



Stream Temperature Monitoring in the Olympic Experimental State Forest

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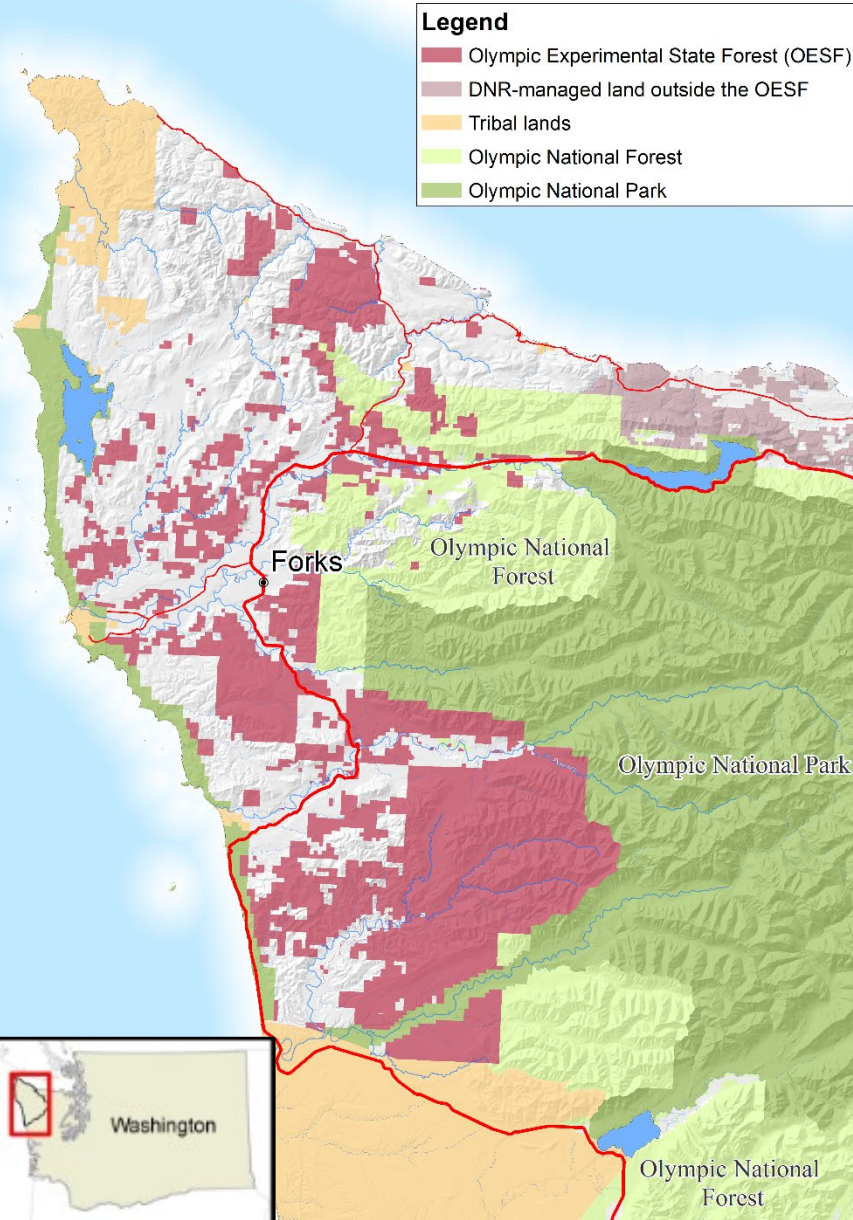


Presentation Focus

Long-term monitoring project in the Olympic Experimental State Forest (OESF)

Evaluation of riparian conservation measures across the OESF

The effects of specific timber sales on stream temperature are not evaluated



Information Source



Channel Morphology



Channel Substrate



Stream Flow



Water Temperature



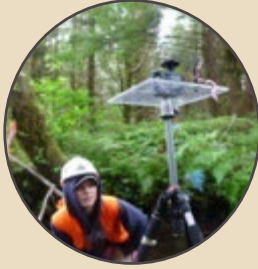
Habitat Units



In-Stream Wood



Riparian Microclimate




Stream Shade



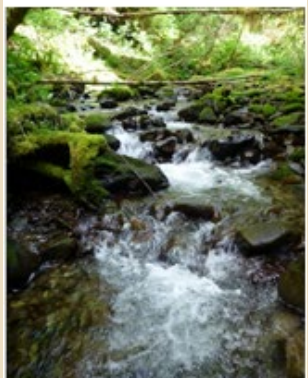
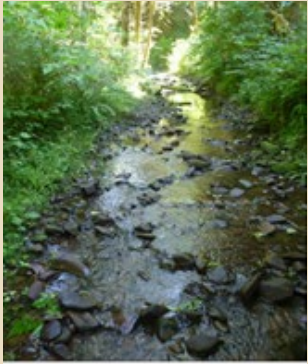
Riparian Vegetation

