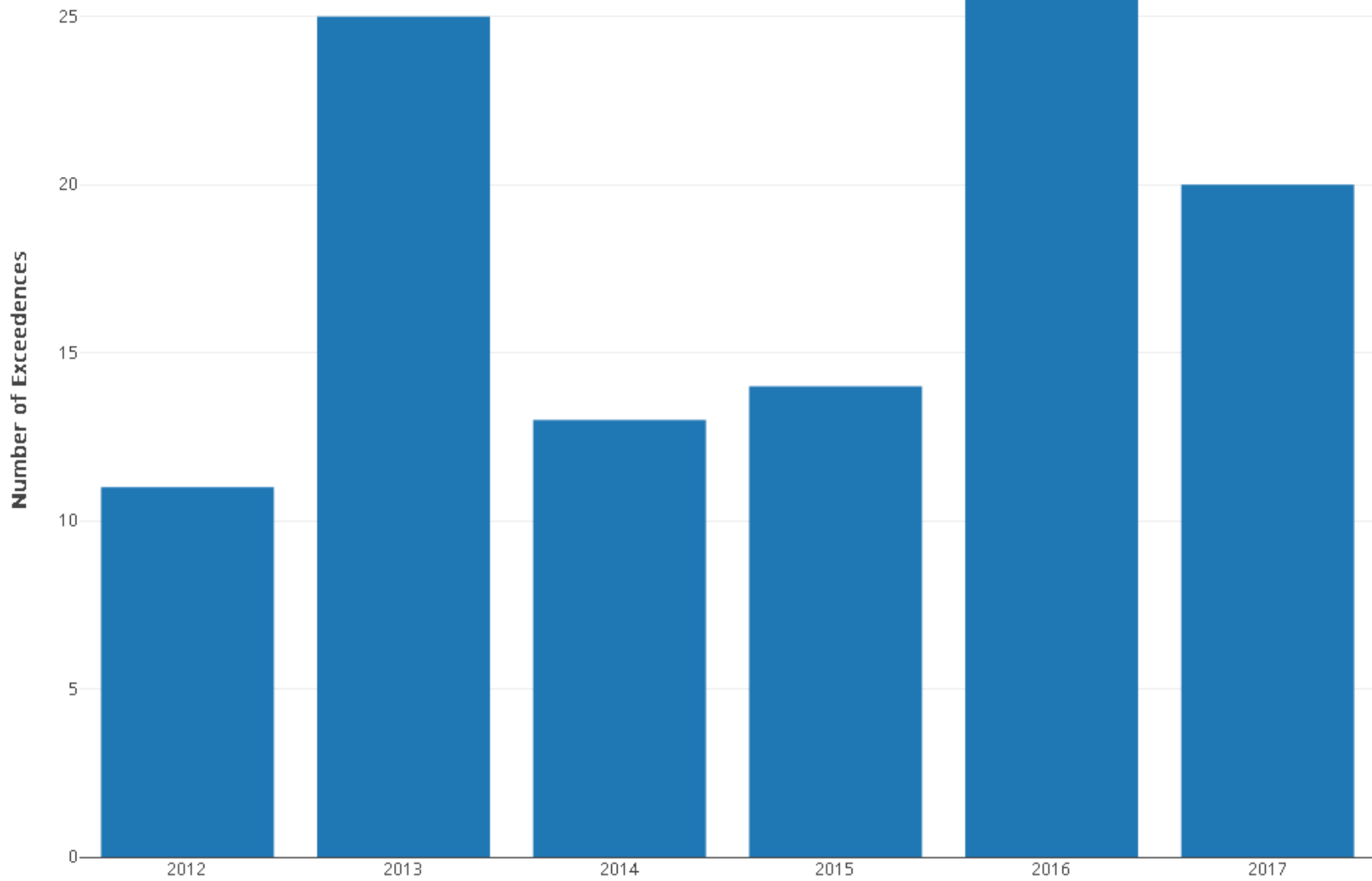




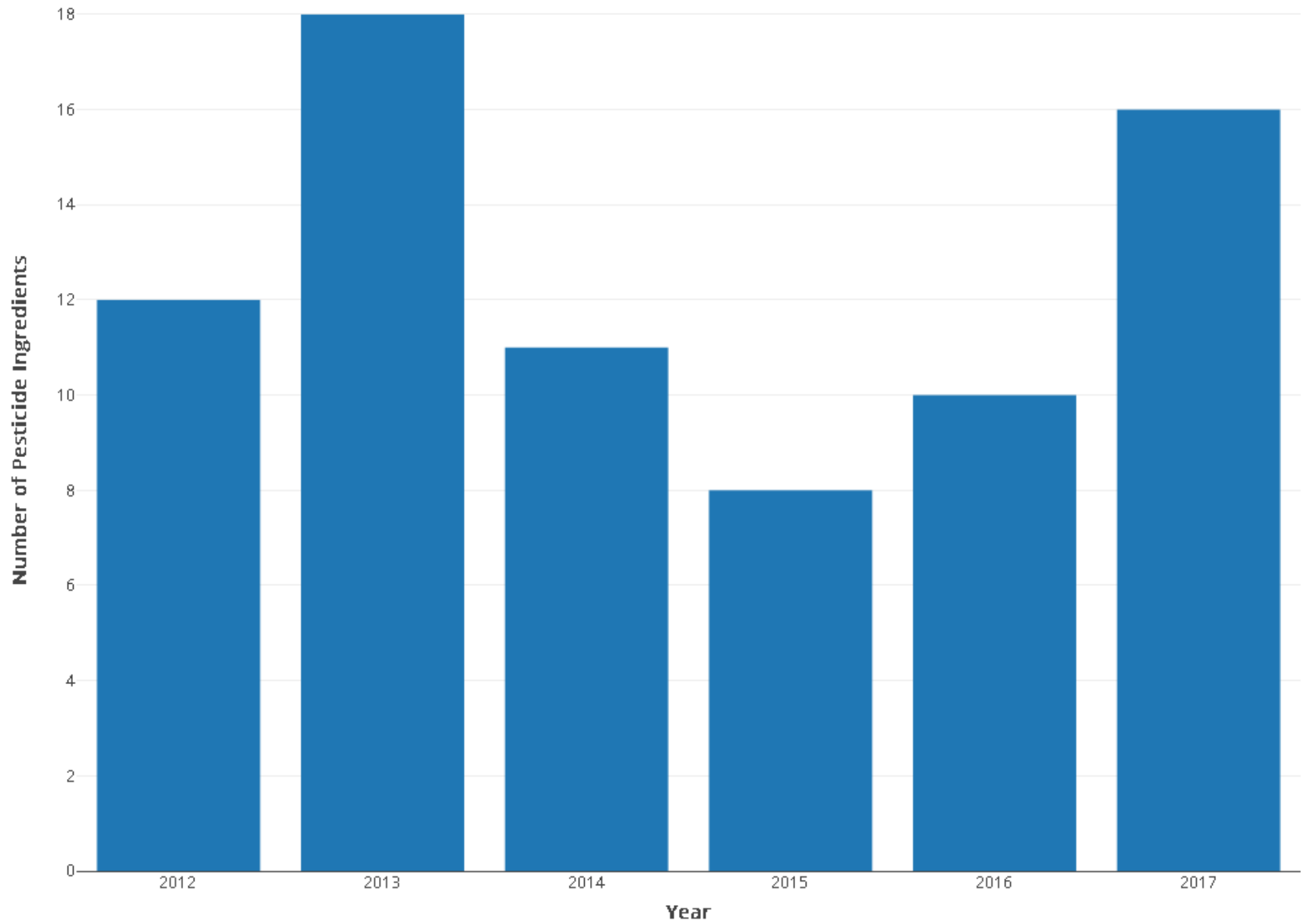
## Total Number of Detections in the Clackamas Basin



## Total Number of Benchmark Exceedences in the Clackamas Basin



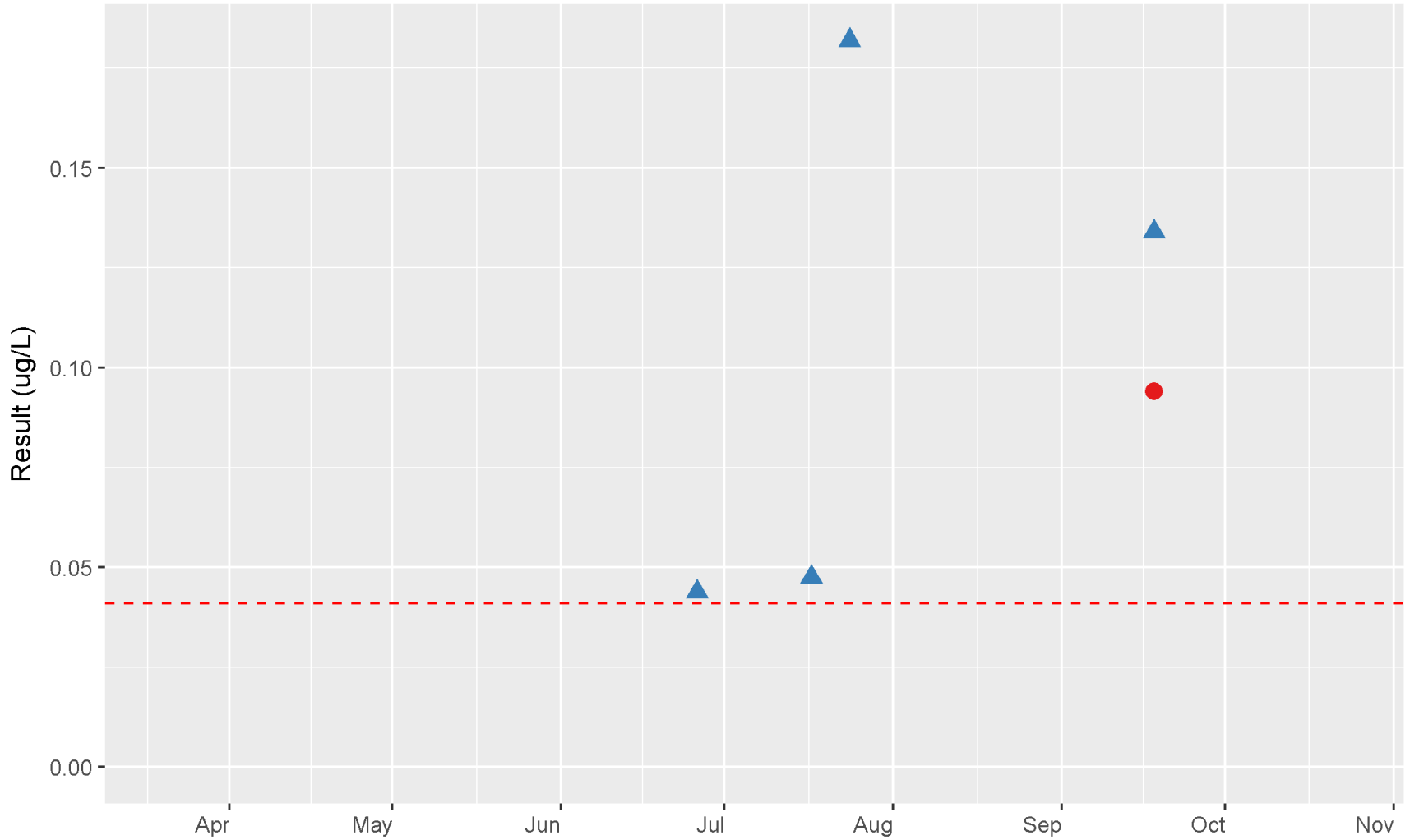
## Maximum Number of Pesticide Ingredients in a Single Clackamas Basin Mixture



# 2016 CLACKAMAS SELECTED INSECTICIDE DETECTIONS

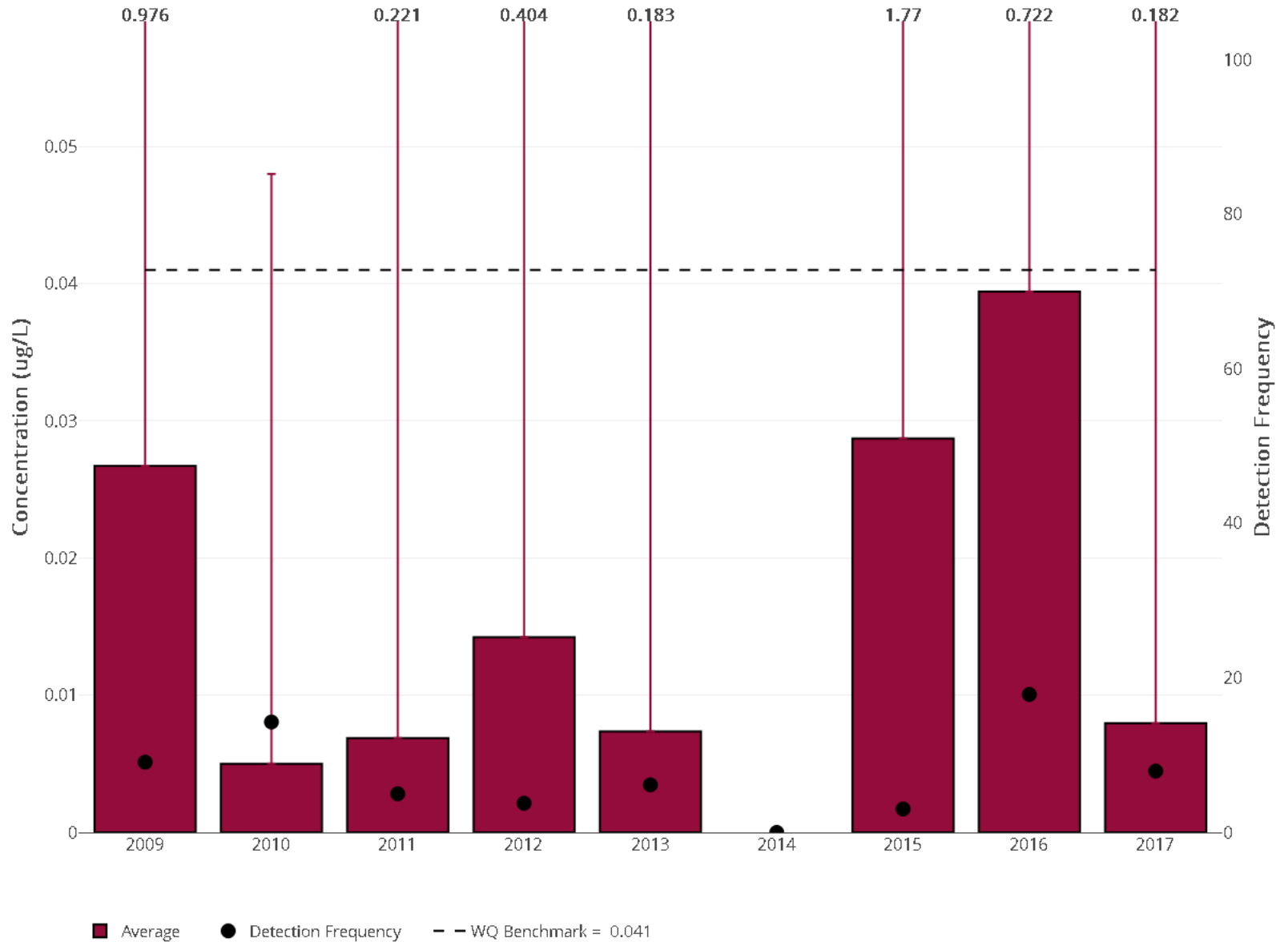
# Clackamas 2017 chlorpyrifos (Lorsban)

