CLIPA

Capitol Lake Improvement and Protection Association

"Save the Lake – Preserve the Past, Improve the Future."

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COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR CAPITOL LAKE / DESCHUTES ESTUARY

The Capital Lake Improvement and Protection Association (CLIPA) appreciates the opportunity to provide public input on the Draft Environmental Impact Statement (DEIS) issued June 30, 2021. After reviewing the DEIS, the Executive Summary, the background Discipline Reports and the additional Planning -Level Cost Estimates (issued August 9, 2021), CLIPA is now submitting our comments for your response and consideration.

CLIPA is a 501(c)(4) organization of community stakeholders, including a multi- discipline team of experienced professionals, that began its review of the status of the Capitol Lake Basin beginning in 2009 with the CLAMP Study, and extending to the current Capitol Lake-Deschutes Estuary EIS. Our members have participated in public forums and advisory groups with Ecology, Thurston County, DES and are currently part of the Community Sounding Board (CSB) for this EIS. We have met regularly for twelve years to develop an understanding of the issues impacting Capitol Lake, with an emphasis on using defensible scientific information to inform our decisions. We have also commissioned and funded several independent expert studies to help understand the conclusions of questionable studies by state agencies. This work has been submitted to DES previously.

For this document, we have arranged our input with a GENERAL COMMENT first for your consideration, followed by a brief synopsis of the KEY FINDINGS IMPORTANT TO THE STATE DECISION PROCESS beginning on Page 4. Beginning on Page 11, we have arranged our SPECIFIC COMMENTS FOR EACH SECTION OF THE DRAFT EIS INCLUDING DETAILS FOR KEY FINDINGS for each section of the Draft EIS in the general order they appear in your presentation. Our submission ends with an APPENDICIES section for your reference.

GENERAL COMMENT

PROJECT VS PROGRAMMATIC EIS

For years the community has been divided on the long-term future of the Capitol Lake Basin. One issue on which the community largely agrees, however, is the need to actually begin action in the basin and bring the studies to a close. After spending an estimated $10M on various studies over the past twenty years or so, both the community and the State Legislature are ready for action. This current EIS process is the most promising effort to make that happen. However, this EIS is somewhat unusual in that it combines elements of both a "project EIS" and a "programmatic EIS". The program elements of the project, and the desired outcomes, have been clearly outlined following a robust stakeholder and community discussion. But, unlike most projects that can then move forward to evaluate the environmental impacts of a single option, this project has three widely different approaches to reach the desired outcomes. Therefore, we have an EIS that must not only evaluate the environmental impacts of all three alternatives, it must additionally provide enough information to evaluate the merits and costs of each alternative so that a preferred alternative can be selected. It is this last requirement of the EIS that the current Draft EIS fails to provide. The Estuary and Hybrid Alternatives, in particular, have been poorly defined leading up to this current effort. This, in part, has led to some of the major deficits in the Draft EIS; namely, significant gaps in understanding the alternatives, incomplete critical data, lack of the use of local experience and expertise and the absence of defined funding sources. Compounding this problem with the Draft EIS is the position of DES as stated in the June 30, 2021 opening letter from William Frare, the SEPA Responsible Official:

> **Neither short-term actions nor a long-term management alternative can be implemented until an EIS is completed and a Preferred Alternative is selected.**

How can the community's and Legislature's desire for action be met if even short-term actions must wait until a preferred alternative is selected and the final EIS approved? The Draft EIS doesn't call for work to begin until 2028, and that assumes that there are no delays in moving from the draft to final EIS. CLIPA's evaluation of the Draft EIS is that it is inadequate as it stands to provide the necessary information to select a preferred alternative. If this proves to be the case, any action will be further delayed, and further frustrate the community and the Legislature.

PHASED IMPLEMENTATION AND RATIONALE

For each of the active alternatives considered in this EIS, all require a dredge of the North Basin as an initial step and a precursor of any work specific to all of the alternatives. Some of the details of this dredging operation vary with the three alternatives, but the basic features include dredging the accumulated sediment from the past 30 plus years, and placing it within the basin to form habitat islands. This is essentially a "maintenance dredge", similar to the last one done in the 1980's and consistent with the historical requirement for DES to maintain this portion of the Capitol Campus. All alternatives will continue to remain viable while this dredging is underway. **Why is it necessary to commit to a preferred alternative at this stage?**

CLIPA suggests that DES modify their process, within the SEPA guidelines, to create a phased implementation that will allow this "maintenance dredge" to begin promptly. This would be done

concurrently with the work necessary to resolve the issues with the Draft EIS so it can move forward to a final EIS with a selected alternative. We suggest that the consultant could advise DES and create a brief Project EIS for the minimal environmental impacts of the "maintenance dredge", similar to the one used during the 1987 dredging operation. DES could then move forward to request funding from the Legislature for this limited work.

The concurrent work during this initial phase would essentially be the Supplementary Environmental Review (SEIS), called for in the Draft EIS if substantial issues are raised in the Public Comments for the Draft EIS. This SEIS would include the key findings that CLIPA outlines in the following sections below (including the establishment of funding sources), plus additional items raised by other commenters on the Draft EIS that are also determined to be substantial. Additional, thorough analysis for the SEIS may be required for any of these additional comments that are in conflict with those of CLIPA or others, so that all community members feel that they have been heard.

Following public review of this SEIS, the recommendation for a preferred alternative would then move forward and DES could request funding from the Legislature for the specific alternative selected. By the time this funding is approved, the "maintenance dredge" would be well underway. With this proposal to create a phased approach, the project would be better able to "hit the ground running", minimizing the overall project timeline**. Is DES willing to work, within the SEPA Guidelines and with the Legislature, to make a phased implantation such as this to move the project forward?**

KEY FINDINGS IMPORTANT TO THE STATE DECISION PROCESS

CAPITOL LAKE WATER QUALITY IMPROVEMENTS

To quote from the Executive Summary of the Draft EIS, Page 12:

> "As part of the water quality analysis for the Draft EIS, the EIS Project Team evaluated monitoring data from 2004 to 2014 and also collected water quality samples in 2019 to compare current conditions against the historical dataset. Despite what has been perceived to be worsening conditions in Capitol Lake, monitoring data indicate that water quality conditions have actually been improving in the lake and are relatively good in terms of physical and chemical characteristics important to aquatic life. There are only occasional seasonal violations of water quality standards, primarily associated with slight changes in temperature and dissolved oxygen."

And:

> "These improving water quality trends reduce the level of management that would be needed under a Managed Lake Alternative to meet lake management objectives."

This improvement in water quality is evidence that adaptive management can work. The City of Olympia and DES have worked to remove many of the sources of contamination, along with others who continue to improve upstream conditions to make Capitol Lake the cleanest in Thurston County. This adaptive management concept must be remembered as we now look to the future of Capitol Lake with respect to control of invasive plants and animal species.

PASSIVE NITROGEN REMOVAL IN CAPITOL LAKE

Ecology's primary water initiative in the South Sound and the overall Salish Sea is their study, the Puget Sound Nutrient Reduction Project, which is focused on meeting the dissolved Oxygen (DO) water quality standards by reducing both the human point and non-point sources of excess nutrients. The primary nutrient impacting water quality in Budd Inlet is Nitrogen.

The Draft EIS failed to consider the natural effect of aquatic plants in removing a substantial portion of the Nitrogen entering Capitol Lake from the Deschutes River flow. On a daily basis in the summertime, this downstream environmental improvement rivals the summer season Nitrogen removal capacity of the LOTT Wastewater Treatment Plant, installed in about 1990 at a cost of more than $50M. The lake's cost-free Nitrogen removal will be lost with the elimination of Capitol Lake and creation of an estuary. Focusing on LOTT, the primary Nitrogen point source discharge to Budd Inlet, Ecology's upcoming TMDL is likely to require LOTT to make up the difference in Nitrogen removal if the Capitol Lake contribution is lost. However, even with total removal of Nitrogen from their discharge, LOTT will still not be able to compensate for the large amount removed in Capitol Lake. Therefore, the result of dam removal is likely to be a degradation of water quality in Budd Inlet. **Doesn't this directly conflict with the project goal of "Improving Water Quality"? Why isn't the Nitrogen removal aspect of the Managed Lake Alternative recognized as a significant benefit?**

Ironically, a confirmation of the ability of aquatic plants to remove nitrogen has been documented by LOTT at their reclaimed water wetland site in Lacey. They found the following when characterizing the incoming and outgoing reclaimed water at the site :

> "It is also noted that total nitrogen and nitrate concentrations are decreased through the wetlands. For example, nitrate concentrations in the Class A reclaimed water average 6.6 mg/L over the four events, compared with concentrations in water discharging from the wetland ponds averaging 2.8 mg/L". (Page 44, Wastewater and Reclaimed Water Quality Characterization, (Task 1.3) LOTT Clean Water Alliance Reclaimed Water Infiltration Study Technical Memorandum February 7, 2017.)

The DEIS alleges that an estuary would relieve Budd Inlet of DO depletion caused by Capitol Lake. The opposite is true; Lake vegetation, like the LOTT wetland's vegetation, removes nitrogen. An estuary with no comparable nitrogen removal ability would increase the Inlet's DO depletion and could force increased remedial nitrogen removal actions by LOTT at increased costs to ratepayers."

Please review this result with LOTT Technical Staff, and ask them to confirm our conclusions regarding Nitrogen removal in Capitol Lake, and the implication for LOTT if this removal capacity is lost.

SWIMMING IN CAPITOL LAKE NOT CONSIDERED

Many in the community have memories of swimming in Capitol Lake (open from 1964 to 1985), and this is often cited as a desirable recreational and socializing opportunity. The Draft EIS recognizes that Capitol Lake now has better water quality than several local swimming areas, such as Black Lake and Long Lake. Obviously, only with the Managed Lake Alternative is this recreational option possible. Intertidal mudflats, or even a marine reflective pond, do not offer the same recreational benefit.

DES has rejected consideration of this recreational opportunity, stating:

> "Operating formal swimming facilities is not in alignment with the mission of Enterprise Services, and there are no known plans to introduce such services into the agency mission or scope of services."

Because of DES's position, the Draft EIS appears to place no value on the potential for swimming as a component of the Managed Lake Alternative. DES also did not have the mission of providing swimming during the 1960's, 70's and 80's, yet the City of Olympia saw the value to the community, and operated this swimming beach for many years. Ignoring this possibility diminishes one of the key recreational opportunities for the Managed Lake Alternative. **In fairness, shouldn't the potential for swimming in Capitol Lake be reconsidered as a significant benefit? And, in general, shouldn't the community's desires be considered as an important element in any issue bearing on the selection of the preferred alternative?**

NEW ZEALAND MUD SNAIL (NZMS) EVALUATION

The future persistence of the NZMS is a question of key importance in the evaluation of the cost of long-term dredging, both in the freshwater of a Managed Capitol Lake and in the marine waters of an Estuary or Hybrid. Based on the Planning-Level Cost Estimates recently provided by DES for the Draft EIS, we find some startling information based on the impact of this one question. For the Managed Lake Alternative, the difference in total cost using upland disposal (due to NZMS) versus in-water disposal

(without NZMS) is projected to be $243M. For the Estuary Alternative, this same comparison results in a total cost difference of $401M. And for the Hybrid Alternative, $564M.

It's apparent that we must bring all possible information to bear on this question if we are going to have any chance of making a valid preferred alternative selection. For this reason, CLIPA has examined the literature, commissioned an independent study, searched all current samples and suggested a variety of options and adaptive management approaches. The most pertinent of this information is presented in the discussion in the section on **AQUATIC INVASIVE SPECIES (AND IMPERILED AND NUISANCE SPECIES).**

The bottom line is, the NZMS is unlikely to persist as a problem, in either freshwater or marine water by the time dredging is anticipated to occur. We have asked that DES resume the exploration of the Capitol Lake Basin immediately for NZMS to provide current data which has been missing for the last five years. We have also asked a number of questions designed to narrow the uncertainty around the NZMS persistence. **Again, these critical issues must be thoroughly explored so that an informed decision on the preferred alternative can then be made.**

NEXUS WITH FEDERAL CORPS OF ENGINEERS (COE) NOT DEVELOPED

COE permitting is not discussed in the Draft EIS. However, the Draft EIS concluded that the Port and COE would need to complete a Turning Basin and Navigation Channel dredge before the Estuary and Hybrid Alternatives could proceed. Therefore, we assume that the Capital Lake and Deschutes Estuary Project/Program has a "State/Federal Nexus" and as such the COE is a critical part of the decision process. The Draft EIS does not confirm that the COE has officially been engaged in the review, and their requirements have not been integrated into the EIS process. If the pre-dredge is a prerequisite for the Estuary and Hybrid option, COE involvement and agreement is an essential first step for any dredging work. **Shouldn't this discussion be included in the Draft EIS?**

The COE also plays an integral part in determining disposal location and the sediment properties that are appropriate for deep-water disposal. This is again an instance of a "State/Federal Nexus", and there is no discussion of this in the Draft EIS. The deep-water disposal criteria may prove to be critical in determining the disposition of up to 500,000 cubic yards of sediment over the next thirty years. **Shouldn't this discussion also be included in the Draft EIS?**

THE HYBRID ALTERNATIVE HAS A CRITICAL FLAW

The development of the Hybrid Alternative was intended to be a compromise that would incorporate many of the most positive elements of the Managed Lake and Estuary Alternatives. In reality, however, the removal of the dam makes the Hybrid just a subset of the Estuary, with the only significant "Lake" feature being the addition of a barrier wall in the North Basin to create a reflecting pool. The irony of this proposal is that the imposition of the one-half mile long concrete and sheet pile barrier wall will block the view of the reflecting pool from most of the significant viewpoints along the Deschutes Parkway. Instead of the scenic view across the water to the East shore and Capitol, this industrial-scale barrier will predominate the view. **The Draft EIS needs to include simulated views at both high and low tide from the Deschutes Parkway across the North Basin to fully inform the public.**

FUNDING SOURCES FOR LONG-TERM DREDGING ARE NOT IDENTIFIED

In a heading in one section of Chapter 7, the Draft EIS asks the question:

"What are the recommendations for funding construction & long-term management?"

In answer, they provide the following background:

> "Under the Estuary and Hybrid Alternatives, the primary focus for long-term funding and governance would be sediment management in impacted areas of West Bay. Recurring maintenance dredging, at a 5- to 6-year frequency, is critical to avoiding and minimizing significant impacts to downstream resources from sediment deposition. A governing body would oversee annual monitoring and ensure that dredging was coordinated across potentially impacted areas of West Bay." … " Without shared long-term funding and governance, these management actions may not be implemented. In past planning processes, the lack of committed funds in the State of Washington budget was frequently cited as a potential significant obstacle to adequate long-term management of the Capitol Lake – Deschutes Estuary."

Despite the above, the Draft EIS fails to identify how this "Governing Body" would function, who the beneficiaries would be (i.e., who would be expected to provide the funding) and the basics of the funding plan. Instead of providing this information to help inform the selection of the preferred alternative, the expectation is to select the alternative first, then determine the beneficiaries and develop the plan. Therefore, the Draft EIS is not heeding its own admonition concerning the lack of committed funds as an obstacle to adequate long-term management. And in the case of the Estuary and Hybrid Alternatives there is no option to adaptively manage the situation: once the dam is removed, the sediment will keep coming, and coming, and coming…

COST COMPARISON WITH THE FOURTH AVENUE BRIDGE IGNORED

A review of the planning-level cost estimates for the new Fifth Avenue Bridge and Deschutes Parkway realignment reveals that both the Estuary and Hybrid Alternatives assign a cost of just under $40M, escalated to a start date of 2028. Because this is a planning level cost estimate, we don't have a good way to evaluate whether this is a reasonable number or not. However, we do have the costs for a similar "bridge" right next door, completed in 2004. Granted, the Fourth Avenue Bridge is not an exact comparison, but both bridges span the same waterway, are about 500' in length, and one has the additional element of the elevated Deschutes Parkway approach to the bridge and round-about, while the other has the installation of the round-about itself. Overall, they are certainly similar. For comparison, the actual cost to The City of Olympia for the Fourth Avenue Bridge, with escalation to 2028, is about $87M. A text search of the entire Draft EIS makes no mention of the Fourth Avenue Bridge as a comparative cost to the new bridge. **Why was this comparison ignored?** This makes the nearly $50M discrepancy between the two bridges suspect, and also raises doubt about the validity of other cost estimates.

ADAPTIVE MANAGEMENT IGNORED FOR LONG-TERM DREDGING PROCEDURES AND COSTS

The only long-term dredging event for the Managed Lake Alternative is scheduled at the very end of the 30 year time horizon for the project. This is a major dredging operation, to be sure, but it is not scheduled to take place until about 2050. The Draft EIS states that:

> "Upland disposal is the only feasible disposal option for material dredged under the Managed Lake Alternative because invasive species are expected to persist in the freshwater environment, at high densities similar to existing conditions."

This is problematic for several reasons. First, the current situation with the NZMS is unknown, because sampling is outdated and current observations show little activity. Second, and described more fully in the Invasive Species section of our comments, is the probability that eradication efforts or natural attrition will eliminate this as a problem requiring upland disposal of sediment. Third, and described more fully in the Sediment Quality section of our comments, is the likelihood that adaptive management practices will result in procedures to allow deep-water disposal, or land disposal within the watershed that could even allow for beneficial reuse. And the community has 30 years to figure this out.

This issue is critically important because of the impact that upland disposal has on the Planning-Level Cost Estimate for the Managed Lake Alternative. Upland disposal, in this case, has been determined in the Draft EIS as requiring trucking to Eastern Washington, 250 miles one-way. The "penalty" assessed for this disposal option compared to deep-water disposal ranges from $200M to $350M, using costs from Table 7.1.1.

OLYMPIA YACHT CLUB DREDGING EXPERIENCE IGNORED

The Draft EIS has concluded that all long-term dredged sediment in West Bay for the Estuary and Hybrid Alternatives will likely be clean enough for deep-water disposal at Ketron Island. This has resulted in their determination that the disposal cost will be relatively minor, compared to the cost if the sediments are contaminated and must be sent to upland disposal. The cost difference between these two disposal options is estimated in the Planning-Level Cost Estimates to be $400M for the Estuary Alternative and $564M for the Hybrid Alternative. Therefore, this question of whether the West Bay sediments are contaminated is of critical importance for determining the relative overall costs for the various alternatives.

The most recent dredge in West Bay, by the Olympia Yacht Club (OYC) in 2013, included 10,000 cubic yards of sediment that would have been characterized as "clean" by the stated Draft EIS standards. However, 40 percent of the sediment was determined to be contaminated, and was sent to upland disposal at a cost approximately five times that of the uncontaminated sediment. This real-life experience raises serious questions about the Draft EIS assumptions and resulting cost estimates. We find no information in the Draft EIS that this actual experience was considered in the analysis. **Can you explain why this was ignored?**

COST IMPLICATIONS BASED ON THE THREE IGNORED ITEMS ABOVE

Creating a new analysis for the estimated costs, based on the real-world, actual information that has been ignored in the Draft EIS, would have profound implications for the comparative costs for the three active alternatives. In round numbers, the overall cost for the Managed Lake Alternative would drop by about $260M, while the Estuary Alternative would increase by about $200M and the Hybrid Alternative would increase by about $275M. This would make the Managed Lake the least costly at somewhat less than $200M, while the Estuary would be next at about $450M and the Hybrid the most expensive at about $600M. **Can the DES consultants prepare a "most likely" cost estimate incorporating these ideas? Doesn't this provide a more realistic and defensible comparison of the alternatives?**

SIMULATED VIEWS OF THE ESTUARY AND HYBRID ARE INCOMPLETE

In addition to evaluating the environmental impacts of the alternatives for the Capitol Lake Basin, one of the key benefits of the Draft EIS presentation is informing the community about the nature of the three active alternatives. An important part of this public information aspect of the EIS are the visual simulations of each alternative from various locations and under varying tidal conditions. The Draft EIS does a good job of providing some of these views, but unfortunately, misses or misrepresents three key views that would provide the community with valuable information. These include:

- The Northwest end of the North Basin. The removal of the Fifth Avenue dam, construction of a new bridge and the changes to the Deschutes Parkway will dramatically alter the appearance of the North end of the North Basin. The only visual information presented for this area is a small plan view of the project area. Neither the Executive Summary, or the long and short-term sections of the Draft EIS, provide any simulations of this area. Reading the text description of the area is confusing and leaves many unanswered questions. A simulated view of the Northwest shoreline along the new elevated parkway and including the new bridge would provide the community a clearer picture of the changes. The simulated view would essentially be a "snapshot" from a couple hundred feet off shore towards the Northwest. **This view should be presented as a part of the Executive Summary, as well as in the visual sections of the Draft EIS.**
- The extensive mudflats at low tide. Although there are depictions of the Estuary and Hybrid alternatives at low tide in the long-term visual section, the Executive Summary has only one view of each at mid-tide. Because the critical difference for these alternatives is the creation of an estuary, the depiction at low tide is the key change that the public will observe. **This view should be placed prominently in the Executive Summary.**
- The Hybrid barrier wall from Deschutes Parkway. The Hybrid barrier wall is essentially the only physical change from the Estuary Alternative, and it has severe impacts on the appearance of the North Basin from any viewpoint. The most significant viewpoint is to the East from the Deschutes Parkway, due to the barrier wall's obstruction of the reflective pool. **This view should also be placed prominently in the Executive Summary.**

THE COMMUNITY'S QUALITY OF LIFE HAS BEEN IGNORED

Capitol Lake has been described as "the soul of our community", especially when it was maintained. For decades, it has served as a community attraction for celebrations, outdoor educational displays, boating, swimming (previously), informal sporting events, running, walking and dog walking. Unquestionably, these activities benefit human health, both physical and mental. Social cohesion for individuals and families in and outside the community are facilitated. In contrast to the conditions created by the estuary/mudflat, Capitol Lake has been and will continue to be an enormous contributor to our quality of life with the Managed Lake Alternative.

TOXIC CONTAMINANTS WILL INVADE THE ESTUARY

How does dam removal affect the nature of the Capitol Lake Basin? The Draft EIS is silent on one key issue. The emptying and filling of the basin twice each day with the marine waters from Budd Bay will expose the basin to the same toxic contaminants that are now present in the bay. And we know that contaminants tend to be higher at the terminal end of estuaries. This invasion will change the character of the basin from a freshwater lake with relatively good water quality to an intertidal mudflat with Thurston County warning signs to avoid contact due to toxic contaminants and entrapment hazards. In addition to the public health hazards, fish and wildlife could be impacted, and many in the community will find the aesthetics and recreation potential diminished. These issues are explored more fully in the Specific Comments sections for Fish and Wildlife, Recreation and Aesthetics.

