Update: Puget Sound Nutrient Reduction Project

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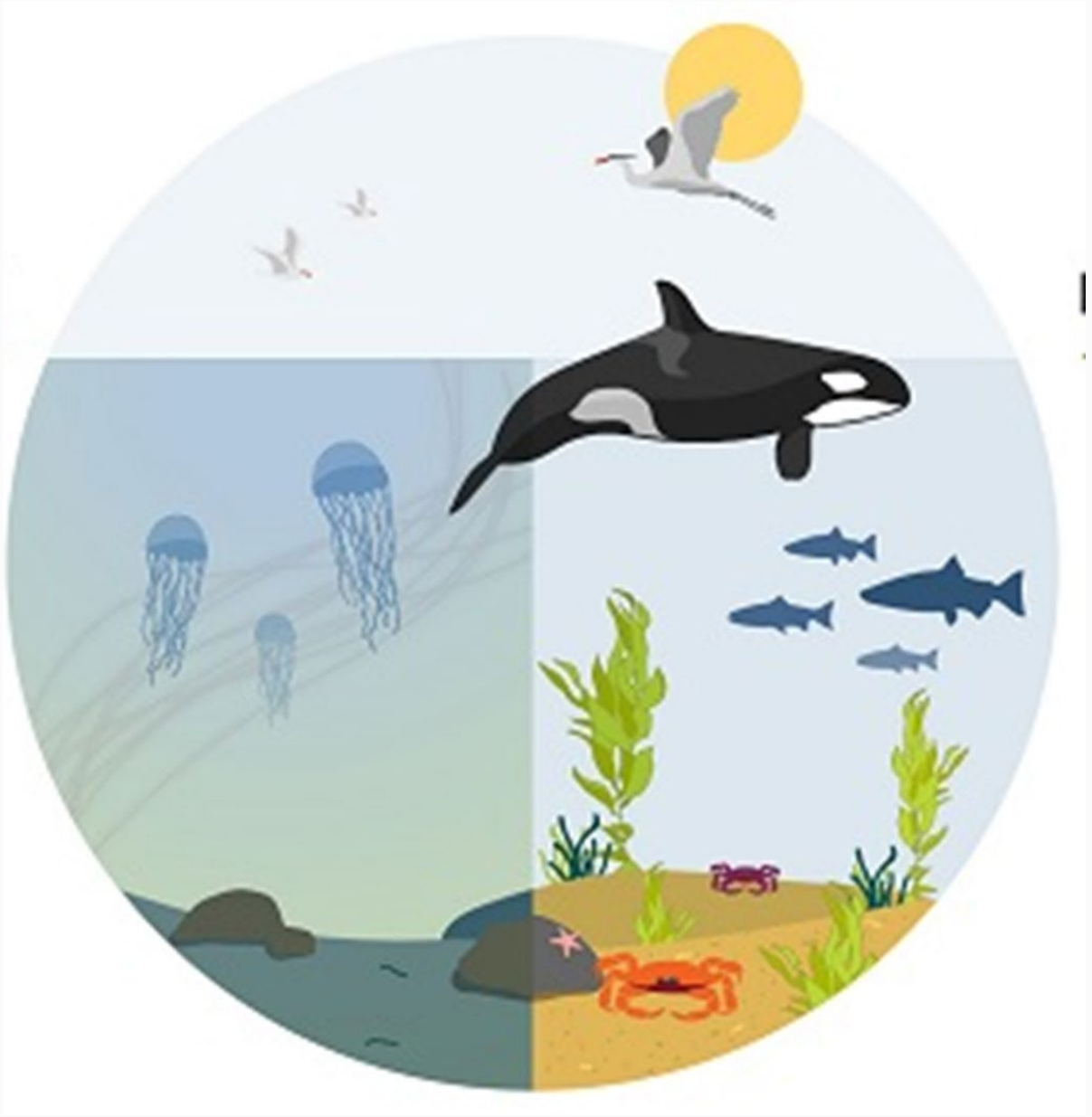
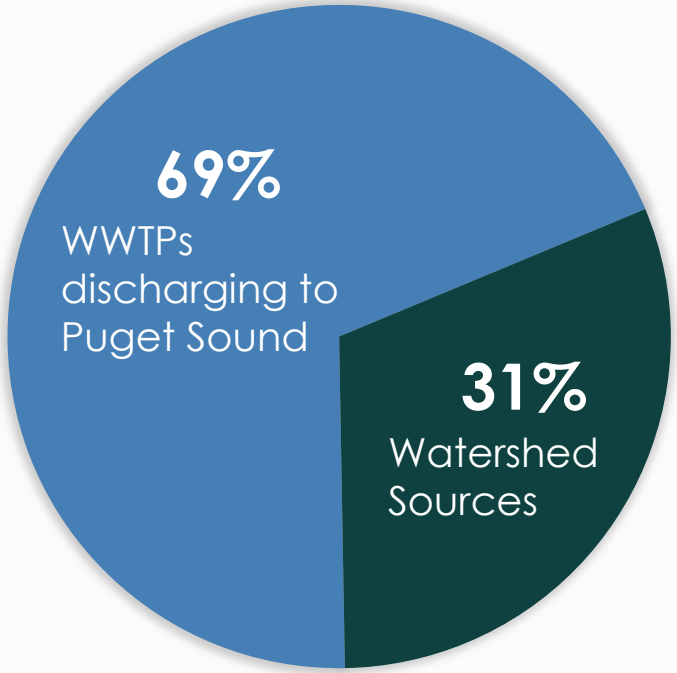
Puget Sound Nutrient Forum – March 27, 2025

