

# **Puget Sound Nutrient Source Reduction Project**



Marine DO Alternative Restoration Plan

Dustin Bilhimer, WQP-HQ

Presentation for the EPA Region 10 Nutrients Roundtable Meeting

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# Team Acknowledgements

**PSNSRP Lead** – Dustin Bilhimer

**Nutrient Forum and Communications Lead** – Kelly Ferron

**Salish Sea Model Team** – Cristiana Figueroa-Kaminsky, Anise Ahmed, Teizeen Mohamedali, John Gala

**Nutrient General Permit** – Adrien Carroll-Perkins, Ellie Ott, Karen Dinicola

**Project Steering Committee** - NWRO, SWRO, and HQ section managers and key unit supervisors; team leads

# Phased Restoration Plan

## Marine Phase

- Technical evaluation using the Salish Sea Model
- Load reduction targets for WWTP and watershed loads entering marine waters
- Puget Sound Nutrient Reduction Plan

## Watershed Phase

- Technical evaluation using Puget Sound SPARROW and other tools
- Load reduction targets for point and nonpoint source loads within watersheds
- Puget Sound Watershed Nutrient Reduction Plan

# *What we've learned from the SSM to date*

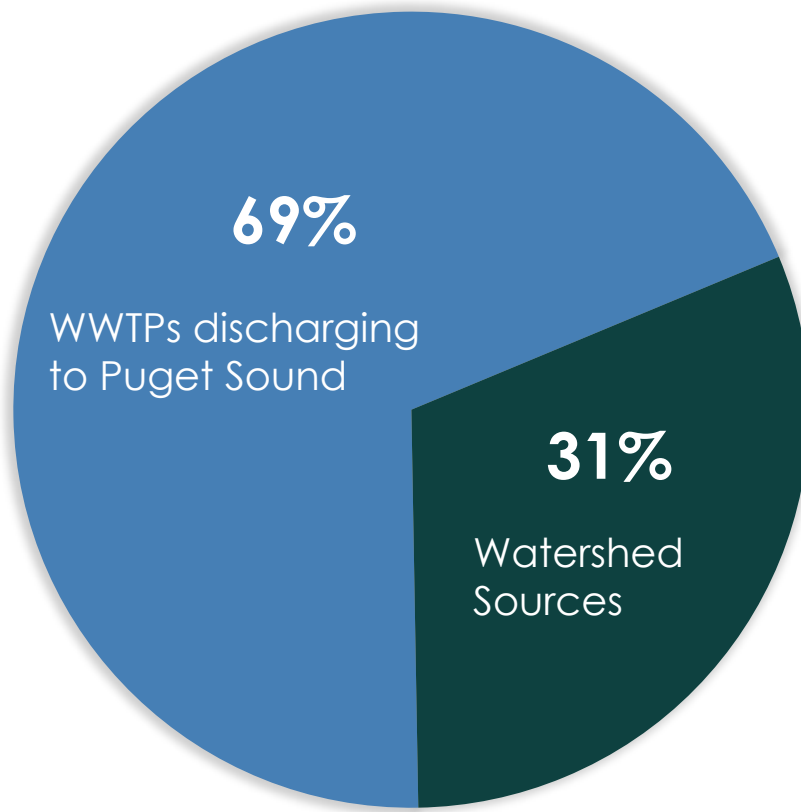


*Puget Sound Nutrient Source Reduction Project:  
Salish Sea Model Results ([arcgis.com](http://arcgis.com))*

Nutrient pollution studies - Washington State  
Department of Ecology



# What we learned from Bounding Scenarios Report (2019)



Cumulative regional human sources of nutrients contribute to not meeting DO standards

If all WWTPs achieved 8 mg TN/L seasonally we still wouldn't fully meet standards

Both WWTP and Watershed reductions are necessary to meet standards

Total regional nitrogen load from human sources



# Year 1 Scenario Results (2021)

Sources with the biggest DO impacts both within their basins and on all others are in:

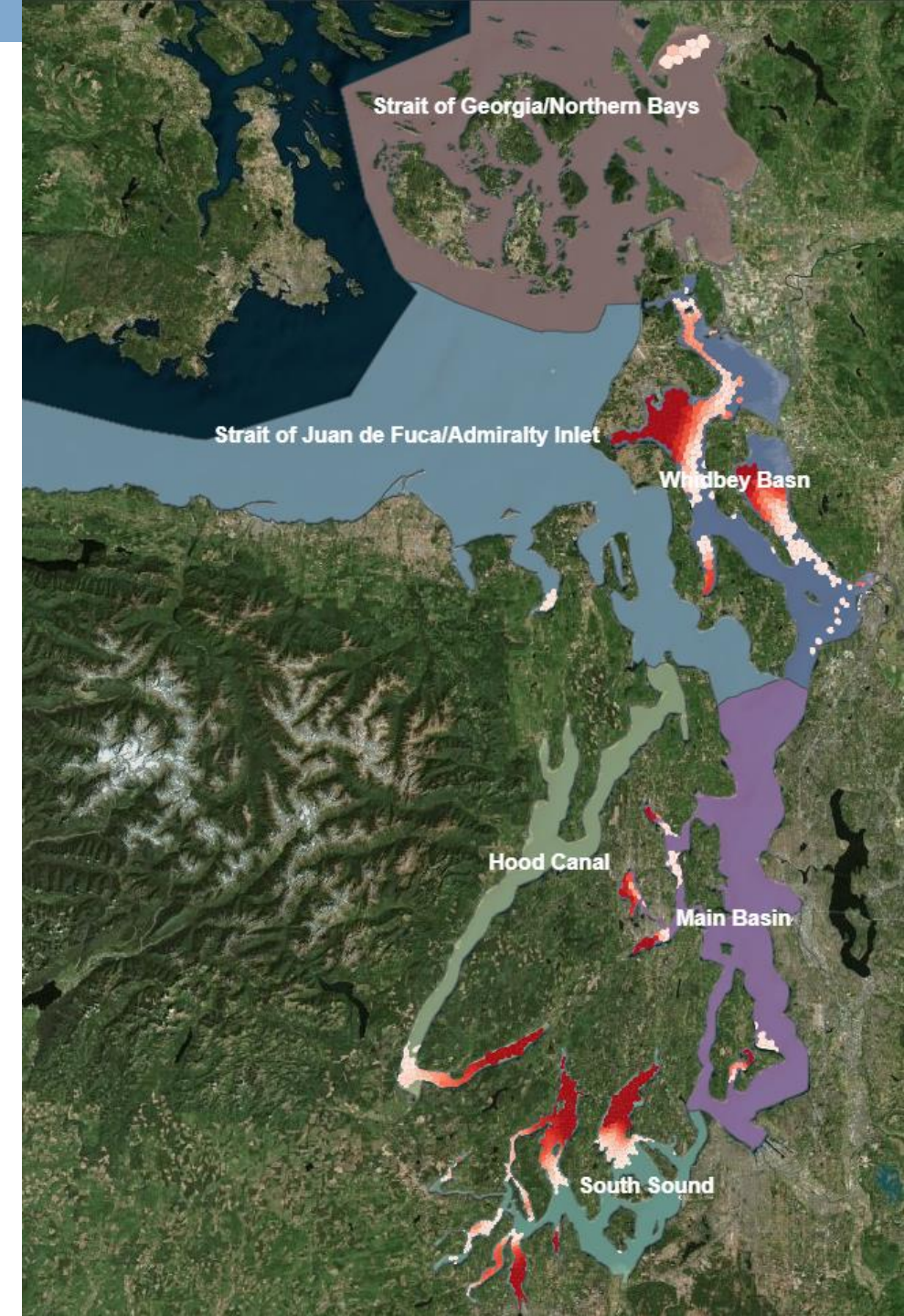
- Whidbey Basin
- Main/Central Basin
- South Sound Basin