Status and Trends Monitoring of
Riparian and Aquatic Habitat in the
Olympic Experimental State Forest
2013-2020 Results

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 WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES
HILARY S. FRANZ, COMMISSIONER OF PUBLIC LANDS





Study Purpose and Objectives

Goal: Document long-term change in stream habitat in managed watersheds

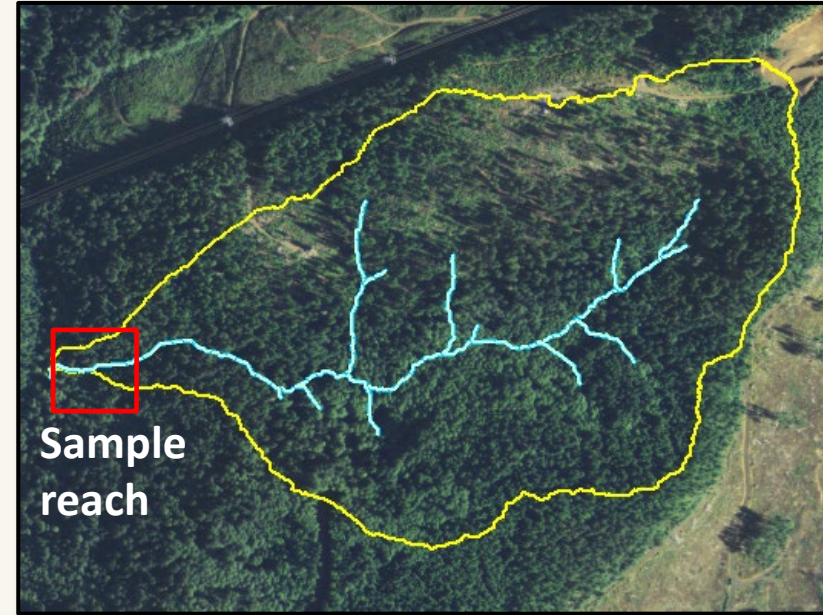
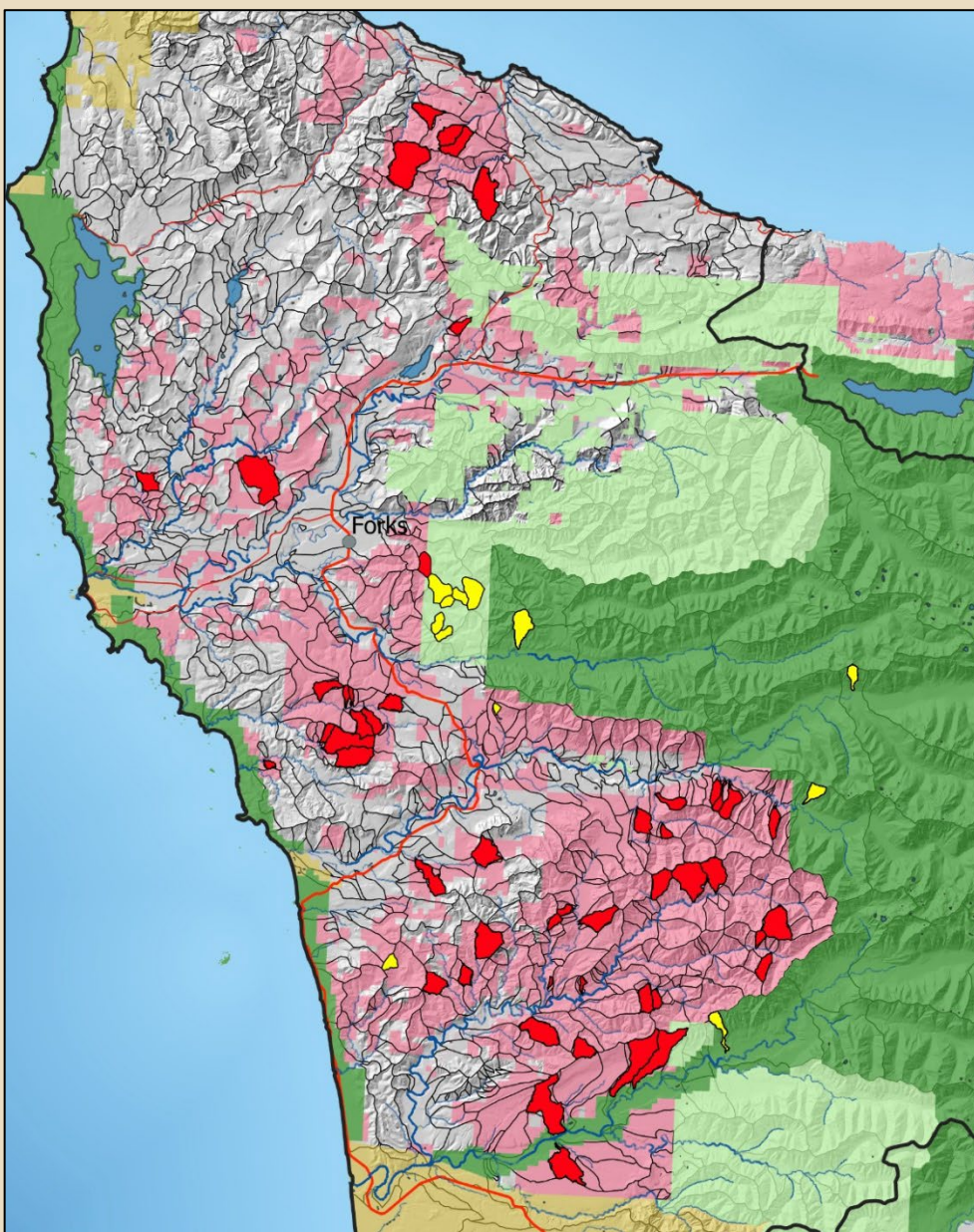
Objectives