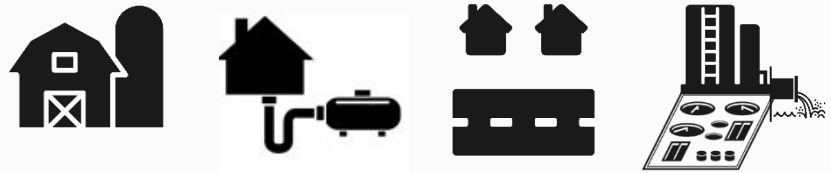
Dissolved Oxygen Listings in Puget Sound

- Nutrient pollution leads to low dissolved oxygen, meaning aquatic life doesn't have enough oxygen to thrive



Human Sources of Nitrogen to Puget Sound

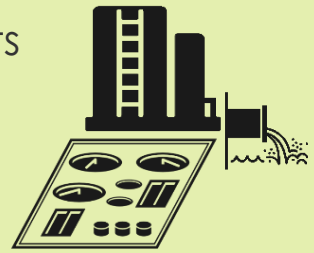




Watershed permitted point sources, Agricultural runoff, onsite septic systems, unmanaged stormwater

Puget Sound WWTP nutrient controls:

- NPDES permits
- Infrastructure investments



Reducing watershed sources:

- NPDES permits
- Nonpoint Source Plan
  - BMPs for landowners
  - Local Partnerships
  - Centennial Clean Water Grant Program
  - Clean Water State Revolving Fund Loans

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Puget Sound Nutrient Source Reduction Project