Annual WWTP reductions are better than seasonal

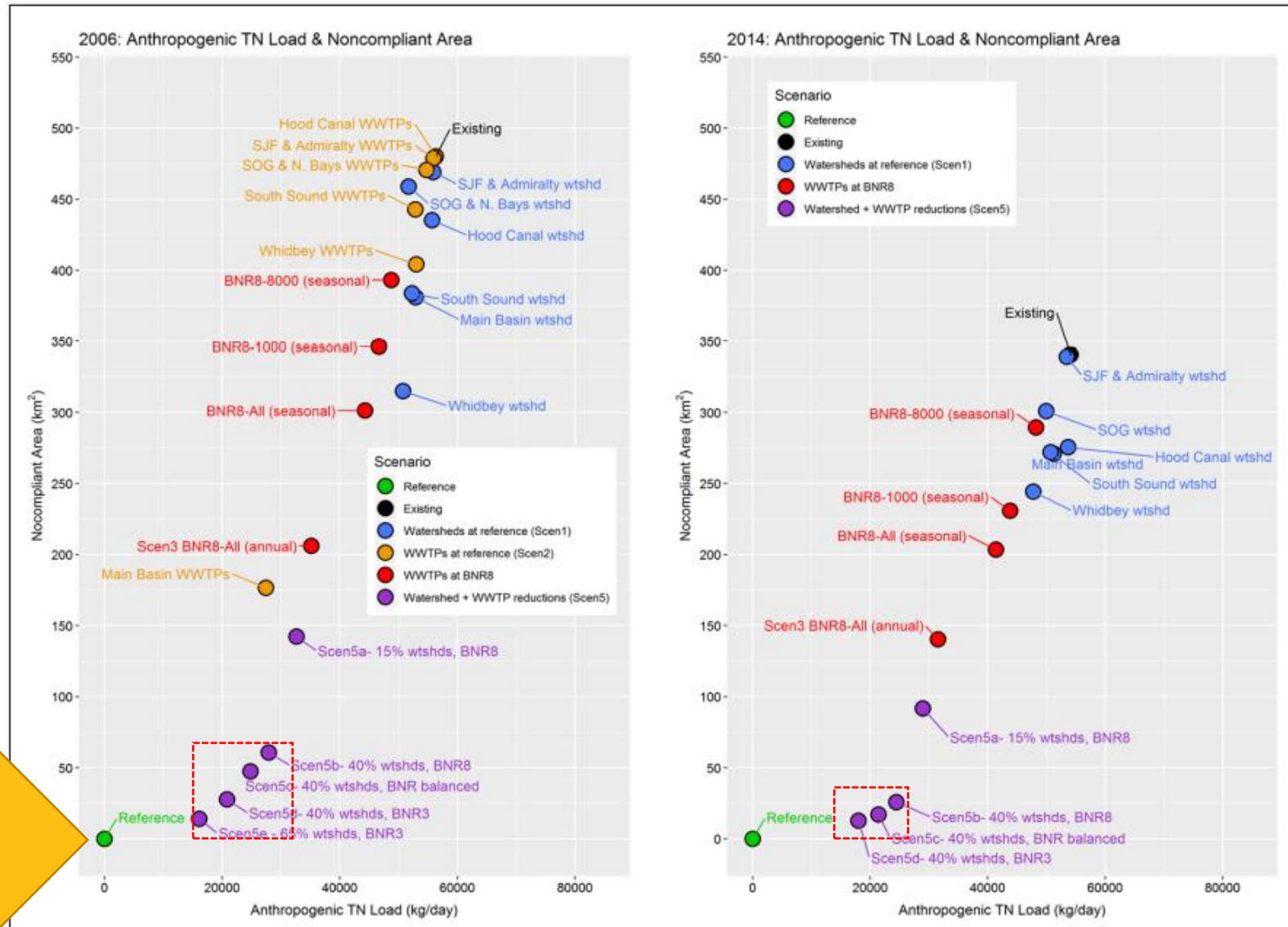
Higher regional population will lead to even worse DO problems if no actions are taken

Big reductions from both WWTPs and watersheds substantially improves DO

[www.ecy.wa.gov/salishseamodel](http://www.ecy.wa.gov/salishseamodel)



# Comparing Scenarios to Each Other



Meets Standards

Figure 8. Comparison of predicted noncompliant area in WA waters of the Salish Sea resulting from all Optimization Scenarios and BNR8 Scenarios, with each scenario's associated anthropogenic total nitrogen loading in 2006 (left) and 2014 (right).