minimum benchmark: 0.041



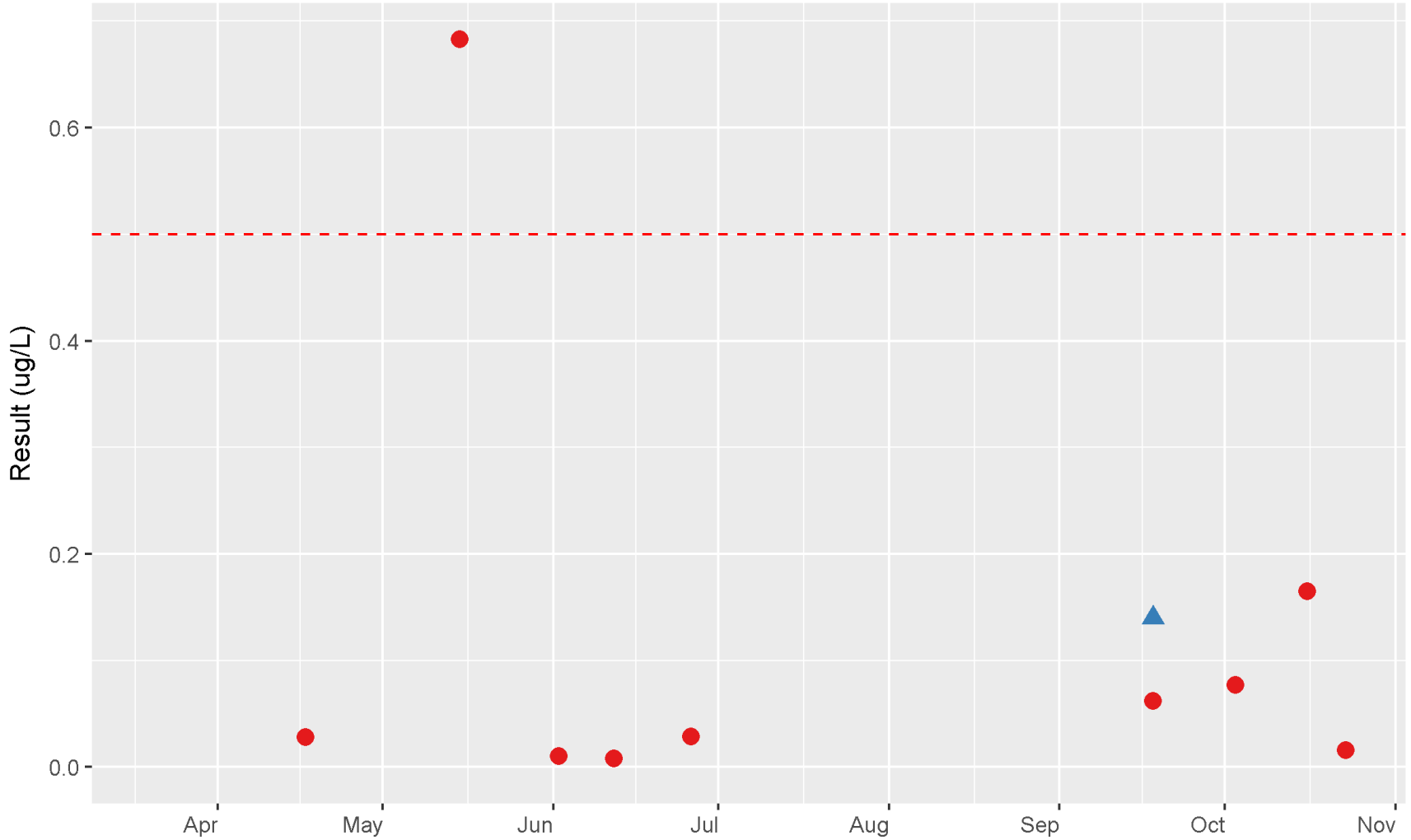
● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church

Noyer Creek at Hwy 212, St. Paul Lutheran Church Average and Maximum Concentration of Detections chlorpyrifos 2009 - 2017



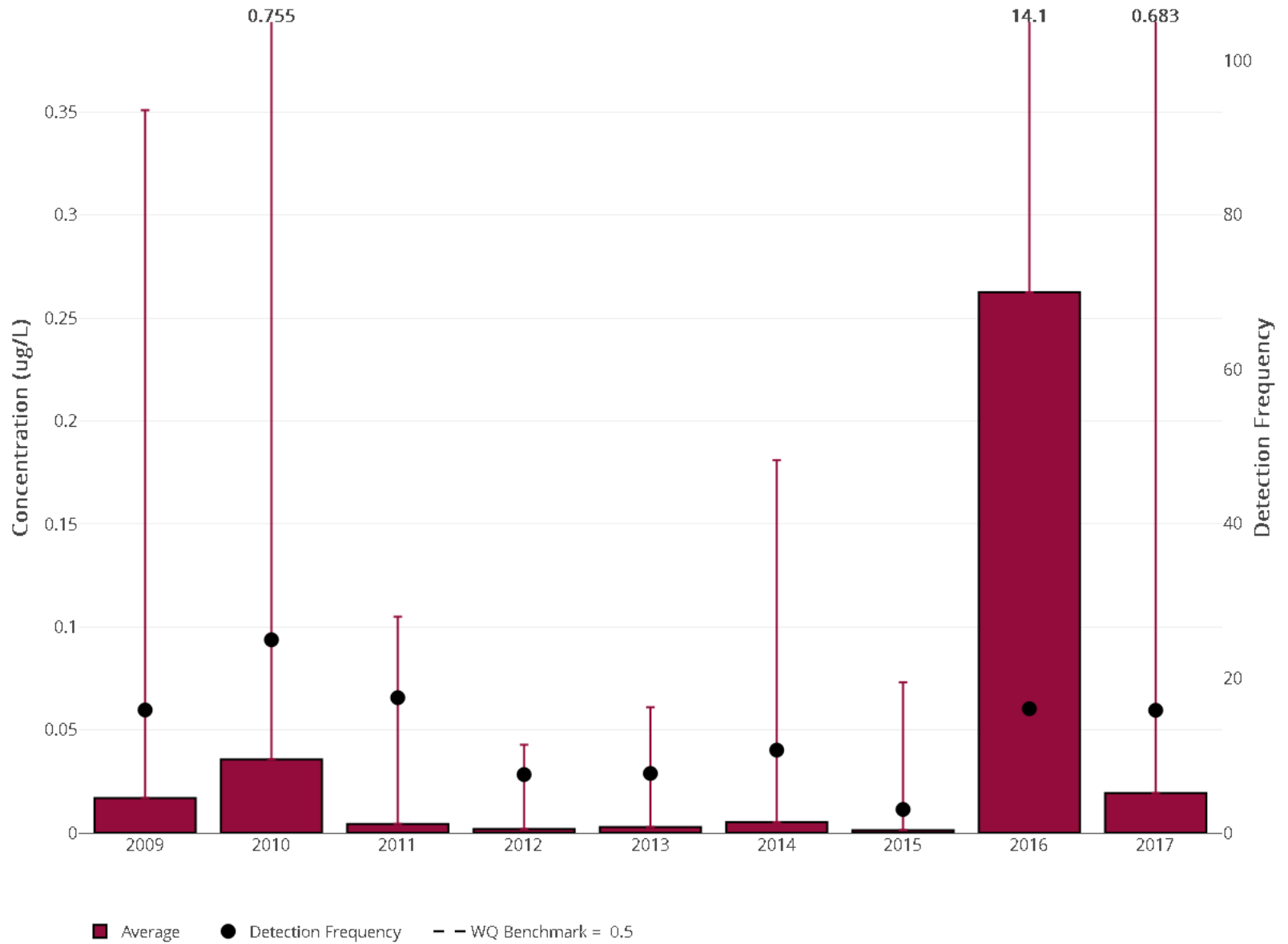
# Clackamas 2017 carbaryl (Sevin)

minimum benchmark: 0.5



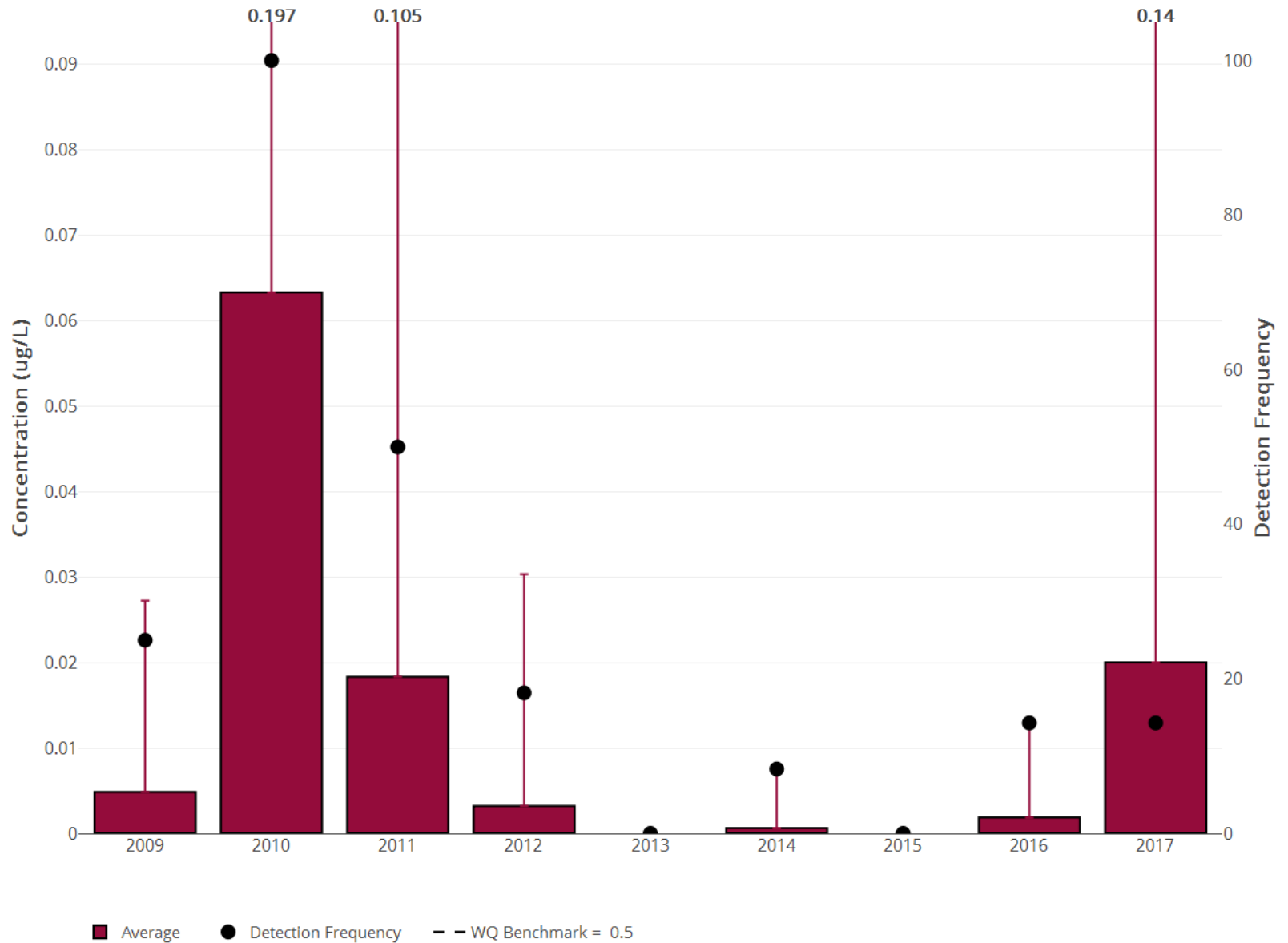
● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Sieben Creek at Hwy 212 (Clackamas)

North Fork Deep Creek at Hwy 212 (upstream of Boring) Average and Maximum Concentration of Detections carbaryl 2009 - 2017



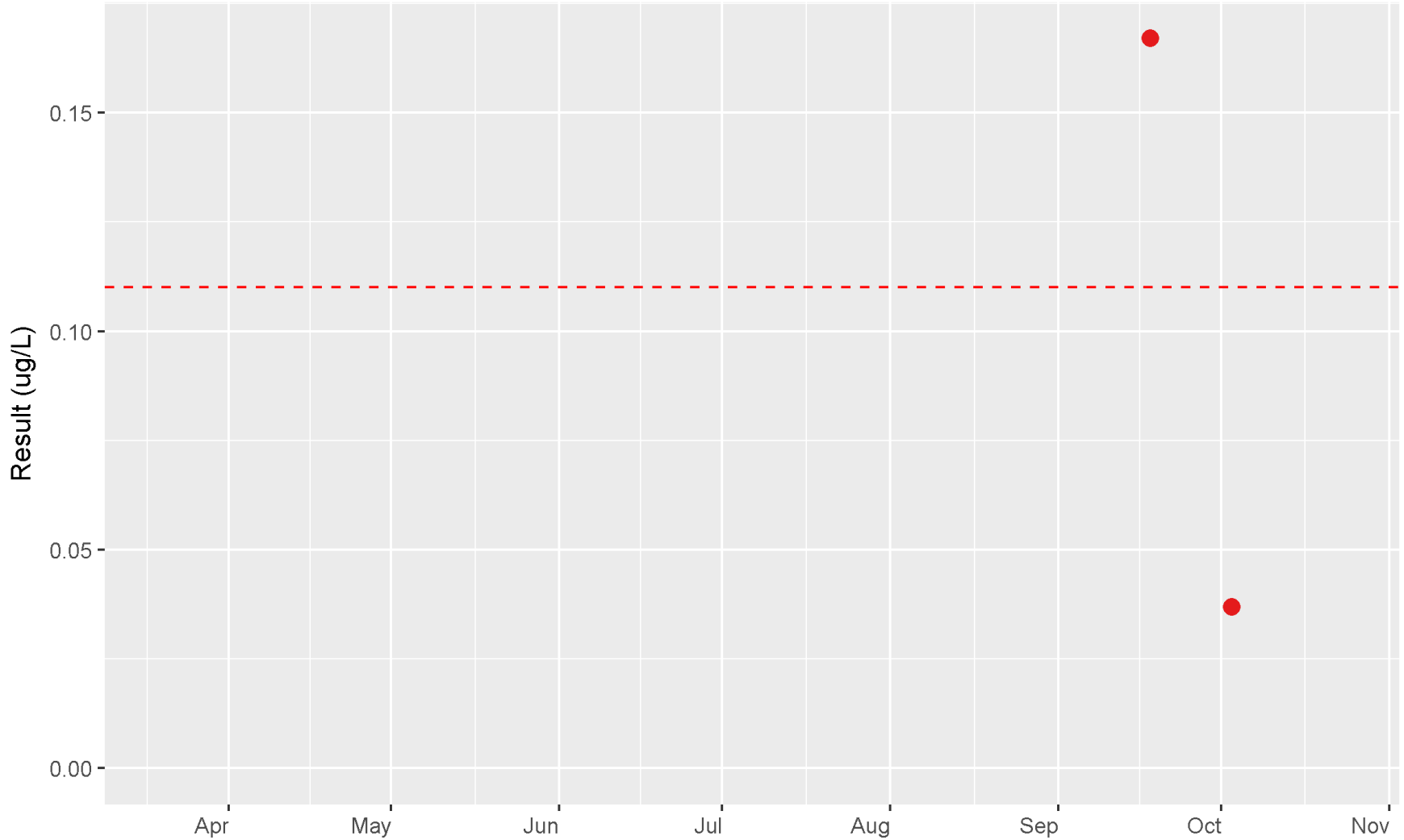


Sieben Creek at Hwy 212 (Clackamas) Average and Maximum Concentration of Detections carbaryl 2009 - 2017