Nutrient Forum

- Public advisory group to discuss, learn, and provide input

Salish Sea Modeling

- Science helping to guide management actions

Puget Sound Nutrient General Permit/Individual Permits

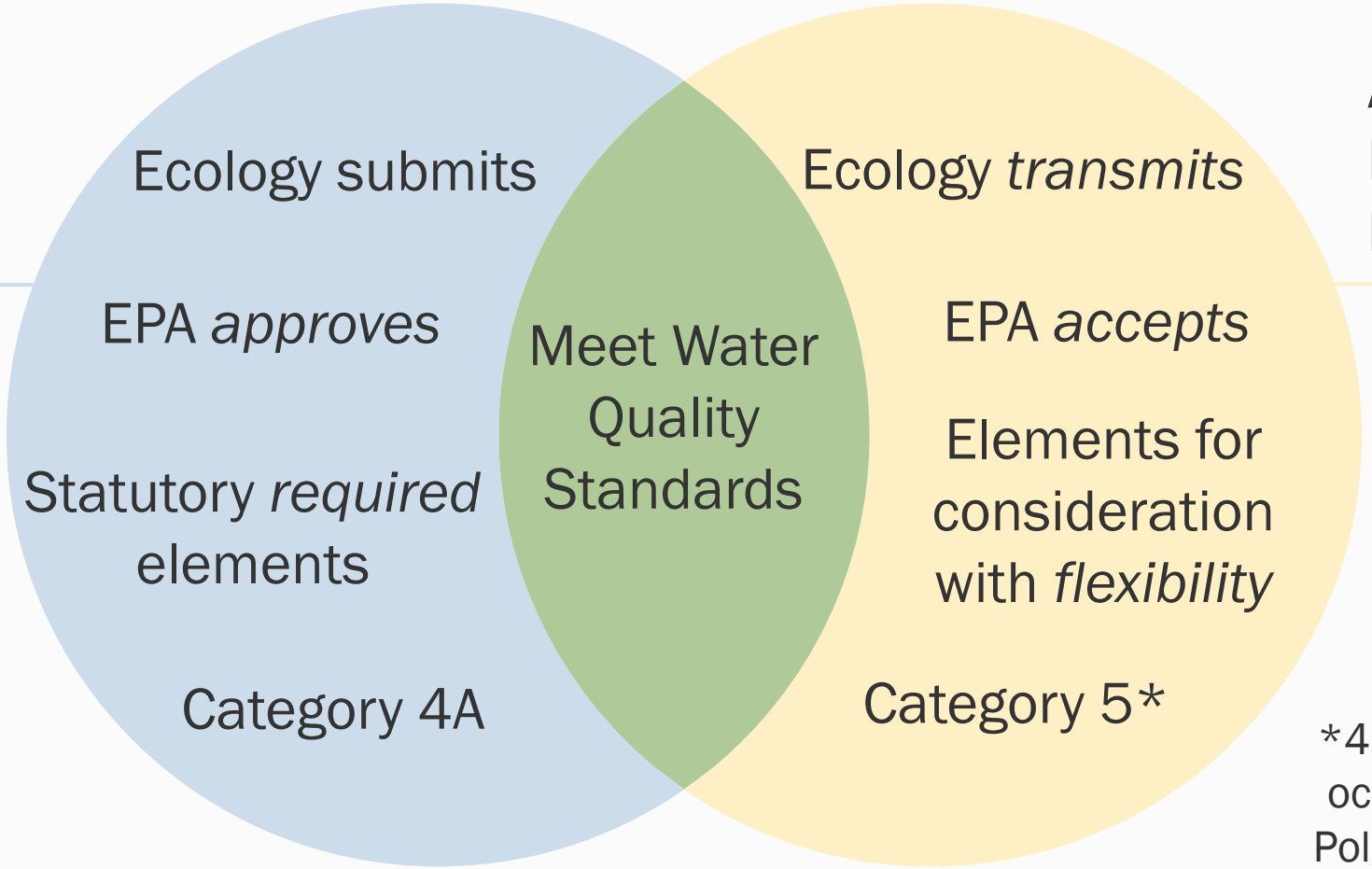
- Permitting tools to regulate nutrient discharges from WWTPs

Water Clean-Up Plans – Puget Sound Nutrient Reduction Plan

- Plan(s) outlining our strategy for reducing nutrients and restoring DO in Puget Sound