Health warning signs at Budd Bay adjacent to Mission Creek

SPECIFIC COMMENTS FOR EACH SECTION OF THE DRAFT EIS INCLUDING DETAILS FOR KEY FINDINGS

CONSTRUCTION AND TRANSPORTATION

Because the construction and transportation chapters are interrelated, our comments will span both of these areas. We have found several recurring deficiencies which we will bullet below, and then provide more specific details and examples in the following sections.

- First, the evaluation of the alternatives in these sections suffers from the "best case/worst case" problems that we have addressed in other comments, particularly in the sediment related sections. In brief, we find that when considering the Managed Lake alternative, the "worst case" is assumed as most likely and opportunities for adaptive management are minimized. However, for the Estuary and Hybrid alternatives, the "best case" is assumed as most likely and potential problems are reduced to footnotes or ignored.
- Second, for both the construction and transportation issues, the fundamental difference in magnitude between the Managed Lake alternative and the Estuary alternatives is not sufficiently recognized. We see this as "allowing the trivial to obscure the obvious" and will explain this deficiency later.
- Third, costs for the major elements of each alternative are not addressed in the EIS draft or the relevant discipline reports. Repeated questioning has resulted in the statement by the consultants that these costs will be developed after the preferred alternative is selected and are not available at this stage in the project. However, prominent tables in the Draft EIS and the Executive Summary have identified a range of costs for each alternative for "Design, Permitting & Construction Costs" (Table 7.1.1) and "Construction Costs" (Table ES.4). **Where did these cost ranges come from?**
- Fourth, we fear that the terms that characterize the various impacts and benefits, if not properly assigned, will be used as a rating tool that unfairly influences the selection of the preferred alternative. For this reason, we will highlight several questionable rating instances in our following comments.
- And finally, we have several questions regarding the viability of the proposed construction elements and sequencing for the Estuary and Hybrid alternatives.

Details and Examples:

The "best case/worst case" issue identified in the <u>first bulleted comment</u> is sometimes subtle, and sometimes blatant. The following is one of the more egregious examples in the construction and transportation categories.

The proposed schedules for the alternatives (Figures 2.4.1, 2.4.2 and 2.4.3) appear to unnecessarily extend the Managed Lake schedule, while compressing the Estuary and Hybrid schedules. This results in making the alternatives appear to be similar in duration, rather than acknowledging that the Estuary and Hybrid alternatives are likely to take roughly twice as long to complete, due to the sequential nature of

the work and the substantially increased duration for the construction of the new bridge, roadways and barrier wall.

Specifically, for the Managed Lake alternative, the dredging and material placement begins in the middle of the first year and extends for four and one-half years, to the end of year five. However, the habitat island construction is shown to be complete by the end of year four, and yet the dredging extends a full year after the habitat islands are in place. The pedestrian bridge is scheduled at the end of the project, but could easily be moved earlier. It appears that the overall project completion could be a year earlier than shown.

For the Estuary alternative, the same start time for the dredging is used, but completion extends further; several months into year six. This is to be expected due to the increased volume of material dredged, and the need to move a portion of it upland for disposal. However, unlike the Fifth Avenue dam overhaul, which can be done independent of the dredging, many of the major construction elements for the Estuary alternative must be done sequentially; only after the dredging is complete. These construction elements include the placement of the coffer dams, excavation of the isthmus, removal of the Fifth Avenue dam and construction of the new bridge and approaches; most of which must be done during the in-water work window. Despite this, these construction elements are shown to begin slightly less than two years into the nearly five-year dredge period. Further, the schedule shows all construction work complete just fifteen months after the end of dredging. It appears highly unlikely that the completion date in the middle of year seven can be met, and will likely be one or two years longer.

Thus, for the Draft EIS estimates, which suffer from our "best case/worst case" concerns, the overall durations of the Managed Lake and Estuary alternatives are five and seven years, respectively. The more likely durations are closer to four years for the Managed Lake and eight to nine years for the Estuary. **Please reevaluate Figures 2.4.1, 2.4.2, and 2.4.3, and make adjustments consistent with our estimates or explain why our analysis is incorrect.**

We now examine (second bullet) the magnitude of the alternatives during the "construction " period, which encompasses roughly the first 6 to 8 years and includes the design, permitting, predredging and all construction activities. At first look, the three active alternatives appear to be somewhat similar in scope, as shown in Table 7.1.1. Using the average of the high and low estimates, the Managed Lake comes in at $125M, with the Estuary at $183M and the Hybrid at$248M. We will consider the accuracy of these costs later, but for now, they all seem to be in the same "ballpark". But looking a little closer, we see that all three alternatives have several common elements, which would all be done regardless of the selection of the preferred alternative. Because we have no information available for the individual cost elements (more on this later), in order to compare the true differences, we can resort to a simple description of the unique elements for each alternative. Removing the common elements, we find:

Managed Lake	Dam Refurbishing Jet grouting and buttressing the earthen dam
Estuary	Permitting and Design for new bridge and roadways Property acquisition Permitting for dam removal and excavation Replacement of Capitol Lake culverts & sealing concrete

	Installation and later removal of two coffer dams
	Dam and Fifth Avenue removal and excavation for 500' opening
	Construction of new 500' Fifth Avenue bridge
	Construction of roadway connections to/from the new bridge
	Armoring at Fourth Ave bridge, RR Bridge, Interstate 5 Bridge
	Slope stabilization along Deschutes Parkway (West side of new estuary)
Hybrid	All Estuary elements plus
	Permitting and design for 2600-foot barrier wall
	Installation of barrier wall

It is now apparent that we are looking at three substantially different projects when the common elements are removed. For the Managed Lake alternative, we have a relatively small maintenance project, involving a small crew and minimal equipment, and estimated to take about seven weeks to complete. For the Estuary alternative, we have a major Civil Engineering Bridge and Roadway project, rivaling the largest projects seen in the Downtown Olympia Area since the replacement of the Fourth Avenue Bridge 20 years ago or the original dam installation in 1951. The project is estimated to take 5.5 years to complete. And the Hybrid adds yet another major component and additional time to the project.

This fundamental difference in scope among the three projects is not apparent when reading the Executive Summary or even digging deeper into the draft document. **Please make additions throughout the Draft EIS so that it is crystal clear to the public what each alternative entails. Do not let this 'false equivalency' persist.** The addition of the common elements to the tables obscures the fact that they could all be completed as a preliminary stand-alone project that would still retain the ability to pursue any of the three alternatives. Also of importance here is that most all the common elements must be done before the bulk of the construction begins. **Perhaps a little "outside the box" thinking could be of value here?**

Our last comment for this section relates to our issue of "allowing the trivial to obscure the obvious". We are told that it is premature to provide even basic cost information for the various key elements for each alternative; information that would help the reader understand the true nature of the project differences. At the same time, in both the construction and transportation sections, we find page after page of details regarding street networks, parking issues, transit issues, construction worker trips, street capacity and so forth. If we are truly at the conception stage, then the 12 pages in section 4 and the 23 pages in section 5, meet the criteria of obscuring what otherwise could and should be obvious.

The third bulleted comment follows up on some of the issues previously raised. Looking at table 7.1.1, someone had to determine these cost numbers and place them in the table. **How was this done?** Even if they were educated estimates, or even guesses, someone provided them and this should be disclosed. And to do this, the estimator would need to at least be able to provide a breakdown of the major elements that add up to the totals. For example, the Managed Lake alternative consists of several disparate elements, including dredging, constructing pedestrian walkways, building a boat launch facility and refurbishing the dam and Fifth Avenue bridge. The only one of these elements that is unique to the Managed Lake alternative is refurbishing the dam and Fifth Avenue bridge. The other elements are common to all the alternatives. Each of these discrete elements must have also been estimated to be able to develop the total cost of $89M to $160M. Therefore, the cost for refurbishing the dam and Fifth Avenue bridge should be available. Likewise for the other alternatives, the cost elements unique to

each alternative should be available, even if only in the aggregate. Comparison of these unique costs for each alternative is a critical way to evaluate the alternatives, and is actually much more instructive than the overall estimated construction costs in the tables. For these reasons, **we request that the Draft EIS Tables ES.4 and 7.1.1 be amended to include a column that provides these unique costs for each alternative. References to these tables in the text of the Draft EIS will also need to be amended. If you are unable or unwilling to do this, then we recommend that the Estimated Construction Cost column be eliminated.** For different reasons, in previous comments for the long-term dredging chapter, we have recommended elimination of the two other cost columns in these tables. **Thus, if you are not able to add the requested unique cost information, we are essentially requesting the elimination these tables in their entirety, throughout the entire Draft EIS.** In short, what we are advocating for is that no cost information is better than incomplete, unsupported, potentially inaccurate and misleading cost information.

Now, we have complained about this inability to obtain the cost estimates for the major elements, in particular to allow us to evaluate the relative costs of the unique parts of each alternative. But by making a few assumptions based on the comments above, we may have a way to help our understanding. We will use the average costs mentioned previously and look at the Managed Lake alternative first. Looking at the scope of the dam refurbishing and Fifth Avenue repairs, it seems reasonable to assume that these costs will be a very small part of the total $125M construction cost, perhaps one to three percent. Therefore, the balance, somewhere near $120M, is the cost of the common elements. If we now look at the average Estuary cost of $183M and subtract the common element costs that we just estimated, we are left with the remaining unique construction costs for the Estuary alternative at about $63M. Moving to the unique Hybrid alternative cost, in this case relative to the Estuary alternative, they are easier to calculate. Because every element is the same except for the barrier wall, we simply subtract the two construction cost amounts, and find the barrier wall costs to be $65M, which coincidentally, is about the same as all the Estuary alternative unique costs.

If the above assumptions and calculations are anywhere near correct, the questions that now must be answered is: **do the Draft EIS tables of construction costs meet the sanity test? Can the volume of work necessary to complete the Estuary alternative be done for $63M?** (seems low relative to the costs for replacement of the Fourth Avenue bridge about 20 years ago) **Will the Hybrid barrier wall require an additional $65M to complete? Is it time to reconsider the inclusion of any cost data in the Draft EIS at this stage of the project?**

For the fourth bulleted comment, we have several examples of questionable ratings of impacts and benefits.

In Section 4.12.5 and in subsequent tables, a **Substantial Transportation Benefit** is claimed for the Estuary and Hybrid alternatives based on the addition of a new bridge and associated roadways. This may very well be a benefit for the City of Olympia's infrastructure; however, this should not be considered a benefit for this project. Rather, it is a burden for the Estuary and Hybrid alternatives, required in order to facilitate the opening of the waterway to allow tidal flows. The bridge/roadway does not advance any of the four stated project goals. **Therefore, we request that this benefit be deleted from any tabulation of impacts and benefits used to rate the relative merits of the alternatives.**

In Section 5.12 Transportation Construction Impacts, all active alternatives are rated the same; as having **significant unavoidable impacts**. These impacts come from the closure of Fifth Avenue and the bridge. Although the logic for the specific impact may be reasonable for each alternative; from an overall perspective, equating a 7-week potential interruption as having the same impact as a 5.5-year complete road removal, has little credibility. This could also be described as a "false equivalence". For the rating system to have any validity, it must be able to discriminate between these two widely different time periods. **Please correct these transportation construction impacts to reflect the widely different impacts.**

Now, we could make this same type of comment regarding many other impacts, such as transit impacts, development of CTMP and Traffic Control Plans, the impact on Downstream Economic Activity and Downtown Development, and so forth. You get the idea. One of the major requirements of this Draft EIS is to compare and contrast the alternatives. Again, and particularly for the construction and transportation impacts for these two widely different alternatives, the methodologies must be able to discriminate effectively.

We recommend that this system of characterizing the benefits and impacts throughout the document be reviewed and modified to more effectively reflect the true nature of the alternatives. Lacking this, we strongly request that you not use any of these characterizations to create numerical ratings or otherwise influence the selection of a preferred alternative.

As stated in the fifth bulleted comment, we have several construction related questions and comments from Chapter 2, section 2.4. Refer to Figure 2.4.4 and related text.

An area of shoreline restoration is shown under the new bridge and within the 500-foot opening. **Please correct.**

The roadway connection from the roundabout to the Deschutes Parkway is described as being built using an MSE retaining wall structure, rather than an elevated structure. Because the bridge is an elevated structure and ties into this roadway near the elevation of the roundabout, **where is the transition from the elevated structure to the MSE retaining wall structure?** This West end of the project is difficult to visualize. **Please provide an elevation drawing to aid in understanding how this fits together. Better yet, could you also provide a visual simulation of the bridge and roadway connection looking Northwest from a couple hundred feet offshore, similar to those provided across** the North Basin from the Law Enforcement Memorial**?** In the visualizations across the North Basin for the various alternatives, the bridge and roadways are so far away that they can not be distinguished, one from another.

On the sides of the 500-foot opening, no transition from the bottom of the waterway to "street" elevation is shown. **Are the sides of the opening vertical walls or do they slope, and if they slope, at what angle? Is it possible that the bridge will need to be longer than 500 feet to accommodate the slope?**

What waterway depth is assumed to accommodate the current and projected tidal range? Will the bottom of the waterway ever be completely exposed?

The intersection of the Fifth Avenue bridge and the roadway from the roundabout to the Deschutes Parkway is essentially a "tee". **How will traffic be controlled at this intersection?**

Parcel boundaries should also be shown on the East side of the waterway, as it appears that some will be impacted by the project. **Please add these parcels to Figure 2.4.4, the related text and your analysis.**

Is the overall design and specific detail for the new Fifth Avenue bridge consistent with the existing Fourth Avenue bridge? Are the relative elevations similar? Has this been reviewed with the City of Olympia?

For the Hybrid Alterative, The Draft EIS assumes the reflective basin will be filled using marine water from the estuary at high tide, but also discusses as an alternate, using freshwater**. What is the source of this freshwater? If it is groundwater, have existing water rights been considered? What infrastructure is assumed for providing and treating this freshwater? Have these costs been included in the analysis?**

UPDATED COMMENTS BASED ON ADDITIONAL COST DATA PROVIDED ON AUGUST 9, 2021

Now that we have the planning level cost estimates for each of the alternatives, some of our questions have been addressed, but the new information has also raised additional concerns. Because our original Draft EIS comments were nearly complete prior to receiving the new information, we are continuing to provide these original comments so that you can see the progression of our concerns.

Our comments will focus on two types of costs as detailed in your new documents. The first are the direct costs for each item; and the second are the "fully loaded costs", or total costs, when all the indirect costs, escalation to 2028, contingency, soft costs and engineering and permitting are included. The ratio of total costs to direct costs varies slightly with each alternative (from 2.65 to 2.81) but for simplicity, we will assume that the total cost contribution from each individual direct cost can be obtained by multiplying the direct cost by 2.75.

Looking first at the Managed Lake Alternative, we have several concerns and questions.

- **How is it possible to spend nearly $5.7M in total cost for the dam overhaul (including mob/demob) in an estimated seven weeks?**
- This is the first time we have seen a revetment called out for the project. Apparently, this is the rip rap required along about 400' of the West Bay side of the earthen dam. The total cost of this is shown as more than $6.5M and includes 37,500 tons of rock. That seems like a lot of rock in a small space. It is not clear what is at risk that is being protected by this revetment. We are also spending more than $4.5M for jet grouting of the earthen dam for additional earthquake protection. **Is this necessary?** To provide context, we can look specifically at the damage caused by the Nisqually Earthquake in 2001. The Fourth Avenue Bridge and the Deschutes Parkway were heavily damaged and required repair/replacement. No significant damage occurred to the Fifth Avenue roadway, the dam or the earthen dam that is adjacent. Of note is the fact that repairs to the Deschutes Parkway, totaling $5M, excluded earthquake protection due to the estimated additional cost of $9-11M. Apparently, the decision makers at that time determined that the risk of future damage was not significant enough to justify the additional expenditure. Yet, for this Managed Lake project, an additional $11M is being allocated for protection of the 400' earthen dam, which has been unaffected for the past 70 years of tidal action, and several earthquakes. **Are either or both of these really necessary? Please justify**

why we can spend more than $11M to protect this 400' barrier. Although we are not suggesting it, would it be less expensive to install a sheet pile and concrete barrier wall similar to the Hybrid alternative barrier? (Note: on a per foot unit basis, the Hybrid wall total costs are about $6M for 400'.)

- There is also another inconsistency here, when comparing this earthen dam slope protection with the scour protection needed for Interstate 5, the RR Bridge, the Deschutes Parkway Bridge, the Fourth Avenue Bridge and the new Fifth Avenue Bridge. For the Estuary and Hybrid alternatives, the scour protection called out is for 2000 tons of rock, at a total cost of $300K. Not much compared to the $6.5M for the revetment. Also for reference, the entire Deschutes Parkway slope stabilization, over about 1.6 miles in the North and Mid basins, is estimated to cost slightly more than $1M. **Please explain these cost inconsistencies that appear to favor the Estuary and Hybrid alternatives.**
- **Although not a significant cost item at $60K, why does an epoxy coating need to be applied to the Arc of Statehood for this freshwater alternative?** It is not called out for the case that the Hybrid reflective pond is freshwater; only if it is marine water.

Moving to the Estuary Alternative, the cost of the new Fifth Avenue bridge and Deschutes Parkway reconfiguration are of most concern.

- The bridge direct cost is a single line item at more than $11M. No further detail is provided. Combining this cost with the parkway and bridge mob/demob and the parkway reconfiguration, the total costs for "the bridge" are just under $40M. Because this is a planning level cost estimate, we don't have a good way to evaluate whether this is a reasonable number or not. However, we do have the costs for a similar "bridge" right next door. Granted, it's not an exact comparison, but both bridges span the same waterway, are about 500' in length, and one has the additional element of the Deschutes Parkway elevated approach to the bridge and round-about, while the other has the installation of the round-about itself. Overall, they are certainly similar. The design of the Fourth Avenue bridge underwent significant public comment, before the current design was accepted. It is logical to assume that the public would desire a similar design for the new Fifth Avenue bridge. **Has this been taken into consideration in the basic design of the new bridge? Has the City of Olympia been consulted on this design? Are they in agreement that the design meets their expectations?**
- **Now, have you compared the final cost of the Fourth Avenue bridge with the estimated cost of the new Fifth Avenue bridge?** We have found no information about this in the Draft EIS or the additional information on planning level cost estimates. **Wouldn't this be an appropriate check on the accuracy of the consultant's estimate; what we sometimes call a sanity check?** Lacking this information, we checked with the City of Olympia and found that the final cost of the Fourth Ave Bridge project in 2004 was about $38M. Using your consultant's annual escalation of 3.5 percent, the comparative cost in 2028 would be about $87M, or more than twice the Fifth Avenue Bridge estimate. **How do you account for this discrepancy?** We're looking at a nearly $50M difference with the actual current construction cost of the Fourth Avenue Bridge.

For the Hybrid Alternative, the same comments apply as for the Estuary.

- There is one additional discrepancy, however. On item 4, for the Fifth Avenue Dam demolition, the line-item cost for the Hybrid is $881,110, while the similar line-item for the Estuary is $2,232,836. All other line-items in item 4 are the same. **Why are these amounts different? Does this difference translate to the final analysis for the Grand Total?** If so, the total cost for the Hybrid is undercounted by about $3.7M.

We now come back to one final, rhetorical, question. Why does it appear that the Managed Lake costs are inflated (revetment, jet grouting, dam overhaul, epoxy coating), while the Estuary and Hybrid costs are low-balled (bridge, parkway stabilization, scour protection)? Considering our comments, a case can be made that the total costs for the Managed Lake Alternative could be from $8 -15M less (using your +35%/-25% range), while the Estuary and Hybrid Alternatives could be from $40-70M more.

We have also noted this bias in other areas of the Draft EIS and have characterized it as "best case/worst case" or "false equivalence". This consistent pattern needs to be addressed and corrected if the Draft EIS is to be considered as an impartial document.

SEDIMENT QUALITY

Our primary comment for this section is to provide an example of how inconsistency or bias in an underlying document such as this discipline report, intentional or non-intentional, can lead to a major misrepresentation as the information passes forward to the main report and on to the Executive Summary.

In this Sediment Quality Discipline Report, the conclusions presented regarding the quality of sediments are said be the most likely outcome for each alternative, but this approach does not provide a full analysis of other possible outcomes. For example, for the Managed Lake Alternative, this discipline report assumes that the long-term maintenance dredge material from Capitol Lake will require upland disposal by truck due to the presence of NZMS. This "worst-case" conclusion does not allow for the possibility that NZMS populations may decrease over time, that their impact will be deemed insignificant or that adaptive management techniques or BMPs may mitigate the problem. **Also, what recent research indicates that NMZS, dumped in deep salt water with dredge spoils, poses a risk of infestation of adjacent shores? If there is no such research, this should be acknowledged. If NZMS are not a problem, could dredge spoils from the North Basin be pumped under Fifth Avenue or through the dam structure to a waiting barge in West Bay for deep water disposal?** Also, this single-minded approach that trucking will always be required, does not allow for the possibility that efficiencies and economy of scale will reduce costs over the next 20 to 30 years. Some questions come to mind. **With regard to hauling dredged sediment away from the Lake, why is the impact on traffic said to be "significant" if it only occurs for a few months, once every 20 years? With regard to hauling dredged sediment away from the Lake, why is the impact on traffic said to be "unavoidable" if it can be done using railroad cars? (The Deschutes Parkway railroad crossing could be left open while cars on the railroad bridge are loaded)** These questions are particularly relevant for this long-term dredging operation, as it is not scheduled to occur for nearly 30 years, until about 2050, which coincidentally is the project time horizon (per comment on page 7-3 of the main EIS document). Incidentally, this 2050 time horizon was selected because to predict events beyond that time would be too speculative. **Isn't it**

also reasonable to consider that this long-term dredging event might also fall into the speculative category?

On the other hand, for the Estuary and Hybrid Alternatives, this discipline report assumes that the long-term maintenance dredge material, occurring on a 5–6-year cycle from West Bay, does not require upland disposal. This "best-case" conclusion assumes that NZMS will not be present in marine waters and sediment mixing from over dredging or upward migration of contaminants will not require any upland disposal.

To be fair, this discipline report and Chapter 7 do provide some narrative regarding other options. The problem comes when the conclusions are used to create cost estimates for the project alternatives. In Table 7.1.1 of the main EIS document, some other options are noted as footnotes (which by the way, are mis-numbered and confusing **– please correct**). And by the time the information passes to the Executive Summary in Table ES.4, the footnotes are gone.

So, with this background, **what would table ES4 or Table 7.1.1 look like if, by 2050, the long term dredged material for the Managed Lake Alternative qualified for deep-water disposal, similar to the Estuary alternative?** Because the total amount dredged for all alternatives is based on the amount deposited by the Deschutes River over this 30-year period, the Managed Lake costs would be essentially the same as those for the Estuary Alternative, i.e., between $48M and $101M. In this case, if the conclusions regarding the quality of the sediments are reversed, the swing in overall project costs is between $200M and $345M.

