Options for ensuring WQS of downstream water – Budd Inlet **TMDL February, 8th 2017**

Federal regulations require that "*In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.*"(40 CFR 131.10(b)).

Part A: Capitol Lake

The Budd Inlet TMDL will establish allocations to meet water quality standards in the marine waters of Budd Inlet. The TMDL will not focus on meeting standards in Capitol Lake or the lower Deschutes River. However, load allocations well be established for the lake and the river to ensure standards within the inlet are met.

Capitol Lake and the Deschutes River are both upstream of Budd Inlet and therefore need not be considered at this time. In the case that Capitol Lake remains and is not converted to an estuary, a separate TMDL will be completed for the lake and the lower Deschutes.

Ecology decided to write the TMDL only for marine waters because it is not useful to write a Capitol Lake TMDL if Capitol Lake reverts to an estuary. The only modeling scenarios to date which meet water quality standards convert the lake back to an estuary.

Part B: Puget Sound

In the case of Budd Inlet, the term *downstream* applies to the neighboring inlets within Puget Sound. The Budd Inlet TMDL will determine an aggregated allocation for external sources outside of Budd Inlet and a later TMDL or TMDL equivalent will determine WLA for specifics permittees within the greater Puget Sound Region. However, the Budd Inlet TMDL *does* need to ensure that internal Budd Inlet allocations do not have a negative impact on the greater Puget Sound.

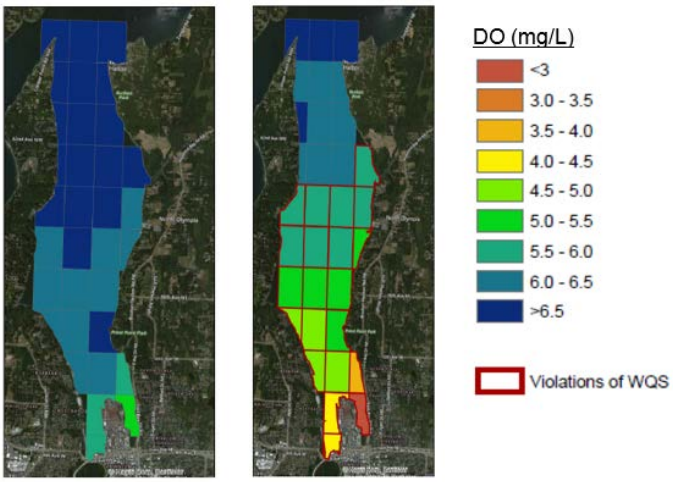
The figure below shows dissolved oxygen conditions in Budd Inlet under natural and existing conditions. The northern most grid cells are those that come into direct contact with the greater Puget Sound. As shown, the dissolved oxygen in these cells remains similar under natural and existing conditions and there is no violation of water quality standards.

Commented [ZC1]: As we discussed, language in Part A seems a better fit for the topic of reasonable assurance rather than downstream.

Commented [ZC2]: ([redacted] b)

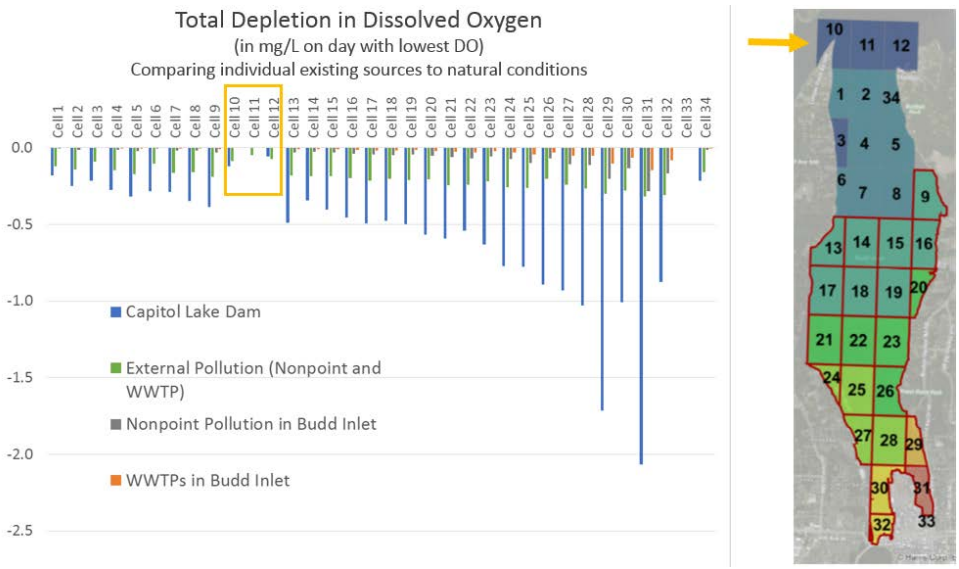
Commented [ML3]: Do you mean "TMDL alternative"? I'm not sure what is meant by TMDL equivalent. The discussion of aggregated allocations will need to be substantial, but doesn't need to worked out in this section. You could say "The Budd Inlet TMDL will determine aggregated allocations for external sources outside of Budd Inlet, as discussed further in Section XX" (Section XX could be the LA and WLA section, or a special section called "aggregated allocations")