TMDL vs. ARP Comparison

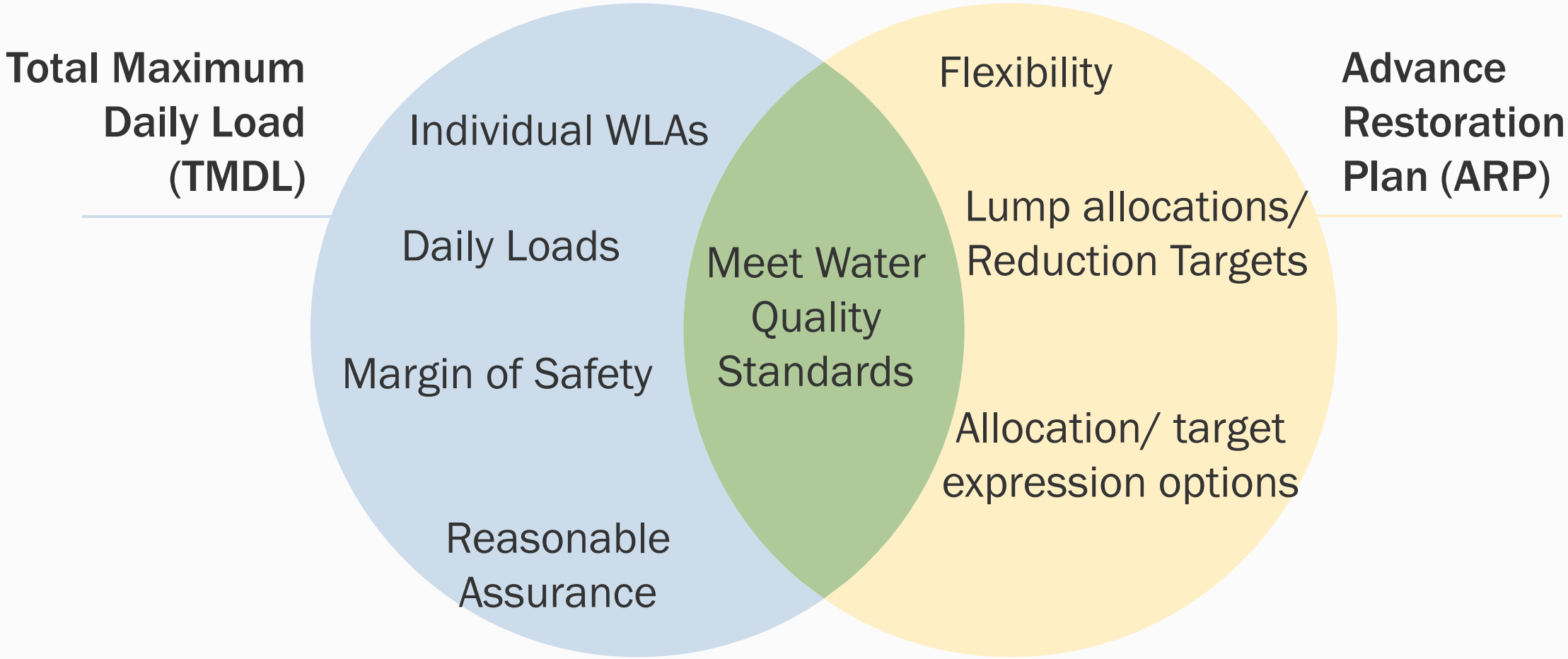
Total Maximum Daily Load (TMDL)



Advance Restoration Plan (ARP)

*4b Implementation occurring and meet Policy 1-11 elements

Why an ARP for Puget Sound?



Puget Sound Nutrient Reduction Plan

- Detailed Outline to Forum in 2020
- Anticipate draft plan will be released in June 2025 along with the Modeling Report.
- June Forum
- Comment Period

Puget Sound Nutrient Reduction Plan

- Background and information on the problem
- Discussion of the project area and the impairments
- Nutrient reduction targets/loads for marine point sources and the watersheds (Basin targets)
- Implementation actions, Monitoring, and Financial Support