Conversely, **what would the table look like if the long term dredged material from the Estuary Alternative did not qualify for deep-water disposal?** Per the footnote for Table 7.1.1, the Estuary Alternative would increase to between $367M and $660M. In this case, if the conclusions regarding the quality of the sediments are reversed, the swing in overall project costs is between $319M and $558M.

Considering the magnitude of the potential cost swings (up to one-half billion dollars) based on speculative and questionable assumptions, **why aren't the Planning-Level Cost Estimates expanded to include at least the "best case" for all alternatives and the "worst case" for all alternatives?**

Due to our concerns with this apparent bias and the lack of any nuance in the tabled long term cost presentation, we attempted to examine the Draft EIS to help us understand and better evaluate the relative sediment disposal costs used to establish the tabled ranges. Because we have been given the relative amounts for dredging each alternative, having the unit costs for the alternative disposal options would provide a check on the tabled ranges. Additionally, we have current unit cost information from actual current dredging operations by the Olympia Yacht Club to verify the Draft EIS numbers. Unfortunately, we were unable to find any information on the unit costs for the various dredging scenarios. Repeated questioning at the review meetings and open house options with the consultant likewise resulted in no unit cost information. Without this, we were unable to verify the cost figures in Tables ES4 and 7.1.1, or compare them with actual current disposal costs. Further, we do not understand how the costs presented in the tables could be developed without assuming unit costs, and are left with a lack of confidence in the basis for these numbers. **Please correct this deficiency or explain how the cost tables were created.**

Considering all the preceding issues, we have reached the following conclusions and recommendations:

The extremely large magnitude of these potential cost swings, the range of possible alternate disposal techniques developed through adaptive management, the fact that these costs are dependent on projections 30 years in the future, the lack of demonstrated support for the costs and the potential impact of unknown outside influences in the future, makes the long-term costs estimates for tables ES4 or Table 7.1.1 virtually meaningless, and certainly indefensible.

We recommend that the Table 7.1.1 be modified to eliminate the third column for 30-year maintenance costs and the fourth column for construction +30-year maintenance dredging totals. This would leave the second column, which includes design, permitting and construction costs. We will also have comments regarding these second-column costs, but because of their short-term nature, they are more defensible and provide the public with a clearer picture of the cost impact for the various alternatives.

We also recommend similar changes to Table ES-4 in the Executive Summary.

We recommend revisions to the qualitative discussions in the Sediment Quality Discipline Report, Chapter 7 and the Executive Summary for consistency regarding our "worst case/best case" comments, and with emphasis on the high probability that the dredge for the Managed Lake alternative in 2050 will not incur the high costs associated with upland disposal by truck.

The next comment for this section concerns the characterization of West Bay sediments as having **Substantial Beneficial Effects**, as described in Table E-2 of the Sediment Quality Discipline Report. This table states that "Minor to Substantial Beneficial Effects on natural recovery of contaminated sediments in West Bay that varies with level of existing contamination and deposition rate" for the Estuary Alternative. This is a mis-characterization that gives the Estuary and Hybrid alternatives an undeserved advantage.

First, there will be no "natural recovery of contaminated sediments" as all dredging for this long-term maintenance dredge is planned to be in sediment levels above the legacy contaminated sediments. All existing contaminated sediments will remain; there will be no recovery. Otherwise, this maintenance dredging would not qualify for deep water disposal, as concluded elsewhere in this section.

Second, the case for **Substantial Beneficial Effects** is also advanced for the Estuary and Hybrid alternatives because the contaminated sediments will be covered by the relatively clean sediments from future deposition, particularly in the southeast, east, and northwest portions of West Bay where contamination is highest. **How can this be a "Substantial Beneficial Effect" if the contamination is not removed, but simply buried under the new sediments?** Perhaps it could be characterized as a minor beneficial effect, but stating it to be substantial is a mischaracterization. Further, if we were looking at sediment deposition, similar to that in Capitol Lake, it might be reasonable to assume a minor beneficial effect due to layering of sediments. The layering of lake sediments might be more effective in the lake due to the one-way flowrate South to North and the relatively slow-moving currents in the wide basin. However, in West Bay, with the estuary, we have twice daily tidal flow in both directions, at times with relatively high velocity creating turbulence. And the nature of the largest sediment transporting events, which occur a couple times each winter during extreme Deschutes River flooding, would create additional turbulence. Therefore, the potential for sediment mixing is much greater here, and combined with the potential for upward migration of contaminants, raises questions of even the characterization

of a minor beneficial effect. **Considering this potential mixing of contaminated and clean sediments, how can a 'substantial beneficial effect' be determined?**

Also, in the Port area, the theory that the relatively clean new sediments will overlay the contaminated sediments and future dredging will only encounter clean material, is even more tenuous. We were reminded, in reviewing with the Port, that they service many extremely large vessels in the turning basin and along the Port docks. They describe the prop wash from these vessels and the tugs that position them as creating "a big mixing bowl" which disrupts the stratification that might otherwise occur. **Have you considered this Port experience in the analysis?**

Further supporting these comments is the experience of the most recent dredging operation, in the West Bay area, by the Olympia Yacht Club (OYC). Their dredge took place above the z-layer, with sediments that would be characterized as 'clean" by your sediment quality conclusions. Yet, 40 percent of this 10,000 cubic yard dredge did not meet deep water disposal requirements due to contamination and were disposed upland at a cost approximately five times more than deep water disposal ($145 per cu yd versus $30 per cu yd). This dredging experience also lends credence to our issues regarding the presentation of cost projections discussed in the earlier comment for this section. **Why wasn't this OYC dredging experience taken into account in the analysis?**

For these reasons, we ask that **the sections of Table E-2 for the Estuary and Hybrid Alternatives be changed to "No adverse impacts" or "Minor Beneficial Effects on natural recovery of contaminated sediments in West Bay that varies with level of existing contamination and deposition rate".**

Our third comment for this section relates to an apparent inconsistency in the Sediment Quality Discipline Report between the text on Page 2 (paragraph 3) and Tables E-1 and E-2. The text identifies a "**minor beneficial effect**" based on the reduction of high sulfides in the sediments in Capitol Lake. However, for all alternatives in Table E-1 and the Managed Lake alternative in Table E-2, the impact finding was "**No adverse impacts**". **Please explain or correct this inconsistency.**

UPDATED COMMENTS BASED ON ADDITIONAL COST DATA PROVIDED ON AUGUST 9, 2021

Now that we have the planning level cost estimates for maintenance dredging for each of the alternatives, the new information has raised additional concerns. Because our original Draft EIS comments were nearly complete prior to receiving the new information, we are continuing to provide these original comments so that you can see the progression of our concerns.

First, it should be noted that the headings on the Page 1 table 'High Level Summary' are mislabeled. **Please correct.**

We were surprised to see that the consultant had developed detailed maintenance dredging cost estimates for the Estuary and Hybrid alternatives for Upland Disposal. **Our basic question is, why wasn't this information provided or at least summarized in the Draft EIS and Executive Summary? (Other than in an obscure, mis-labeled footnote)**

We also noted that In-water disposal for the Managed Lake Alternative was not even a consideration, and labeled Not Applicable in the table. This is not surprising based on the Draft EIS statement in Chapter 7, on Page 7.4:

> "Upland disposal is the only feasible disposal option for material dredged under the Managed Lake Alternative because invasive species are expected to persist in the freshwater environment, at high densities similar to existing conditions."

Are NZMS expected to persist for 30 years? Are existing densities high? What evidence supports these conclusions? We have explained in detail in our earlier comments why it is unlikely that the NZMS will be present, or a significant factor when the time for the long-term dredge is required; or if it is still present, how adaptive management could be used to greatly reduce the cost. Apparently, these ideas were not even considered in the Draft EIS analysis. In fact, instead of considering disposal within the watershed, or dewatering on site and NZMS desiccation, followed by disposal locally or marketing as a soil amendment, the Draft EIS projected that the entire 472,000 cu yd would be transported 250 miles one-way to the Roosevelt Regional Landfill in Eastern Washington. **Do none of these ideas rise to the level of being a "feasible disposal option"? Should the author of the <u>Not Applicable</u> designation for in-water disposal of sediment 30 years from now have their crystal ball license revoked?**

Why did the Draft EIS fail to consider any options other than this $250 to $450M disposal option? Do the authors of this Draft EIS have so little confidence in DES, their consultants, other State Agencies, local Universities, community organizations (such as CLIPA), and the community at large to research, adaptively manage and creatively analyze this issue, <u>over the next 30 years</u>?

If, after reviewing all the comments submitted for this Draft EIS, none are found to be substantial enough to require a Supplementary Environmental Review, then isn't this issue alone sufficient to require such a review? We would find it incomprehensible that this Draft EIS could move to a final EIS without additional analysis. At a minimum, this analysis is necessary to recognize the high probability that the dredge for the Managed Lake alternative in 2050 will be substantially less in cost. Upland disposal in Eastern Washington by truck is a "worst case" scenario that unrealistically burdens the Managed Lake Alternative by as much as $350M.

HYDRODYNAMICS AND SEDIMENT TRANSPORT

Our first comment is one you have heard before, regarding flooding events for the various alternatives. After review of Chapter 4, we have concluded that there is not sufficient recognition of the value of current dam operating procedures in limiting high water (i.e., flooding) in areas adjacent to Capitol Lake. To briefly review our past comments, this flooding protection is accomplished by lowering the lake level and utilizing its storage capacity in anticipation of high river flows that would otherwise overflow the Arc of Statehood wall and any other low points around the lake. Please note that in Chapter 2, page 2-17, in the section describing sediment management, the following is stated:

> Within the 30-year project time horizon, the Capitol Lake Basin would still provide flood storage capacity, given project rates of sediment deposition and because flood storage capacity is largely controlled by early release of lake water through the 5th Avenue Dam.

After searching in the Chapter 4 Hydrodynamics and Sediment Transport Discipline report, we were able to find only one reference to this procedure after reading through 44 pages in the Existing Conditions section and a second comment at page 90 in the Modeling Assumptions and Limitations. However, in

Chapter 4, page 4.4, this flooding protection procedure is deemed to be insufficiently robust to remove the risk of flooding in every case, because the dam operations have the potential for failure. As a result, throughout Chapter 4, it is assumed that this procedure will not be used and therefore flooding will be more extreme in the Managed Lake alternative. Keeping in mind that a significant element of the Managed Lake alternative is refurbishing the Fifth Avenue Dam, we do not believe it is appropriate to reject this operating procedure, which has been effective in the past, and should be even more reliable in the future. The Lake Alternative should not be penalized 100 percent of the time due to the remote possibility of a mechanical failure. Although this Draft EIS does not provide sufficient detail regarding the dam refurbishment, it seems reasonable to conclude that spending nearly $5.7M in total cost for the dam overhaul for this work would include any necessary improvements in reliability and redundancies to essentially eliminate or greatly reduce the risk of failure.

And after all, the name of this alternative is the Managed Lake Alternative, and using the lake for flood storage capacity is the essence of adaptive management. **Why does the Draft EIS, and public statements by the EIS contractor (Daily Olympian August 1, 2021), continue to promote the idea that flooding due to the lake alternative is more severe than the other alternatives, and fail to recognize the obvious benefit of this long-standing procedure? How will removal of the dam (with its ability to mitigate downtown flooding by coincident high tides and heavy rainfall) be replaced by equivalent flood control capacity in the Estuary and Hybrid Alternatives?**

To correct this deficiency in the Chapter 4 analysis; Key Findings on Page 4-2, the text on the following pages and Figure 4.1.1 all require revision. Further, it would also be accurate and appropriate to state that under all high tide/high Deschutes flow conditions, the Managed Lake Alternative provides more protection from flooding than either the Estuary or Hybrid Alternatives, and sea level rise will make high tide flooding more severe and frequent. **Appropriate corrections are also required for the Chapter 4 Executive Summary and in section 4.8 Land Use, Shorelines, & Recreation (Key Findings and 4.8.4.1).**

Our second comment for this section is to ask for more information to allow the public to better understand the maximum velocity of the water through the new 500-foot opening for the Estuary and Hybrid Alternatives. This is important to help evaluate boating and other recreation opportunities throughout the tidal cycle. The consultant has provided substantial information on maximum depth-averaged velocity, but it is not clear how this relates to the surface velocity, which is probably most important to the public. Tables 4-22 and 4-23 show the maximum velocity through the 500-foot opening (observation point NB06) under two extreme scenarios as 1.36 and 0.79 meters per second. Conflicting with these numbers is Table 4-26, which shows 2.2 and 0.5 meters per second for the same scenarios.

Here is where we have a problem. In the Fall of 2006, the consultants for the CLAMP study used an earlier version of the Delft3D computer model to perform a similar "Hydrodynamics and sediment Transport Modeling Report". General Administration, now DES, provided Fact Sheets for the public to help understand the findings from this feasibility study. In CLAMP Fact Sheet #4, they stated:

> "…the restriction points of 5th Avenue, Burlington Northern Santa Fe railroad trestle, and interstate 5 would need to be reinforced to resist scour during flood or extreme tidal events. At those times, velocities up to 16 feet per second are predicted."

Converting this velocity from feet per second to meters per second, we find the CLAMP study prediction is 4.9 meters per second, or about four times greater than the current EIS consultants' estimated velocity in Tables 4-22 and 4-23. **Which of these projections are correct? What is the practical impact of this velocity on safe operations at these constriction points?**

This discrepancy between the CLAMP study and the Draft EIS needs to be resolved. More important, however, is to put this velocity in perspective with respect to kayaking, canoeing or waterboarding through these constriction points. **What percentage of the time will these activities be curtailed, both during high flow and also low water conditions? Will warning signs or restrictions be needed to ensure safe operations? How will restrictions be enforced?** These are all questions that need to be addressed, and compared/contrasted with the benign boating situation in the Managed Lake alternative.

WATER QUALITY

CLIPA would like to acknowledge the willingness of the consultants for the water quality discipline report (Herrera Environmental Consultants, Inc.) to look beyond the historical conditions in the Capitol Lake Basin and Ecology's questionable conclusions regarding the impact of the discharge from Capitol Lake on the water quality of Budd Inlet. The consultant's use of current sample results and the questioning of Ecology's analysis and conclusions has shed a new light on the improving water quality in Capitol Lake. CLIPA and our water quality consultants have been in the forefront of this analysis for several years, and it is rewarding to see that much of our work is now being accepted.

Again, to quote from the Executive Summary of the Draft EIS, Page 12:

> "As part of the water quality analysis for the Draft EIS, the EIS Project Team evaluated monitoring data from 2004 to 2014 and also collected water quality samples in 2019 to compare current conditions against the historical dataset. Despite what has been perceived to be worsening conditions in Capitol Lake, monitoring data indicate that water quality conditions have actually been improving in the lake and are relatively good in terms of physical and chemical characteristics important to aquatic life. There are only occasional seasonal violations of water quality standards, primarily associated with slight changes in temperature and dissolved oxygen."

And:

> "These improving water quality trends reduce the level of management that would be needed under a Managed Lake Alternative to meet lake management objectives."

And further, with regard to Ecology's conclusions for water quality (particularly dissolved Oxygen [DO]) in Budd Inlet due to the lake discharge, we agree with the consultant's summary statement in the water quality discipline report, Page 4-41:

> "Overall, the differences between predicted TOC concentrations and measured concentrations, the atypical year that was used to calibrate the model, and the apparent lack of a relationship between the onset of DO problems and changes in TOC, contribute to uncertainty in interpretation of TOC results. This is exacerbated by the general lack of TOC data, i.e., data from

just 2 years that were separated by a period of over 10 years and during a time when lake conditions appear to have been changing. Comprehensive monitoring of the lake was last completed over 15 years ago and there have been significant changes in water quality over the past decades. Ecology (2012) (based on data from 1988 to 2008) indicated there were measurable trends in water quality in the river. The analysis of more recent data (based on 2004 to 2014 data reported in this study) indicates there have been improving trends in both the lake and river during that time. This implies that the water quality conditions may have changed since the modeling effort."

The consultant calls for a closer examination due to this uncertainty. We agree with this, and encourage the consultant to review the detailed report "Assessment of Water Discipline Section 4: Affected Environment [AE]", prepared specifically for the Draft EIS comment request, by David H. Milne, PhD. (Faculty Emeritus, TESC, Environmental Studies). This report is provided in its entirety in the Appendices Section.

Key elements of Dr. Milne's report include:

- Capitol Lake does not have the widespread negative effect on Budd Inlet shown in the water quality discipline report, Figure 4-13

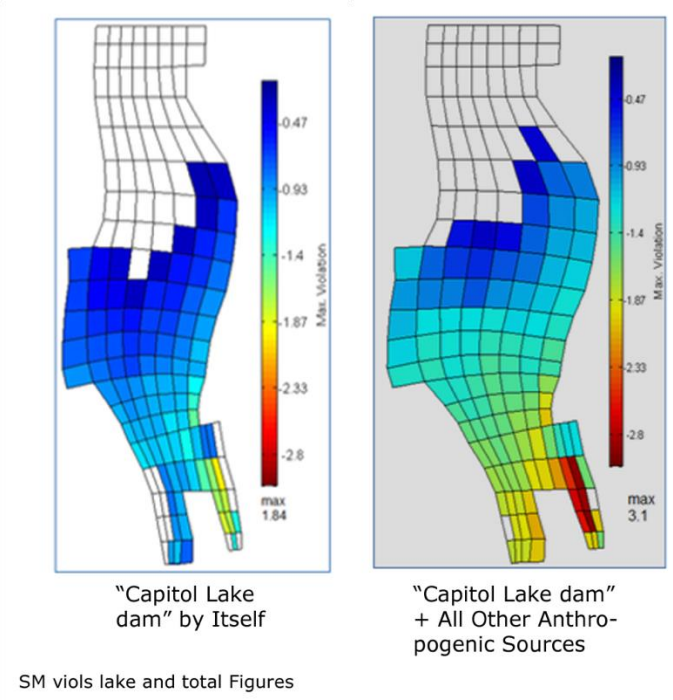

Figure 4. "Model Predictions of DO Depletion (mg/L) From (a) the Cumulative Anthropogenic Effects and (b) Solely Due to the 5th Avenue Dam

- Capitol Lake does not contribute more TOC to Budd Inlet (in total, and in particular during the growing season) than would an estuary.
- Many of Ecology's conclusions are in error, because the extent of WQ violations attributable to Capitol Lake and throughout Budd Inlet are based on an assumption of accuracy that the model doesn't possess, on DO calculations that fail to portray critical shallow bottom water oxygen

production by benthic algae in East Bay, and do not show the extent of WQ violations in "natural" (pre-dam) Budd Inlet.

AQUATIC INVASIVE SPECIES (AND IMPERILED AND NUISANCE SPECIES)

General Questions

Why is removal of freshwater invasive species from the Lake not compared with arrival of marine invasive species in the Estuary alternative?

Estuaries are veritable hotbeds of invasive species, brought there by shipping and other human activities. Heads of estuaries (as the Lake basin would become) are among the most species-impoverished of all familiar aquatic environments and are wide open to new invasions by every newly introduced species everywhere around the entire Salish Sea. (Several new marine invaders, including the purple varnish clam, are presently moving down-Sound in the direction of Budd Inlet.) The Lake is a species-rich environment isolated by intervening land from easy entry by new freshwater invasive species.

Species-rich ecosystems are inherently much more resistant to invasive species establishment than are species-poor ecosystems.

Destroying the Lake and its invasive species would bring an equal number of marine invasive species – or more – to the basin.

What, if any, advantages would be obtained by replacing the very high species diversity of the Capitol Lake ecosystem with the very low species diversity of a replacement estuary? What disadvantages?

In Chapter 4, Page 187, the Draft EIS maintains:

> "The action alternatives would create long-term changes in habitat quality and distribution, with a greater diversity of habitat types, including tide flats and estuarine wetlands under the Estuary and Hybrid Alternatives compared to the Managed Lake Alternative, which would have primarily freshwater wetlands and deep freshwater habitat types.

Does this diversity of habitat types translate to species diversity? Apparently not, as described in the following comments about the heads of estuaries, from Estuarine Ecology, by John Day, et al:

Heads of estuaries have the lowest species diversity of any familiar aquatic ecosystems; about 25% that of lakes and shallow ocean waters and about half that of mid-estuarine waters. (Day et al, 1989) Ecosystems with high biodiversity are much more resistant to establishment of invasive species than those with low biodiversity. (Day, John W., Charles A. S. Hall, W. Michael Kemp, and Alejandro Yáñez-Arancibia. 1989. Estuarine Ecology. John Wiley & Sons, New York. 558 pp)

New Zealand Mud Snail Specific Questions and Comments

When was the last lake wide survey of the distribution and abundance of New Zealand Mudsnails (NZMS's) made in Capitol Lake? What were the findings?

The last lake wide survey that determined snail population densities was (to our knowledge) in 2011 (Johannes 2011, data first examined in 2016). (Johannes, Edward J. 2011. Distribution Survey for Potamopyrgus antipodarum (New Zealand Mudsnail) in the North and Middle Basins of Capitol Lake, Thurston County, Washington. Final Report Contract #FAC 10-026. Prepared [by Deixis Consultants] for General Administration Facilities Division, Olympia WA).

Do we have recent comparable data for assessing population changes?

Do populations of NZMS's live in any of the creeks, open waters, and wetlands crossed by or adjacent to the railroad tracks going from Capitol Lake to Chehalis?

This question bears on the possibility of spreading the snails to new waters by transport of sediment by rail cars. If the snails are already present, there is no new environmental risk even if the snails are known to be harmful. If the snails are not really harmful, there is no environmental risk whether they are present or not.

What population densities of living NZMS's are found in bottom sediment from the areas that will need to be dredged to maintain a "Managed Lake?" Where can those data be obtained? (This bears on the next question.)

Dredged sediments will contain large numbers of dead shells from many years past as well as a lesser number of live snails of the present generation. Knowing the numbers of living snails per m^3 of sediment bears on the next question.

What threshold level of living NZMS's in dredged sediment would be considered hazardous enough to warrant isolating the dredged material on land (vs dumping it in deep marine water)? What is the population density threshold below which the risk can be deemed minimal?

What ecological or other problems (e.g., biofouling) have NZMS's caused in Western Washington? Where have those other problems manifested themselves?

A widespread early rumor that they caused massive biofouling in the Idaho Power System's cooling water intake proved false. ("In the summer most of the [fouling] material is aquatic plants that are being moved downstream by flow. We have no idea how he [Johannes] might have estimated that half of the weight is P. antipodarum." Pers. comm., Ralph Myers, Idaho Power Environmental Affairs, March 2017. [Johannes made this estimate but he himself couldn't remember where he'd heard it. Pers. comm. About 2017] Many such alarming statements proved false after that time.

