Overview of Supplemental Modeling Scenarios report for Deschutes Advisory Group

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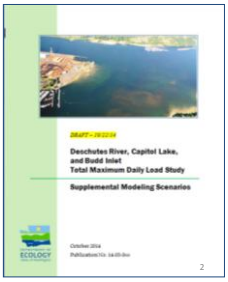
What we'll cover

- Reminder – *you've seen this all before…*
- Report purpose
- Report organization
- Timeline for review and comment
- Questions?



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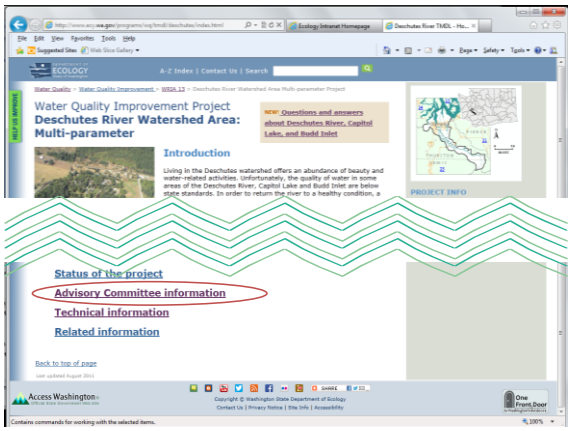

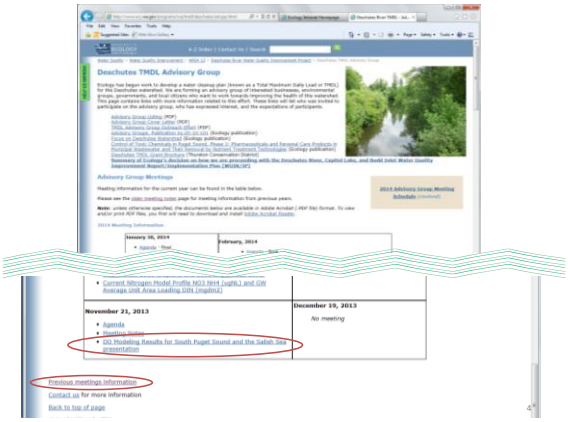

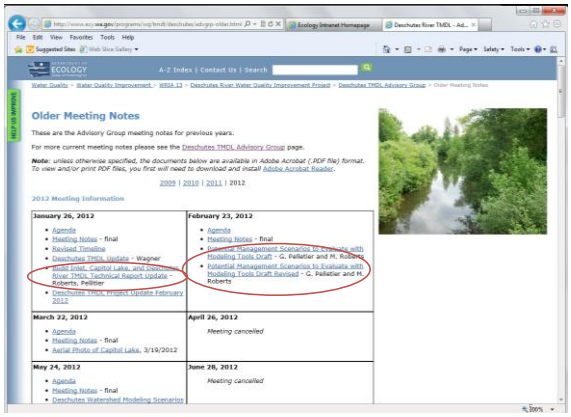

May 24, 2012 • Agenda • Meeting Notes - final • Deschutes Watershed Modeling Scenarios • Capitol Lake Modeling Scenarios - A. Ahmed	**June 28, 2012** *Meeting cancelled*
July 26, 2012 • Agenda • Meeting Notes - final • Nutrient Scenarios for Budd Inlet - M. Roberts	**August 23, 2012** *Meeting cancelled*
September 27, 2012 *Meeting is cancelled.* We are still actively involved in internal policy discussions related to background conditions, marine water boundary conditions, and consistency with other TMDLs. We are hopeful these discussions will soon resolve our issues and concerns. We appreciate your patience and understanding as we work through these.	**October 25, 2012** *Meeting cancelled*
November 15, 2012 • Agenda • Budd Inlet Model - A. Ahmed, M. Roberts • Thurston County Commissioner Briefing • Capitol Lake Dam Condition Assessment and Life Expectancy-2008 • Deschutes Estuary Feasibility Study - 2008 • Meeting Notes - final	**December 13, 2012** • Agenda • Allocations Presentation - K. McKee • Meeting Notes - final

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September 22, 2011

- Agenda
- Meeting Notes - final
- Dissolved Oxygen Model Scenarios

Brainstorming Exercise: *The following are the flip chart notes taken during the meeting.*

Lake Aeration
- Solar powered

Septics (within UGA?)
- Shift to centralized wastewater
- Reduce N to GW

Drinking water wells
- Septic v. centralized

Deschutes – engineering log jams
- Erosion, sediment control
- Habitat benefit

Lake weed harvesting
- Lake treatments to inactivate P
- Lake benefits
- ? Budd Inlet benefit

Bioremediation
- (lake, marine) - temp

Wetland Restoration
- Freshwater
- Multiple bens – aq. Recharge, temperature

Outfall Extension at WWTP to better circulation area
Stormwater – 15,000 rain gardens (strong worded local effort) (?) stormwater OF
Consider external inputs from SPS/PS

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Nutrient trading
Pleasure boat waste disposal (marinas, out)
No discharge zone
- Liveaboards, boaters
- Wastewater, gray water