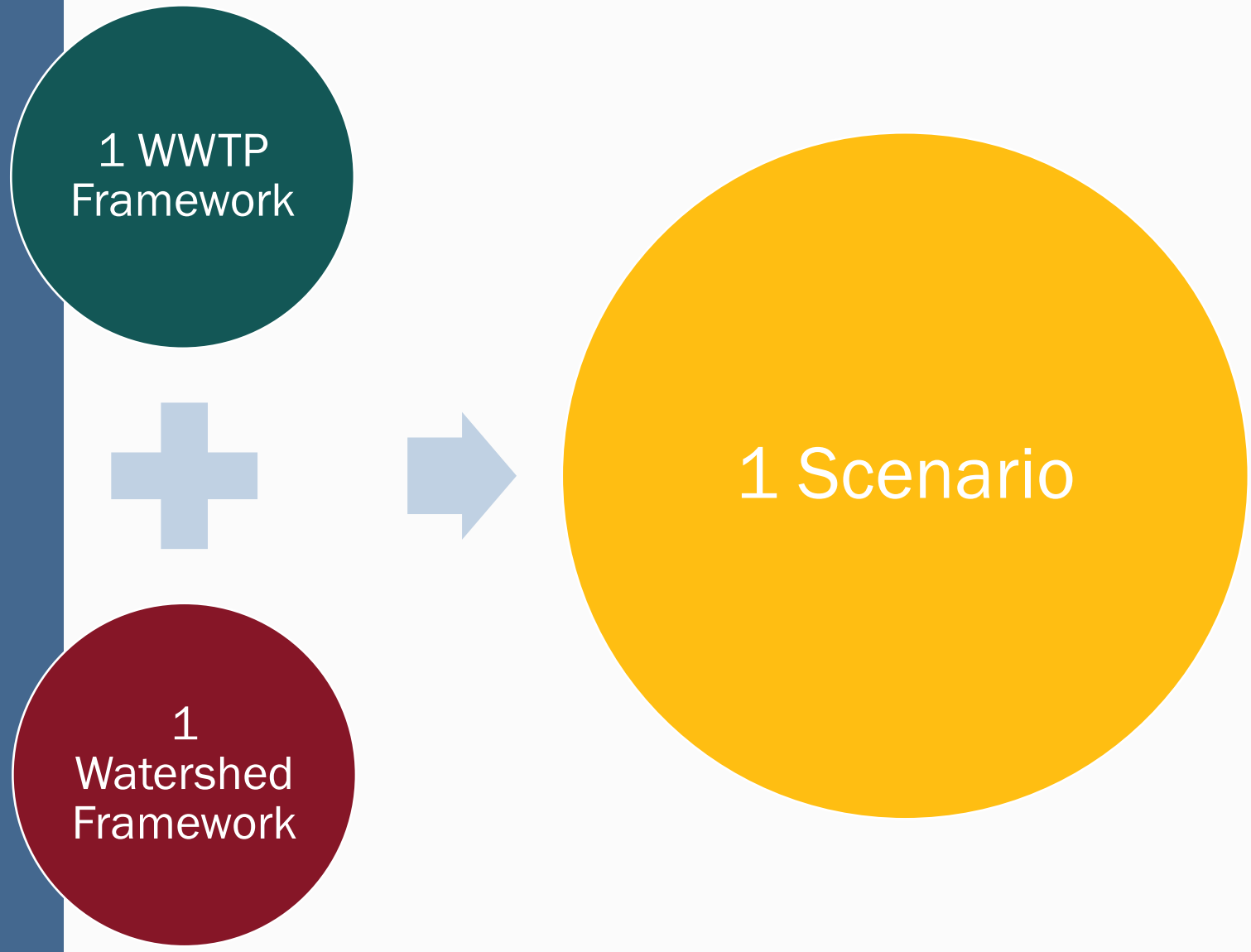
Phase Two Modeling

Goal: find the nutrient reduction scenario (or set of scenarios) that results in the highest predicted compliance with Dissolved Oxygen (DO) standards in the Washington waters of the Salish Sea

Key Terms:

- **Scenario**: refers to one model run that when evaluated with the Salish Sea model informs the answers to a specific nutrient management question
- **Frameworks**: Alternative ways to distribute nutrient loads to WWTPs and watershed inputs.

What is a Scenario?



Phase Two Modeling

1. Will DO compliance improve if we make bigger reductions near predicted-noncompliant areas?
2. How do smaller sources further away from noncompliant areas impact DO?
3. What are the DO improvements from different WWTP seasonal limits throughout the year?

Our approach for developing Phase 2 scenarios

- Identify the most optimal watershed framework
- Identify the most optimal WWTP framework
- Further adjust the selected watershed and WWTP frameworks to identify scenarios that meet water quality standards

Refer to Meeting Packet for Scenarios!