Please engage an out-of-state consulting firm to review all published literature identifying problems caused by NZMS's in Washington State (if any), also review evidence from personal experience by field personnel where obtainable and reliable, and render a judgment on whether the snails are menacing enough to warrant strenuous expensive efforts to control their spread. *Said consultant to begin work immediately and report to the EIS writers in time to inform their statements about management of the Lake Alternative in the final EIS*.

Independent expert opinions should be sought from authorities who are not employed by Washington State agencies (WDOE, WDFW, WDNR, DES, etc.) and who have not been affiliated with those agencies by consulting or in other ways in the past. The agencies themselves could find it difficult to abandon a narrative ("the snails are an eco-menace") that they have promoted for a decade and in-state consulting

firms might be reluctant to disagree with agencies that might employ them in the future. A truly independent, unbiased judgment should be sought.

This is the KEY QUESTION. **Are New Zealand Mud Snails, contrary to their reputation, actually so harmless that the EIS need not consider them?**

This question is raised because it is CLIA's opinion that they are harmless. If so, many very costly actions taken for granted by the DEIS would be unnecessary. The following presents evidence that they are, in fact, harmless in western Washington State.

Because of the overriding cost implications of the likely status of NZMS for sediment disposal, we are providing the following detailed analysis supporting CLIPA's position that NZMS are harmless.

Summary of key points

- Native predators in Capitol Lake eat introduced NZMS's and keep their numbers low.
- NZMS's were present in Capitol Lake for several years before their "discovery" in October 2009; during those years waterfowl and boaters on the Lake did not spread them to any other nearby waters.
- NZMS's are present in at least 30 other locations in Washington State. No ecological or other problems caused by them have (to my knowledge) ever been reported.
- NZMS's have no genetic ability to evolve resistance to native predators, or to adapt to changing climate, or to adapt to any other adverse or favorable environmental factors.
- Where NZMS's have increased to huge abundances, their numbers have dropped back to low levels, a pattern seen in the population histories of many newly introduced species.

Introduction.

The initial reaction by state agencies when NZMS's were first "discovered" in Capitol Lake was one of hysteria. In the words of WDFW workers;

> "In addition, NZMS are relatively recent invaders to the United States and their potential invasive harm *continues to evolve with each new location* in which they become established, *developing relationships with other invasive species*, *and the effects of climate change*." (Pleus and Schultz, 2015; emphasis added by me)

Many similar mistaken claims were made about how abundant they would become, how easily they would be transported to other lakes by waterfowl *and boaters*, how disruptive they would be in native ecosystems (e.g. fish would eat but couldn't digest them and so would lose weight), how native species couldn't cope with them, how fast they would multiply, and the like. The Lake was closed to the public,

the dock in Marathon Park where they were first "discovered" was immediately dismantled, and signs warning of the "hazard" they pose were posted around the Lake. Today, 12 years later, the Lake is still closed to public use on account of the snails.

Since then we've learned the following – all of it supportive of the idea that the snails are actually harmless. "Losers," in a real way.

Details

Introduced NZMS's have no genetic ability to adapt to native predators, climate change, or any other hostile or beneficial environmental feature.

The NZMS's in Capitol Lake are all descendants of a single female. They reproduce asexually and are all genetically identical. They have zero ability to evolve defenses (thicker shells, protective coloration, distasteful flavor, cryptic behavior, etc.) against native predators or to adapt to any other environmental factors, including effects of climate change. The claim quoted above (Pleus and Schultz) is grotesquely mistaken.

Many native species in Capitol Lake were able to eat *and digest* NZMS's from the moment the snails were first introduced to the Lake.

One initial fear of wildlife biologists was that the snails, with their ability to close their shells and pass through predators undigested, would a) enable NZMS's to spread as the predators – specifically ducks – moved to other water bodies, and b) starve the predators that mistook them for suitable prey, with consequent weight loss and malnourishment. But Capitol Lake is home to many predators that can eat and digest them. Our native signal crayfish crushes its prey and eats it, and actually prefers NZMS's to native prey in experimental tests (Brenneis et al, 2011). Mallards, all other dabbling ducks, Canada geese, and four species of native fishes – redside shiner, riffle sculpin, largescale sucker, and peamouth minnow, known from studies elsewhere to eat snails – can also digest them. The fishes and ducks have "pharyngeal teeth" and gizzards, respectively, that break up snail shells. Predation by these species and others is almost certainly the reason why folks looking at clear pale surfaces (stones, white plastic, etc.) in Capitol Lake almost never see a NZMS. (Brenneis, Valance E. F., Andrew Sih, and Catherine E. de Rivera. 2011. Integration of an invasive consumer into an estuarine food web: direct and indirect effects of the New Zealand mud snail. Oecologia 2011: Sep; 167(1): 169-179. Available on line athttp://www.ncbi.nlm.nih.gov/pmc/articles/PMC3155678/)

Some native predators really do lose weight when consuming introduced NZMS's – but they can evolve ways of overcoming that handicap.

Rainbow trout (lacking pharyngeal teeth) are native predators that have been shown to lose weight when fed only NZMS's (Vinson & Baker, 2008). But as sexually reproducing animals, they also have the potential for overcoming that constraint. In New Zealand, they actually did so. Introduced there (where NZMS's are native) in ~ 1885, rainbow trout did not thrive at first. But they soon became much better adapted to their new habitat. In the 1990's events occurred that resulted in a population explosion of NZMS's in Lake Aniwhenua. The snails blanketed the bottom and crowded out nearly every other benthic species that trout could use as food (Wells & Clayton, 2001). The rainbow trout in the lake, with nothing else to eat but NZMS's for about four years, grew huge and healthy and made the lake a magnet destination for trophy fishermen and -women for years. A classic picture shows one of the huge rainbows the anglers

were catching. A similar picture shows a NZ fisherman with a gigantic brown trout – another introduced species that became adapted to eating NZMS's. After the Lake's NZMS population was obliterated, sizes of trout there returned to normal.

Rainbow trout in Capitol Lake have been exposed to NZMS's for about 20 years now. They may already be adapted to preying on these snails … as may other native predators that could not initially digest them. *(*Vinson, M., and M. A. Baker. 2008. Poor growth of rainbow trout fed New Zealand Mud Snails *Potamopyrgus antipodarum*. North Am. J. Fish. Manag. 28: 701-709.Wells, Rohan D. S., and John S. Clayton. 2001. Ecological impacts of water net (*Hydrodictyon reticulatum*) in Lake Aniwhenua, New Zealand. New Zealand Journal of Ecology 25(2): 55-63.)

NZMS's are rare in Capitol Lake (and in Lake Washington).

In winter 2009-2010 an acquaintance dug up a few square feet of Capitol Lake sediment during a drawdown. After examining that sample, it was found to have only a few scattered NZMS's. Since then we have watched for them by looking from the walls, the bridge, and other vantage points – and, even knowing what we were looking for, have never seen one. A few years ago, a colleague obtained a permit from DES to find NZMS's in Capitol Lake and show them to a visitor from Argentina. The two had great difficulty even finding them (they were always rare and always on the undersides of stones) and asked "Why are these things considered a menace?" A colleague up at Lake Washington, where the NZMS's appeared a little before their "discovery" in Capitol Lake, had the same question.

In both lakes, NZMS's have not lived up to claims made about how abundant they would become.

NZMS's were present in Capitol Lake – and not noticed – long before their "discovery" in 2009. [*This fact negates two alarmist claims made about the snails; see below*.]

The first reported NZMS's were "found" at Capitol Lake's Marathon Park on October 22, 2009. A year and a half later (June, 2011) a mollusk expert (Ed Johannes, Deixis Consulting) surveyed the Lake for the DES to determine the presence or absence of NZMS's at 31 locations. Five years later (2016) the Lake protection association (CLIPA) hired Mr. Johannes to reexamine the samples and count the snails in each of them.

The snails probably entered the Lake at Heritage Park about 2001 and had already spread southward past the Marathon Park "discovery" site by October 2009.

NZMS's were in the Lake for eight years before the Lake was closed – and were never spread to other water bodies by waterfowl or public users of the Lake.

Surveys of the nearest 85 ponds, streams, and lakes within five miles of Capitol Lake by Johannes in 2010 showed that none of these other water bodies had NZMS's in them, despite fully eight years (2001 – 2010) of public boating and waterfowl overwintering in nearby Capitol Lake before the Lake was abruptly closed. **The hazard of transporting the snails to other waters is nonexistent. The closure of the Lake for fear of spreading the snails to other waters is unjustified.** (Johannes, Edward J. 2010b. Survey for Potamopyrgus antipodarum (New Zealand Mud Snail) within a five-mile radius of Capitol Lake, Thurston County, Washington. Final Report [by Deixis Consultants] Contract #10-1908. Prepared for: Washington Invasive Species Council, Washington State Recreation and Conservation Office, Olympia Washington.)

Where NZMS's have been able to establish huge population densities, they have soon dwindled back to scarcity.

Early worries were voiced that the snails would become so numerous on the bottom that they would displace the prey organisms of native predators. A common (not universal) feature of populations of introduced species is a huge "spike" in numbers followed by a huge drop in numbers back to a low level that persists from that time, as exhibited by NZMS's in the Columbia River estuary. First noticed in 1990 near the Astoria Yacht Club and thereafter sampled near-yearly, they exploded in numbers to about 250,000/m^2 in 2000, then dropped back to 50,000 /m^2 the next year, then dropped to a few thousand per square meter during the years after that. That pattern is a common feature of introduced species presence in newly invaded habitats. Initial scarcity – then a population explosion – then a precipitous drop as native predators "notice" the intruders and start seeking and eating them. The intruder population is decimated and – especially for species like NZMS's that can't adapt to the native predators – the predators get better and better at finding and eating the new species.

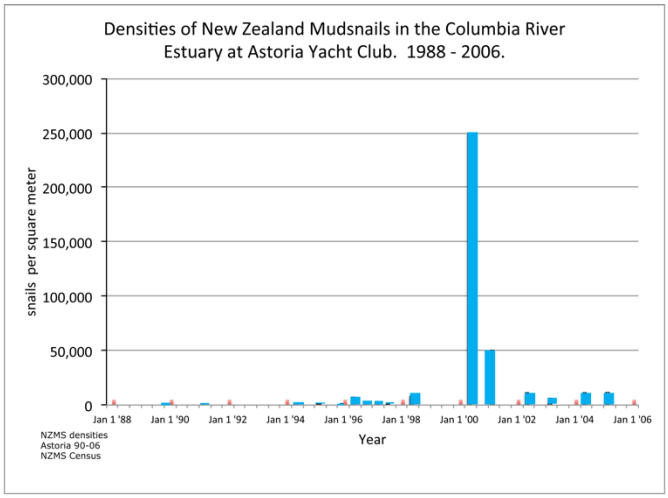

Figure 1. Outbreak, then collapse of NZMS population in Columbia River near Astoria. Bersine et al, 2008. (This graph has converted Bersine's log-scale graph to this one with an arithmetic scale for better visualization of the "spike" in population density.)

The snails existed at a population density of some 17,000+ per square meter at Heritage Park in 2011 (Figure 1). If they existed at that density today, there would be about 2 snails on every square centimeter of bottom at present. None can be seen on the bottom there today, (Source: Bersine, K., V.E.F. Brenneis, R.C. Draheim, A. Michelle Wargo Rub, J.E. Zamon, R.K. Litton, S.A. Hinton, M.D Sytsma, J.R. Cordell, and J.W. Chapman. 2008. Distribution of the invasive New Zealand Mudsnail (*Potamopyrgus antipodarum*) in the Columbia River Estuary and its first recorded occurrence in the diet of juvenile Chinook salmon (*Oncorhynchus tshawytscha*). Biological Invasions 10:1381-1388.)

NZMS's are present in at least 30 other locations in (mostly western) Washington. We know of no reports that they have ever caused problems in those places. Locations that come to mind are Lake Washington, a pond at Ocean Park, and Blue Slough on the Chehalis River. (http://nas2.er.usgs.gov/viewer/omap.aspx? SpeciesID=1008)

Purple loosestrife Specific Questions and Comments

Please prepare an alternative estimate of the costs of dredging and handling of Lake sediments if it were discovered that both New Zealand Mudsnails *and* Purple Loosestrife were harmless and required no special precautions.

If purple loosestrife is not now or likely to pose a threat to nearby ecosystems, expensive precautions to prevent its spread would be unnecessary. The following questions examine whether purple loosestrife is unlikely to create problems elsewhere if seeds of these plants are present in Lake sediments.

- **What recent research on the abundance of purple loosestrife at Capitol Lake has been cited as a reason for restricting sediment disposal and transportation options to avoid spreading its seeds**?

  As a result of a sustained eradication effort started in 1988, purple loosestrife is now almost entirely absent from the shores of Capitol Lake and the Deschutes River (citation available). It is likely that the last plants will be gone by the time dredging for any of the Alternatives begins, several years from now.

  A survey of the Lake shores by the author and a colleague (August 8, 9, and 12, 2021) showed that these plants are even scarcer today than they were in 2018. (See the DEIS purple loosestrife distribution map for 2018 shown here, updated to 2021; DEIS Figure 3.4.1). All plants found in the survey are near the I-5 bridge or farther south, most of them are some 100 feet from the South Basin shore at Tumwater Historical Park and unable to easily seed Capitol Lake waters. (One plant, easily removable, is at water's edge on the east shore of the Deschutes River near the old brewery building.) All are present in small patches or as single individuals. These plants are flagged for removal, which will probably happen this year (2021). Their increasing scarcity and confinement to the south end of the Lake has probably diminished the presence of their seeds in the sediments.

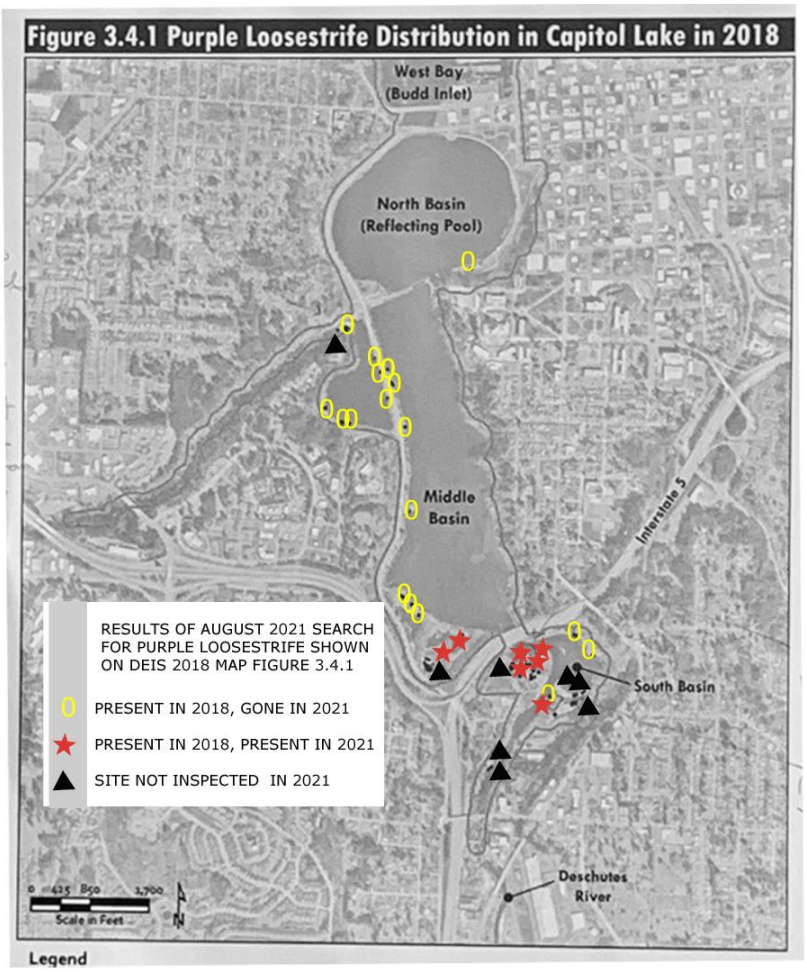

Figure 1. Diminished presence of purple loosestrife at Capitol Lake. 2021. Yellow: Present in 2018, absent in 2021. Red: present in 2018, still present in 2021. Black: present in 2018, probably absent at Percival Creek (upper).

- **Do purple loosestrife seeds sink? Accumulate in bottom sediments? If so, how long do purple loosestrife seeds remain viable in lake bottom sediments?**

  With purple loosestrife near extermination at this time, a year remaining to finalize this EIS, and several years' lag time between the finalization and the beginning of any dredging, the last seeds now remaining in the sediments (if any) will probably be dead. The likelihood that the last viable purple loosestrife seeds will be gone by the time dredging for any of the alternatives begins has huge significance for the cost of any Lake Basin dredging.

- **Are purple loosestrife seeds present in Capitol Lake sediments? If so, what percent of them are viable?**

  Please have an impartial expert (say, a palynologist) examine samples of Lake sediments for evidence of viable purple loosestrife seeds. (An expert would be needed; the seeds are the size of small sand grains.) Sediment samples might already be available from recent studies (oil spill, brewery source; sewage, Percival Creek source; bathymetry study, etc.)

- **What would be the cost of sediment disposal in the Managed Lake alternative if purple loosestrife seeds were absent or could be regarded as harmless?**

  Please provide this information in the final EIS.

Eurasian Milfoil Comments

As described in Chapter 3, Page 3-51:

> "[Eurasian Milfoil] …is likely not significantly impacting native wildlife or recreation in and around the Capitol Lake Basin based on its current abundance and the aquatic plant habitat diversity."

It was effectively treated in 2004 with Triclopyr, and since that time has been kept under control by hand pulling where it has reappeared. These minimal maintenance procedures should continue to be effective in the future.

Imperiled And Nuisance Species Specific Questions and Comments

Northern Pikeminnows

What would be the statewide impact on native Northern Pikeminnows (*Novumbra hubbsi*) if Capitol Lake were replaced by an estuary?

This is the only species of fish that is endemic to Washington State. Its geographic distribution includes streams and shallow ponds on the west slope of the Olympics (but also includes Lake Ozette) with its southern boundary reaching Capitol Lake. Known occurrences over its former range have been decreasing during the past decades (Mongillo and Hallock, 1999).

Although this species lives in Capitol Lake (Entranco 1997, also Herrera 2004), it was dismissed by the CLAMP Report (Hayes et al, 2008) in a footnote claiming that the Lake "is not its typical habitat." (However, it actually lives there and "typical habitat" as described by Page & Burr (2011) and others reads like a description of Capitol Lake.)

Citations: Mongillo, P. E., and Hallock, M. 1999. Washington State Status Report for the Olympic Mudminnow. Washington Department of Fish and Wildlife; Fish Program. Olympia, WA. 43 pp.

Hayes, Marc P., Timothy Quinn and Tiffany L. Hicks. 2008. Implications of Capitol Lake Management for Fish and Wildlife. Report prepared for Capital (*sic*) Lake Adaptive Management Program Steering Committee by The Washington Department of Fish and Wildlife. 92 pp

Page, Lawrence M. and Brooks M. Burr. 2011. Peterson Field Guide to Freshwater Fishes.

Entranco, 1997. 1997 Capitol Lake Drawdown Monitoring Results. Report Prepared for the Capitol Lake Adaptive Management Plan [=CLAMP] Steering Committee. Bellevue, WA.

Herrera Environmental Consultants, Inc., 2004. Capitol Lake Vertebrate and Invertebrate Inventory. Prepared for the Washington Department of General Administration, Division of Capital Facilities. Seattle, WA. 76pp.

Freshwater Mussel

What would be the statewide impact on the native freshwater mussel *Anodonta oregonensis* if Capitol Lake were replaced by an estuary?

This species, first discovered in Capitol Lake on October 22 2009, has been disappearing over its entire range in the West, including Washington waters (Nedeau et al, 2009).

Nedeau, Ethan J., Allan K. Smith, Jen Stone, and Sarina Jepsen. 2009. Freshwater Mussels of the Pacific Northwest. Second edition. The Xerces Society, Portland, OR. 51 pp

Vaus's Swift, Purple Martens

What would be the statewide impact on Vaux's swift and purple martens, insectivorous birds said to be imperiled in the CLAMP 2008 report but not mentioned in the DEIS?

Dragonflies

What impact on dragonflies (and potentially on mosquito control) would replacement of Capitol Lake with an Estuary create?

Dragonflies are not addressed in the DEIS. These easy-to-overlook but common consumers of mosquitoes live as immature forms for a year or more on lake bottoms with sufficient oxygen before emerging to become flying adults. With all other lakes in Thurston County experiencing zero dissolved oxygen at the bottom during the summers, Capitol Lake provides by far the best and most extensive open-water dragonfly habitat in our county.

Western Pond Turtles

Are there state-listed Western Pond Turtles in Capitol Lake? Could the Lake provide habitat for this scarce and imperiled species?

If removing the Lake destroys potential suitable habitat for Western Pond Turtles, that would be a serious loss and negative impact.

Saltmarsh Mosquitoes (Nuisance Species)

What is the likelihood that the Estuary alternative will unleash saltmarsh mosquitoes on our communities?

Washington's saltmarsh mosquitoes (Ochlerotatus [Aedes] dorsalis) are day-biting far-flying "vicious" mosquitoes that rise to (sometimes "extreme") nuisance proportions in Pacific and Island counties. The Olympia area is fortunate that this species is not found here and other species are not common enough to be bothersome.

With diminished populations of bats, swifts, and dragonflies, and in the presence of saltmarshes created by the Estuary alternative, what is the likelihood that these factors will introduce that species to our area? (citations available upon request)

FISH AND WILDLIFE

Background

The dam creating Capitol Lake protects its waters, habitat, fish and wildlife, and shorelines from the substantial contaminants currently and continuously pervasive in the waters of Budd Inlet.

If the dam is removed, the toxics from Budd inlet derived from shore, groundwater, bottom, run-off from the surrounding area, and southward flow of Puget Sound would infiltrate what is now **a virtually toxic free Capitol Lake**. The touted ecological function of "mixing of freshwater with marine water", would likely become a significantly harmful characteristic to the entire basin of 264 acres.

Capitol Lake will become a Terminal Urban Estuary. According to several public health officials interviewed (state and county), Terminal Urban Estuaries are well known for unusually high contamination. The Capitol Lake Terminal Urban Estuary would be the southern-most estuary of Puget Sound and would be especially vulnerable to a variety of toxics currently and continuously affecting Budd Inlet.

As mentioned in Governor Inslee's ***Southern Resident Orca Task Force Report*** of November 2018, "**Moreover, the survival of juvenile Chinook salmon from these urbanized estuaries was 45% lower than Chinook collected from uncontaminated estuaries."** (p.31)

Consider the following from the same report :

1. Adult Chinook salmon are a major source of persistent toxic chemicals to Southern Resident Orcas. (p.30)

2. In particular, toxics can reduce juvenile Chinook salmon survival by reducing their growth and making them more susceptible to disease. (p.30).