# WWTP and Watershed Combinations Led to Most Improvement

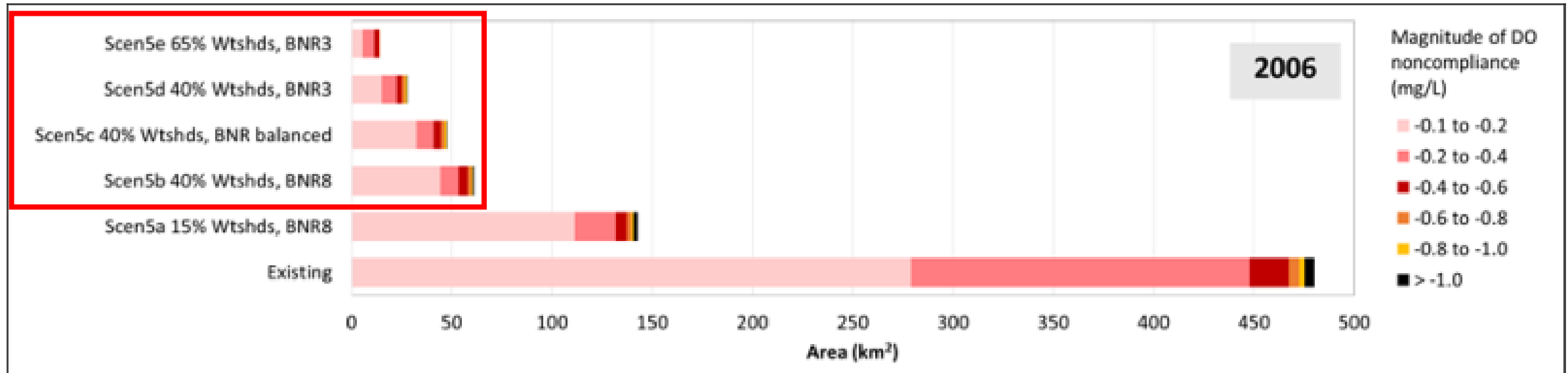


Figure 14. Distribution of magnitudes of predicted DO noncompliance within the total noncompliant area in WA waters of the Salish Sea across all Scenario 5 runs in 2006 (top) and 2014 (bottom).

Further Reduce Nutrient Loads  
or  
More Strategic Reductions?



# Year 2 Model Scenarios Goal

Find the nutrient reduction scenario/s that result in the highest predicted attainment of DO standards in the Washington waters of the Salish Sea.

**MORE STRATEGIC  
COMBOS!**

# Scenario Questions for Final Combos

Will DO compliance improve if we make bigger reductions near predicted-noncompliant areas?

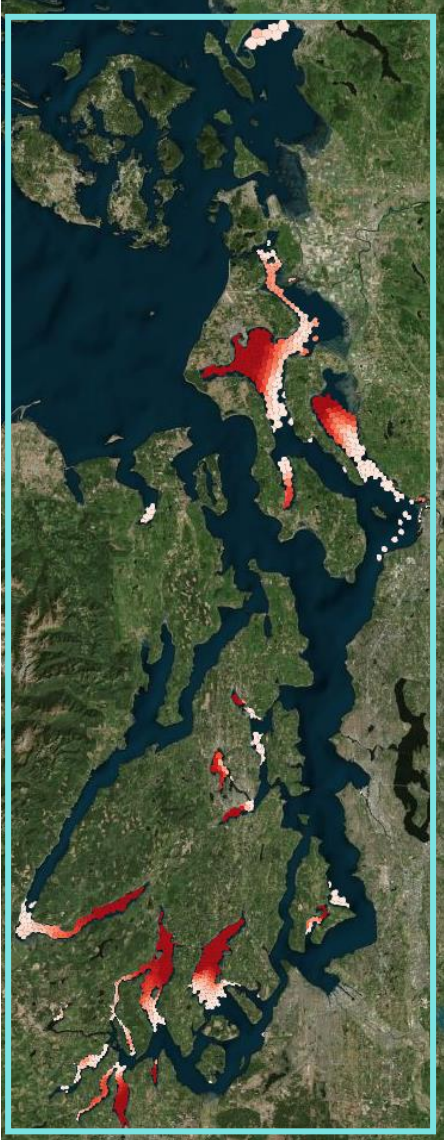
How much do smaller sources further away from predicted-noncompliant areas impact DO?

What are the DO improvements from different WWTP seasonal limits throughout the year?



# Improve the Remaining Areas of Noncompliance

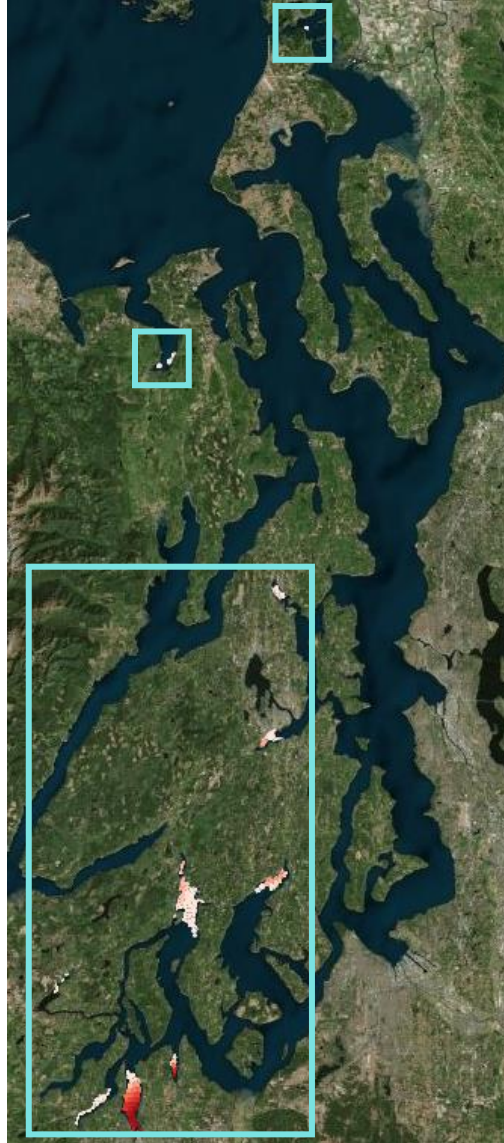
2006 Existing  
(56,079 kgTN/day)