Watershed Frameworks (16)

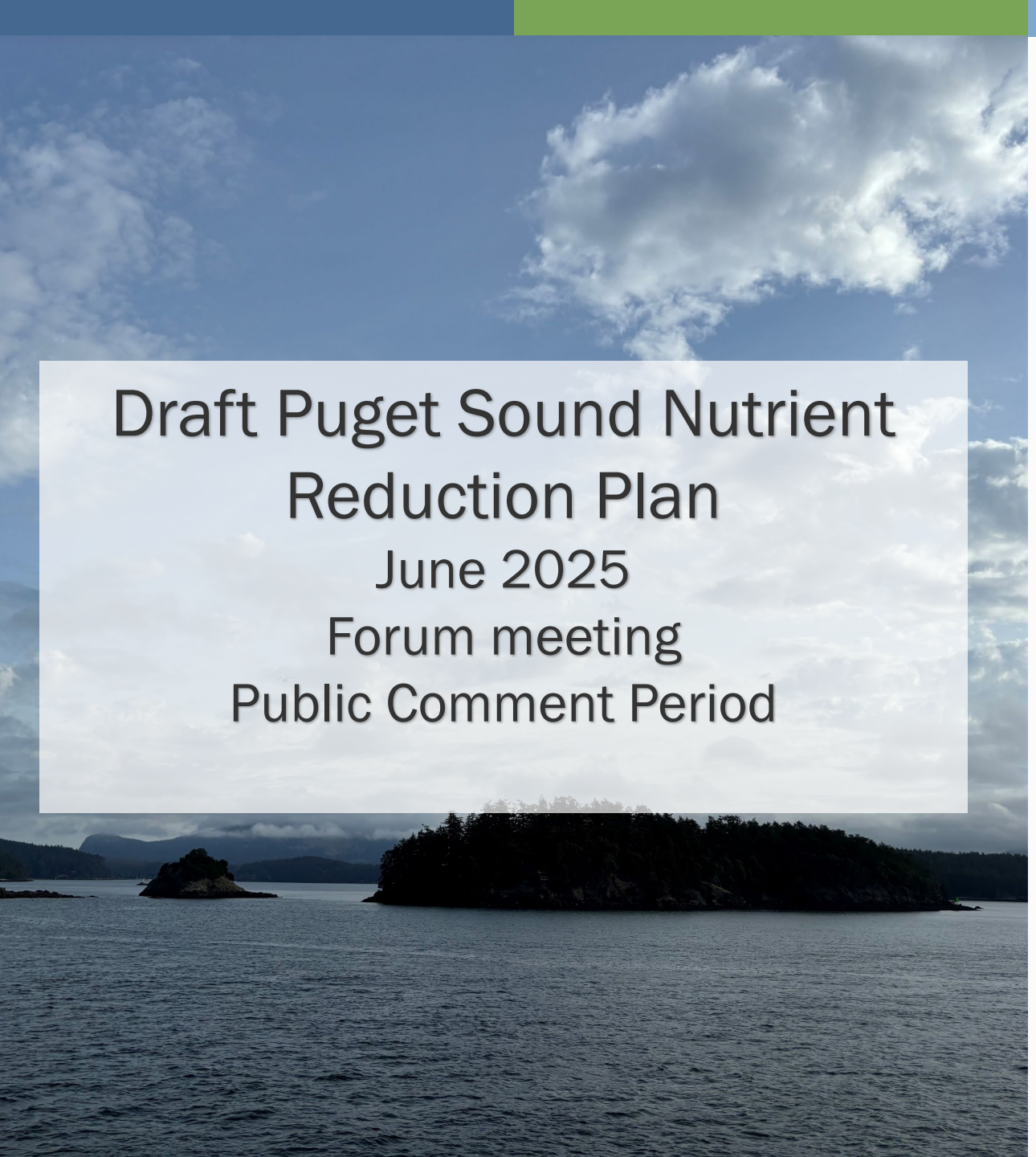
Basin	Basin #	Draft 2014 Watershed Annual Anthropogenic TN Loads (thousands kg/year)									
		Existing	Framework F			Framework G			Framework H		H1 Refined
			F1	F2	F3	G1	G2	G3	H1	H2	
Northern Bays	1	1,330	610	650	650	450	470	470	450	450	450
Whidbey	2	2,460	1,110	1,190	920	820	860	680	820	820	820
Main	3	1,690	800	850	840	590	630	610	590	590	540
South Sound	4	1,260	689	529	729	509	389	529	509	509	469
Hood Canal	5	407	256	274	272	190	204	198	190	407	137
Admiralty	6	37.3	23.5	25.2	24.9	17.4	23.4	22.7	17.4	37.3	17.4
SJF - US	7	238	150	161	159	111	149	145	238	238	238
SOG - US	8	419	263	282	280	195	262	254	419	419	419
Regional WWTP TN Load		**7841.3**	**3901.5**	**3961.2**	**3874.9**	**2882.4**	**2987.4**	**2908.7**	**3233.4**	**3470.3**	**3090.4**
Total Percent Reduction		-	**50%**	**49%**	**51%**	**63%**	**62%**	**63%**	**59%**	**56%**	**61%**
Framework Variations		2014 existing anthropogenic watershed loads	**F1**: Increase reductions in basins with bigger impact (1-4) **F2**: start with F1, with extra reduction in South Sound **F3**: start with F1, with extra reduction in Whidbey			**G1**: Increased reductions in basins with biggest impact (1-4) **G2**: Start with G1, with extra reduction in South Sound **G3**: start with G1, with extra reduciton in Whidbey			**H1**: Start with G1 for Basins 1-6, puts Basins 7-8 at existing **H2**: Start with G1 for Basins 1-4, puts Basins 5-8 at existing		Start with H1, extra reductions to sub-watersheds draining to recalcitrant bays/inlets
What this tests		Existing load that must be reduced	Estimated minimum load reduction with spatial variation			Estimated maximum TN load reduction with spatial variation			DO sensitivity to loads in the Straits, Hood Canal, and Admiralty Inlet		DO response to reducing loads in recalcitrant bays/inlets