- Evaluate DNR's progress in meeting the State Lands HCP riparian conservation objectives
- Reduce uncertainties around the integration of habitat conservation and timber production



Monitoring Design

Type 3 streams (smallest class fish-bearing streams)
50 DNR-managed watersheds
12 reference watersheds



Avg. watershed area: 545 ac

Avg. stream width: 16 ft

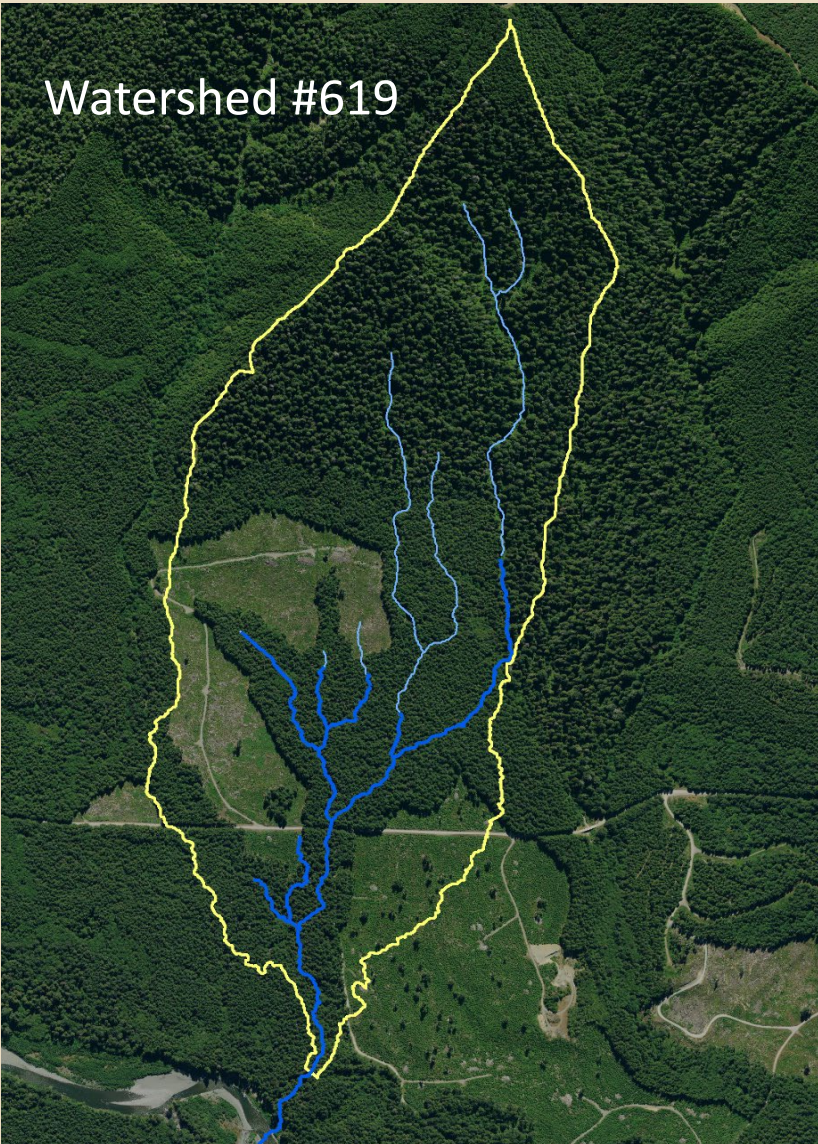
Timber harvest 2013-2022: 4.8% thinned, 2.8% VRH