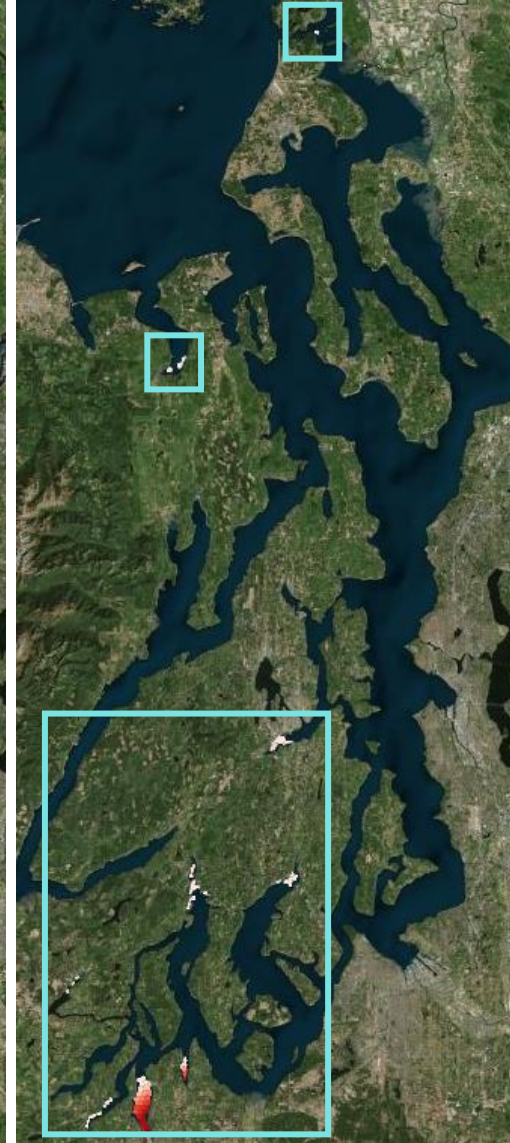
Scenario 5b  
(27,682 kgTN/day)



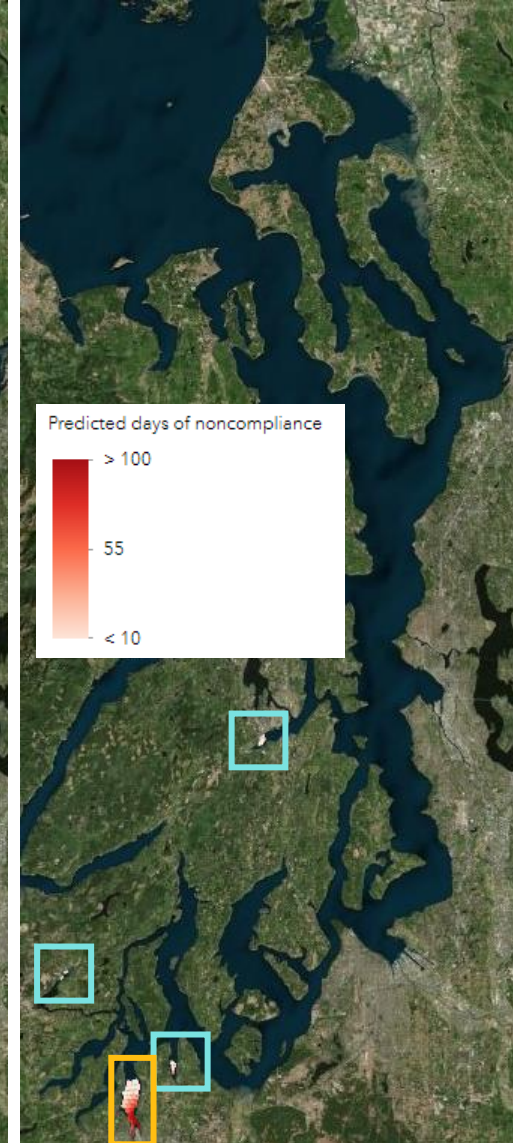
Scenario 5c  
(24,678 kgTN/day)



Scenario 5d  
(20,717 kgTN/day)