Advance treatment for all WW discharges, all the time
- Big + small
- All seasons

Cross connections in urban areas (sanitary → stormwater)
Public education effort (implementation) effectiveness of
Illegal stormwater – higher fines, dry weather discharges
Vesting issues – future 7 years development
Animal waste
- Livestock
- Pet waste

} Relative contribution to NPS for model (+ implementation)

Quantifying PS, NPS
Eliminate outfall to Capitol Lake
- Stormwater pollutants
- Related to rain gardens

Forest coverage class (Deschutes hws) infiltration in upper watershed
Water conservation

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Scenario matrix from Feb 2012

Appendix B. Budd Inlet, Capitol Lake, and Deschutes River TMDL – Potential Management Scenarios to Evaluate with Modeling Tools

Prioritized reflecting February 23, 2012 Deschutes Advisory Group discussion.
Red text indicates changes resulting from meeting or request for further information from Advisory Group.
(Initial brainstorming September 22, 2011: sorted by Greg Pelletier and Mindy Roberts)

Analysis order	Scenario	Improvement mechanism	Budd Inlet	Budd Inlet watershed	Capitol Lake	Capitol Lake watershed	Deschutes River	Deschutes River WS	Response
Deschutes River-oriented ranked analyses (model runs and simple calculations):									
1	Reduce nonpoint phosphorus sources	Various management activities that target nonpoint sources[a]						X	*Approach: Decrease nonpoint source phosphorus contribution by 10, 20, and 50% to bound nutrient target reductions. Distinguish surface water and groundwater. Deschutes River model.*
2	Shift from septic systems to centralized wastewater	Reduce nitrogen (and phosphorus?) to groundwater	X				X	X	Complicated land, groundwater, surface water interaction not covered by current models. *Approach: Include as part of sensitivity analyses in #1. No additional scenarios. Could calculate difference between population * per capita flow * (OSS – centralized effluent concentration) as %inputs in system. Consider UGA*

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Scenarios Timeline

- September 2011 – DAG brainstormed potential management actions
- October 2011 – January 2012 – ECY staff scoped and developed preliminary priorities
- February 2012 – ECY presented preliminary priorities for discussion and DAG adjusted
- DAG presentations on analyses in May, July, and November 2012 plus June and November 2013

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Report purpose:

- Capture the scenarios previously presented to the Deschutes Advisory Group to support 2015 Capitol Lake and Budd Inlet discussions
  - Updated definition of natural conditions since June 2012 technical report
  - Updated impacts from external human sources (beyond Budd Inlet) since June 2012 tech report
  - Include spring 2014 poster
  - *Report does not set load or wasteload allocations…*

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Report organization

- Introduction – general background on the study purpose, water quality standards, findings; science of nutrients, algae, oxygen
- Methods – high level only; refer to June 2012 technical report for the details
- Results and Discussion – scenario graphics, interpretation
- Conclusions – high-level findings
- Recommendations – *continue on to WQIR…*

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4 examples

1. Boater contributions to Budd Inlet – calculation only; no model
2. Dredge Capitol Lake – Vollenweider diagram; no model
3. Human impacts on Budd Inlet oxygen – combined effect of local sources, external sources, dam – update since June 2012 rpt
4. Shift LOTT outfall – model analysis

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Example 1 – boater contributions

- May 2012 DAG presentation
- Per capita contributions of nitrogen (and bacteria, phosphorus)
- Assumptions for proportion of time spent on Budd Inlet and proportion of people releasing wastes
- Distinguish recreational boaters from marinas

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6. Decrease boater waste

- Calculation only (no model)
- Annual and peak summer estimates
- Recreational boaters ~0.4 kg/d nitrogen
- Marinas ~4.6 kg/d nitrogen

Loads per person:

FC	1950	10^6/day/person
TP	1	kg-P/yr
TN	4.5	kg-N/yr

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Recreational boaters

	Annual	Peak Summer	
Number of people using Budd Inlet per day	5	200	
Proportion of time on Budd Inlet	10%	30%	
Proportion of people peeing overboard:	50%	50%	
Proportion of people defecating:	1%	1%	
Fecal Coliform Load:	9.75	1170	10^6/day
Phosphorus Load:	1.4E-05	0.002	kg/d
Nitrogen Load:	3.1E-03	0.370	kg/d
	1.13	135	kg/yr

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Marinas

	Annual	Peak Summer	
Number of people using Budd Inlet marinas	500	2000	
Proportion of time at marina	75%	75%	
Proportion of people peeing overboard:	25%	25%	
Proportion of people defecating to marine:	5%	5%	
Fecal Coliform Load:	36562	146250	10^6/day
Phosphorus Load:	0.05	0.205	kg/d
Nitrogen Load:	1.2	4.6	kg/d
	422	1688	kg/yr

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Concluding statements for boater waste…

Recreational boaters do not likely contribute significant loads of nitrogen to Budd Inlet, even during peak summer usage. While recreational boaters should not discharge wastes other than at approved pump-out stations, the impacts are likely greater in terms of bacteria and lesser in terms of nutrients.