OESF Riparian Management

- **Riparian buffers**
- **Protection of unstable slopes**
- **Protection of wetlands**
- **Road management plans**
- **Watershed-level riparian protections (hydrologic maturity, rain on snow, etc.)**

(Forestry Handbook PR-14-004-160)



Field Sampling Methods



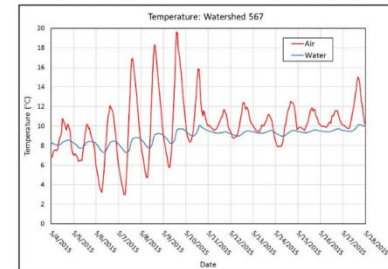
N A T U R A L R E S O U R C E S

Status and Trends Monitoring of Riparian and Aquatic Habitat in the Olympic Experimental State Forest

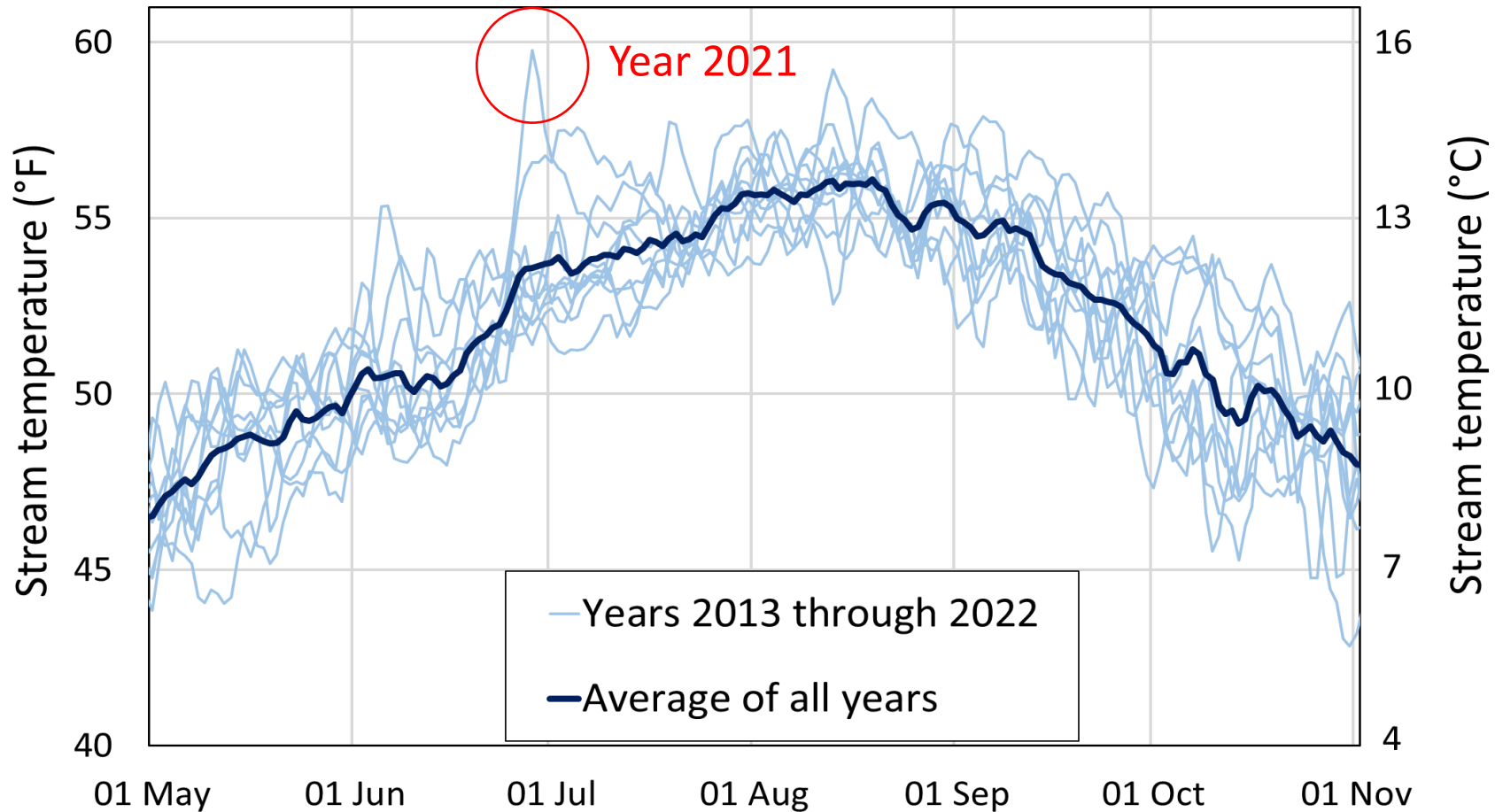
Monitoring Protocols



November 2022
Revision



Results: Average Daily Temperature



15-19 °C - optimal growth for steelhead

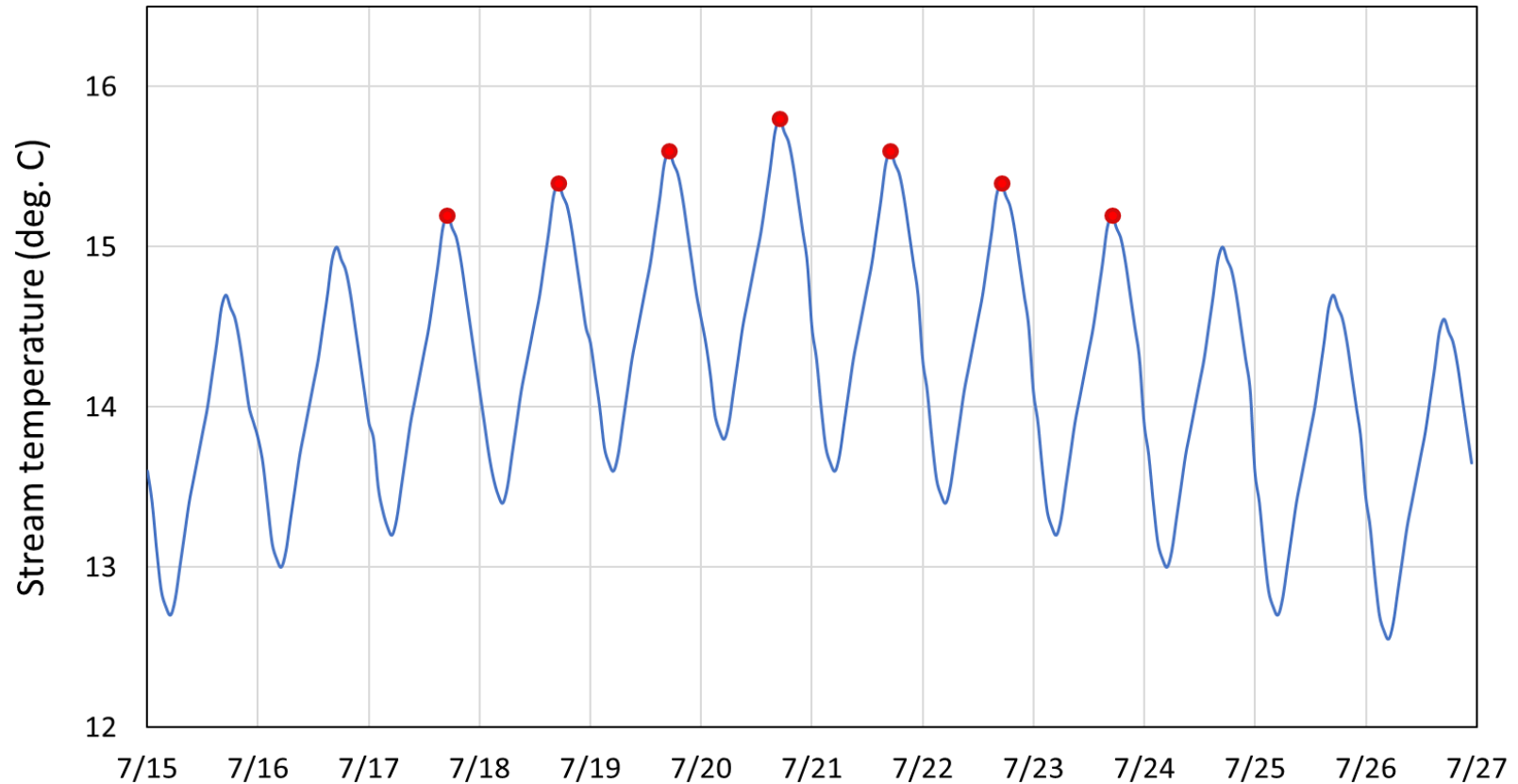
12-15 °C - optimal rearing of juvenile coho

Richter, A. and Kolmes, S.A., 2005. *Reviews in Fisheries Science*, 13(1), pp.23-49.