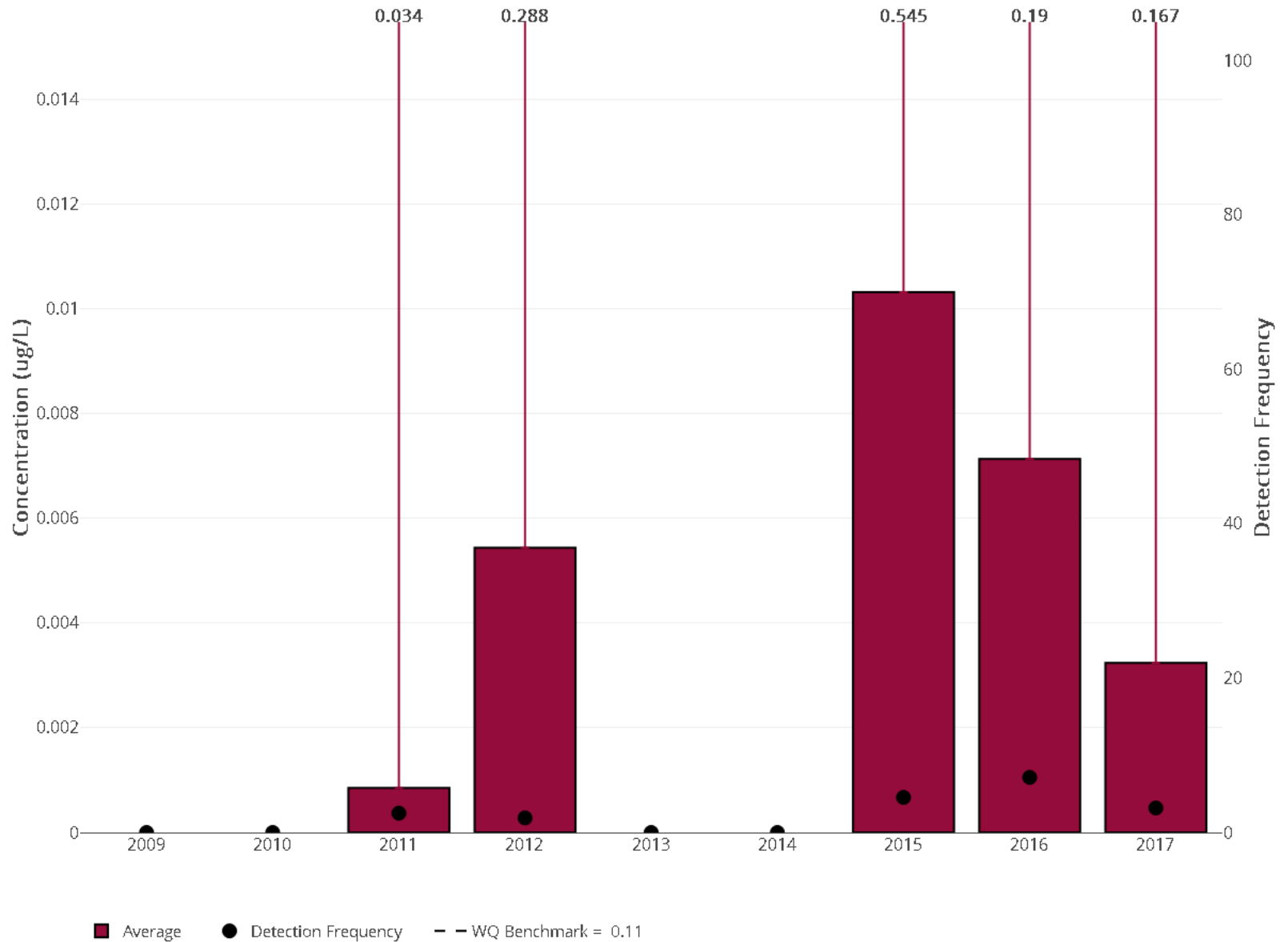
# Clackamas 2017 diazinon (Knox Out, Spectracide)

minimum benchmark: 0.11



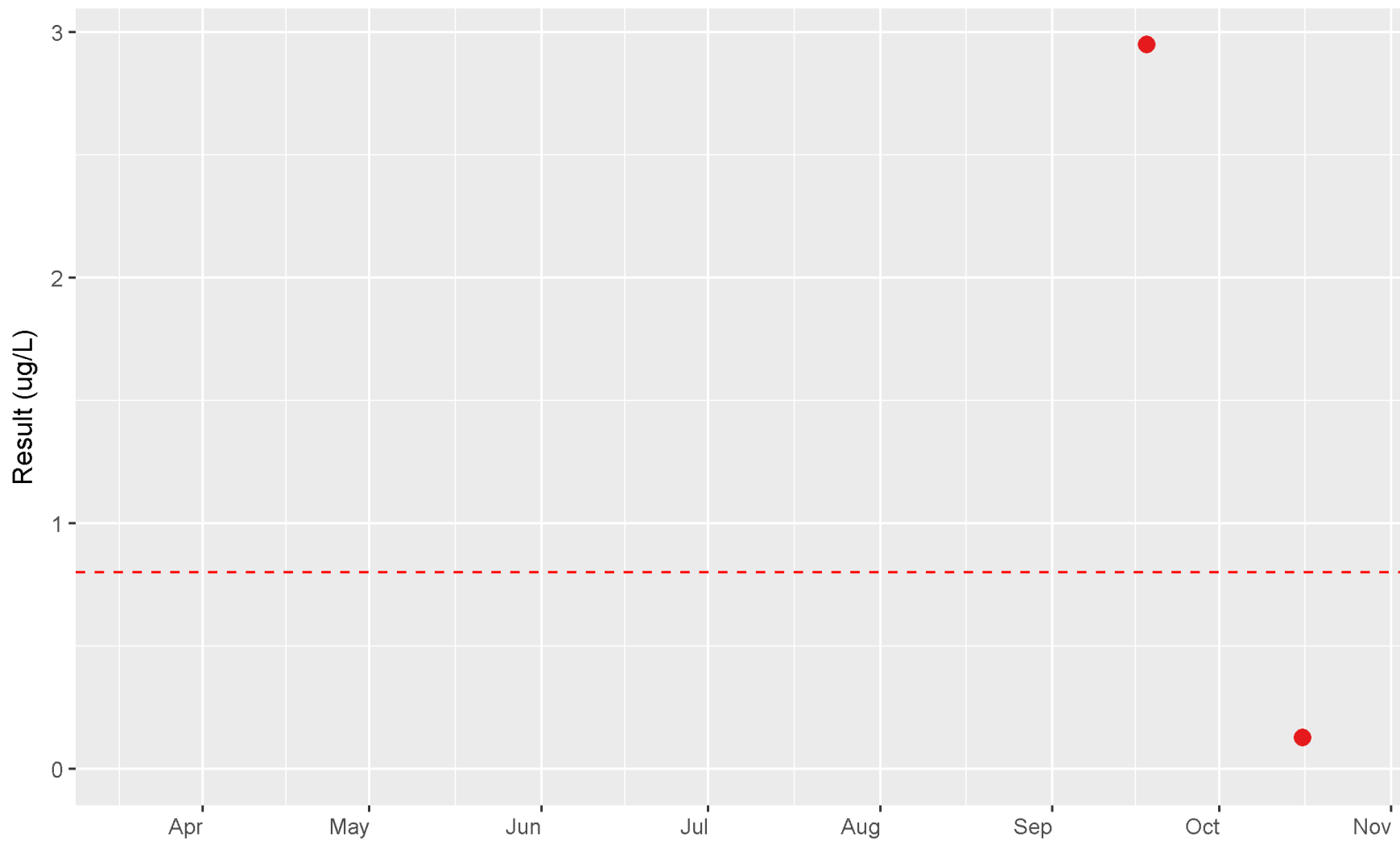
● North Fork Deep Creek at Hwy 212 (upstream of Boring)

North Fork Deep Creek at Hwy 212 (upstream of Boring) Average and Maximum Concentration of Detections diazinon 2009 - 2017



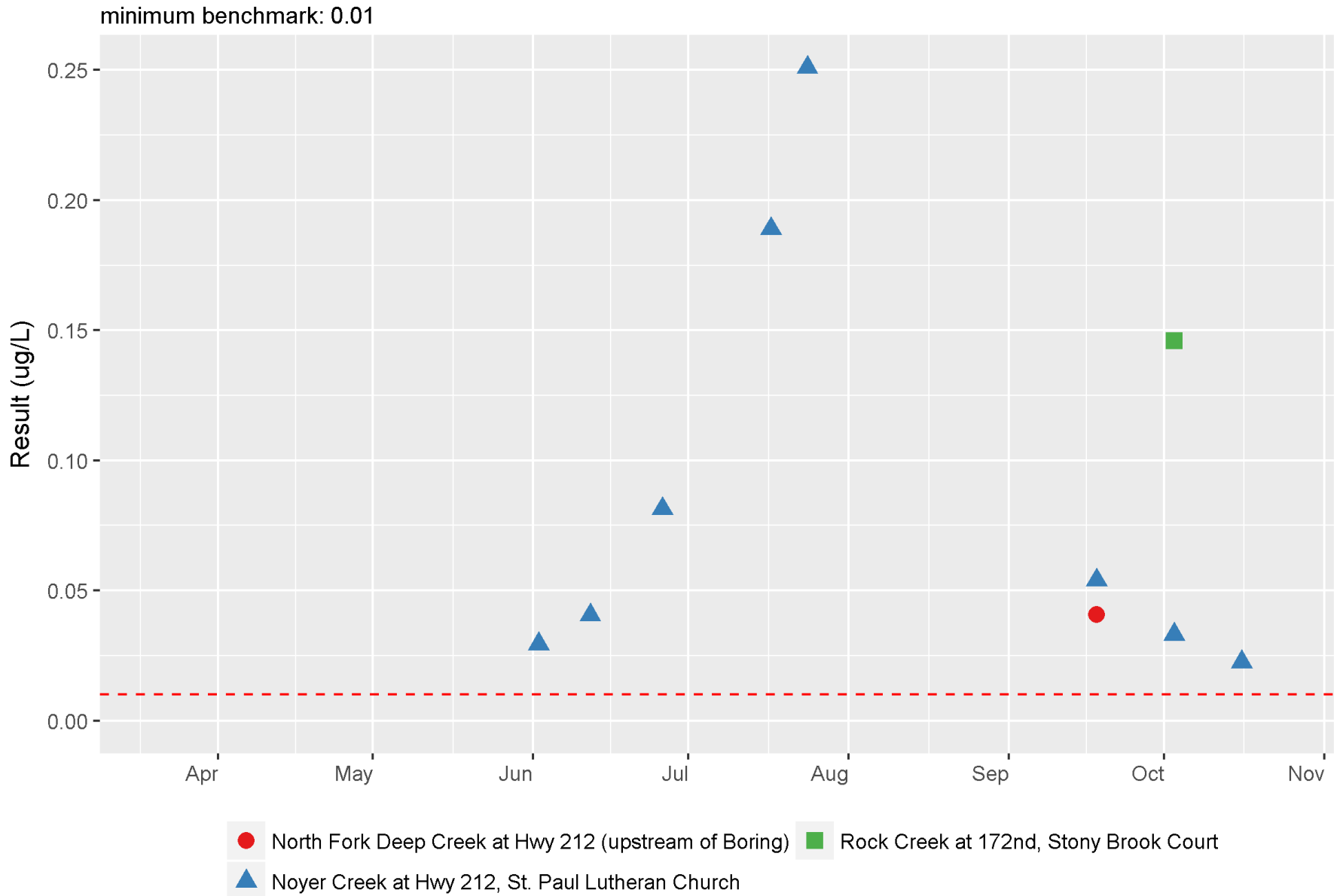
# Clackamas 2017 ethoprop (Mocap)