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Example 2 – dredge Capitol Lake

- May 2012 DAG (and February 2009 memo)
- Vollenweider diagram of trophic status as a function of fertilization rate and mean depth
- December 2008 request from General Administration – effect of dredging

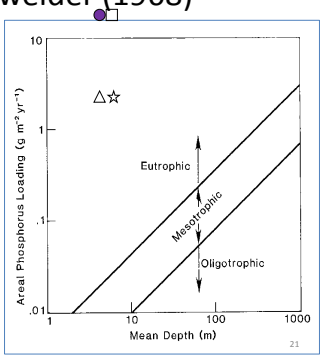
Increase depth (3.2 m ➡ 4.0 m, +22%)

- Increase volume
  - 3.36×10^6 ➡ 4.19×10^6 m^3
- Increase mean annual residence time
  - 3.5 ➡ 4.3 days
- Increase summer residence time
  - 23.0 ➡ 28.6 days

Vollenweider (1968)

Deschutes River Loading Rates ($g/m^2/yr$)
- 25.9 *(estimated annual)*
- 1.9 *(measured summer)*

Capitol Lake Sediment Loading Rates ($g/m^2/yr$)
- 1.6 *(average model)*
- 10.6 *(maximum measured)*



Conclusion [Feb 2009 memo]

"Given the large areal phosphorus loading and continued relatively shallow depths in Capitol Lake, ***we do not believe that the proposed dredged lake alternative would result in measurable improvements in water quality***."

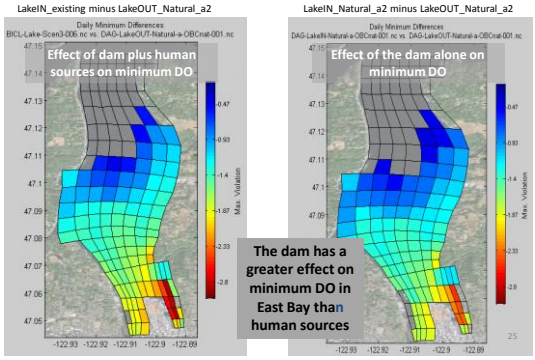
Example 3 – update human impacts to Budd Inlet oxygen levels

- June 2012 technical report included two baseline natural conditions:
  - No human nutrients from local wastewater or watershed with dam in
  - No human nutrients from local wastewater or watershed without the dam
- Two families of scenarios comparing impacts with either natural condition

Example 3 – update human impacts to Budd Inlet oxygen levels (cont'd)

- November 2012 DAG notes and presentation
  - Dam not part of natural conditions
  - South Puget Sound model indicates sources external to Budd Inlet contribute to oxygen depletions within Budd Inlet
    - *Resulted from a DAG scenario suggestion*
  - Updated oxygen impact graphics that include three influences:
    - Local wastewater and watershed sources
    - Capitol Lake dam
    - Sources external to Budd Inlet

Q1. Can Budd Inlet meet water quality standards with the Capitol Lake dam in with all possible point and nonpoint source reductions within the model domain and outside the model domain?



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Conclusions

- The cumulative effects of all human activities cause DO violations >0.2 mg/L throughout most of southern and central Budd Inlet…
- The combined effects of human activities have the worst impact on East Bay…

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Example 4 – shift LOTT outfall

- November 2012 DAG presentation
- Low circulation at existing outfall location
- Extend to
  - North of Priest Point Park?
  - Near Boston Harbor?

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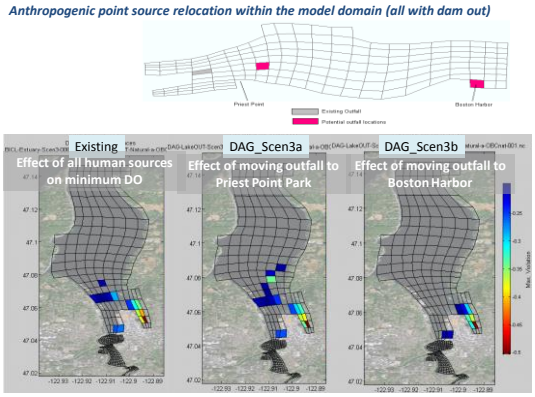
Anthropogenic point source relocation within the model domain (all with dam out)



Move LOTT outfall → North of Priest Point → Boston Harbor

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Conclusions

- *Moving the outfall to the location near Boston Harbor is predicted to decrease the magnitude of DO depletions, and decreases the areal extent of predicted violation of the DO standard (Figures ___). Several areas are predicted to remain in violation of the DO standard…*
- *… but could shift the impacts to other locations*

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Summary of modeling scenario and report development

- Graphics from DAG presentations
  - 2012: May, July, November
  - 2013: June, November
- Added science context around oxygen
- Conclusions – high level findings as discussed during advisory group meetings

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Timeline for review and comment

- Report link available November 20 afternoon
- Please send comments to Lydia Wagner by December 11, 2014
- Ecology will finalize report in December
- Publication in January/February
- 2015 => WQIR discussions

- QUESTIONS?

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