3. High levels of persistent toxic contaminants including PCB's, PBDE's, and DDT's are present in the blubber of Southern Resident Orcas potentially resulting in harmful health effects including alterations in hormone levels, reproductive disruption or miscarriages, reduced immunity to diseases, neurotoxicity, neurobehavioral disruptions and cancer. (p.31).

4. Isolation from these toxins should provide a lesser likelihood that these disease inducing toxins will find their way into the tissues of Southern Resident orcas via the food web (p. 30).

The following questions immediately come to mind:

Why are these findings, which are so important to our vulnerable Southern Resident orcas, not mentioned in the DEIS?

Why weren't the negative aspects of a Terminal Urban Estuary mentioned in the DEIS?

Why would we choose to contaminate the virtually toxic free Capitol Lake basin?

These Chinook are also consumed by humans, especially tribal members. (According to Nate Tyler- council member Makah Indian Tribe, Amy Grondin- commercial fisherman and co-owner , Duna Fisheries, and Chris Wilke--executive director, Puget Soundkeeper Alliance "tribal communities consume fish at a higher than average rate.")

Without the Dam, a New Aquatic (Toxic) Environment for Capitol Lake Basin

Health warning signs at Budd Bay adjacent to Mission Creek

Dozens of these warning signs exist throughout Budd Bay and will likely need to be placed around the Capitol Lake Basin

At least five sources <u>continuously</u> supply contaminants to Budd Inlet:

- Urban stormwater runoff, (PAH's, PCB's, CEC's)
- Effluent from LOTT Cleanwater Alliance, (PBDE's, PCB's –low concentrations, CEC's)
- Southern Puget Sound marine flows flowing south,
- Turbulence induced mixing of sediment and legacy toxics by large port vessels in the turning basin.
- Legacy industrial pollutants from toxics clean-up sites. (Listed below from Washington Department of Ecology Website.)

An additional four closed sites continue to leach contaminants into Budd Inlet:

- Reliable Steel site: (Westbay Drive)
    - Gasoline-diesel or oil range petroleum hydrocarbons in soil or Budd Inlet sediments Toxic metals – arsenic, cadmium, copper, lead, mercury or zinc in soil groundwater, stormwater runoff or sediments.
    - PAHs or Carcinogenic PAHs – in soil, stormwater runoff or sediments.
    - PCBs – in soil.
    - Phthalates – in stormwater run-off and sediments.
- Industrial Petroleum Distributors site: (Westbay Drive, formerly ARCO):
    - Petroleum hydrocarbons from petroleum leaks and spills.
- Solid Wood, Inc. : (Westbay Drive just north of 4th Ave., owned by city of Olympia):
    - Total petroleum hydrocarbons.
    - PAHs.
    - Metals – exceeding standards for soil and groundwater.
- Cascade Pole site: (north end of Port peninsula):
    - Creosote contaminants – soil and groundwater.

Please address the contamination problems posed by the estuary/mudflat. They appear to have been inadequately investigated. Please answer: **1) What will be the expected carcinogenic effects (to humans and other species) of introduced West Bay Toxics? 2) The DEIS suggests that "future clean-ups are planned to address this contamination". Considering that the State is over 25 years late in dredging and maintaining Capitol Lake, how can we be sure they will address this issue in a timely manner? 3) Ecology lists five sources of toxics in Budd Bay (mostly continuous). How will the <u>continuous</u> nature of these toxics be stopped?**

Under an estuary (or hybrid option) introduction of these contaminants into the Capitol Lake basin will unquestionably create serious problems to all living organisms (please note picture above).

Because this contaminant problem will very likely do the following, please make the corrections in the Executive Summary listed in bold type.

1. Negate virtually all ecological advantages (such as "mixing" and habitat improvement") to the estuary. **Page 30, Water Quality. Add "significant impact" to estuary .**
2. Discourage community use of this resource. This includes shellfish harvesting, fish harvesting and any form of recreation. **Page 32 Land use, Shorelines, and Recreation. Add "significant impact" to estuary.**
3. Pose a public health threat where none currently exists. **Same as 2 above.**
4. Negate any advantages of an estuary to shorebirds and wading birds in the Capitol Lake basin. **Page 31, Fish and Wildlife, estuary, regarding salmon, anadromous species, and marine fish, due to contamination, change from "substantial beneficial impacts" to "substantial impacts"**
5. Negate virtually all asserted water quality advantages to the estuary due to toxic contamination. **Water quality, estuary, page 30, add "significant impact due to introduction of toxics". Please answer: How can good water quality be improved if it is becoming contaminated with multiple toxics?**

6. At least partially or totally make meaningless the value of tribal shellfish harvesting and fishing in “usual and accustomed places and stations”. Thurston County Health regulations and proximity to LOTT will make the above activities meaningless.
7. Substantially reduce the value asserted in the DEIS of an estuary regarding Fish and Wildlife. **Why isn’t this problem presented, addressed, and clarified in the DEIS. Same as #4 above.**
8. Negate the asserted aesthetic advantage to the estuary. (Dozens of warning signs for toxics and entrapment would be necessary negating the “unified and harmonious” attribute). **Page 33, Visual Resources, estuary, Change “less than significant” to “significant impact”.**

Please explain in detail why any of the above eight statements are not true and reduce the current estuary overvaluing assessments (found in the tables of the Executive Summary) in the DEIS to what is recommended above. Not recognizing the serious nature of infiltration of toxics into the Capitol Lake basin is indefensible as it misleads the public and its decision-makers.

In the final or supplemental EIS report, please state the following at least in the Executive Summary, “The dam creating Capitol Lake protects its waters, habitat, fish and wildlife, and shorelines from the contaminants currently and continuously pervasive in the waters of Budd Inlet. Removing this barrier will be detrimental to water quality, fish and wildlife, habitat, and ecological processes in Capitol Lake basin. This is a ‘significant impact’.

Mudflats are Deemed Dangerous by Thurston County Health Department

As the warning advisory on the right side of this photograph in Ellis Cove demonstrates, at low tide, mudflats are dangerous. The public will need to be advised to keep off the mudflats with multiple signs in Capitol Lake basin.

Priest Point Park signage referencing Ellis Cove

Advisory reads: “Water and Soil Pollution. Shower after contact with sand or water from this area.” Please note the “Caution At Low Tide, Mud Flats Are Dangerous PLEASE KEEP OFF”.

In addition to the omission in the DEIS that toxics threaten many living organisms in the Capitol Lake basin, another serious omission in the DEIS is the fact that mudflats are inherently dangerous to humans and other animals. According to *The Olympian*, in 2016 a man became entrapped in the mudflats of Ellis Cove requiring emergency life-saving assistance. Longtime residents interviewed on this issue confirm that these entrapments are not uncommon.

Here is another example of the DEIS neglecting to inform the public and its decision-makers of serious problems associated with an estuary/mudflat. **Please provide a statement in the Executive Summary, Land use, Shorelines, and Recreation, estuary, page 31, stating that an estuary creates a significant danger due to the potential for public and pet entrapment at low tides. Please state clearly that this represents a "significant impact" and remove the current characterization of "no substantial changes" and "less than significant impacts".**

Findings from Relevant Lake-Raised Chinook Juvenile Studies were Ignored

Page 17 of the Executive Summary makes the following statement: "…estuarine conditions would provide productive habitat for shellfish, salmon, other anadromous species, and marine fish in the area, potentially including Endangered Species Act-listed Chinook salmon (non-hatchery) and steelhead."

Do we know with any degree of certainty that the advantage of an estuary will increase the numbers of non-hatchery Chinook ? Or steelhead, for that matter? **Please read the quoted findings of Koehler, et. al., and Engstrom- Hegg studies listed below and try to provide answers within the context of those findings. For example, will the fourfold increase in "predator favorable" compression points created by the estuary produce fish losses in excess of any benefit Chinook juveniles or steelhead straying into the Capitol Lake estuary for sustenance? Do we have any idea of what the numbers could be? Aren't the numbers likely to be very small? This becomes important when we are discussing the expenditure of hundreds of millions of dollars which could be used in much more productive habitat rehabilitation.**

Michelle Koehler - According to the article *Diet and Bioenergetics of Lake-Rearing Juvenile Chinook Salmon in Lake Washington*, published in 2006 in Transactions of the American Fisheries Society, authors Michelle Koehler, D. Beauchamp, J. Cordell, C. Simenstad, and D. Seiler suggest that **predation** of juvenile Chinook is at least as important as habitat type per se for Chinook juveniles. **"Efforts to rebuild Chinook salmon populations in this basin [Lake Washington] should therefore focus on the influence of other lake related factors, such as predation, disease, and other life stages."**

Dam removal would increase marine predator-friendly compression points by a factor of four (railroad bridge, Percival Creek mouth, I-5 juncture, and Tumwater Falls. Currently only one marine pressure point exists at the base of the 5th Avenue Bridge.) Numbers of salmon and other anadromous fish (all stages) would likely suffer. **Will you please provide evidence to show that the Koehler et. al report mentioned above is not valid for Capitol Lake Chinook and other anadromous fish?** As reported in the governor's *Southern Resident Orca Task Force*, reduction in Chinook numbers would have negative effects on our endangered Southern Resident Orcas.

Note: the Koehler et. al. report mentioned above was submitted (as requested by DES) to the EIS consultant authors in 2018 yet is apparently is not listed as a reference in the EIS. **Considering the report's relevance to Capitol Lake Chinook, please explain why.**

Additionally, the above 2006 article by Koehler, et. al. makes the following statements: **" Little is known about use of lacustrine habitats by juvenile ocean-type Chinook salmon….To better manage existing populations and aid in designing recovery strategies for ocean-type Chinook salmon using lacustrine environments, basic information on the ecology of juvenile Chinook salmon rearing in this habitat is needed."**

Regarding the above paragraph, **has "basic information on the ecology of juvenile Chinook salmon rearing" been advanced since 2006 which might indicate the superiority of lacustrine, riverine, or estuarine rearing environments? If so, please elaborate. If not, shouldn't the following statements from *Diet and Bioenergetics of Lake-Rearing Juvenile Chinook Salmon in Lake Washington* likely be considered to be the current and best available science? "Lake residence is a rare life history for ocean-type Chinook salmon (Burger et. al. 1985) but our results suggest that the juvenile salmon can feed and grow well in this habitat".** And, **"Despite the heavily altered nature of Lake Washington and the relatively short time Chinook salmon have used the system, feeding and growth performance of juvenile in littoral habitats of Lake Washington were comparable to those for Chinook salmon rearing in estuarine or riverine environments. (e.g. Healey 1982; Simenstad et. al. 1982; Rondorf et. al. 1990; Miller and Simenstad et. al. 1997; Duffy 2003….Even if the EIS report does not state the exact quotation, shouldn't the public be informed of the essence of those findings?** Using broad statements such as "better habitat for salmon" easily misleads readers with a generality which may not be true for all species. The fall Chinook run in Capitol Lake dwarfs all other runs of salmonids in this watershed and is of significant economic importance. **Executive Summary, page 31, Fish and Wildlife, estuary, change "substantial beneficial effects" for salmon, other anadromous species, and marine fish to "less than significant benefits". How can "substantial beneficial effects" be valid here in light of Koehler's and Engstrom Hegg"s (below) findings? Wouldn't the most accurate, scientifically based assessment be, "We don't really know."**

Engstrom-Hegg. According to fisheries biologist Robert Engstrom-Hegg's report in 1955, *Environmental Relationships of Young Chinook Salmon in Capitol Lake and the Deschutes River System,* Washington Department of Fisheries, **"The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival, either for better or worse."** His report also states, **"The data show growth of Chinook salmon in Capitol Lake to be extremely rapid, greatly exceeding that attained by fish of the same stock held in hatcheries."**

Note: Despite its extreme relevance to the Chinook run in Capitol Lake, the above report by Robert Engstrom-Hegg does not appear in the references for Fish and Wildlife issues. **Please explain why**.

Note: A local fishing enthusiast with an interest in the Capitol Lake issue submitted (as requested by DES in 2018), a well-documented report, reviewed by a highly-respected, retired WDFW fisheries biologist, Hal Beecher **which highlighted important findings made by Koehler, et al and Engstrom-Hegg regarding Chinook juvenile rearing in lake environments**. The report was primarily intended to provide EIS reviewers with two important studies relevant to Chinook and the Capitol Lake issue. The report's title is *Capitol Lake or Estuary Habitat Strengths Appear to be Equal for our Hatchery Chinook Run,* October 6, 2018 by Jack Havens, DVM . A copy is being included as an attachment to this submission for your convenience. It does not appear to have been reviewed for the DEIS. **Please review. Again, (this time using Engstrom-Hegg's research), Executive Summary, page 31, Fish and Wildlife, estuary, change**

"substantial beneficial effects" for salmon, other anadromous species, and marine fish to either "minor benefits" or "no significant benefits".

It bears repeating that the hatchery Chinook salmon from Capitol Lake make up, by far, the most important salmon and anadromous fish resource in this watershed. The EIS report mentions several times that salmon habitat will be improved if the dam is removed. Yet, analyses by Engstrom-Hegg, a qualified State researcher, show no advantage for Chinook juveniles of an estuary habitat over that of a Lake habitat in this basin. **How can we reconcile a theoretical habitat improvement mentioned in this DEIS with the actual findings of this state Fisheries scientist? Please explain. Most importantly, is there evidence that Engstrom Hegg is wrong? Shouldn't the DEIS clearly state that the conversion to an estuary or dual basin may well have no (or even a negative) effect on Chinook salmon survival or size? Shouldn't the EIS report state that, according to publicly funded studies, it appears likely that Chinook in Capitol Lake will likely grow to a "larger size than those raised in a hatchery" (which we believe to be the Tribal/Fish and Wildlife plan)?**

Furthermore, shouldn't the EIS report state clearly that no conclusive scientific evidence exists which would suggest that "an estuary would provide the potential for an increased salmon prey base" for Orcas as stated on page ES-6 in the Fish and Wildlife Discipline Report? Please explain.
Considering the findings of the Governor's Report on Southern Resident Orcas, isn't it likely that more harm is done to these mammals by our toxic-ridden Chinook? Isn't it also just as possible (according to Koehler and Engstrom-Hegg) that an estuary would provide the potential to decrease the salmon prey base for orcas (For example, by increasing predator-friendly compression points)? Please explain.
This is why these two studies are important. The conclusions of their research should inform the understanding by the public and decision-makers of credible information ignored by agencies we are used to relying on. **On this basis, please change in the Executive Summary, Fish and Wildlife, estuary, page 31, estuary habitat conditions, from "substantial beneficial effects" to "no significant impact".** Doing so is more consistent with the two aforementioned studies (as well as the effect of the toxic water associated with dam removal).

Additionally, please note and state to the effect that the above findings from Engstrom-Hegg appear to negate the saline gradient concern mentioned in the DEIS. (See Saline Gradient, below.)

Pertaining to the current plan of raising Chinook salmon to the smolt stage, again consider Engstrom Hegg's statement, "The data….show growth of Chinook salmon in Capitol Lake to be extremely rapid, greatly exceeding that attained by fish of the same stock held in hatcheries.

This finding appears to negate any advantage to raising Chinook juveniles to the smolt stage in a hatchery setting before placing them in an estuary setting in the Capitol Lake basin. It appears that adopting such an option would likely produce smaller fish (which are presumably less likely to survive). **Please explain why this is not true.** It bears repeating, the lack of the Chinook salmon food source is a main cause of the demise of our Southern Resident Orca according to the Southern Resident orca Task Force report of 2018.

Salinity Gradient should be no problem for out-migrating Salmon

Page 17 of the Executive Summary states that Capitol Lake does not provide a salinity gradient for the Chinook juveniles transitioning from freshwater to marine water. In fact, a permanent area of salt water exists in Capitol Lake on the south side of the dam (Thurston County Water Resources Monitoring

Report 2009-2010, 2010-2011). Perhaps this is another factor providing for success of the Lake's juvenile Chinook as described by Engstrom Hegg when he stated, **"The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival, either for better or worse."** Also, it must be recognized that with dam removal, juvenile Chinook released from the Pioneer Park hatchery will experience a similar saline gradient at the base of Tumwater Falls.

Please remove the above reference to the lack of saline gradient in Capitol Lake. It is not applicable.

Spawning of Salmonids Below Tumwater Falls Needs documentation

The DEIS report states on page 17 of the Executive Summary, "Prior to construction of the 5th Avenue dam, salmon and other anadromous fish species spawned in the Deschutes River downstream of Tumwater Falls." **Please give the source of that information and, if possible, specific evidence of where such spawning occurred below the falls. Fisheries biologists we are aware of understand that salmon spawning in marine water is exceedingly rare and highly unlikely.**

The Bat Destruction Problem

Please describe the mitigation plan for the likely partial or total destruction of our local bat populations, especially that of Woodard Bay?

Harvesting aquatic plants in Capitol Lake has been Ignored

The report states that Capitol Lake is currently dominated by coontail, a native floating plant. Much of the carbon, nitrogen and phosphorus in those plants might be largely and inexpensively removed by annual selective harvesting if necessary. This would significantly reduce the amount of those nutrients finding their way into Budd Bay later on in the year. Harvested coontail could be dried within the Deschutes watershed virtually eliminating any significant threat of NZMS contamination spread. Aesthetics would be markedly improved which would negate the characterization of "substantial benefit" ascribed to estuary aesthetics on page 30 of the Executive summary. **Why hasn't this relatively inexpensive and beneficial harvesting concept been incorporated into the Managed Lake Plan? Over several years, the idea has been presented by many writers on this issue multiple times. Employing harvesting aquatic plants could reduce the frequency of dredging, reducing public costs.**

Upland Disposal of Lake Sediment: Enormous Public Cost, Little Justification

The DEIS states that the presence of the NZMS in Capitol Lake requires upland disposal of its sediments. Upland disposal is significantly more expensive than deep water disposal (approximately 5 times as expensive). Deep water disposal which is allowed for the Budd Bay marine sediment (which likely will contain both NZMS and may contain toxics leached from shore, bottom, run-off, etc.). **Why is the EIS proposal to allow deep water disposal of Marine sediment but to deny it for Capitol Lake sediment?** This choice seems questionable and is the principal reason for the colossal cost differential which favors dam removal.

Note: It seems to reviewers of this document that extensive efforts were made to find the least costly disposal method for marine sediment disposal and did not do so for Lake sediment disposal. **Please be advised that many public members have little confidence in the current justification for disposal cost**

estimates. Currently, disposal cost estimation in the DEIS appears indefensible. A step-by-step, detailed analysis of cost estimation is critical for public understanding and support. Please do so.

If this choice of disposal location is based on NZMS population density, what is the threshold necessary to allow deep water disposal? What source has been used to determine that density? What will be the difference in NZMS densities in 30 years (first operational dredging/disposal) between West Bay and Capitol Lake? Between Capitol Lake now and then? When was the density of the NZMS last assessed in Capitol Lake? In West Bay? What do the trend lines tell us? Will this mollusk be listed as an invasive species in 2045? The EIS report should make clear in the Executive Summary and attachments the <u>massive effect</u> this choice has on public cost estimates and the potential risks inherent in our current lack of knowledge and use of assumptions. The public and its decision-makers should be thoroughly informed of the risks of the assumptions and guesses regarding this pivotal and contentious issue which appears to have been inadequately investigated or investigated with bias.

For example, it appears that no investigator has looked into disposing Lake sediment onto a properly bermed (contained) area within the Deschutes/Percival Creek watersheds which would markedly reduce the cost of a Managed Capitol Lake, making this alternative the least expensive management option. Rail transportation might have been investigated. This would likely be a critically important option, a cost game changer, if you will. **Please explain why sediment from Capitol Lake could not be deposited in an environmentally safe manner within the Deschutes River/Percival Creek watershed thirty years from now. Perhaps adjacent to a rail line**. NZMS would desiccate within days, perhaps allowing recuperation of some costs from sale of this nutrient –rich soil. **Isn't this the essence of adaptive management which was supposed to provide the foundational information for this issue years ago? Why has adaptive management failed so totally? Please respond to this question.**

Another example: Apparently, plans are to cautiously and judiciously use an herbicide to eradicate aquatic plants in Capitol Lake. Doesn't it stand to reason to allow the cautious and judicious use of a pesticide to eradicate the NZMS? **Please explain why this is not a feasible and potentially significant cost-saving tactic**. By doing so, Lake sediment could be disposed of (preferably) within the watershed in a safe manner while avoiding the enormously high disposal costs of an upland depository. The public would benefit in many ways such as:

1) Substantial cost reduction (including possible sale of dried nutritious sediment),

2) Avoiding the 5-7 year-long traffic disruption at the 5th Avenue bridge,

3) Maintenance of well-documented cherished aesthetic qualities of Capitol Lake.

4) Avoiding the myriad problems caused by the toxic contamination of the Capitol Lake basin with toxics from West Bay.

Marine invasive species problem under an estuary not made clear

The DEIS report states on page one of the Executive Summary that 15 plant and animal invasive species exist currently in Capitol Lake. However, we know that Budd inlet also contains many invasive species, possibly more than Capitol Lake. **Why wasn't this latter statement made clear in the DEIS Executive Summary?** The report's inference is that by taking out the dam, the invasive species problem will be eliminated. It will not be. More specifically, page 30 of the Executive Summary characterizes the estuary

alternative as having "a substantial beneficial impact" regarding aquatic invasive species. This appears to be misleading as it mischaracterizes the asserted advantage of dam removal by avoiding recognition that marine invasive species will invade Capitol Lake basin under an estuary management plan. **Please explain this apparent oversight. Please correct the current mischaracterization regarding invasive species in the Executive Summary, estuary, page 30, from "substantial beneficial impact" to "less than significant impacts".**

Chapter 4 mentions that the estuary will, in fact, have invasive species but infers that the problem will be of less importance than that of the Lake. **How was that determination made? How are marine invasive species of less concern than those of freshwater? Please explain in detail.**

Additionally, what mitigation plans exist for controlling marine invasive species in the Capitol Lake basin?

This Project's Decision Structure is Illogical, financially risky, and indefensible

Note: In light of the above unknowns, assumptions, guesses and the overriding importance of public costs, why are we choosing the preferred alternative in 2022? Assuming that all parameters will be the same in 25-30 years is a mistake which should be obvious to the most novice of analysts. The current rigid decision structure seems illogical and indefensible. Consider the following: Choosing the estuary/mudflat or hybrid is irreversible, final, thus non-adaptive. Choosing the Managed Lake Alternative is "adaptive" as it leaves many future options open and could save the public hundreds of millions of dollars.