Draft loads. Basin-level loads rounded to 3 significant figures.

WWTP Frameworks (17-19)

Basin	Basin #	Draft 2014 Basin WWTP Anthropogenic Annual TN Loads (lbs/yr)					
		Existing	Framework A	Framework B	Framework C	Framework D	Framework E
Northern Bays	1	474	221	219	199	199	271
Whidbey	2	1,380	569	565	502	502	687
Main	3	10,000	3,380	3,340	2,920	2,920	3,980
South Sound	4	1,180	442	432	396	396	405
Hood Canal	5	0.371	0.306	0.291	0.282	0.371	0.282
Admiralty	6	24.1	20.8	21.1	20.5	24.1	20.5
SJF - US	7	105	66.4	67	62	105	75.8
SOG - US	8	251	186	185	180	251	192
Regional WWTP TN Load		**13414**	**4886**	**4829**	**4280**	**4397**	**5632**
Total Percent Reduction		-	**64%**	**64%**	**68%**	**67%**	**58%**
Seasonal Biological Nitrogen Reduction levels tested		2014 loads from WWTP marine discharges	Cool = BNR8 Warm = BNR8 Hot = BNR5	Cool = Remainder Warm = BNR5 Hot = BNR3	Cool = BNR8 Warm = BNR5 Hot = BNR3	Basins 1-4 = Framework C Basins 5-8 = Existing	Framework C but combined systems at existing levels during cool months
What this tests		Existing load that must be reduced	Estimated minimum TN reduction with treatment	Estimated minimum that allows more load during cool months	Estimated maximum nitrogen reduction	Improvement without WWTP reductions in basins 5-8	Existing impact from combined WWTPs
Seasonality			Cool = Nov-Mar | Warm = Apr-Jun, Oct | Hot = Jul-Sep				

Draft loads. Basin-level loads rounded to 3 significant figures.
Loads represent total loads from WWTPs and industrial point sources.



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