Results: Maximum Summer Temperature

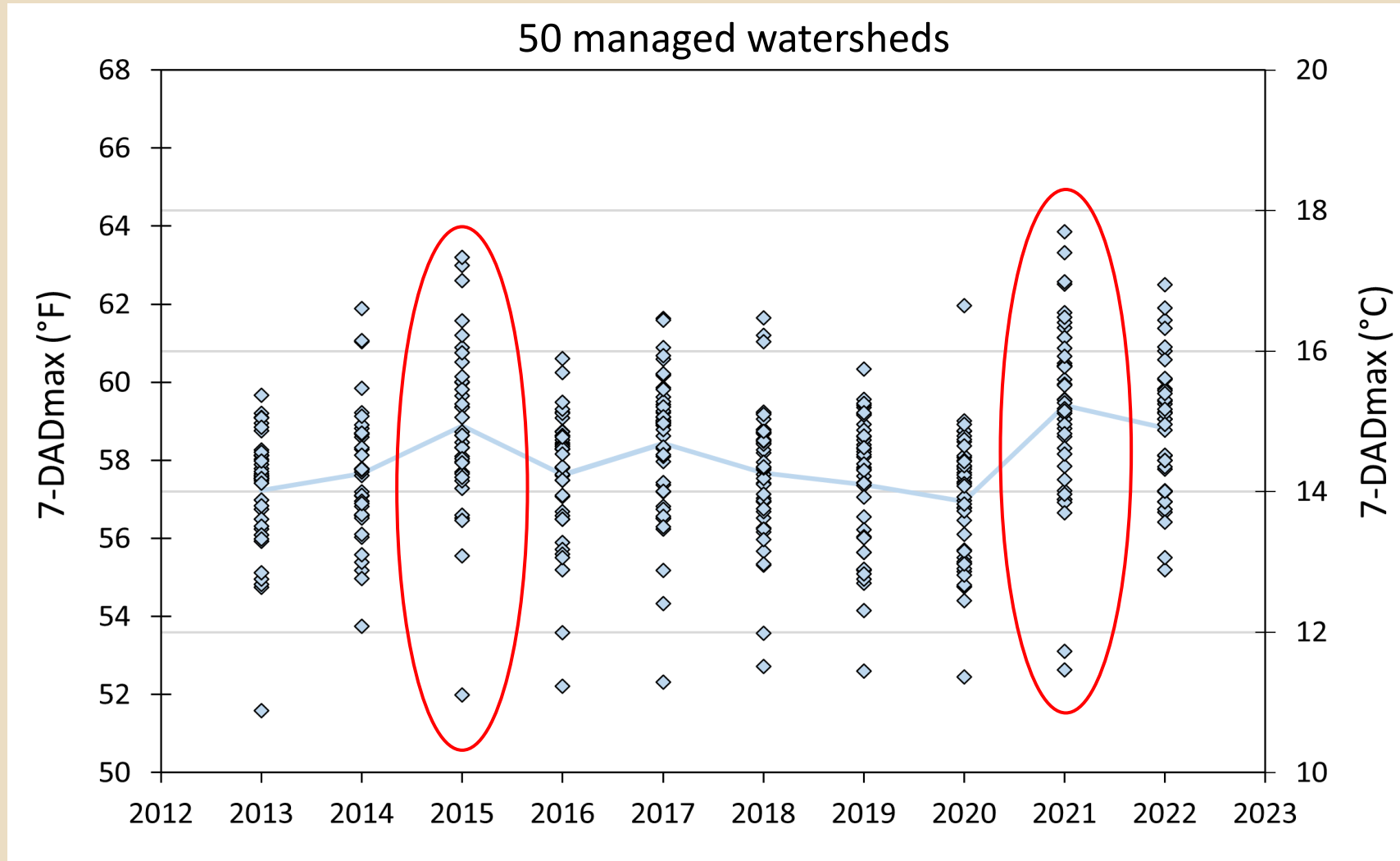
7-Day Average Daily Maximum (7-DADmax)