LAND USE, SHORELINES AND RECREATION

What is the impact of water quality on Recreation?

In the Executive Summary under Land Use, Shorelines, and Recreation, page 32, estuary alternative, we see the following statement: "Improved water quality, sediment management, improved ecological functions, and increased opportunities for community use would have a **substantial beneficial effect** on recreation." For the Estuary and Hybrid Alternatives, each of these assertions seem highly unlikely, and the reasons for this are described below.

Will Water Quality be Improved?

Clearly, it will not.

The Executive Summary states that there may be "minor to moderate benefits" to dissolved oxygen (DO) in Budd Inlet with an estuary/mudflat. However, total and permanent removal of aquatic plants in the north basin with an estuary will significantly increase nitrogen in Budd Inlet, which ultimately reduces DO. Additionally, marine waters typically have DO levels about one-half of the levels in freshwater such as Capitol Lake. Samples from Budd Inlet and Capitol Lake confirm this to be the case in these waters. The marine waters of Budd Inlet will flow twice daily into the lake basin giving these waters the same characteristics as found in Budd Inlet. See our Water Quality comments for details. **Please modify the Executive Summary statement to reflect that with an estuary or hybrid, DO is likely to decrease to less than one-half the level currently in the freshwater of Capitol Lake.**

Toxic contaminants are another water quality issue that must be addressed for the Estuary and Hybrid Alternatives. The influx of toxics from West Bay into the currently toxic free Capitol Lake will impact recreational opportunities in the basin. Please review the information on West Bay toxics and also the danger of mudflat entrapment potential. This information is covered in our documents pertaining to "Fish and Wildlife" and "Aesthetics". Questions that relate to this issue include:

- **How will recreation in the basin be impacted by the presence of these toxic conditions?**
- **What are the expected short and long term effects from carcinogens, heavy metals, and other toxics (to humans and other species) of introduced West Bay water?**
- **Ecology lists five sources of toxics in Budd Bay (mostly continuous). How will the <u>continuous</u> nature of these toxics be stopped?**
- **These toxins have existed in West Bay for many decades. The DEIS suggests that "future clean-ups are planned to address this contamination". Considering that the State is over 25 years late in dredging and maintaining Capitol Lake, how can we be sure they will address this issue in a timely manner?**
- **How can we say that the water quality is truly improved?**

Will Sediment Management be Improved?

No. Under an estuary-hybrid, sediment management is less efficient.

By far, the most efficient means of sediment control for a managed lake is the use of the north basin as a "catch basin" to contain the spread of sediment. Unfortunately, this obligation has been neglected for decades by the state at great aesthetic cost to the community. For the managed lake, dredging in the north basin will be necessary every 20 years. With dam removal, dredging will be necessary, involving several entities, every 5-6 years. This dredging will take place in and around the marinas, Percival Landing, the Port Plaza and the port itself. This more frequent and complicated dredging in the marine waters of West Bay will, by its nature be less efficient.

Will Ecological Functions be Improved?

Considering the contamination from West Bay, and the reduced Do levels, ecological function improvement is questionable at best.

Mixing marine water with fresh water is considered by some as the strongest ecological improvement to be made by the conversion to an estuary/mudflat. **Regarding the Capitol Lake issue, how can we say that ecological functions (in this case, the mixing of clean river water with toxic marine water) will be improved? Please explain.**

Will Increased opportunities for community use be Improved?

No. Certainly not.

Increased inclinations to recreate in the Capitol Lake basin under an estuary-hybrid alternative is unlikely. In fact, recreation in the basin may be advised against by the Thurston County Health Department. Please note that under the estuary-hybrid, the signs referred to in our other documents

warn specifically that swimming, clamming, mussel harvesting, and fishing are not advised. Other signs warn of the danger of human entrapment at low tides.

The usage time of water-based recreation under the estuary/mudflat would be reduced by at least 50% due to reduced tide levels. The daytime tides tend to be lower during the summer months when recreation activity peaks. Additionally, strong tidal currents below the railway bridge and at other constriction points will pose a safety hazard. **Please include this information in the Executive Summary and elsewhere where appropriate throughout the Draft EIS.**

The lone exception might be within the reflecting pool under the "hybrid alternative with freshwater management"; but this alternative has other serious problems and is not likely to be adopted in our opinion.

Why would a rational health-minded person find advantages in recreating in toxic marine water over clean freshwater? Please change the impact statement for the Estuary and Hybrid Alternatives in the Executive Summary from "substantial beneficial effect" to "significant negative impact" on recreation.

Capitol Lake as a Community Attraction

For decades, Capitol Lake has served as a community attraction for celebrations, outdoor educational displays, non-motorized boating and swimming (pre-1985), informal sporting events, running, walking, and dog walking. Unquestionably, these activities benefit human health, both physical and mental. Social cohesion for individuals and families in and outside the community are facilitated by the Lake. Freshwater swimming and non-motorized boating recreation in the clean, non-toxic water of Capitol Lake could easily be sanctioned by local governments.

Even forgetting the toxic nature of contaminated estuary water, expecting the social cohesion value to persist with an estuary seems unlikely. Why? Consider the historical and current use of Mud Bay, East Bay, Woodard Bay, and other intertidal mudflats. The uses of those areas are a small fraction of Capitol Lake's activities.

Recreational Boating

This recreational activity is generally considered outside the scope of the Draft EIS. However, it comes into play because of its economic impact when its availability is affected. Uncertainties for funding of the dredging operations required to keep the Budd Bay marinas viable are a significant concern. The importance of funding issues for long-term dredging for the Estuary and Hybrid Alternatives are discussed elsewhere in this document. And, for more complete information on recreational boating and the questions of funding alternatives, see the responses to the DEIS prepared by the Budd Bay marinas.

Swimming in Capitol Lake:

The DEIS's lack of emphasis regarding the community's long held desire for a public freshwater swimming area is disappointing. This recreation feature served to define summertime fun in the area. One of the most recognizable pictures of historic Olympia, is that of approximately two hundred or so persons (mostly children) swimming and socializing in Capitol Lake. The Arc of Statehood (funded by the State) designed and dedicated a rather large section on the Lake's eastern shore specifically for this

community benefit. When discussing the "Lake/Estuary issue with residents living here in the 60's, 70's and 80's, "loss of the family swimming area" was frequently their prime lament.

Of course, swimming is only likely to occur under a Lake Management Plan. Swimming was curtailed in 1985 after it became clear that excessive contaminants had entered from upstream and the Lake's shorelines. It is ironic to note that, through adaptive management, the Lake is now "swimmable" but will likely will not be once again under an Estuary management plan partially due to contaminants from Budd Bay.

Mudflat Entrapment and Other Safety Issues

In addition to the omission in the DEIS that toxics threaten many living organisms in the Capitol Lake basin, another serious omission in the DEIS is the fact that mudflats are inherently dangerous to humans and other animals. According to *The Olympian*, in 2016 a man became entrapped in the mudflats of Ellis Cove requiring emergency life-saving assistance. According to interviews with long-time residents, this type of event is not uncommon.

Here is another example of the DEIS neglecting to inform the public and its decision-makers of the serious problems associated with an estuary/mudflat. Please provide a section in the Executive Summary stating that an estuary creates a serious danger due to the potential for public and pet entrapment at low tides. Please state clearly that this represents a "serious negative impact".

The narrow gap at the railroad bridge and other constricting points would likely present an additional safety problem as the speed and turbulence of tidal flows could be excessive for many boaters, sail boaters, inner-tubers, canoeists, paddle borders, and kayakers.

Congregating harbor seals hunting salmon below the railroad bridge or at other predation points could pose a threat to these user groups named above. Recall the voracious harbor seals congregating at the outfall of the dam. All of the above constitute significant problems for recreation under an estuary/mudflat alternative.

Mudflat Odors

A lake with its aquatic plants properly dredged or harvested produces virtually no objectionable odor. Hydrogen sulfide is a naturally occurring and odiferous molecule in mudflats. Many have experienced this mudflat odor and found it to be objectionable and inappropriate for an urban area, especially that of a capitol city. Some of these people will undoubtedly avoid the shorelines and surrounding areas. Again, the DEIS fails to adequately address this common characteristic of an estuary/mudflat and specifically, that some people will avoid it. This cannot bode well for recreation and downtown economic activity. **Please address the odor issue with an unbiased, scientifically developed survey of those who have experienced the odor in this urban setting. Preference surveying between Lake and estuary/mudflat odors in a capitol city would be helpful. Please report the results of such a meaningful survey in the EIS.**

Terminal Urban Estuary

The Capitol Lake Basin would become a Terminal Urban Estuary. How would this Impact Recreation? If the dam is removed, the toxics from Budd inlet derived from shore, groundwater, bottom, run-off from the surrounding area, and southward flow of Puget Sound would continuously infiltrate what is now a virtually toxic-free Capitol Lake. The touted ecological function of "mixing of freshwater with marine water", would likely become a significantly harmful characteristic to the entire basin of 264 acres. According to several public health officials interviewed (state and county), Terminal Urban Estuaries are well known for unusually high contamination. The Capitol Lake Terminal Urban Estuary would be the southern-most estuary of Puget Sound and would be especially vulnerable to a variety of toxics currently and continuously affecting Budd Inlet. **Why would we choose to contaminate a basin having clean freshwater, toxic-free, and productive? Please explain.**

A Brief Review:

- Without the dam, toxics infiltrating the Capitol Lake basin from West Bay pose a threat to humans, wildlife and fish, habitat, and ecologic functions.
- According to Thurston County Health Department, mudflats are inherently dangerous to humans and pets due to entrapment potential.
- **Why would we create these two significant problems in a basin which is currently clean, safe, and productive?**
- Their negative impact on recreation will undoubtedly be severe.
- **Why are these threats not mentioned or adequately discussed in the DEIS? Please do so.**

HISTORIC AND CULTURAL RESOURCES

Pursuant to the State Environmental Policy Act (SEPA) WAC 197-11-440(6)(iv) Urban quality, historic and cultural resources, and the design of the built environment, the EIS needs to consider the impacts to the Washington State Capitol Campus National Historic District since Capitol Lake is a significant part of the Capitol Campus designed by Wilder and White in 1911 and the Olmsted Brothers in 1928. The Draft Environmental Impact Statement does not take into account the nationally significant City Beautiful Movement design principles of the State Capitol Campus which is on the National Historic Register.

In 1911, the architectural firm of Wilder and White created a master plan for the Washington State Capitol Campus as part of a nation-wide design competition. This plan captured the imagination of the competition judges with its unique approach, a group of symmetrically arranged buildings in a forest, atop a bluff overlooking a reflective lake, the City of Olympia, and Puget Sound. As stated by Wilder and White in their August 29, 1911 report to the State Capitol Commission, "a tide lock at [5th Avenue] would form a lake and the whole effect would be visible from most points of the City as well as the Sound." "Washington's Audacious State Capitol and Its Builders," Norman Johnston, p. 33, (1988).

Wilder and White incorporated five design principles into their plan for the State Capitol Campus. These principles include: (1) the City Beautiful Movement, (2) the Capitol Group of buildings, an unprecedented design of separate legislative, executive, and judicial buildings to look like a singular

Capitol building when viewed from Budd Inlet, downtown Olympia, and the Fourth Avenue Bridge, (3) the borrowed landscapes of the Olympic Mountains and Budd Inlet to frame the design, (4) the northern orientation of the Capitol Group and Campus to Budd Inlet and the Olympics and (5) a lake to reflect the beautiful buildings on the bluff.

> "It was at Olympia, Washington, that the American Renaissance in state capitol building reached its climax… Such a collection of Classical buildings on a plateau surmounting a green hill 117 feet above sea level proved an irresistible vision. It would be a spectacular monument, with Mount Rainer in one direction, the Olympic Range in another… all mirrored in the blue waters below. The City Beautiful, a concept of perfection evolved for dense urban scenes, seemed destined to achieve its finest expression in the natural landscape of the Pacific Northwest. No architect or dreamer could have asked for a more splendid setting."

Temples of Democracy, The State Capitols of the USA, Professor Henry-Russel Hitchcock (1976), pp. 257-259.

The Olmsted Brothers 1928 plan for the landscape also required Capitol Lake to reflect the buildings. Maintenance of Capitol Lake as a reflective lake is necessary in order to preserve and protect the historic design of the Washington State Capitol Campus which is the best example of City Beautiful movement architectural design and urban planning outside of Washington D.C. Capitol Lake stands in the design tradition of the Tidal Basin and the other reflective bodies of water along the National Mall from the U.S. Capitol of the Lincoln Memorial, Failure to protect Capitol Lake would replace its mirroring and sparkling presence with the dismal mud flats of the past.

"To the south of the boulevard skirts the edge of a proposed freshwater lake secured by tide locks across the head of the Sound and will be a great addition to the city park system."

The American Architect, VOL CVIII, No. 2083, November 24, 1915, Wilder and White, p. 346.

> "The late 1940's was to include the beautification of the expanse at the base of the Capitol group site to its north and west. The [Wilder and White and Olmsted Brothers] plan saw this area as a grand water feature… [to replace the] plane of mudflats… The project also included the construction of a dam, the ensemble thereby creating a permanent body of water, Capitol Lake. Substantially completed in 1951, this new visual and recreational amenity became an appropriate setting for the acropolis of the Capitol group which is now so handsomely supported."

Washington's Audacious State Capitol and Its Builders, Professor Emeritus, Norman J. Johnston (1988).

Significant progress has been made toward the completion of the Wilder and White plan since 1911. After the Capitol Group of buildings on the West Capitol Campus bluff was completed and the Olmsted landscaping plan was instituted in the 1920's and 1930's, Capitol Lake was created by the State Capitol Committee and the Legislature in 1949-1950 with the construction of a dam and a tide gate along 5th Avenue. Since 1991, further progress has been made toward the completion of the North Capitol Campus Heritage Park along the shore of Capitol Lake with the Legislature and City of Olympia spending twenty-five million dollars to complete the land acquisition, the Arc of Statehood, the Western Washington Inlet, the Eastern Washington Butte, the North Campus Trail, the Lawn Amphitheater, the City Fountain, the City seasonal ice and roller rinks in the Isthmus Park, and several phases of the construction of Heritage Park and the Washington State Law Enforcement Memorial. Two million dollars in private funds have also been raised for construction of these City Beautiful elements of the North Capitol Campus. The predesign of enhancements to the Eastern Washington Butte at the North end of the Arc of Statehood should also be addressed in the Draft EIS.

Maintaining the open water environment in the north and middle basins of Capitol Lake is the only action which is compatible with the historic 110- year plan for the State Capitol Campus. The Draft EIS does not consider the national significance of the historic design of the State Capitol Campus remaining intact by maintaining and improving Capitol Lake through regular dredging every 10 to 20 years which occurred up until 1986.

16 U.S.C. 470f – Section 106 of the National Historic Preservation Act provides,

> The head of any federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal Agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking.

The Nationally protected State Capitol Campus Historic District must be preserved under federal law.

Under RCW 79.24.720 Capitol Lake is designated as a historic facility of the State Capitol.

RCW 79.24.720 – Department of enterprise services' responsibilities.

> The department of enterprise services is responsible for the stewardship, preservation, operation, and maintenance of the public and historic facilities of the state capitol, subject to the policy direction of the state capitol committee and the guidance of the capitol campus design advisory committee. In administering this responsibility, the department shall:
>
> (1) Apply the United States secretary of the interior's standards for the treatment of historic properties.

Capitol Lake must be preserved under State law. The Draft EIS fails to analyze the necessary dredging and maintenance of Capitol Lake to the standard as applied by the Secretary of Interior to the National Mall in Washington D.C. Capitol Lake is the City Beautiful movement equivalent of the Tidal Basin and the reflective pools from the U.S. Capitol to the Lincoln Memorial.

The cost of dredging and maintaining Capitol Lake are extremely inflated by only including the costs of disposing the dredge spoils upland instead of in-water disposal. The Draft EIS chart on page 7-5 should include the cost of maintaining the historic Capitol Lake with the cost of in water disposal for a fair comparison of the cost of the alternatives. Whether dredging in Capitol Lake or dredging in Budd Inlet the New Zealand mud snail will be present and those dredge spoils can be safely disposed of in-water. The dredge spoils from the Lake could also be used and sold as valuable soil and be a revenue stream to the State.

The sediment disposal costs of maintaining Capitol Lake should also be shared by the State, Thurston County, the Port of Olympia, the City of Olympia, the City of Tumwater, and LOTT since all these public entities benefit from removal of sediment in Capitol Lake on a every 10-to-20-year basis just as Capitol Lake was designed. Removal of the dredge spoils in Capitol Lake will be less frequent and more economical than removing the dredge spoils from contaminated Budd Inlet. Not maintaining Capitol Lake is in violation of Federal and State Law and the Draft DEIS must analyze these issues.

VISUAL RESOURCES, AESTHETICS

We suggest that Aesthetics be added to the Draft EIS heading of Visual Resources to more clearly indicate the importance of this topic. The origin of Capitol Lake was almost entirely based on mainstream aesthetic preferences at that time, and aesthetics continue to play a critical role as we move forward to develop long-term plans for the Capitol Lake Basin. Alone, "Visual Resources" connotes an institutional concept, "Aesthetics" humanizes it.

One of concerns we have with those who favor recreating an estuary/mudflat or hybrid option is that they have effectively removed mainstream aesthetic values from the discussion. They appear to be unaware of the aesthetic issues that led to the creation of the Capitol Campus in general and Capitol Lake in particular. They have accomplished this feat through an almost total deemphasis and devaluing of aesthetics, and replacing it with the ideal of environmental perfection, no matter what the cost. They have ignored the fact that Capitol Lake Aesthetics have contributed significantly to the community's quality of life for over 70 years.

DES sponsored survey shows "Aesthetics" as the most desired characteristic for the Capitol Lake Basin

The Community Input survey of 2016 sponsored by Capitol Lake /Lower Deschutes Watershed Long-Term Management Planning Department of Enterprise Services ranked in order of importance, the top fifteen criteria for this project's management goals using 421 responses. The #1 most important criterion in this survey was "Aesthetics". No mention of this finding exists in the DEIS.

It should be noted that this survey is one of only two (along with the Seven Wonders survey) known to seek the public's opinion on the Capitol Lake/ Estuary issue. Both surveys reveal the dominant importance of aesthetics regarding Capitol Lake. **Why aren't these findings recognized in the DEIS? A thorough and unbiased report (whose job it is to educate decision-makers) would have done so. Knowledge of the community's opinion should be of supreme importance. Please make this fact known in the report's Executive Summary or in the Introduction, Project Background, & History. Include the factual information from "A Brief Review" presented a few paragraphs below.**

The aesthetic value of Capitol Lake to the community and state of Washington is substantial, as evidenced by the survey results. It bears repeating, the subject has been ignored in the DEIS. For example, the Executive Summary "Visual Resources", estuary, visual resources, page 33, give an evaluation of "less than significant impacts" with an estuary/mudflat conversion. History of the Lake's origin and the surveys indicate the above characterization is not accurate. **Please review the many arguments below which suggest that the evaluation "significant impact" for the estuary-hybrid would be most appropriate by far.**

Please note that the realistic term "estuary/mudflat" for the estuary or hybrid options will be used here to emphasize an ignored but overridingly important characteristic to our urban area. The term is meant to be realistic, not derogatory.

Capitol Lake's **urban location** must be recognized as a paramount factor which amplifies the importance of aesthetics and differentiates it from a non-urban location such as Nisqually Reach and Mud Bay. The community has recognized this for basically a century, reasoning that a well-managed lake would be much more valuable to the community than an estuary/mudflat. Quality of life would be markedly improved.

However, it must be noted that some people say they find the aesthetics of the estuary/mudflat to be equally as pleasing as the Lake. This opinion likely represents a small minority of the general population as evidenced by the minute fraction of visits to Mud Bay, East Bay, Woodard Bay, etc. when compared to visits to Capitol Lake. For a realistic and revealing comparison, would Central Park in New York City enhance the aesthetic appeal of that city if it were converted to a mudflat? Similarly, consider Lake

Union, Green lake, or Lake Washington in Seattle. A small minority might shout "yes". The majority (mainstream) would likely say "no". How unfortunate it would be for those urban areas if the "yea-sayers" won the day!

The method mostly employed in the creation of these comments is to use as a standard the aesthetics of a **managed** Capitol Lake, then compare those to the other proposed alternatives. Obviously, a degree of subjectivity is employed in some areas. Without data and survey results, this cannot always be avoided. However, reasonable attempts should be made to determine the will of the public on this issue using subjective evidence if necessary. Again, the public's opinion is important and should not be ignored.

Looking at the design elements of each alternative:

The Managed Capitol Lake is a part of the Wilder-White-Olmstead Design of the Capitol Campus and the Arc of Statehood. The substantial historical investments of our city and state to create an aesthetically pleasing public amenity, Capitol Lake, are well documented elsewhere and do not require a review here.

The Estuary/Mudflat is an attempt to recreate a natural setting before European settlement, and as such is not designed with aesthetics in mind. There are significant problems with this in the current urban setting. First, there was no isthmus connecting Olympia with the West Side, and most of the Downtown area was intertidal mudflats in these earlier times. The mudflats were not surrounded by a dense urban core, or crisscrossed with major roadways and bridges, railroad tracks and bridges, and an Interstate Highway. Though returning to more idyllic times may be desirable, creating this estuary will not accomplish that. The aesthetics of these earlier times are gone forever.

And creating a Hybrid with the addition of a half-mile long industrial-looking sheet pile and concrete barrier structure through the middle of the Northern part of the estuary, further reduces any positive value to the aesthetics of the basin. From a design point of view, the reflective pool may offer some limited aesthetic appeal, but the barrier wall will obscure the pool from most vantage points.

Capitol Lake was Created Primarily for Aesthetic Purposes in an Urban Area

Public meetings hosted by DES in 2016 made clear via decades-old news clippings and meeting notes that Capitol Lake was created mostly to solve the unfortunate **aesthetic dilemma** posed by the estuary/mudflat. Most citizens and legislators apparently felt the estuary/mudflat had a strong negative effect on the quality of living in Olympia. **EIS authors should emphasize this important fact and remind the public that re-creating the estuary/mudflat will, by its expensive nature, preclude a future do-over, as it is not a plan utilizing adaptive management. Removing the dam makes this a "one and done" and "no turning back" plan.**

Jeffers Studio has archived several photos which show the marked extent of the mudflats prior to the dam. Although, as in other "quality" or subjective characteristics, the distasteful effect of the mudflats (mud and marine debris) cannot be quantified, the community was driven to replace the mudflat with an amenity which was **viewed as overwhelmingly positive by the mainstream until its maintenance was neglected by state caretakers**

For the estuary, on page 4-126, 'Key Findings: Long Term visual Resource Impacts', the statement is made that the estuary will allow the landscape to "remain unified and harmonious with the natural

setting of the existing surroundings resulting in less than significant impacts". **This characterization regarding the estuary should be changed to "significant impact"**. Please remember that the Capitol Lake basin is now and has been for well over a century an urban area, not a wild or undeveloped or rural one. It is part of an urban state capitol campus and is surrounded by paved streets, buildings, public parks, residences, a parkway, and interstate highway. Thus, making the assertion in the Executive Summary that the estuary will "remain" unified and harmonious reflects a biased and inaccurate assessment. Stating that the change to an estuary/mudflat will qualify as "less than significant" avoids the reality which is obvious to virtually everyone with an honest and objective point of view. Also see the Executive summary, Visual Resources, page 33, estuary. Again, **this characterization regarding the estuary should be changed to "significant impact".**

For the Hybrid, like the Estuary, the Draft EIS fails to adequately address urban aesthetics. However, acknowledging that the wall's dominant and ominous appearance will likely be objectionable to a substantial number of people with mainstream tastes, is positive. Compliments to the DEIS for recognizing this problem which does not meet mainstream needs.