minimum benchmark: 0.8



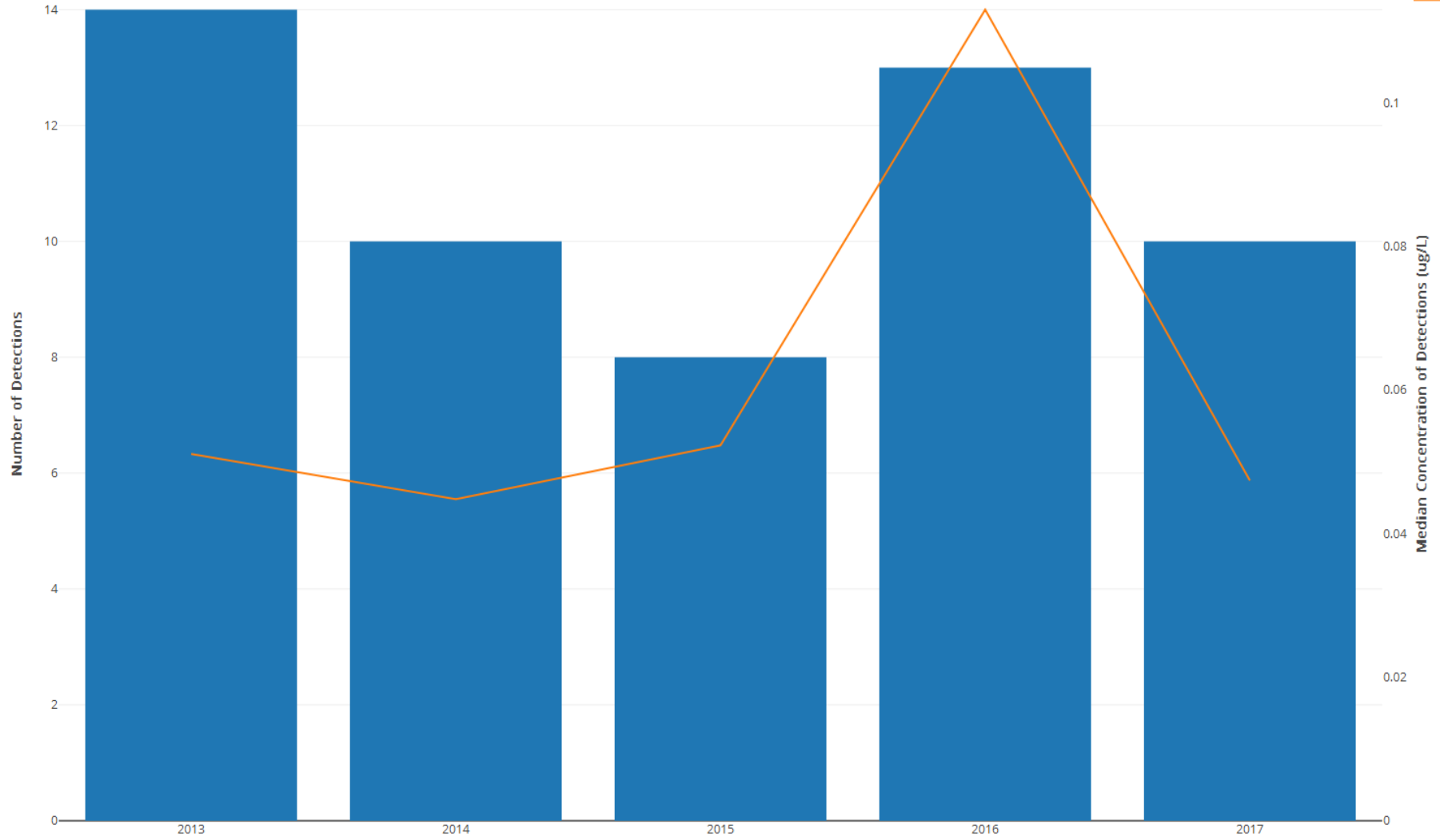
● Noyer Creek at Hwy 212, St. Paul Lutheran Church

# Clackamas 2017 imidacloprid (Admire, many others)



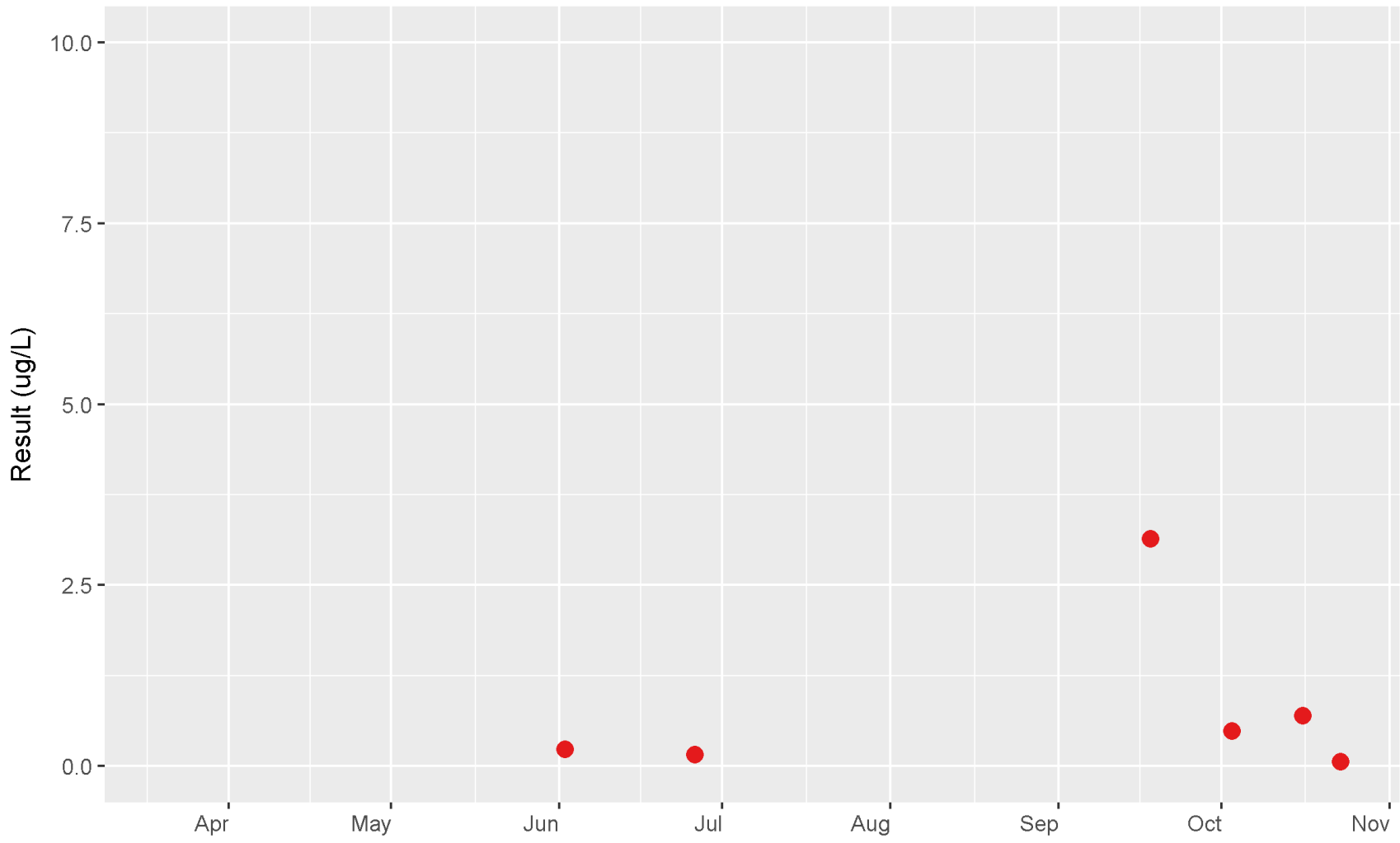
Clackamas Imidacloprid 2013-2017  
Number and Median Concentration of Detections

■ N Detections  
— Median



# Clackamas 2017 acephate (Orthene)

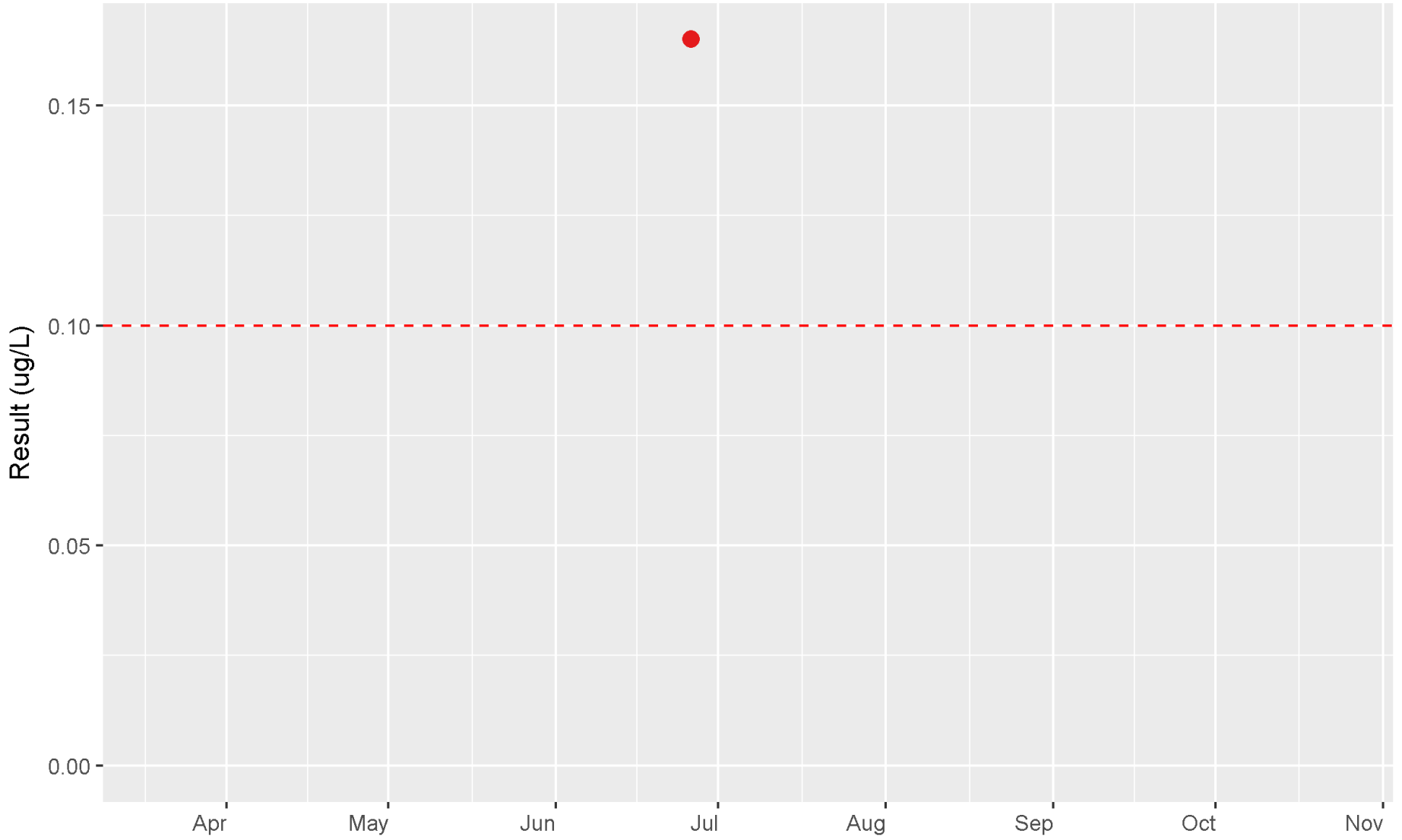
minimum benchmark: 150



● North Fork Deep Creek at Hwy 212 (upstream of Boring)

# Clackamas 2017 methiocarb (Mesurol)

minimum benchmark: 0.1



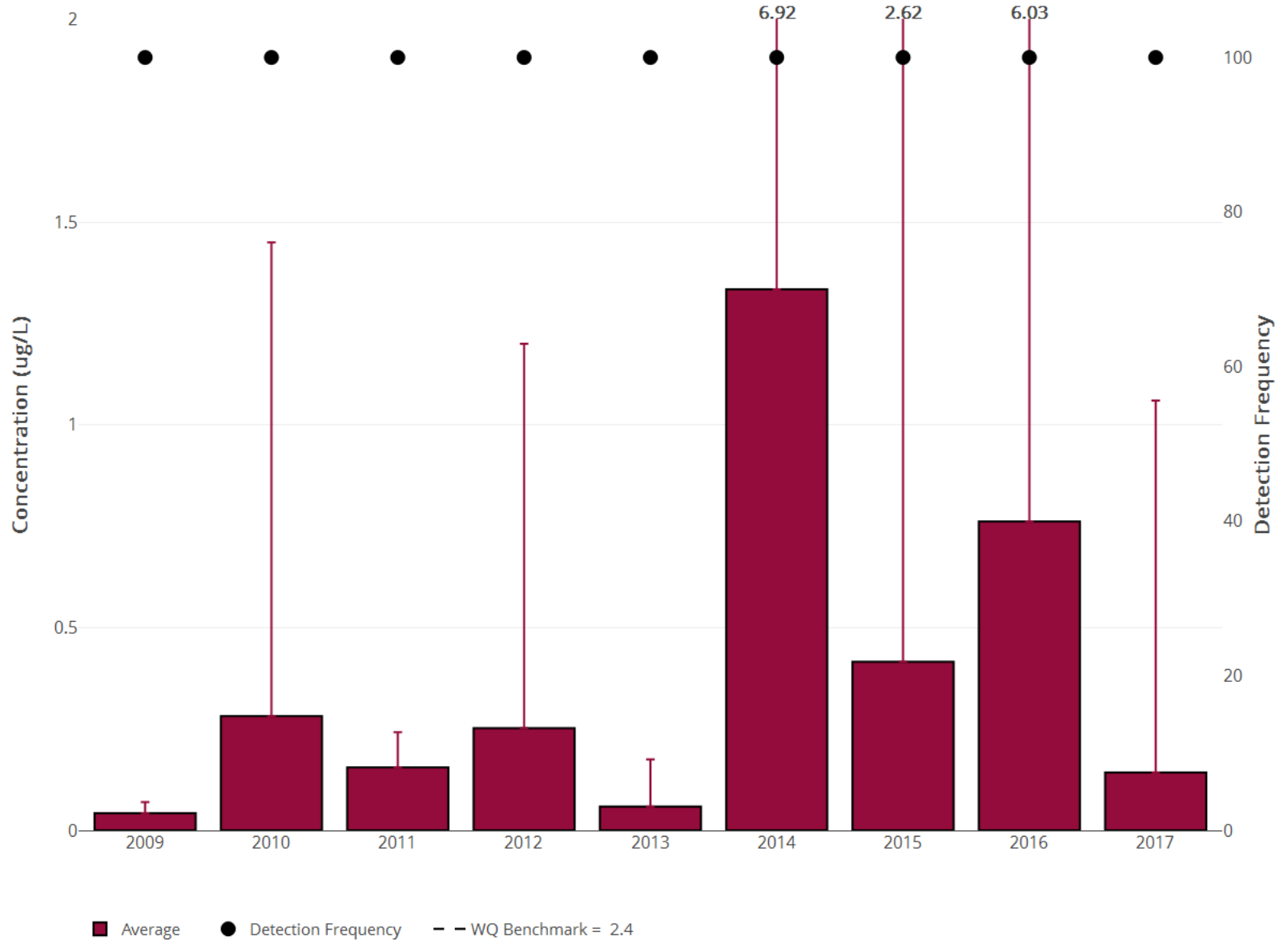
● Noyer Creek at Hwy 212, St. Paul Lutheran Church