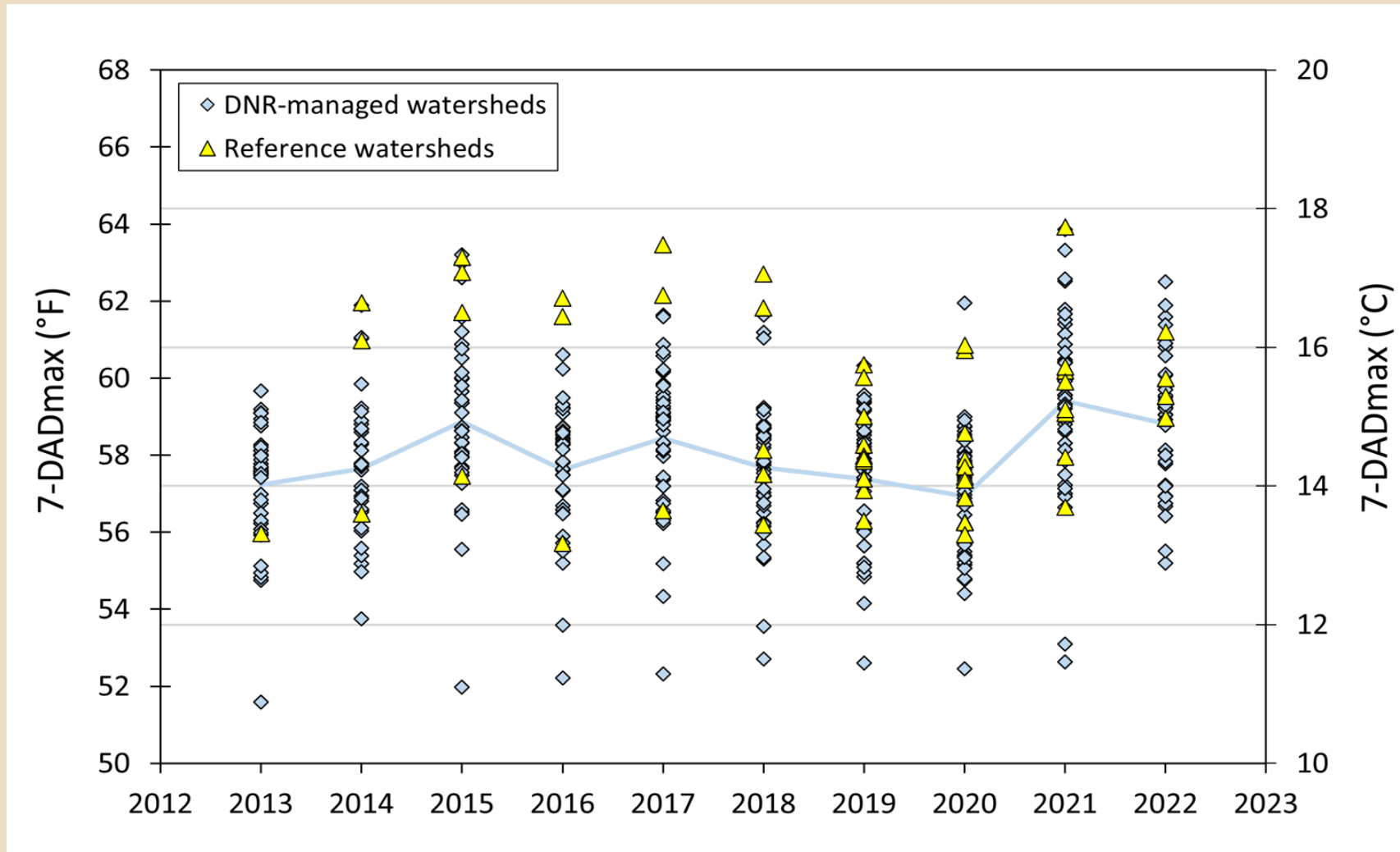
(not actual data)