View of Capitol Lake is the "#1 Wonder in Thurston County"

A "Seven Wonders of Thurston County" county-wide survey of 2011 sponsored by the Thurston County Commission chose the view over Capitol Lake from the Law Enforcement view platform as the **#1 Wonder of Thurston County**. Former Chief Justice of the Washington State Supreme Court Gerry Alexander was interviewed by then county commissioner Cathy Wolfe at the law enforcement pavilion as he explained the unusually significant value of this amenity to the community and State. The conclusion: Capitol Lake can be considered the area's aesthetic crown jewel.

However, like the aforementioned Capitol Lake/Lower Deschutes Watershed, Department of Enterprise Services Survey mentioned in the first paragraph, this important fact was not included in the DEIS, concealing the community's critically important evaluation of a Managed Lake. **The DEIS Report has failed the public and its decision-makers by not reporting on these two surveys. Their findings should be prominently revealed to the public in the EIS. Recognizing and validating the public's will and needs should be of paramount importance in a quality, truthful, and unbiased EIS.**

Note: The two surveys mentioned in this section reveal an important finding other than the strong preference of the community to keep and manage Capitol Lake. The surveys show that the mainstream members of the community, although far from being able to organize the loudest shouters, have quiet, powerful convictions.

The view across the Estuary/Mudflat and Dual Basin would possibly qualify for this same distinction, but only a percentage of the time due to perimeter mud exposure and odor, unpleasant to so many in an urban environment.

To summarize:

- **Capitol Lake was created for Aesthetic Reasons**
- **County Survey in 2011 Rates Capitol Lake #1 "Wonder of County"**
- **DES Sponsored Survey 2016 Rated "Aesthetics" as #1 Criterion for Basin**

- **A reasonable conclusion would be: Clearly, the aesthetics of the Capitol Lake basin is the most important characteristic desired by the public.**
- **Why isn't this finding reflected and emphasized in the DEIS?**
- **Shouldn't considerable weighting be given to the public's declared need?**

Please explain

Land Values Bordering Lakes are Significantly Higher than for Estuary/Mudflats.

Our free enterprise system allows us to vote using monetary resources for items we choose. Perhaps the most objective method of evaluating the aesthetic value of a landmark amenity is to determine what property owners are willing to pay to view it. Data derived by assessor tax records, appraisers, and the opinions of multiple professional realtors in the area suggest with little question that lake-view property is almost always valued much higher than that bordering an estuary/mudflat or wetlands, all other factors being equal. Most objective observers find it disingenuous that the DEIS has failed to recognize this obvious fact that a Managed Lake provides significantly more value to the community than does an estuary/mudflat. This characteristic should be relatively easily quantified. Please do so using an unbiased methodology and fully describe that methodology. The process should be straightforward and described in detail in the EIS.

Lack of Objectionable Odor

A lake with its aquatic plants properly dredged or harvested produces virtually no objectionable odor. Hydrogen sulfide is a naturally occurring and odiferous molecule in mudflats. Many persons (not all) have experienced this mudflat odor and found it to be objectionable and inappropriate **for an urban area, especially that of a capital city**. Again, the DEIS fails to adequately address (investigate) the effect of this common characteristic of an estuary/mudflat. The DEIS fails to understand that (despite its analysis of smelling) the human aversion to the mudflat odor will reduce the number of persons willing to be in the downtown area**. Please address the odor issue with an unbiased, scientifically developed survey of those who have experienced the odor in this urban setting.** Preference surveying between Lake and estuary/mudflat odors in a capital city would be helpful. Consider using the services of a respected pollster such as Elway Research Inc. **Please report the results of such a meaningful survey in the EIS.**

Note: The DEIS analysis of human perception of types of odors is not a substitute for the opinions of those who have lived through and experienced the odors of the estuary mudflats. Attempting to ascribe the perception of objectionable odor in the mudflats solely to human causes (excrement) is not confirmable by those who lived here during that period.

Great Cities are Often Associated with lakes

Please print the following in the EIS. Positive images of urban areas have significant value for tourism, economic activity and quality of living. Consider the following cities whose images (like our state capitol) are enhanced by lakes:

New York	Central Park
Seattle	Lake Union, Green Lake, Lake Washington
Boston	Charles River Basin

Madison, WI	Lake Mendota (Also supporting the state capitol)
Washington DC	National Mall and Tidal Basin
Paris	Jardin du Luxembourg, Versailles Gardens
Oakland, CA	Lake Merritt

The value of these commonly understood associations was not recognized in the DEIS. **The value should be recognized in environmental disciplines such as "economics" and "aesthetics". Please do so.**

Capitol Lake is Appropriate for an Urban Setting. A Mudflat has been Judged as Inappropriate

Again, the Capitol Lake basin is an urban area, not a wild or undeveloped or rural one. As with the above and dozens of other cities, Olympia's urban area is enhanced by the aesthetically pleasing nature of an attractive landmark such as Capitol Lake. Again, quality of life for the mainstream is enhanced (see surveys above). If the Lake's aesthetic needs were properly addressed with expected responsible maintenance, the **urban aesthetic needs** would be met and its **overwhelmingly popular aesthetic appeal** would be immediately restored.

Note: Although proponents of the estuary mudflat will object, the DEIS should raise the question publicly as to why the aesthetic needs of Capitol Lake have been intentionally neglected by GA and DES, and the State Legislature for decades. The issue should be investigated as it appears to be an abrogation of duty. A supportable answer should emerge and be revealed to the public. **They deserve to know why the Lake looks so bad, especially in summertime. The negligence, which makes the healthy lake look unhealthy, appears to be intentional (and is shamelessly used to convince the public that it is "sick".) Only those desiring a different management plan would benefit from the negligence. How have they managed to prevent a normal dredging program? Aquatic weed harvesting? Why has the State Legislature, charged with maintaining Capitol Lake, abandoned its obligation without any reasonable explanation to the public (who actually own the Lake yet have no recourse but to endure its poor appearance)? The two most pertinent questions to be answered are:**

1. **Why the Lake has not been dredged for over 35 years? (The original intent was about a 10 year interval.)**
2. **Why has no selective harvesting of aquatic plants been undertaken?**

Again, the public deserves to know these answers which should reveal both why the Lake has been made to look like it does today and the motivation behind the maintenance prevention scheme.

Estuary/Mudflat: Found to be inappropriate prior the creation of Capitol Lake. Not aesthetically acceptable.

Dual Basin: Not aesthetically acceptable to the public in an urban setting due to the dominant, ominous appearing wall.

A Maintained Capitol Lake Promotes Enrichment of Community Life by Improving Physical and Mental Health. The Aesthetics of the Lake Contribute Significantly to our Quality of Life.

Capitol Lake has been described as "the soul of our community", especially when it was maintained. For decades, it has served as a community attraction for celebrations, outdoor educational displays, boating, swimming (previously), informal sporting events, running, walking and dog walking.

Unquestionably, these activities benefit human health, both physical and mental. Social cohesion for individuals and families in and outside the community are facilitated. Expecting this value to persist with an estuary seems unlikely to be true. Why? Again, consider the historical and current use of Mud Bay, East Bay, Woodard Bay, etc. **The uses of those estuary/mudflats are a small fraction of Capitol Lake's.** Freshwater swimming and non-motorized boating recreation in clean, non-toxic water could easily be achieved in Capitol Lake.

Sadly, for well over a decade, persistent misuse of outdated water quality data, inappropriate conclusions, rumors, along with gross mismanagement have contributed to the public's misconception of the health of Capitol Lake. Of course, this is a commonly employed political strategy – hyperbolically create the appearance of major problems that don't really exist, then offer solutions that serve the desires of the accusers. **Thankfully most of these misconceptions, circulating among the public for so long have been almost totally disproven by independent third party reviewers used by this DEIS. The public should be thankful for these overdue corrections. As the EIS states on page 3-28, "Overall, Capitol Lake exhibits very good water quality."**

Yet, severe lasting damage has been done to Capitol Lake's reputation as the public remains misinformed. Surely, a DEIS responsible to the public's need for accurate, current scientific information would emphasize the unfortunate effect of past dissemination of false information which has tainted Capitol Lake**. A paragraph in the Executive Summary dedicated to this need would be of immense help to the public and its decision-makers. Please do so.** As if we need to be reminded, rumors and false information stated repeatedly as factual are the enemy of good decision-making.

Comment: The existence of such extensive misinformation circulating in our community render the value of a new public survey meaningless. Many responses would be based upon inaccurate and out of date information published in the media and spoken by public officials.

Invasive toxics from Budd Bay are a threat to public health

Additionally, with dam removal, the invasion of toxics from Budd Bay into the Capitol Lake basin will create the potential for a host of problems including human health (as evidenced by Thurston County Health Warning signs posted throughout Budd Bay – see below). The currently clean freshwater and sediment in Capitol Lake will be compromised. The dozens of signs necessary to warn the public will be aesthetically unpleasant. They will negatively affect tribal cultural resources.

Dredging Budd Bay should help to some degree; **however, many contaminants are not stationary in the Bay sediment. They continuously arrive from outside the Bay (leaching from soil, run-off, or southerly directed marine flows or from upwelling)** (See caption below). Mixing from large vessel propellers in the Port's turning basin will be another source. Thus, with the dam removed, Capitol Lake basin will receive toxics from Budd Bay twice per day with the tide. Public knowledge that the water contained in the Capitol Lake basin will be contaminated with toxics (no shellfish or fish harvesting) is a severe detriment to the aesthetics of the estuary/mudflat.

Please address these almost certain problems posed by the estuary/mudflat. They appear to have been inadequately investigated. Please answer:

- **What will be the expected short and long term effects of the carcinogens, heavy metals, and other toxics (to humans and other species) from the introduced West Bay marine water?**

- **The DEIS suggests that "future clean-ups are planned to address this contamination". Considering that the State is over 25 years late in dredging and maintaining Capitol Lake, how can we be sure they will address this issue in a timely manner? They haven't so far.**
- **Ecology lists five sources of toxics in West Bay (mostly continuous). How will the continuous nature of these toxics be stopped?**

Throughout the 1970's and early 80's runoff into Capitol Lake caused water quality to become a serious concern. (Swimming was curtailed in 1985.) Under a Managed Lake, water quality is now "very good" (and will support swimming). However, under an estuary alternative, with the toxic invasion, It is highly unlikely that swimming will be allowed. For a cost of a hundreds of millions of dollars, we will be repeating the same mistake of allowing contaminated water to infiltrate the basin. **How will we explain this blunder to the taxpayers? Do we really want to repeat the mistake?**

Due to the likely introduction of toxic materials into the current lake basin, please change the Executive Summary under Water Quality, estuary and hybrid, page 30 from "less than significant impacts" to "significant impacts". Change the Executive Summary under "Economics (including ecosystem services)" for the estuary, page 35, from a non-characterization to "significant impacts". Change the Executive Summary, page 34, Environmental Health (primarily estuary sediment quality estuary degradation from "less than significant impacts" to "significant impacts". Change the Executive Summary under Land use, Shorelines, and Recreation, page 32, estuary, from "substantial beneficial effect" regarding water quality, improved ecological functions, and increased opportunities for community use to "significant impacts".

Without the dam, a new aquatic (toxic) environment for the Capitol Lake basin

Health warning signs at Budd Bay adjacent to Mission Creek

(Dozens of these and similar warning signs of toxics exist throughout Budd Inlet and will likely be required throughout the Capitol Lake basin if the dam is removed.)

At least five sources <u>continuously</u> supply contaminants to Budd Inlet:

- Urban stormwater runoff, (PAH's, PCB's, CEC's)
- Effluent from LOTT Cleanwater Alliance, (PBDE's, PCB's –low concentrations, CEC's)
- Southern Puget Sound marine flows flowing south,
- Turbulence induced mixing of sediment and legacy toxics by large port vessels in the turning basin.
- Legacy industrial pollutants from toxics clean-up sites. (Listed below from Washington Department of Ecology Website.)

An additional four closed sites continue to leach contaminants into Budd Inlet:

- Reliable Steel site: (Westbay Drive)

- Gasoline-diesel or oil range petroleum hydrocarbons in soil or Budd Inlet sediments
  Toxic metals – arsenic, cadmium, copper, lead, mercury or zinc in soil
  groundwater, stormwater runoff or sediments.
- PAHs or Carcinogenic PAHs – in soil, stormwater runoff or sediments.
- PCBs – in soil.
- Phthalates – in stormwater run-off and sediments.

- Industrial Petroleum Distributors site: (Westbay Drive, formerly ARCO):
  - Petroleum hydrocarbons from petroleum leaks and spills.
- Solid Wood, Inc. : (Westbay Drive just north of 4th Ave., owned by city of Olympia):
  - Total petroleum hydrocarbons.
  - PAHs.
  - Metals – exceeding standards for soil and groundwater.
- Cascade Pole site: (north end of Port peninsula):
  - Creosote contaminants – soil and groundwater.

Mudflats are deemed dangerous by Thurston County Health Department

As the warning advisory on the right side of this photograph in Ellis Cove demonstrates, at low tide mudflats are dangerous. The public will need to be advised to keep off the mudflats with signage to that effect.

In addition to the omission in the DEIS that toxics may threaten many living organisms in the Capitol Lake basin, another serious omission in the DEIS is the fact that mudflats are inherently dangerous to humans and other animals. According to *The Olympian*, in 2016 a man became entrapped in the mudflats of Ellis Cove requiring emergency life-saving assistance.
Here is another example of the DEIS neglecting to inform the public and its decision-makers of the **serious problems associated with an estuary/mudflat. Please provide a section in the Executive Summary stating that an estuary creates a serious danger due to the potential for public and pet entrapment at low tides. Please state clearly that this represents a "serious negative impact".**

Don't these warning signs adversely affect aesthetics?

Priest Point Park signage referencing Ellis Cove

Advisory reads: "Water and Soil Pollution. Shower after contact with sand or water from this area." Please note the "Caution At Low Tide, Mud Flats Are Dangerous PLEASE KEEP OFF".

To summarize:

- **Without the dam, toxics infiltrating the Capitol Lake basin from Budd Inlet pose a threat to humans, wildlife and fish, especially Chinook- and by extension, endangered Southern Resident Orcas.**
- **According to Thurston County Health Department, mudflats are inherently dangerous to humans and pets due to entrapment potential.**
- **Why would we create these two significant problems in a currently clean, safe, and productive basin?**
- **Why aren't these critically important findings described in the DEIS?**

Capitol Lake Serves as a Signature Visual Image for our State

Again, Capitol Lake has been voted the "#1 Wonder of Thurston County". It is iconic.

Promotional and educational photos of Olympia, Thurston County and the Capitol Campus commonly focus on Capitol Lake. News articles, magazines and books frequently include visuals of Capitol Lake. As an example, Craig Romano's hiking book *Urban Trails Olympia* features a full page photo of Capitol Lake in its introduction. The Lake tends to define Olympia's outdoor urban area.

This important economic information is missing from the DEIS. Please mention this Signature Visual Image for our state and local communities, and explain its economic significance. **Please characterize in the Executive Summary, Page 35, "Economics (including ecosystem services)" for the estuary/mudflat as "significant impacts".**

Reduction of Sprawl with a Managed Capitol Lake

Enhancing the aesthetic appeal of downtown Olympia with improved Lake management will help to increase downtown residential and business density likely reducing residential and business sprawl into our valuable and diminishing rural areas. (See "Land Values Bordering Lakes are Significantly Higher"). This would undoubtedly be environmentally beneficial and yet it has not been mentioned in the DEIS**.**

Note: Olympia proper will continue to grow under all the alternatives. However, in the minds of realistic city planners (such as retired City of Olympia and Thurston County Planner Peter Swennson), under a Managed Capitol Lake, our area is likely to have a much higher percentage of city/rural growth, which is a purpose and goal of The Growth Management Act. It is important to attempt to answer the following: **Will the marginal habitat benefit under the estuary/mudflat alternative be less than or greater than the rural habitat saved by attracting more residents and businesses to the urban area? This question must be addressed in the EIS. Experts must be consulted.**

Regarding the Executive Summary, apply the characterization "significant impacts" to the Estuary under Economics (including ecosystem services) page 35. Additionally, in the Executive Summary, estuary, add "significant impact" to Fish and Wildlife, page 37. It is well established that sprawl significantly adversely affects rural ecosystem services due to development pressure (increased run-off, destruction of habitat, etc.). Recognition of this pressure should be stated clearly in the Executive Summary, Land Use, Shorelines, and Recreation, page 32 reflecting this established effect, labelling it "significant impact" for the estuary/mudflat. As mentioned above, please interview experienced city/county planners as to their opinion on this matter.

Lack of recognition of this long term environmental effect belies the third major goal of this project, "Improve Ecological Functions."

Singular Estuary/Mudflat Pictorial in Executive Summary is Misleading to the Public

The singular visual representation of the estuary at mean tide (page 10 of the Executive Summary) reveals an image which exists for a limited amount of time. **This needs to be clarified to the public and its decision-makers. What is the date of this mean tide depiction? Please show calculations as to how the water levels were depicted so that impartial engineers might confirm their accuracy. Will the island grasses be green year round? (aesthetically important). Is this pictorial consistent with the statement on page 1 of the Executive Summary that with the estuary alternative, "tide flats will be the predominant habitat type." No, it is not. Shamelessly, no tide flats or marine debris are depicted.**

Note: How can the DEIS be considered impartial in the face of this evasion of reality which hides the mudflat area? The stark answer is, it can't.

These requests are especially meaningful because most readers of the EIS document will likely look at the Executive Summary and skip the vast majority of the "Discipline Section" which shows more realistically what will be visualized over the span of tide levels. Many of those who consistently view Mud Bay, West Bay Park area, East Bay, and Woodard Bay, or Nisqually Mudflats **in the daytime** understand that substantially more mud in Capitol Lake basin is likely to be revealed the vast majority of time compared to what is pictured in this singular Executive Summary pictorial. This is particularly true of daylight hours in the summer when more people are outside and tides are lower. A significant percentage of readers including public third party reviewers might find this one image in the Executive

Summary to be misrepresentative. Essentially it tells the viewer, "There is no mud! There is no marine debris."

For the sake of credibility, show at least 4 images of the estuary alternative and hybrid alternative in the Executive Summary with at least 2 at summer low tide, at least one of which is taken from the Deschutes Parkway facing northeast and one from Marathon Park facing north. Marine debris should be shown as it is part of the mudflat landscape. The public must be given the chance to visualize the massive "significant impact" brought about by the substantial areal amounts of mudflats. Hiding this feature reveals a significant bias toward the estuary/mudflat and needs to be corrected. After 70 years, most of our community's institutional public memory of the unpleasant nature of the estuary/mudflats has been lost. Furthermore, the Executive Summary Visual Resources aesthetic change assessment from Lake to estuary should read "significant impacts" as regards the estuary/mudflat (page 33). Essentially, that characterization was given 70 years ago. We are reminded that, "Those who ignore history are destined to repeat it".

Recommendation: Although the estuary mudflat has significantly impactful limitations aesthetically, doubling or tripling the number of "coniferous islands" would soften the stark harshness of the mudflats of this inferior alternative.

Note: In the hybrid alternative, at low tide, the wall of the reflecting pool will be up to 20+ feet above the mudflat. From the Deschutes Parkway, the reflection of the Capitol dome will be obscured by the barrier wall, substantially defeating the purpose of the reflecting pool. The wall itself, when viewed from all directions will have a dominating effect (especially at lower tide levels) and will ultimately appear unseemly and dirty with mussel growth and black colored algae-like plant growth like that of the supports of the 4th Avenue Bridge. Perhaps this problem could be alleviated with riprap (placed on both sides of the wall) of a color similar to the Arc of Statehood and short green deciduous vegetation atop. However, this would add significant expense and maintenance requirements, and would likely increase the loss of reflection from the Deschutes Parkway even further.

This severe deficit in the hybrid alternative should be noted in the Executive Summary on page 33. This alternative should be disqualified on that basis alone unless it is accompanied by the above mentioned riprap and landscaping. At the July CSB meeting with DES, one CSB board member described the wall as "hideous" .

Horizontal elevation views of the new 5th avenue bridge and the elevated access road from Deschutes Parkway from any viewpoint have been omitted. These horizontal views are important as they should depict:

- The effect of the new 5th Avenue bridge if designed to "highway bridge" standards and its comparison to the more aesthetically pleasant urban design of the 4th Avenue Bridge.
- Landscape changes created by excavation and the access road to and from the Deschutes Parkway.

Please provide appropriate elevation views so these aesthetic characteristics can be evaluated.

Selective Harvesting and Dredging Benefits

In the Executive summary, page 30 Aquatic Invasive species, for the Estuary alternative, the following statement is made, "Aquatic vegetation is reduced, resulting in a "**substantial benefit"** by improving

aesthetic characteristics of water quality" However, on page 33 of the Executive summary, Visual Resources, for the Managed Lake, the following statement says, "Improved water quality and aquatic plant removal would have **minor beneficial effects** related to aesthetics." **Please address this inconsistency regarding plant removal in the lake basin under the two different alternatives.** Further, aquatic plant growth and peripheral bottom debris in the lake basin account for virtually all of the Lake's negative aesthetic effect. This negative aesthetic effect will be totally eliminated under the Managed Lake Alternative (and also the Estuary Alternative) **and therefore deserves a characterization of "significant beneficial effect". Please correct this discrepancy, or explain why it is fair to rate this removal in an estuary as a "substantial benefit", but if it occurs in the managed lake, it is rated as** a **"minor beneficial effect"? Please be fair and rate both alternatives the same. If these characterizations are to be converted to numerical scoring values, this discrepancy is of concern and must be corrected.**

It appears to have taken approximately 25 years (1986-2011) for the aquatic plant growth and the debris in the north basin of Capitol Lake to produce an aesthetically unpleasant appearance. Therefore, assuming an initial dredge of that basin starting in 2025, it would be 2050 or so before a similar negative aesthetic effect occurs (about the same time the first long-term dredge is scheduled to occur). If aquatic plant growth occurred sooner, a selective harvesting could markedly help the aesthetics. **Therefore, under Executive Summary, Visual Resources, Capitol Lake Alternative, page 33, a characterization of "significant beneficial effects" would be most appropriate, rather than "minor beneficial effects". Please change as previously requested.**

Comment: Reports are that the 5th Avenue bridge to be built is designed to the aesthetics of a highway bridge and is therefore less costly than if it were designed similar to the 4th Avenue bridge. If this is true, using the basic highway design would reduce the cost of an estuary/mudflat plan to reduce its cost disadvantage. Surely, design aesthetics in the state's capitol demand a "4th avenue type design". Please make that intent clear in the EIS.