2016 CLACKAMAS SELECTED HERBICIDE  
DETECTIONS

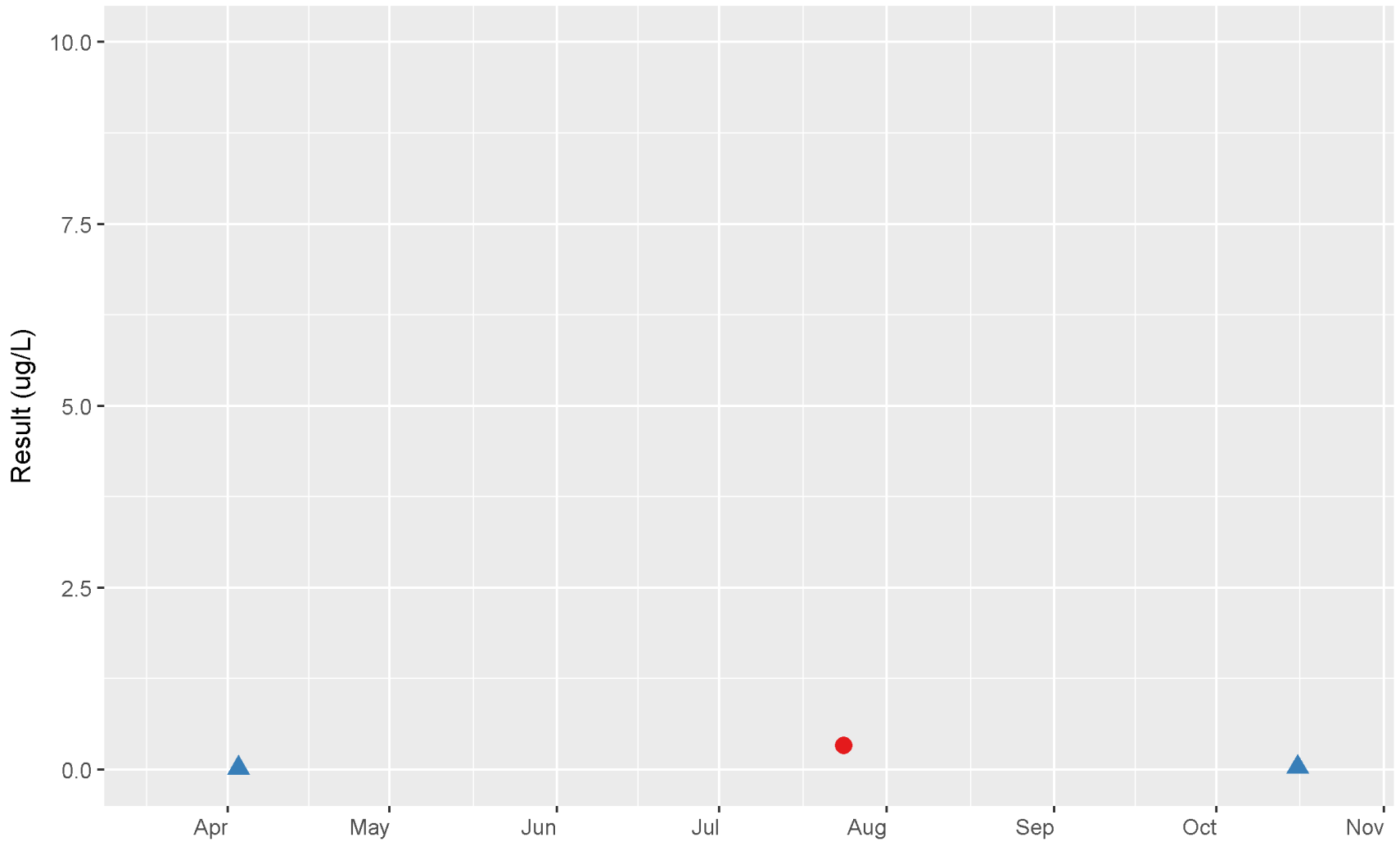


North Fork Deep Creek at Hwy 212 (upstream of Boring) Average and Maximum Concentration of Detections diuron 2009 - 2017



# Clackamas 2017 dichlobenil (Casoron)

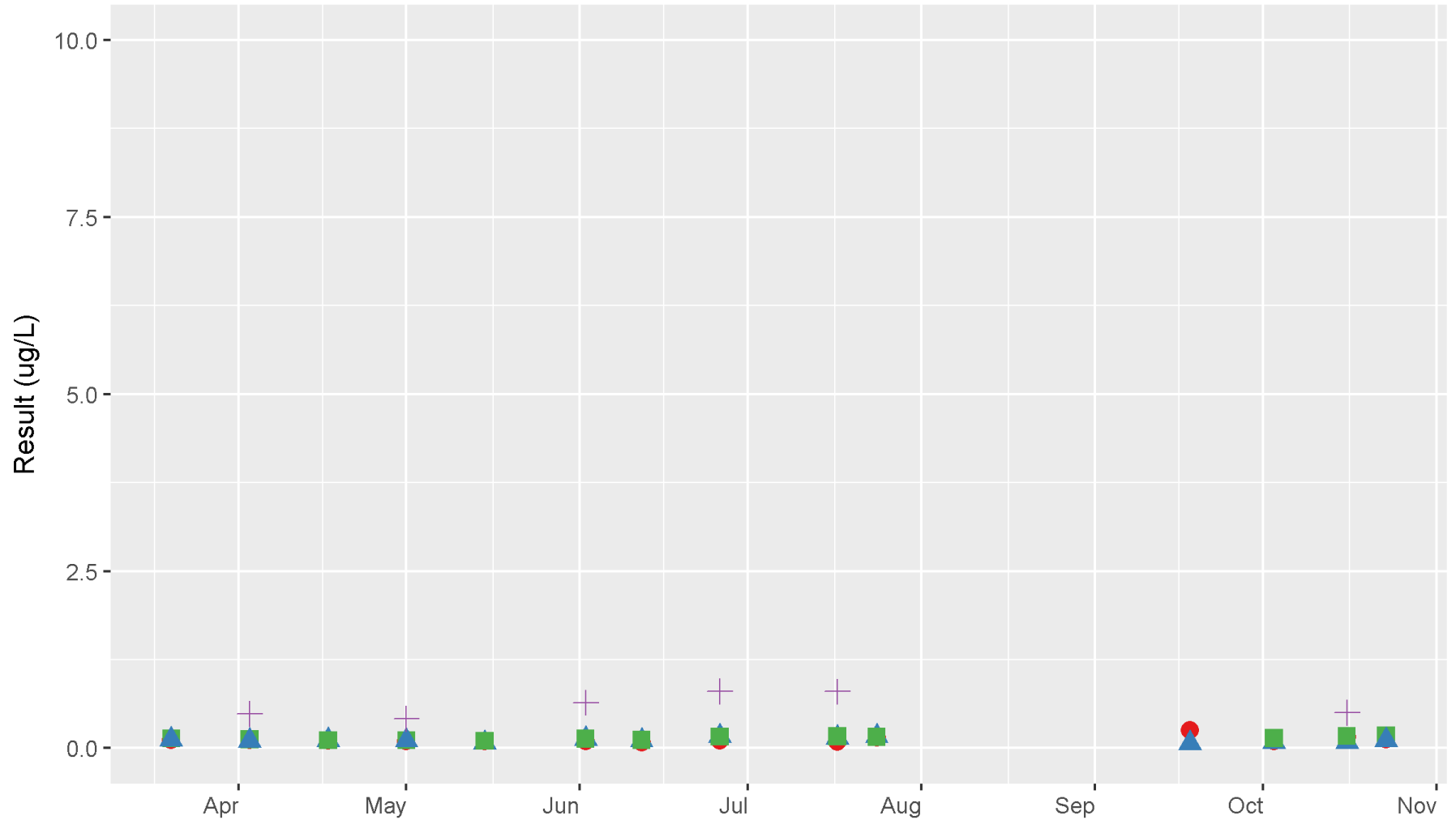
minimum benchmark: 30



● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Sieben Creek at Hwy 212 (Clackamas)

# Clackamas 2017 2,6-dichlorobenzamide

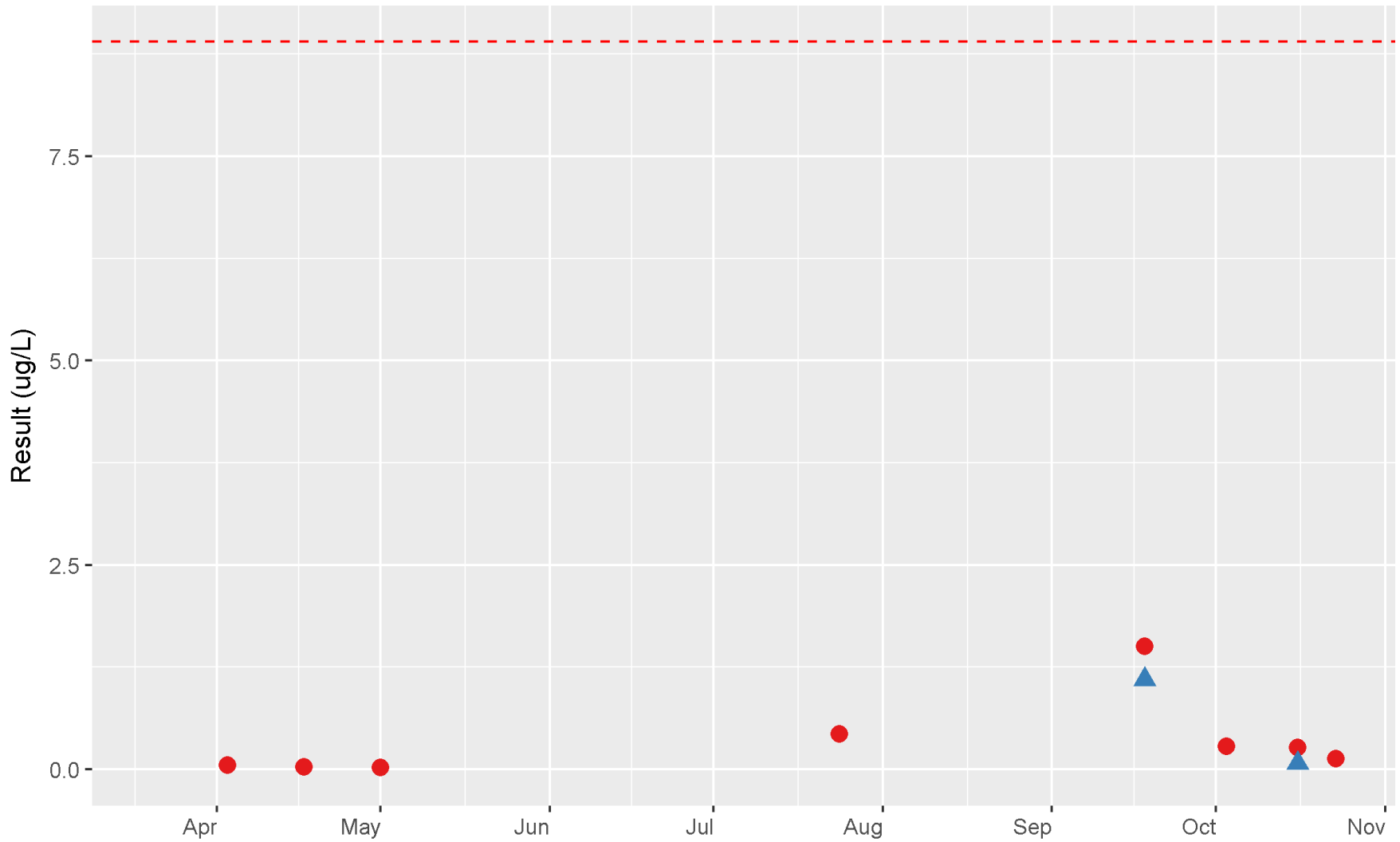
minimum benchmark: NA



- North Fork Deep Creek at Hwy 212 (upstream of Boring)
- ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church
- Rock Creek at 172nd, Stony Brook Court
- ✚ Sieben Creek at Hwy 212 (Clackamas)