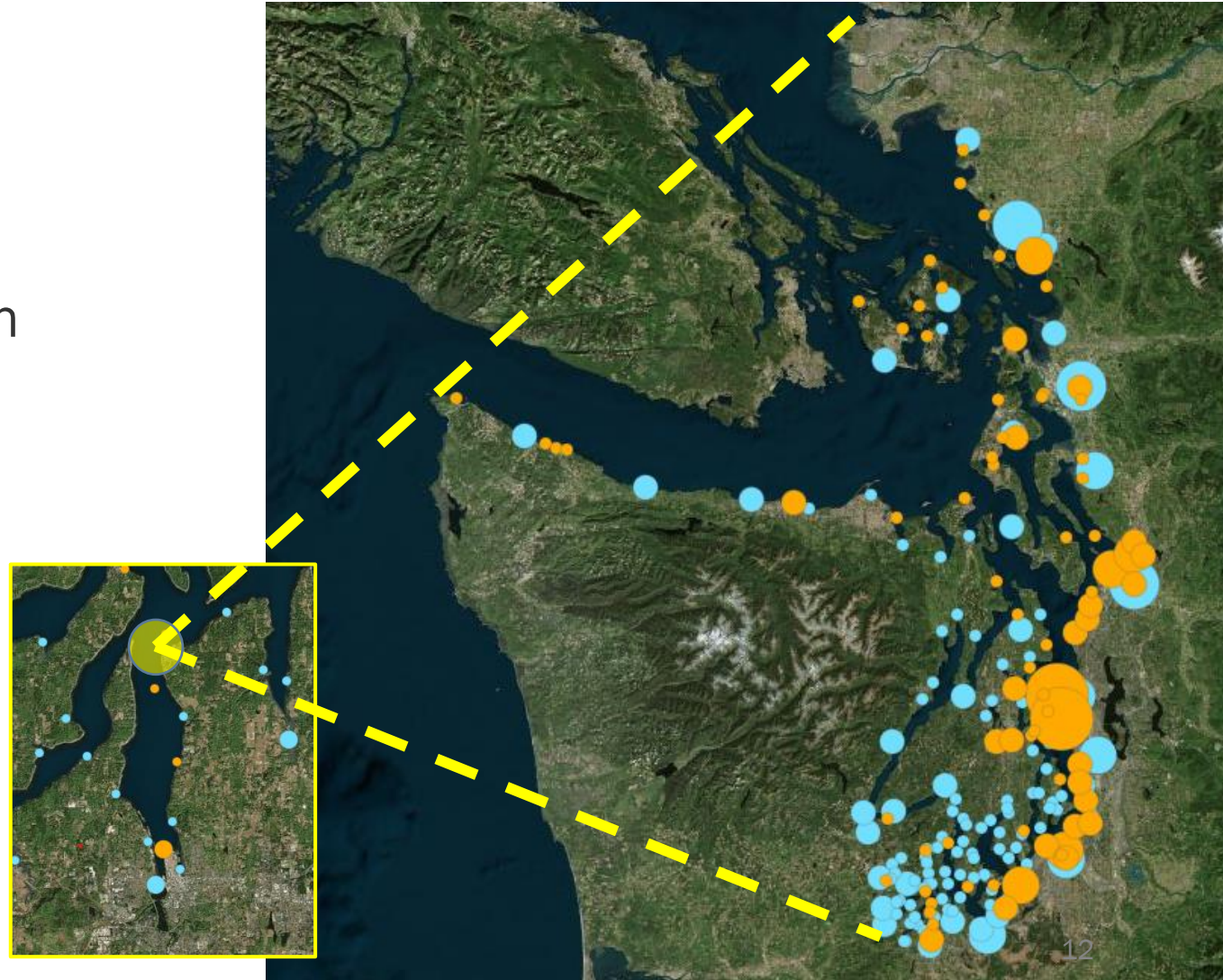
Scenario 5e  
(15,956 kgTN/day)





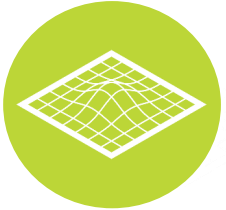
# Metrics for Successful Scenarios

1. Marine DO Water Quality Standards
  - ✓ Numeric Criteria
  - ✓ Limit on Anthropogenic Depletion
2. Budd Inlet DO TMDL bubble allocation for regional anthropogenic sources external to Budd Inlet.