Commented [ZC4]: Correct. The load capacity and disaggregation into WLA and LA should provide for the protection and maintenance of downstream water quality standards.



Natural Conditions Existing Conditions

The figure below depicts impacts of four source categories on model grid cells within Budd Inlet under existing conditions. Cells 10, 11, and 12, the boundary cells, are indicated in yellow. As shown, under current conditions, oxygen depletion in these cells occurs only as a result of external pollution from outside of Budd Inlet and from Capitol Lake.



The table below indicates the value of dissolved oxygen depletion occurring in each of the boundary cells as a result of each of the four source groups.

Total Depletion in Dissolved Oxygen (current conditions, in mg/L on day with lowest DO)

	Cell 10	*Cell 11*	*Cell 12*
Capitol Lake Dam	-0.12	No Impact*	-0.06
External Pollution	-0.09	-0.05	-0.07
Budd Inlet Nonpoint Pollution	No impact	No Impact	No Impact
WWTPs in Budd Inlet	No impact	No Impact	No Impact

**No Impact indicates zero negative impact* (0.0$\overline{0}$).

The minimal impact that Budd Inlet sources have on cells 10, 11, and 12 indicates that impacts on any neighboring areas would also be minimal and not lead to water quality violations. The TMDL will assign allocations to the Capitol Lake dam and all other Budd Inlet sources further reducing these impacts.

Options for further addressing impacts on Puget Sound

If more explanation regarding Budd Inlet's minimal impacts to neighboring regions of Puget Sound is needed, two options have been identified.

Option 1: A narrative explanation of bathometric and oceanic conditions could be provided to explain the why dissolved oxygen depletion from Budd Inlet is not likely to impact areas outside of the inlet.

Option 2: The Salish Sea model could be used to show modeled oxygen levels for the entire sound. In this case we could remove the external pollution sources and determine the impact of only Capitol Lake Dam, Budd Inlet nonpoint pollution, and WWTPs in Budd Inlet.

The options described above would require additional staff from outside of the water quality program. However, they are feasible and fit within the scope of the project, so can be utilized if needed.

Commented [ZC5]: This is a nice table Leanne and thank you for sharing it with us! ☺

Another concept to consider is listing the DO improvement at the boundary (existing run vs. load capacity/TMDL run). In addition, DO greater than the adjacent WQS (LC run) at the boundary may represent evidence of downstream use protections.

Commented [ZC6]: (b) (5)

Commented [ZC7]: Protection of DS WQS could consider the following lines of evidence or concepts:

1) What are the WQS in adjacent waters? What is the most sensitive use-criteria combination?
2) Are pollutants affecting DS WQS being reduced in the TMDL?
3) Are adjacent WQS achieved at the boundary?
4) Is DO improving at the boundary relative to existing conditions?
5) Is DO improving at the boundary relative to internal modeled cells (i.e., is DO increasing spatially, positive gradient/trend?)
6) Option 1 – are there known changes in bathymetry or other conditions in adjacent waters that suggest that assimilative capacity may decrease near the boundary?