# Clackamas 2017 dimethenamid (Outlook, Tower, Frontier)

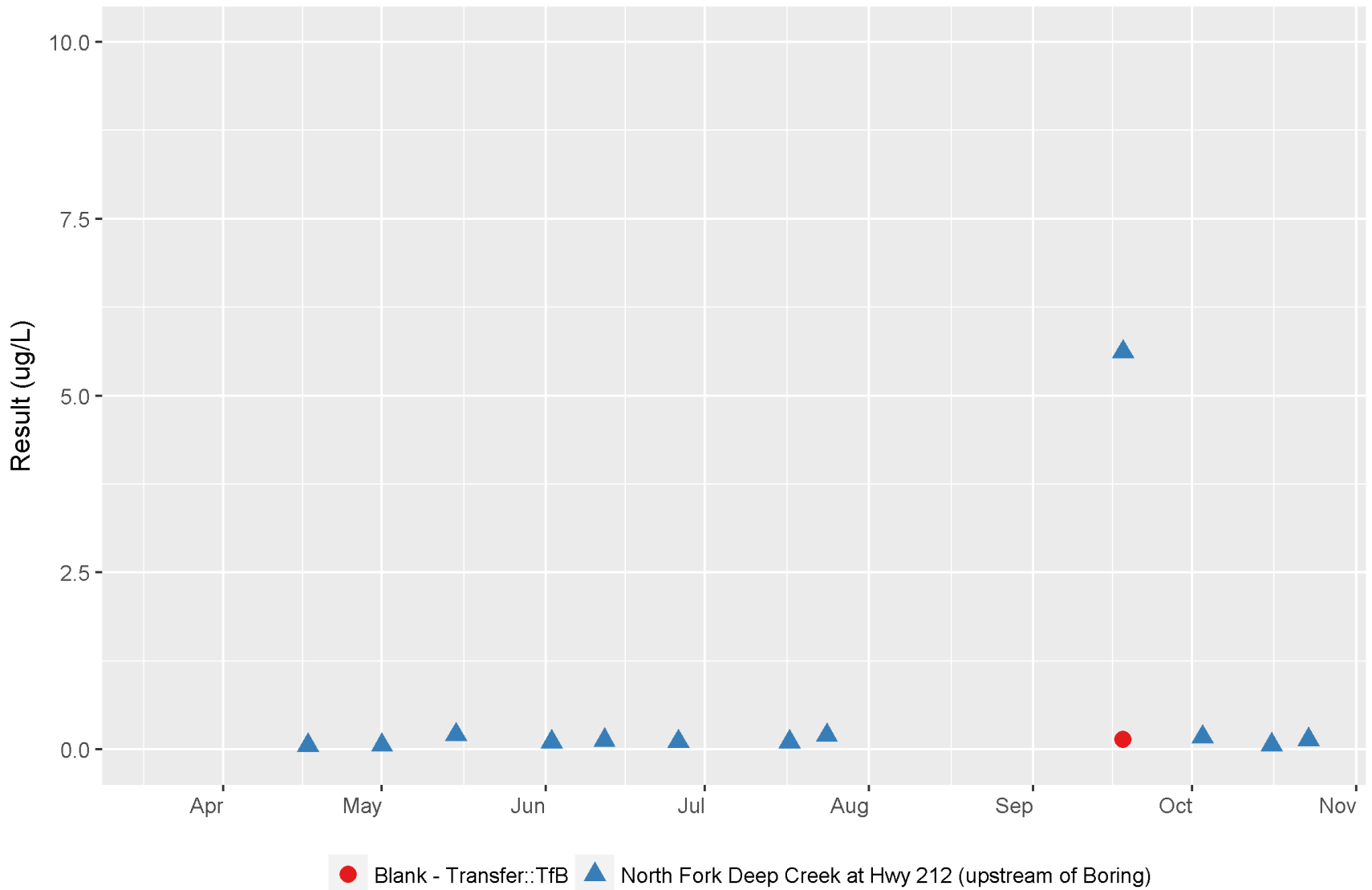
minimum benchmark: 8.9



● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church

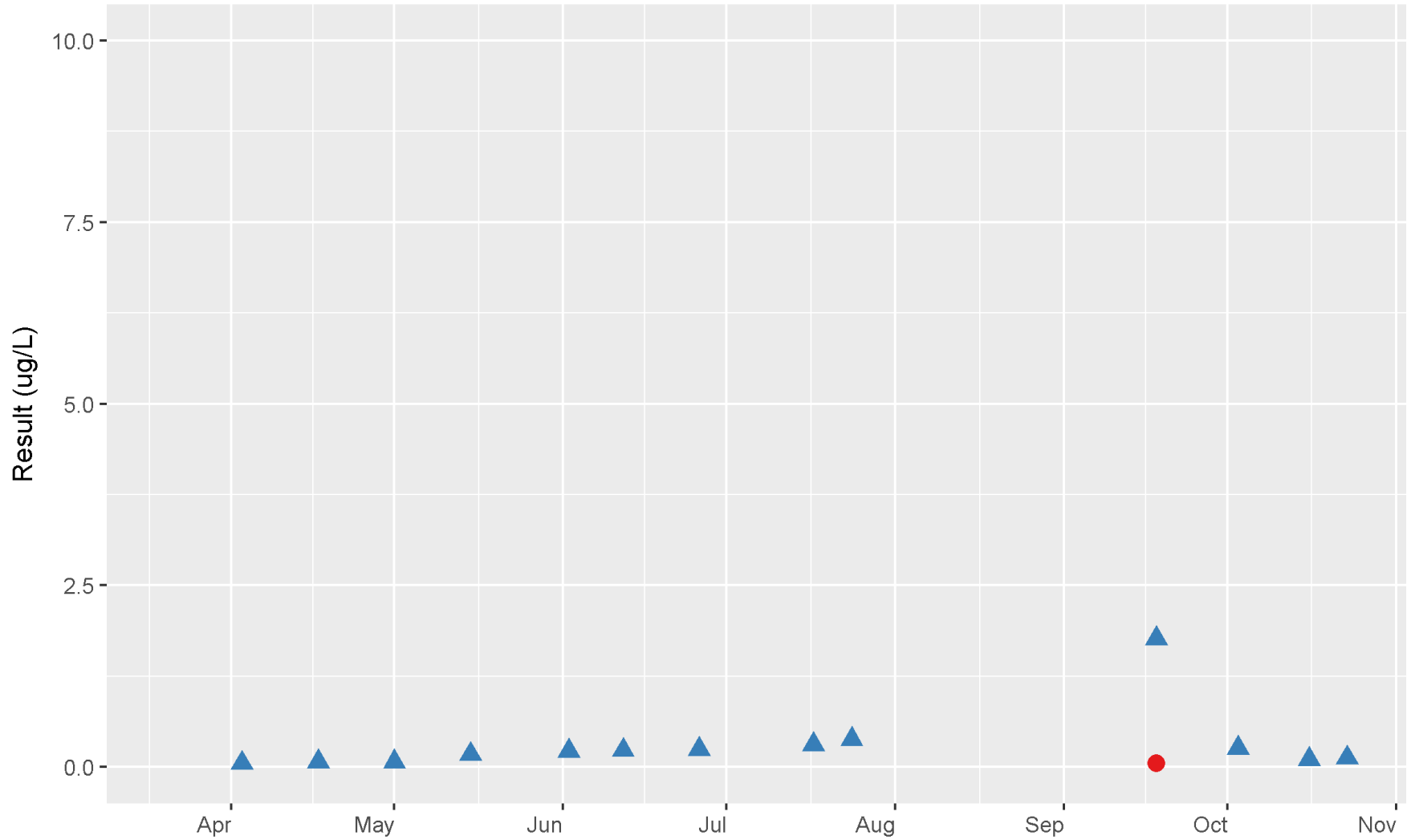
# Clackamas 2017 glyphosate

minimum benchmark: 1800



# Clackamas 2017 aminomethylphosphonic acid (ampa)

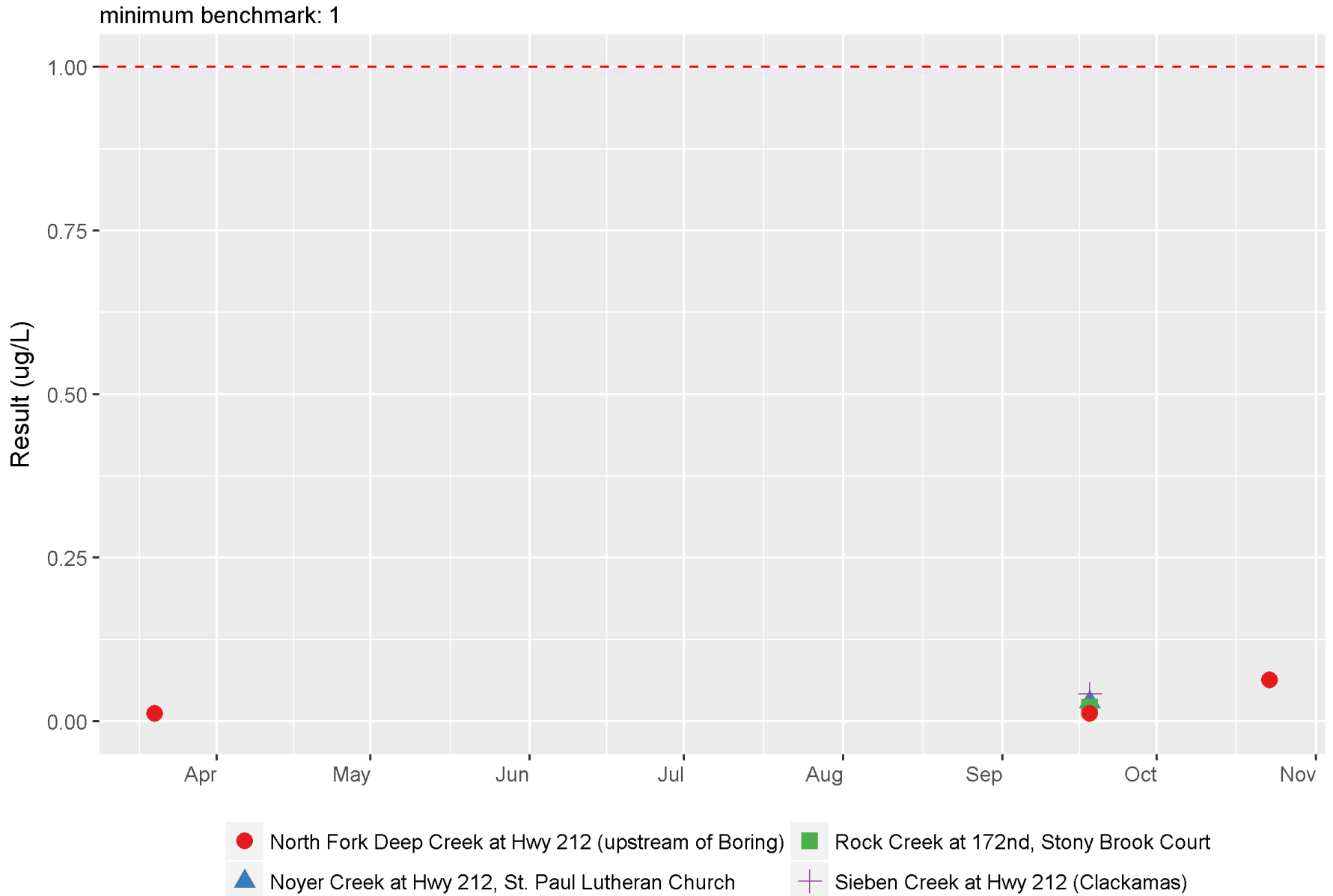
minimum benchmark: 249500



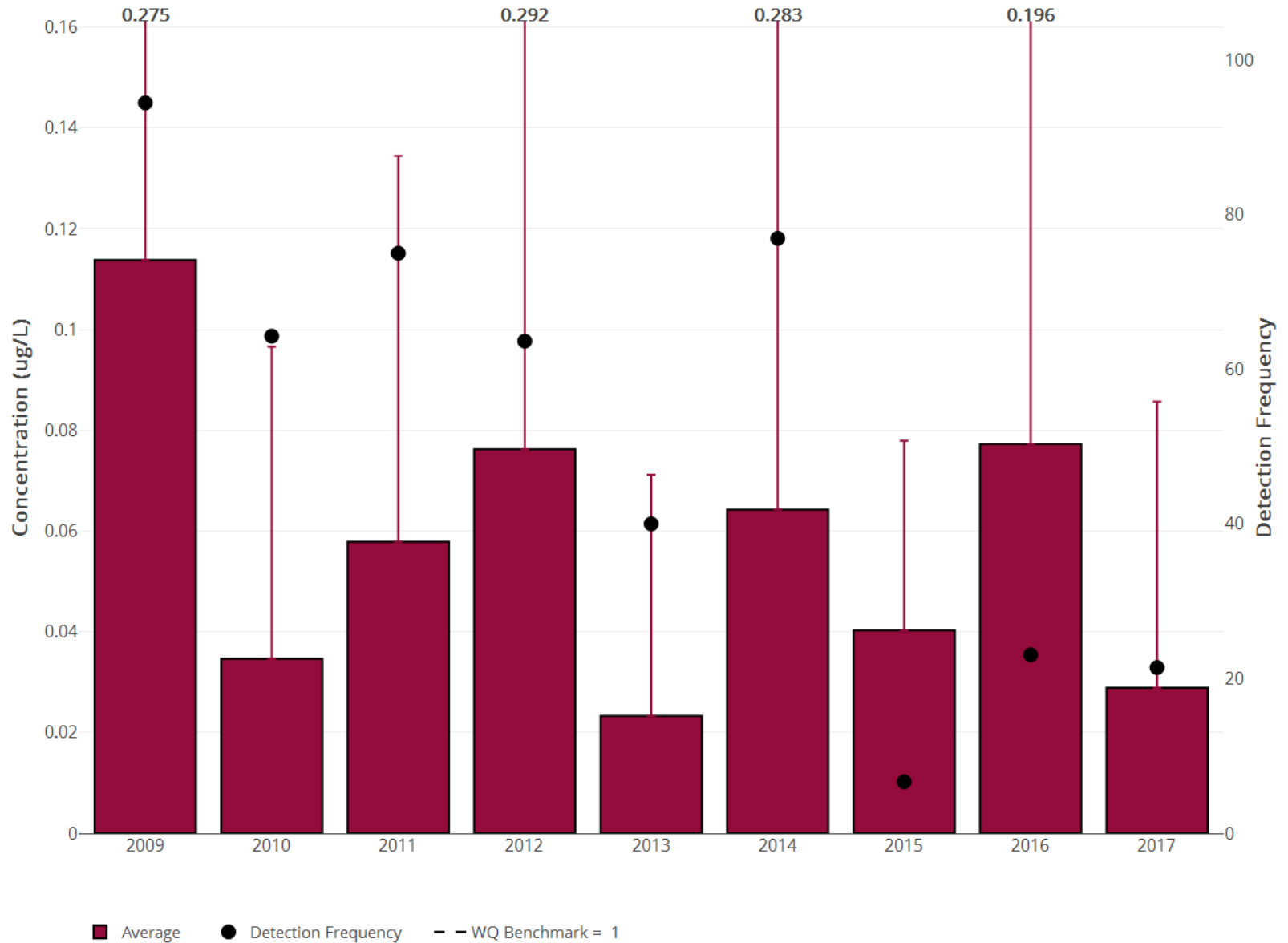
● Blank - Transfer::TfB ▲ North Fork Deep Creek at Hwy 212 (upstream of Boring)



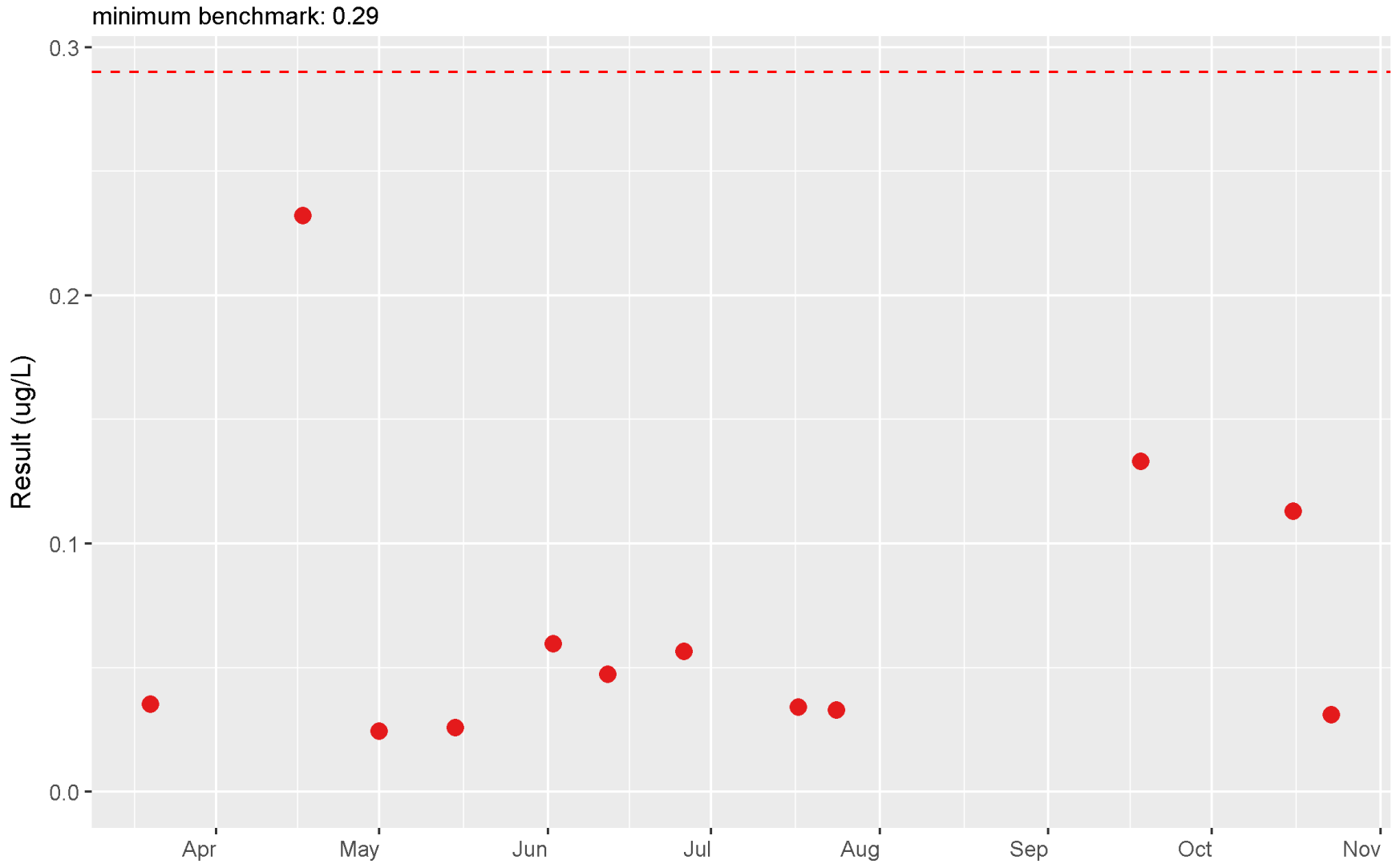
# Clackamas 2017 metolachlor (Dual Magnum)