Results: Maximum Summer Temperature



Results: Maximum Summer Temperature



Results: Predictors of Maximum Summer Temperature*

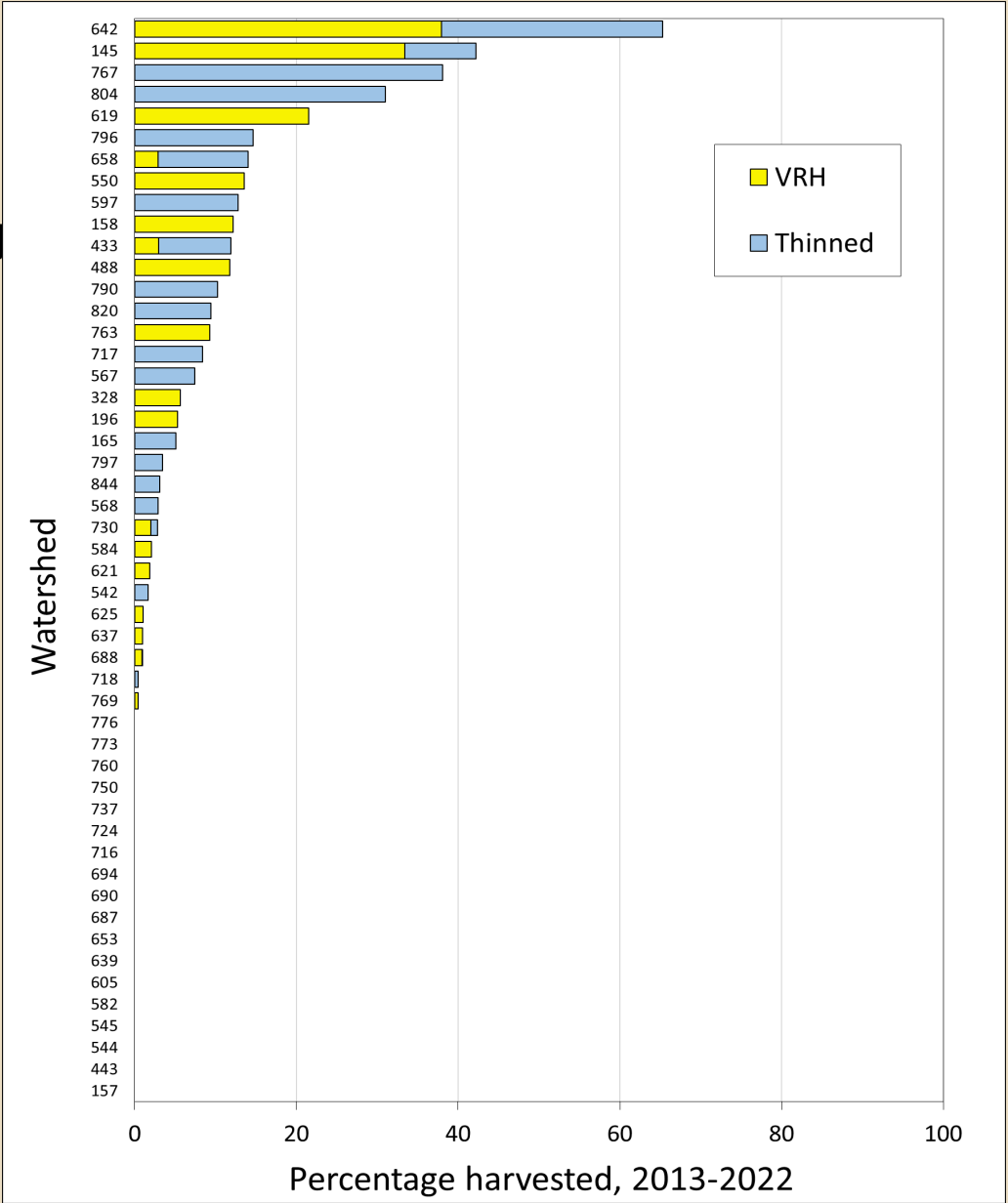
Effect	Result	p-value
Year	Significant effect (year-to-year differences)	<0.01
Gradient of reach	No significant effect	0.32
Channel width of reach	No significant effect	0.12
Elevation of reach	Significant effect (higher = colder)	0.047
Shade above reach	No significant effect	0.12
Channel bedrock in reach	Significant effect (more bedrock = warmer)	<0.01
Watershed solar exposure	Significant effect (more sunlight = warmer)	<0.01
Watershed % harvested during last 5 years	No significant effect	0.79

* In the 50 DNR-managed watersheds



Harvest Level in Monitored DNR-managed Watersheds, 2013-2022

- **18** of the 50 watersheds had no harvest
- **19** watersheds had **1-10%** harvest
- **8** watersheds had **11-20%** harvest
- **5** watersheds had **>20%** harvest



Summary

- **OESF stream temperatures remain cool during the summer**
- **Natural factors explained most of the temperature variation**
- **Year-to-year changes in stream temperature show climate influence**
- **Cause-effect relationships between timber harvest and stream temperature will be evaluated through T3 Watershed Experiment**



Additional Information



**DNR website: www.dnr.wa.gov/oesf
“Research and Monitoring Projects” link**

- **2022 report of project results**
- **Monitoring protocols**
- **Published scientific papers**
- **Other project reports**

Acknowledging the hard work of all field crews



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Board of Natural Resources, July 5, 2023
Subject to changes and amendments over time

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