# Puget Sound Nutrient Reduction Plan Approach



Salish Sea modeling  
& nutrient load  
targets



Implementation  
action plan



Financial &  
technical  
assistance



Effectiveness  
monitoring &  
adaptive  
management

## Watershed Based Plan Elements

1. Causes and Sources of Pollution
2. Estimated Load Reductions
3. Implementation Plan
4. Funding Opportunities
5. Outreach and Education
6. Project Schedule
7. Measurable Milestones
8. Progress Indicators
9. Monitoring Component

# Nutrient Load Targets & Actions



Puget Sound Nutrient General Permit  
(PSNGP)

Washington State Nonpoint Plan

Issuance Date: December 1, 2021  
Effective Date: January 1, 2022  
Expiration Date: December 31, 2026

## PUGET SOUND NUTRIENT GENERAL PERMIT

A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
AND STATE WASTE DISCHARGE GENERAL PERMIT

State of Washington  
Department of Ecology  
Olympia, Washington

In compliance with the provisions of  
The State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington  
and  
The Federal Water Pollution Control Act  
(The Clean Water Act)  
Title 33 United States Code, Section 1251 et seq.

Until this permit expires, is modified or revoked, Permittees that have properly obtained coverage under this general permit are authorized to discharge nutrients in accordance with the conditions, which follow.



  
Vincent McGowan, P.E.  
Water Quality Program Manager  
Washington State Department of Ecology



# Nutrient General Permit Elements and Timing

## First Permit Issuance (2022 - 2026)

- Cap on existing TN loads to marine waters
- Optimize existing treatment processes
- Planning and monitoring requirements

## Second Permit Issuance (2027 – 2032)

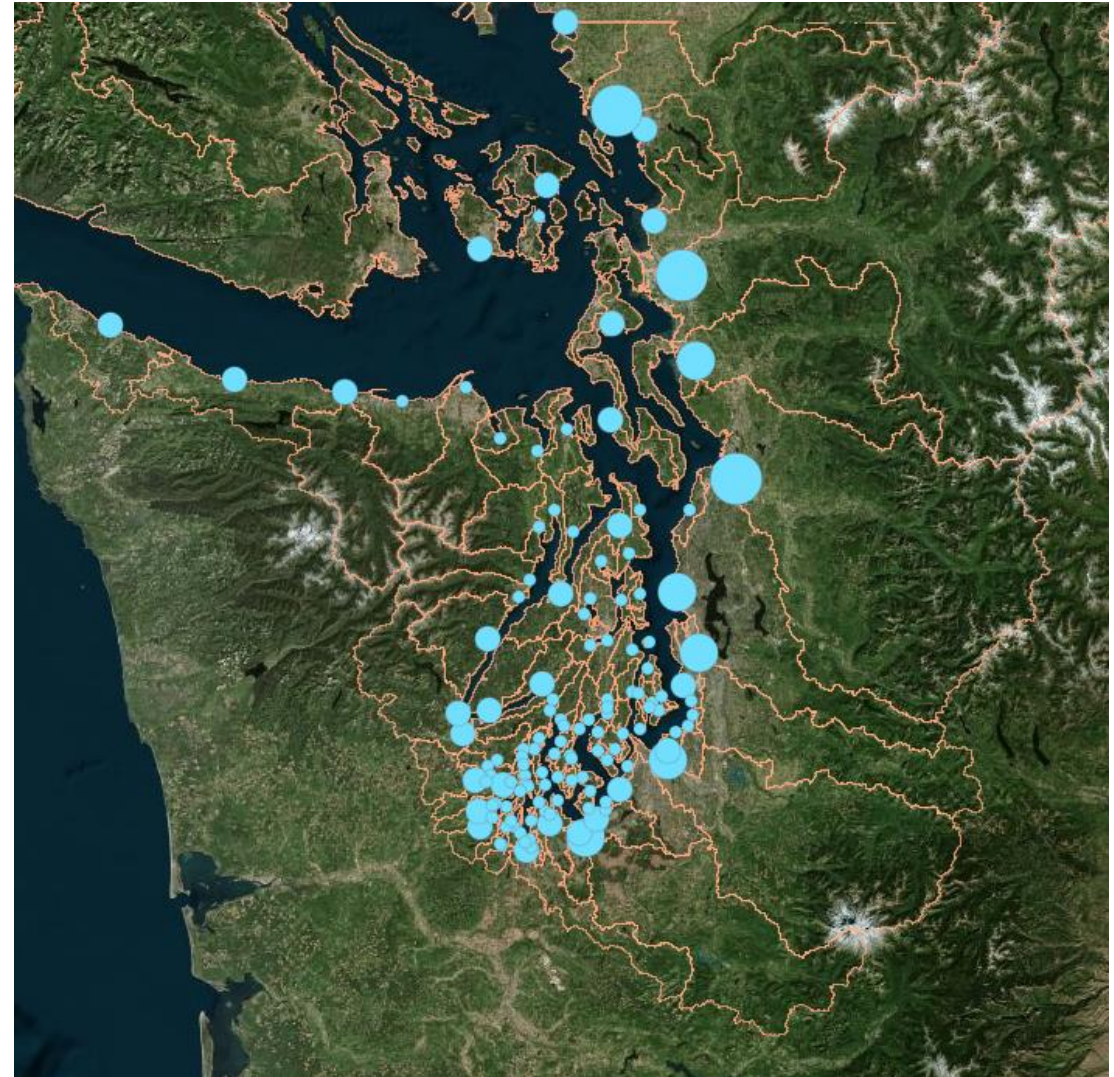
- TN load targets and WQBELs for specific WWTPs
- Watershed WWTP actions