North Fork Deep Creek at Hwy 212 (upstream of Boring) Average and Maximum Concentration of Detections metolachlor 2009 - 2017

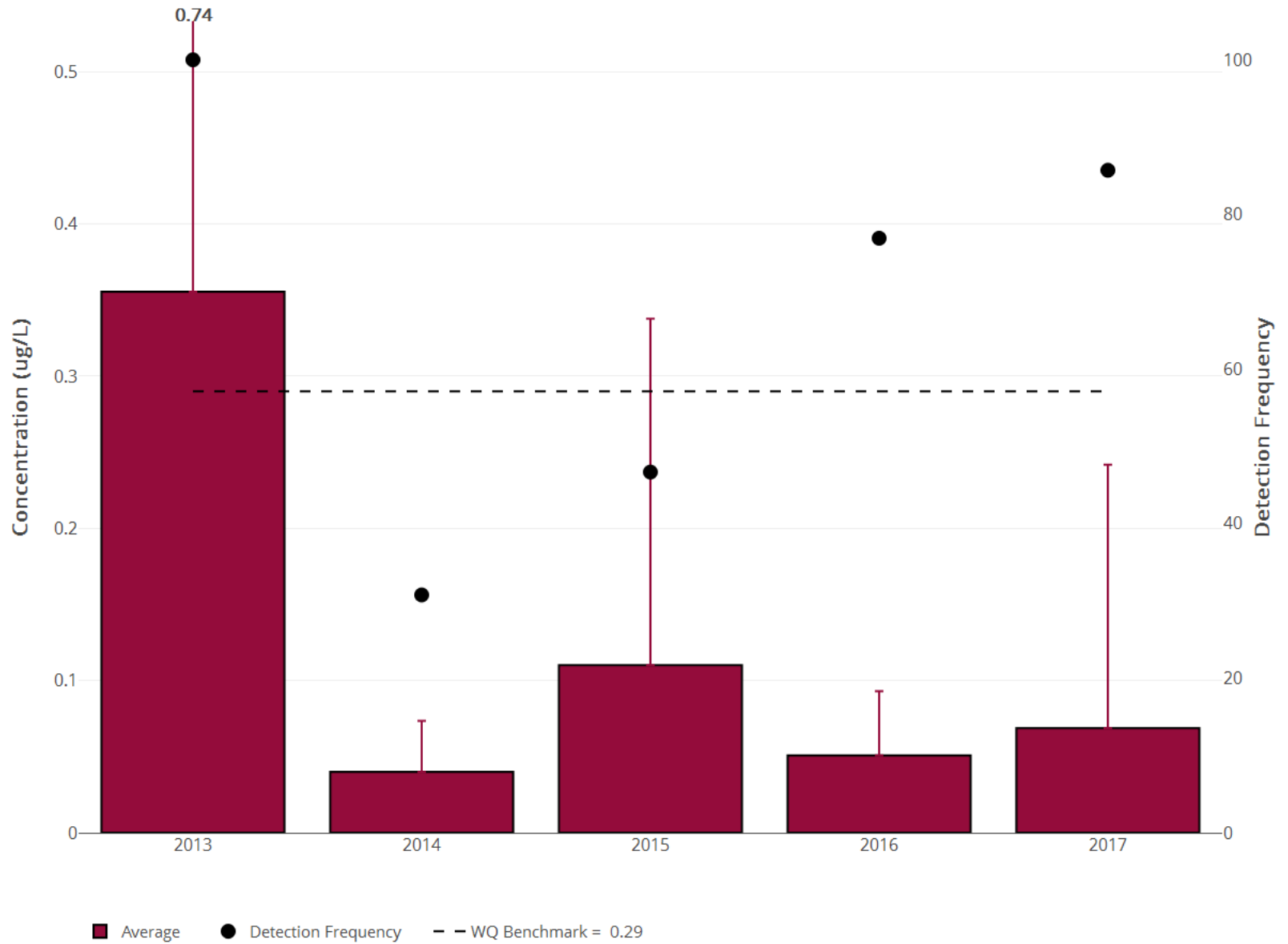


# Clackamas 2017 oxyfluorfen



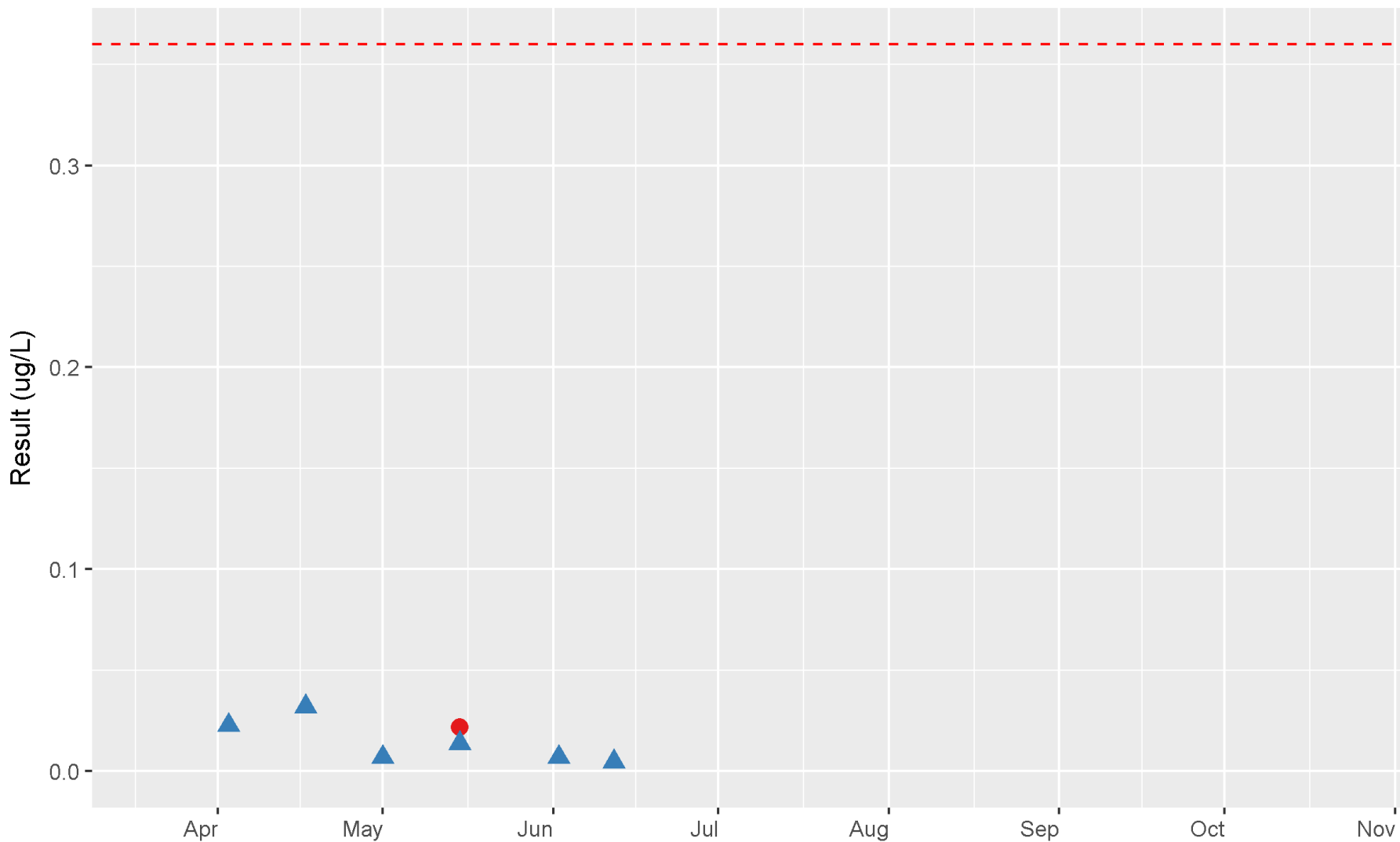
● Noyer Creek at Hwy 212, St. Paul Lutheran Church

Noyer Creek at Hwy 212, St. Paul Lutheran Church Average and Maximum Concentration of Detections oxyfluorfen 2012 - 2017



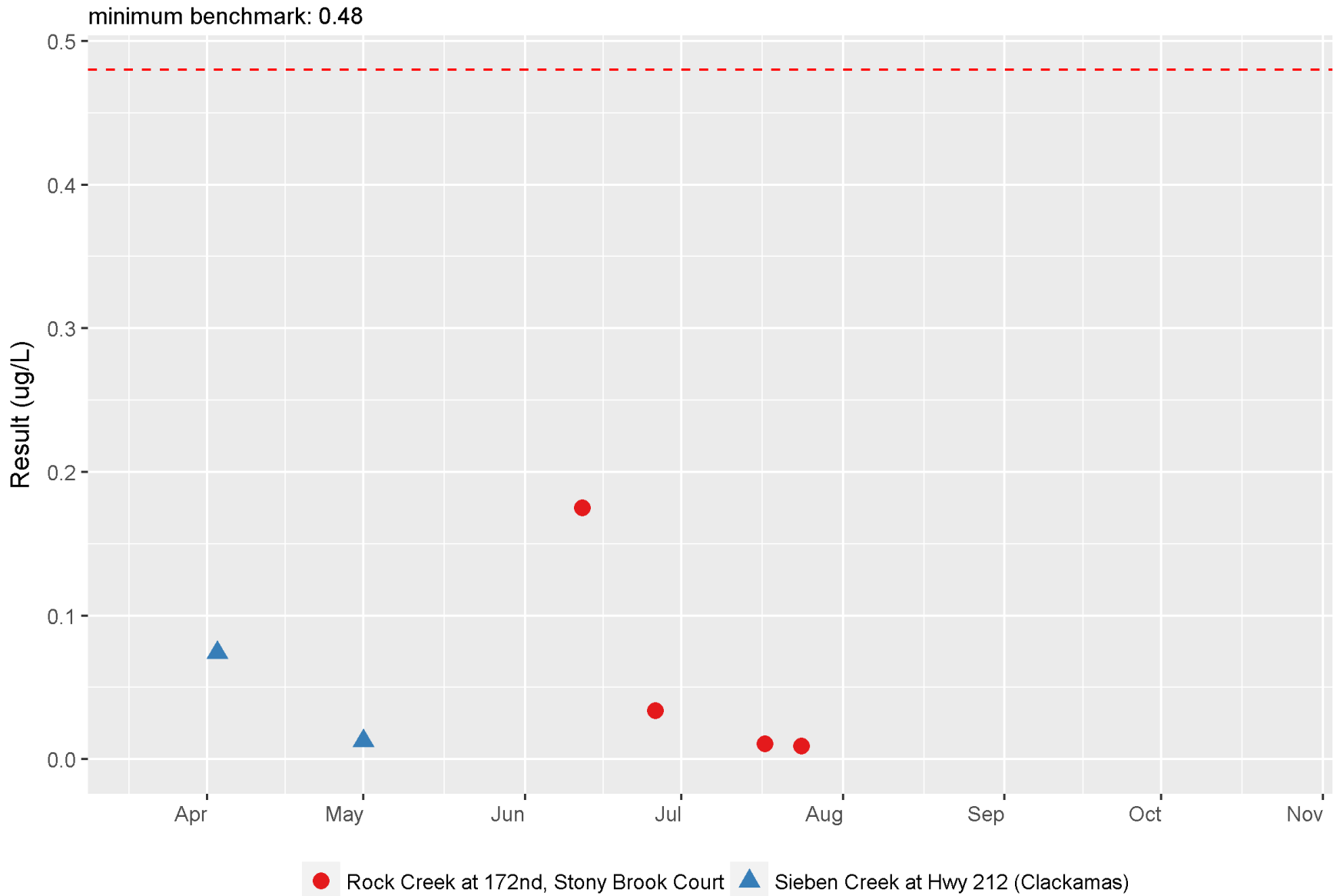
# Clackamas 2017 metsulfuron methyl (Escort)