# Watershed Nutrient Load Targets and Actions

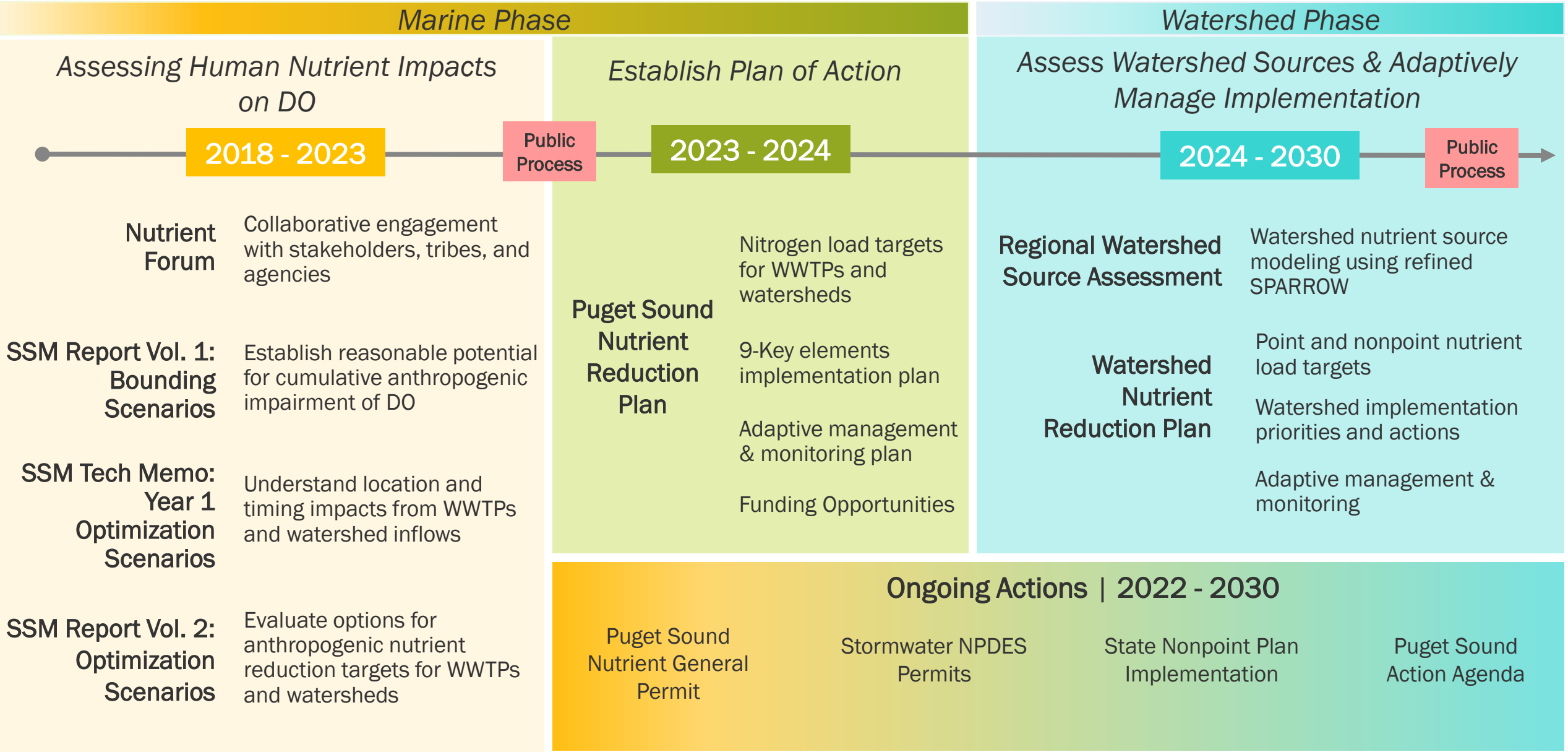
Each watershed target applies to cumulative anthropogenic sources in each watershed

Most targets will be significant reductions from existing loads

Can begin to address agricultural and other nonpoint sources now



# Puget Sound Nutrient Source Reduction Project Milestones







# Thank You!

## Questions?

Primary Links

[Public PSNSRP Web Page](#) | [SSM Results Web Map](#)