minimum benchmark: 0.36



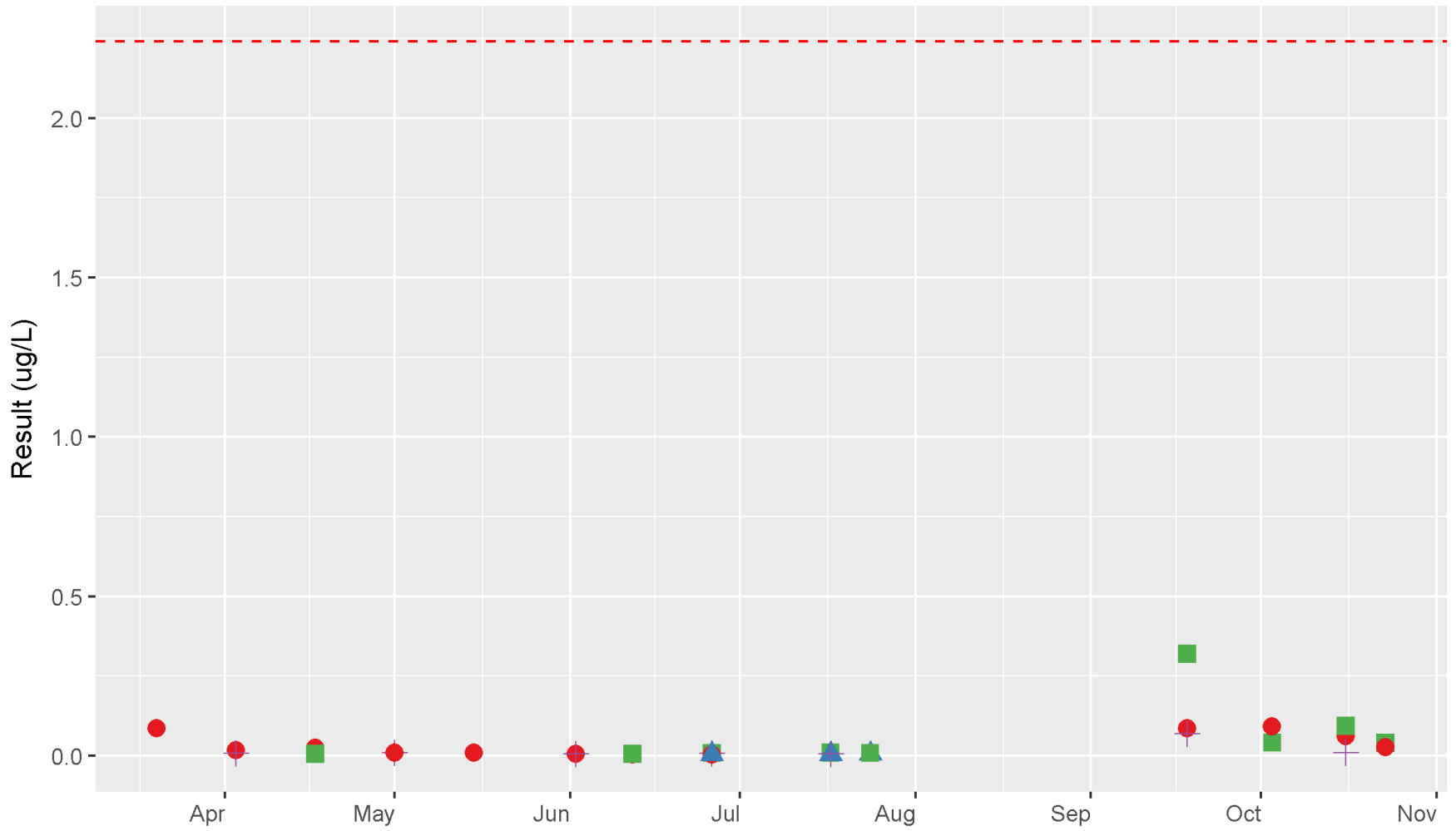
● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church

# Clackamas 2017 sulfometuron-methyl (Oust)



# Clackamas 2017 simazine (Princep)

minimum benchmark: 2.24



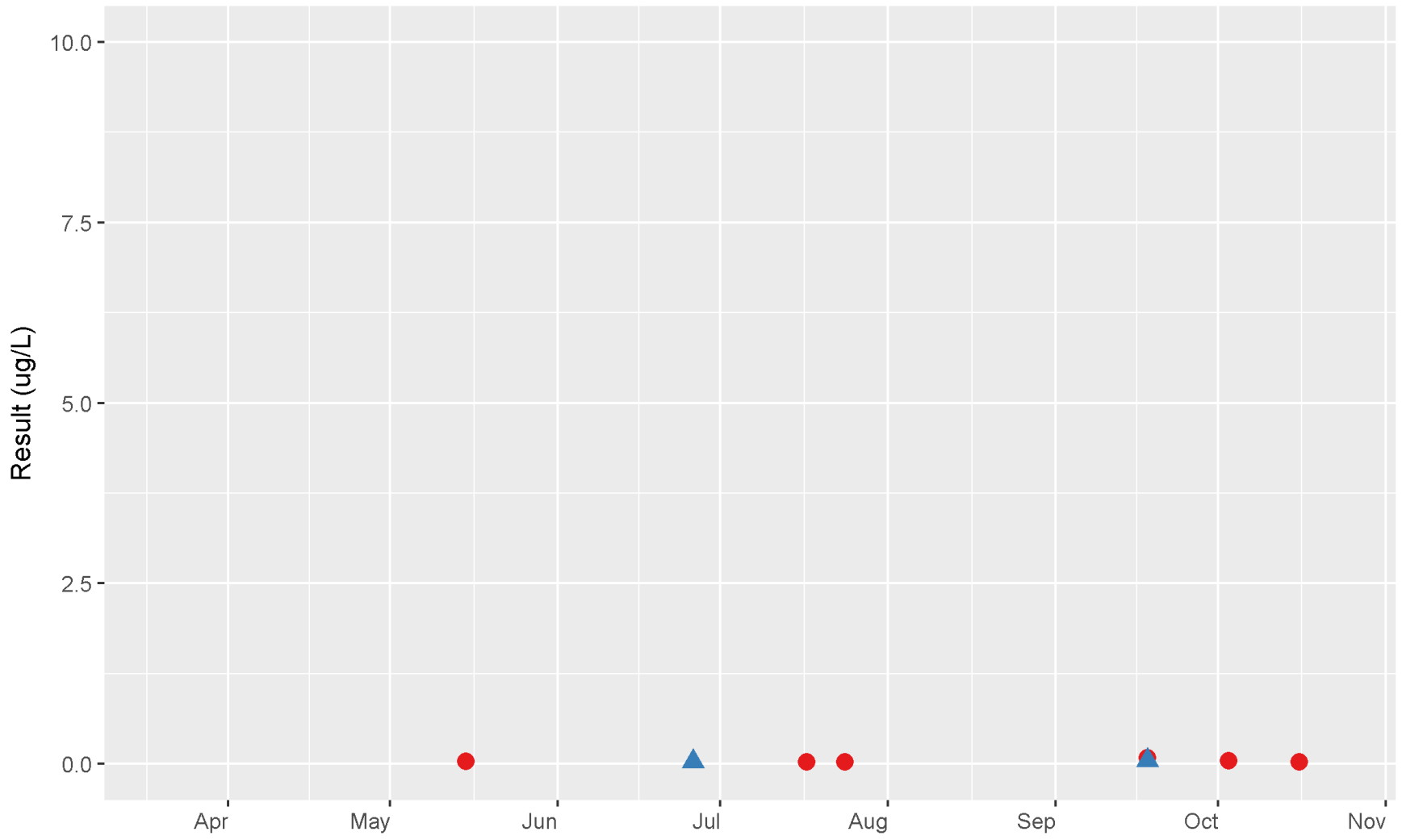
- North Fork Deep Creek at Hwy 212 (upstream of Boring)
- Rock Creek at 172nd, Stony Brook Court
- ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church
- ✦ Sieben Creek at Hwy 212 (Clackamas)

# 2017 CLACKAMAS FUNGICIDE DETECTIONS



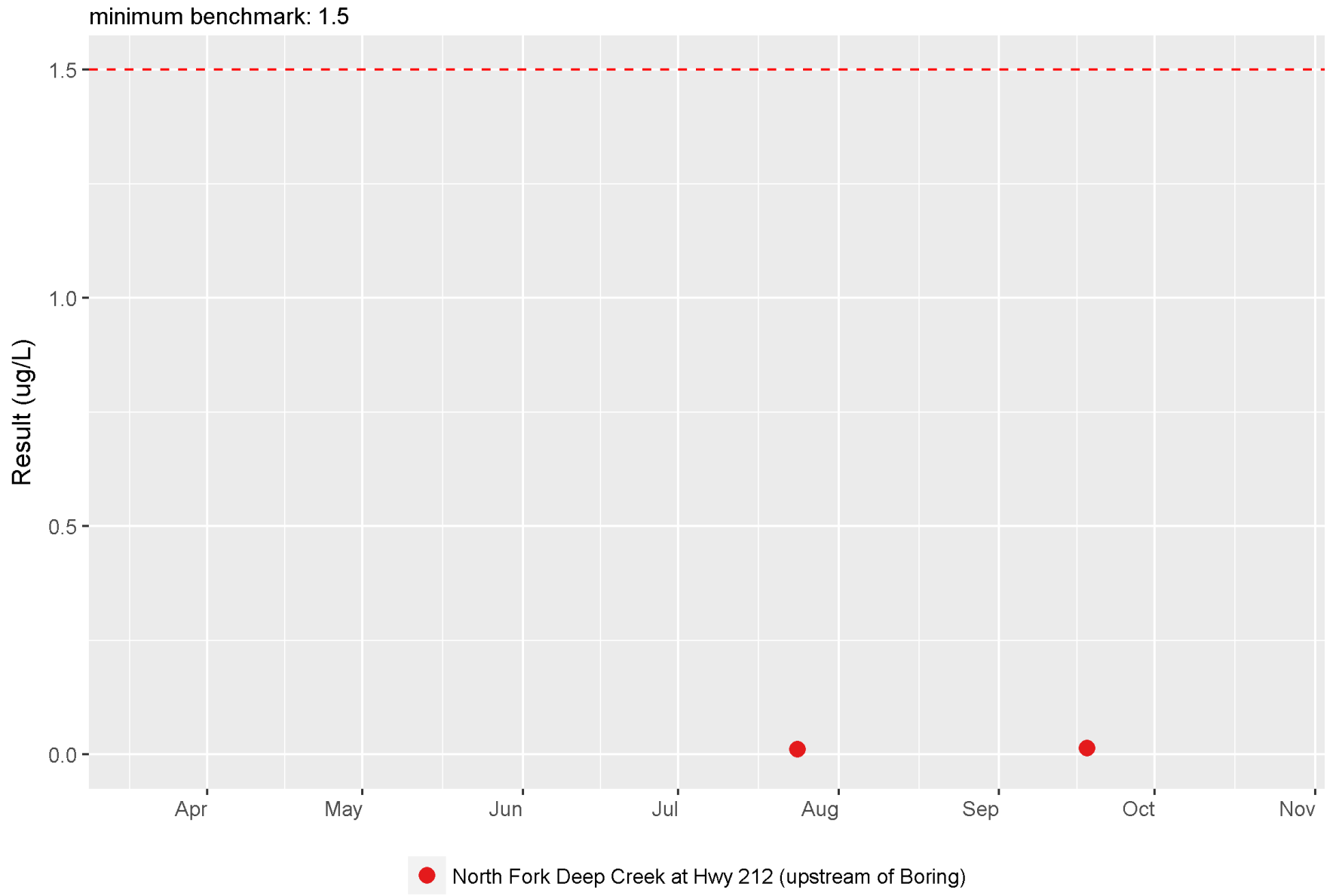
# Clackamas 2017 propiconazole (Propimax, Banner MAXX)

minimum benchmark: 21



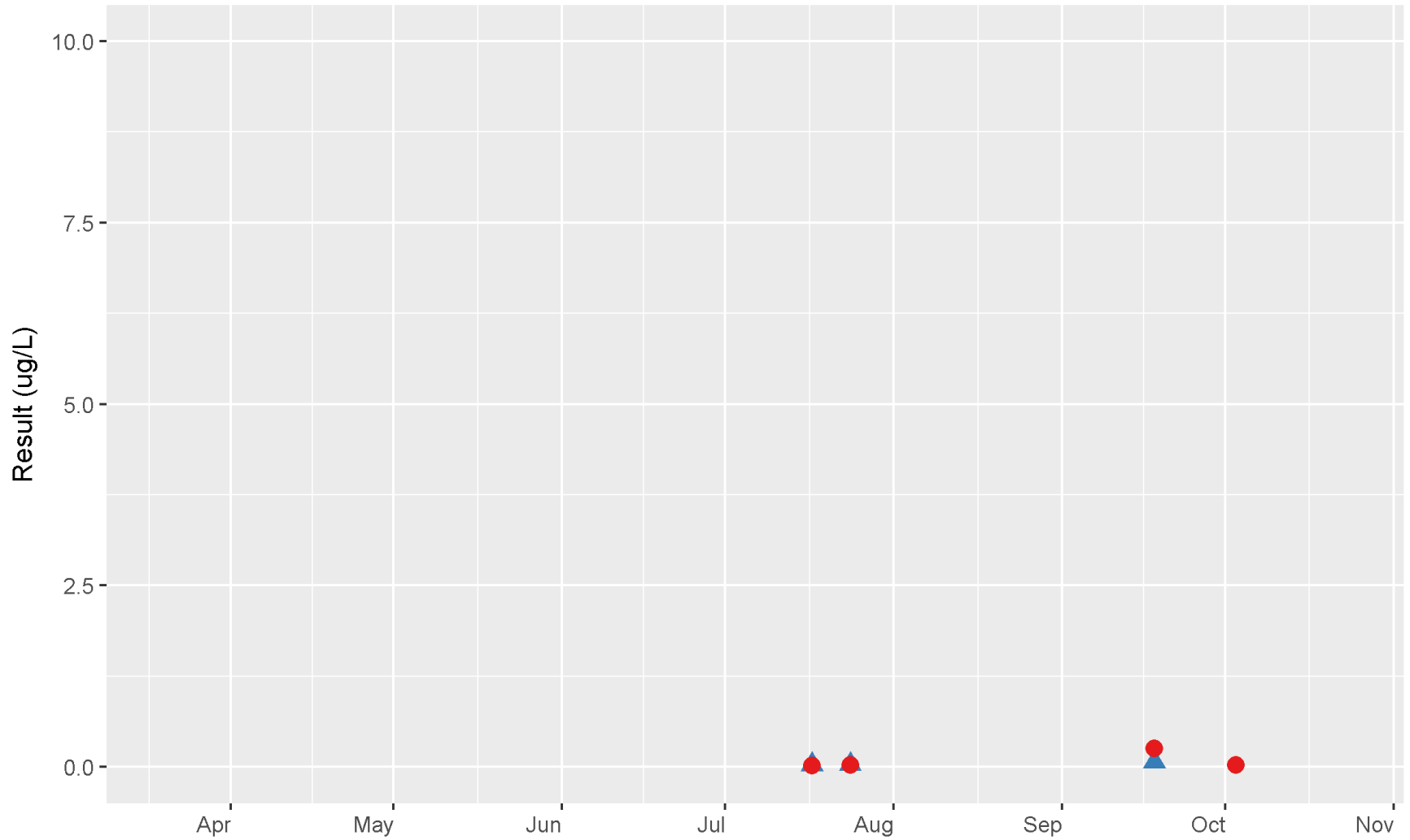
● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church

# Clackamas 2017 pyraclostrobin (Headline, Cabrio, Tilt)



# Clackamas 2017 azoxystrobin (Hertiage)

minimum benchmark: 44



● North Fork Deep Creek at Hwy 212 (upstream of Boring) ▲ Noyer Creek at Hwy 212, St. Paul Lutheran Church