Comment: In the Executive summary, page 30 Aquatic Invasive species, Estuary alternative the following statement is made, "Aquatic vegetation is reduced, resulting in a "substantial benefit" by improving aesthetic characteristics of water quality" This statement is somewhat misleading. Why? Because under all three plans of managed lake and estuary/mudflat, the north basin will be rid of plants because of dredging. The north basin is, by far, viewed by the most people and benefits little from the description described above. Additionally, the middle and south basin will become a wetland. **Please change the characteristic to a "minor beneficial effect".**

Inconsistent Construction Impact Descriptions regarding visual Impact for the Three Alternatives

All three alternatives regarding construction have received a "significant" designation for their visual impacts. This would be logical if all three had only the common construction activity of the initial dredge of Capitol Lake. However, the estuary and hybrid options create significantly more and longer (4-5 years for managed lake vs. 7-8 years for estuary/mudflat and hybrid) construction activity than the managed lake. For example, the estuary and hybrid options require the following additional construction activities as listed on pages 5-59 and 5-60.

- 5th Avenue Dam and Bridge Removal

- Construction of a new 5th Avenue Bridge for Bridge and vehicles and Deschutes Parkway alignment
- Slope stabilization along Deschutes Parkway
- Stormwater outfall replacement along Deschutes Parkway and the Arc of Statehood
- Culvert replacement at the Interpretive Center
- Barrier Wall construction in north basin (hybrid only)

All the above have additional negative visual impacts and over a greatly lengthened time-span.

Using the same descriptive term for visual impact for all three options as "significant" fails to convey the enormous differences as listed above. The common term does not tell the reader of the significant differences in impacts which the community will be required to endure. As such, it is misleading.

Please correct this by using descriptive terms which convey the actual differences of the visual impact of construction activities. Again, the public does not deserve to be misled. Perhaps using "significant impact" for the Estuary/mudflat option and "non-significant impact" for the Managed Lake option would convey the proper difference to the public.

If the characterizations used are to be converted to a numerical ranking value, please ensure that the ranking reflects the extra negative effects of the estuary/mudflat.

SPECIFIC HYBRID ISSUES

We have more specific comments regarding the Hybrid Alternative in the relevant Chapters and Discipline Reports, however, in reviewing the Draft EIS, we have found two aspects of this alternative that are of over-riding concern, and have been identified as key findings important to the state decision process in the earlier section of this document. These issues must be made evident to all interested stakeholders in the Capitol Lake/Estuary project.

One of the most important reasons for developing this dual-basin alternative is to preserve the iconic reflective views of the Capitol, while still creating an estuary. The construction of a barrier wall is essentially the only difference between this alternative and the Estuary Alternative. To meet this objective of preserving the reflection of the Capitol, it should go without saying that the viewer needs to be able to see the water in the reflecting basin; and this is where we have a problem. It appears that the barrier wall, rising eight feet above the normal water level in the basin, will obstruct a significant portion of the views of the water from the Deschutes Parkway and around to the West end of the Arc of Statehood. Looking East from the Parkway across the Estuary, it appears unlikely that even the surface of the reflecting basin will be visible. Even around the North end of the basin, at the elevated feature of the Arc, called the Eastern Washington Butte, the reflection is impacted. To quote from Draft EIS Attachment 14, Page 5-42 which discusses Visual Resources:

> The paths next to the Eastern Washington Butte would be modified to ramp up to the barrier wall, and a guardrail would be added on the water side. As a result, the open water visible from the top of the butte would be substantially reduced. The view of the Capitol Dome would not be

> affected, but some of the reflection of the Capitol Dome in the water surface would be lost from this vantage point.

It may be true that a few of the lucky homeowners on the bluff above Capitol Lake may continue to have reflective views, and motorists descending the Fourth and (new) Fifth Avenue bridges may have fleeting reflective views, but for those walkers, runners, cyclists and motorists on the Deschutes Parkway, the reflection could be only a memory.

And this brings us to the second over-riding concern. The one-half mile long barrier wall, including wing-walls every twenty feet for support and guard rails for fall protection, rises eight feet above the normal water level in the reflective basin, on the East side. However, on the West side, facing the Deschutes Parkway, the height of the barrier wall above the Estuary varies depending on the tide. At best, at high tide, it will be similar to the East side. But as the tide level drops, the elevation will reach about twenty feet (over two stories) above the estuary. Again, to quote from the same paragraph in Attachment 14:

> Its [barrier wall] scale and contrast as seen from this vantage point would be moderate to severe. It would introduce a major structural element that not only contrasts with the tree-lined shores, but also substantially reduces the scale of the basin that would remain visible.

Even this statement does not do justice to the impact that a half-mile, fifteen-to-twenty-foot-high sheet pile and concrete vertical wall will have on the overall appearance of the North Basin, particularly from the Deschutes Parkway level.

As we said previously, these concerns must be made evident to all interested stakeholders. This is a case where a picture is worth a thousand words; and we don't have the right picture. In Chapter 4, Figures 4.10.12 and 4.10.13 show that the reflective basin water surface is not visible from the walkway bridge, but provides only a limited perspective of the issues we have raised. Figures 4.10.14 and 4.10.15 provide no view of the estuary, and appear essentially the same as many other views from the Capitol overlook with the other alternatives. No other views of the Hybrid Alternative are included.

At a minimum, the views from the Deschutes Parkway toward the Capitol need to be developed and placed in Chapter 4, and also included as a part of the Executive Summary.

We believe the issues raised here could be disqualifying for the Hybrid Alternative. **Full disclosure, both in text and pictorially, should be provided so that all stakeholders can be fully informed when they comment.**

You may receive significant comments from others that cause you to take a step back, make corrections or changes, and reissue a supplemental draft of the EIS for further review. If so, **please take that opportunity to also consider these comments. If not, we believe that our concerns rise to the level that they should require reissuance of a supplemental Draft EIS for stakeholder comments on their own merit.**

ECONOMICS

Current Economics, Chapter 3

The descriptions of the Existing Conditions in the Economics section of Chapter 3 provide a thorough review and accurately portray the current conditions. Thank you for providing this review. We noted one comment in particular on Page 3.137, as follows:

> "For Capitol Lake specifically, interviewees most frequently cited the surrounding walking trails as one of its most compelling features for downtown residents, followed by the views it provides. These features would continue to contribute to attracting residential demand to downtown to the extent they are maintained in future management alternatives."

We will have several comments supporting this important citation in the Economics sections of both the Long-term and Short-term Impacts in Chapter 4 and 5.

Long-term Economics, Chapter 4

We have four significant questions regarding the statements in the Key Findings box on Page 4.181:

- **Are the long-term impacts similar among all the action alternatives?**
- **Is the Managed Lake Alternative the most expensive? In the long or short term?**
- **Will LOTT have less stringent discharge requirements under the Estuary or Hybrid Alternatives?**
- Tribal cultural values are prominently featured in these Key Findings, but there is no mention of the historical cultural value of the Capitol Campus as the centerpiece of the Capitol City and State. Both of these cultural values were described in Chapter 3, Page 3.141. **Why was this second cultural value ignored?**

We will address each of these questions as we move through each section of Chapter 4, sub-section 14.

In 4.14.3.1, Downstream Economic Activity, the relative costs of each alternative are discussed, with the Managed Lake as the most expensive, and therefore generating the most economic activity. First, as we have outlined in comments elsewhere, these relative costs do not survive a close examination, and should not be further promoted here. Second, this section describes the costs as "occurring over 30 years". Looking closer, however, we see that the costs fall into two categories: those that will be incurred during the first 8 to 10 years for initial dredging and construction activities; and long term dredging costs that for the Managed Lake Alternative will not occur for about 30 years. For the first set of costs, the Managed Lake Alternative is <u>not</u> the most expensive, it is the least, by far. **These are the costs that should be evaluated for their economic impact.** The long-term costs, occurring 30 years from now, are based on a highly improbable scenario, as we have discussed elsewhere, and are likely to never materialize. The ultimate economic impact from these future speculative costs cannot be measured. The one true statement in this section is:

> "Spending for the action alternatives would likely be funded using a mix of public dollars from a variety of sources, but the ultimate funding mechanisms and cost distributions have not yet been determined." and "…the question of who pays, and how that might affect the regional economy or individual entities, is unknown."

We couldn't have said it better.

One other part of this section that needs to be addressed is the inclusion of Table 4.14.2. This presents the same, flawed costs that we have seen over and over again throughout the Draft EIS. We have maintained previously, that no cost information is better than incomplete, unsupported, potentially inaccurate and misleading cost information. Endlessly repeating these erroneous tables will not make them any more true. We can only reiterate that here, and ask, **will you please remove these tables from the Draft EIS?**

In 4.14.3.2, Development in Downtown Olympia, the Draft EIS summary concludes:

> "… all action alternatives are likely to produce benefits for downtown development, assuming they are implemented in a way that is attractive and accessible."

The key here is assuming implementation in an attractive way. We all know that "attractive" is in the eye of the beholder, but it appears to be nearly universally accepted that the barrier wall running the length of the North Basin will not meet any definition that includes "attractive". The comment on the Hybrid reflective pool as a familiar feature, is negated by the imposition of the barrier wall as obstructing the views. **Therefore, it should be stated that the Hybrid Alternative may have a negative impact on downtown development.**

In 4.14.3.3, Demand for and Value of Recreation, all active alternatives are rated similarly, although there is a brief mention of the low-tide limits for the Estuary, and presumably the Hybrid Alternative. We have raised several questions previously that need to be addressed here. **What is the maximum velocity at tidal change at the various constriction points, and how does that impact kayaking, canoeing and waterboarding? What percentage of the time will these activities be curtailed, both during high flow and also low water conditions? Will warning signs or restrictions be needed to ensure safe operations? How will restrictions be enforced? Shouldn't there be a distinction made between these limitations and the benign conditions for the Managed Lake Alternative?**

In 4.14.3.4, Value of Ecosystem Services, there is one glaring error. This is the assignment of an **Adverse Impact** to the Managed Lake Alternative. The Draft EIS has failed to understand and acknowledge the natural effect of aquatic plants in removing a substantial portion of the Nitrogen entering Capitol Lake from the Deschutes River flow. This benefit of the lake is detailed in our Key Issue comments titled PASSIVE NITROGEN REMOVAL IN CAPITOL LAKE, and further in the general comments section for WATER QUALITY. Please review these two sections to be sure you understand this important water quality benefit that Budd Inlet realizes under the Managed Lake Alternative. Considering this feature of Capitol Lake, it should be characterized as having a **Significant Beneficial Impact** for utilities and their ratepayers. Further in this section, the Estuary and Hybrid Alternatives should be characterized as having an **Adverse Impact** for utilities and their ratepayers, because this Nitrogen removal capability will be lost without the lake. **Please make these changes to the impact statements.**

Later in this same section, it is asserted that:

> "The overall economic value of increased habitat and diversity would likely be higher for the Estuary and Hybrid Alternatives, which would provide better habitat quality for species of commercial, recreational, and cultural value, especially salmon."

As we stated in our comments in the Fish and Wildlife section, there is strong evidence that juvenile salmon, reared in a freshwater environment such as Capitol Lake perform as well as those in a marine environment. Further, the increase risk of predation in an estuary with multiple compression points, and the presence of toxics from Budd Inlet into the newly created estuary, make it even more problematic to assert that an estuary is preferable to Capitol Lake for salmon enhancement. **Please correct this misstatement.**

And finally, in this section, we see once again the flawed conclusion that the Managed Lake Alternative exposes downtown Olympia to a greater flood risk during high river flow conditions. As we stated before, the long-established DES procedures to utilize the storage capacity of the lake, mitigate this flood risk. In fact, for all extreme river flow and high tide conditions, the Managed Lake Alternative has a lower risk of downtown flooding than either the Estuary or Hybrid Alternatives. **Please reverse this beneficial effect to favor the lake versus the estuary.**

In 4.14.4, What are the long-term impacts under the Managed Lake Alternative?, the Table 4.14.3 needs to be corrected to reflect the issues described above. **These include recreational opportunity, LOTT utility and ratepayer costs, and salmon enhancement.**

In 4.14.5, What are the long-term impacts under the Estuary Alternative?, the Table 4.14.4 requires the same corrections as previously described for Table 4.14.3. Additionally, in the last section of the table it is asserted that:

> "The 5 thAvenue Dam has altered the natural system and resulted in water quality changes that have harmed species, specifically salmon, as well as plants and other animals…".

What is the basis for such a claim? If none, this comment should be deleted.

In 4.14.6, What are the long-term impacts under the Estuary Alternative?, the Table 4.14.5 also requires the same corrections as previously described for Table 4.14.3. Additionally, **the aesthetic value comment should be changed to <u>Significant Adverse Impact</u> due to the imposition of an industrial-scale, 2600' sheet pile and concrete barrier wall through the middle of the North basin.**

In 4.14.7, What mitigation measures would be recommended or required for the three alternatives?, adequate funding and a long-term plan for functional governance are identified as important measures to be taken, especially for the Estuary and Hybrid Alternatives. **We maintain that these measures are so important that they must be established <u>before</u> a preferred alternative is selected.** Then after selection of the preferred alternative, and before the dam is removed, if that is the choice, the funding and governance must be legally agreed upon. If funding or governance should not materialize partway through the project for either of these two alternatives, we cannot go back and start over, or allow sediment to accumulate without removal. Once the dam is removed, there's no going back. We get no "do overs".

Short-term Economics, Chapter 5

A review of this section reveals two general conclusions that are demonstrably wrong. The first is that construction impacts will have little to no impact on economic activity in Olympia and the surrounding area. Second is that there is essentially no difference in any economic impacts among any of the alternatives. Section 5.14.2.2 states:

> "Impacts on development in downtown Olympia from construction activities are unlikely to differ based on the alternative selected, and temporary disruption from construction is unlikely to have a meaningful effect on the market for downtown development. No impact is anticipated from construction activities on current or future development in downtown Olympia."

We disagree.

Disrupting the major east-west traffic corridor, for up to 8 years, will most certainly impact commercial activities in the Downtown area. Brief disruptions have little impact, but years-long disruptions can cause more permanent changes in traffic and shopping patterns. Downtown Olympia has struggled for many years with developing a robust city core. The exodus to the westside commercial areas, traffic and parking problems, the impact of the Nisqually earthquake, lack of affordable housing, and most recently the homeless issues, have made this struggle difficult over the years. However, some progress has recently been made, especially with the increase in specialty stores, more affordable and market-rate housing and the addition of amenities like the Farmer's Market, Percival Landing and the Port Plaza. However, traffic remains a significant issue, and up to 8 years of disruption will be significant.

Have you reviewed the loss of economic activity that occurred when the Fourth Avenue Bridge was replaced in the early 2000's? Have you considered the impact on north-south travel from Tumwater to Olympia via Deschutes Parkway for an extended period? Or have you considered the connection from areas West of Olympia to the Port area? And what about the connection from the Courthouse to downtown Olympia?

These construction impacts may not cause developers to eliminate future activities in the Downtown area, but they may well decide to put them on the "back burner" for a while until this gets sorted out. And there is also the likelihood that the extended construction activity for the Estuary and Hybrid Alternatives will significantly impact the marinas, recreational boating, Percival Landing and other West Bay activities, translating directly to economic losses. And, finally, the duration of the disruption could result in the permanent closure of business and marinas.

Moving now to the second Draft EIS conclusion, is it reasonable to expect that all the alternative construction impacts will cause the same, minimal disruption and potential loss of economic activity? Does a couple months of repairs to the Fifth Avenue dam equate equally to 6 to 8 years of major construction at the bottleneck between Downtown Olympia and the Westside? We all know the answer to that question, yet Tables 5.14.2, 5.14.3 and 5.14.4 all show exactly the same description of impacts and effects for the three active alternatives. **If the labelling (and rating) system that is used in this analysis cannot differentiate between a 7 week and up to a 400+ week construction period, then shouldn't it be replaced with one that can? And in any case, the current labelling system should <u>not</u> be used for rating the various alternatives.**

Other comments on this section, Short-term Economic, Chapter 5, include the following:

- Although it's appropriate to include Table 5.14.1 as part of the analysis for this section, the costs included need to be modified to reflect our comments in the Construction Section. Our analysis showed that the Managed Lake Alternative costs were overestimated, while Bridge and Deschutes Parkway costs for the Estuary and Hybrid Alternative were grossly underestimated. Correction of these costs will further demonstrate the disparity between the alternatives.
- The true impact on Olympia area economics is obscured for all alternatives by the inclusion of initial dredging costs in the analysis. This initial dredging will take place primarily in the North Basin, away from any direct impact on economic activity, which is mainly due to the disruption of the major east-west traffic corridor. Limiting the analysis to only the actual construction activities will also further demonstrate the disparity between the alternatives.
- A similar situation exists for Recreation impacts from construction activities, and their impact in turn on economic activities. This should not be minimized. Recreation activities are one of the main draws for visitors and locals alike, and this brings additional economic benefit to the downtown area.
- It is important to recognize that all people do not see the duration of the disruption and resultant impact on economic activity through the same lens. While some in the Gen-X or Millennial generations might see this multi-year activity as "short term", to others in the Baby Boomer generation, this may seem like a "lifetime".

LEGAL FUNDING OBLIGATIONS OF WORKING WATER FRONT BUSINESSES

The Legislature required the DES to incorporate the Economic Impacts of the Project to both the State controlled area and the surrounding Community directly impacted by the Project. The Port of Olympia and the Working Waterfront businesses were specifically named in this direction from the Legislature.

Economics and cost sharing of proposed impacts will depend on the legal and contractual obligations with the impacted property owners. The assumptions made by the DEIS in cost sharing and decision making is not consistent with current Federal, State and local business contracts.

The DEIS makes several conflicting general statements that leave this issue with no guidance to who will be making the final decisions on the selection of the preferred alternative. In one statement, the DEIS suggests that the State will be responsible for funding the selected project. Later in the DEIS they suggest that the COE must complete a pre dredge and then an every 5 to 6 year maintenance dredge for the Estuary and Hybrid Alternative to function as described.

In other discussions they suggest shifting the future maintenance to the downstream marinas and the Port/COE. They do not mention the City of Olympia's Percival Landing Harbor, with a moorage area as large as three of the marinas. They do not mention that all of this area is owned by the State/DNR with 30 year contracts that are limited by existing State Law on how the annual Lease Fees are determined, and that half of the marinas just signed a new 30 year lease with DNR.

There is no information from the COE that they are in agreement with the proposed Alternative designs and that they will accept Federal responsibility to fund and implement the "assigned DEIS responsibilities". **QUESTION: How did the DES and the Consultant Team determine that the State could**

legally transfer significant project costs to others without their concurrence, and then reduce the assumed cost transfer from the Alternative Total Project Cost?

Direct cost assignment transfer versus state financing: The DEIS fails to provide clarity of total costs of the Alternatives and then separate the cost of the total Alternative and then legally assign costs to others. The transfer of State costs to others, legally approved by the Legislature would have a very significant negative impact on the future of Downtown Olympia and its current waterfront environment. The shift in funding most likely would result in a shift from an active family oriented and commercial waterfront to a "tidal estuary passive environment" associated with a Tidal Estuary where only passive use of the waterfront would be the focus.

Another cost and economic impact that the DEIS did not adequately address was the indirect cost impact of the construction project projected to last up to nine years under the Estuary or Hybrid Alternative. A nine year disruption of the East-West major Olympia Arterial and all of the attendant costs to the business and routine land travel is a major consideration. The daily life for many of the Olympia and Thurston County residents over a nine year construction period will have a real cost. Daily business at the County Courthouse and the cross town transportation will be disrupted by the Estuary or Hybrid Alternative---as compared to a one year disruption by the Managed Lake Alternative. This was not adequately defined by the DEIS.

Loss of boating waterfront: The DEIS assumed the high cost transfer to the marinas and others would be a new cost of community use of the marine boating waterfront. This includes the City's Percival Landing harbor, the four private marinas, the Anthony's/Port Plaza public marina, and the Port of Olympia. The potential loss of the boating waterfront due to these new, high costs, would impact the many Community Celebrations with a waterfront focus along with the disruption or ending of the small commercial boating enterprises and family recreation that is linked to boating.

An example of this cost shift in the DEIS for the Estuary Alternative is their "footnote shift of $18 million for each routine dredge obligation to working waterfront without recognizing that the State/DNR is the owner of this land. Most of the marinas have a 30 year lease with the owner of the land--the DNR. These DNR marina leases are adjacent to the Federal navigation channel where the DEIS propose for the Estuary Project to require the COE to complete a maintenance dredge every five or six years to keep the navigational channel open for commercial and public boating use and to protect the Estuary sediment carry over from being contaminated by the Budd Bay Legacy Pollutants.

The 30 year DNR marina land leases are for a small part of the harbor (typically about 300 feet by 300 feet) and obligate the leaseholders to maintain/dredge their leasehold, with the State and the COE obligated by Federal law to keep the navigational channels open. The DNR annually receives significant lease fees from each of these small land leases from each of the marinas while the DNR uses these funds for other purposes than to maintain the sites for the intended use.

State law controls DNR lease fees for marinas: Separate from the legality of the proposed new obligation proposed by the DEIS, the projected cost in the DEIS as a new obligation on the marinas that could put the marinas out of business, is a significant negative impact to the Olympia boating water front.

Since the routine maintenance dredge required for the Estuary Alternative would be a State requirement, the State or the City of Olympia could assume the financial obligations of the maintenance dredge of the navigational channel as an "environmental mitigation" annual cost consistent with the Estuary project objectives.

A more comprehensive review by the Consultant to addressing an approach that builds on an "adaptive management and decision process" is needed. Such an adaptive approach is typically part of all well engineered projects. An Adaptive Management approach combined with phased implementation would help the Legislature and the public proceed to a more informed decision process. This Adaptive Management Approach will both reduce the chance of making a major error in decisions, and provide a much more achievable implementation and funding strategy.

More strategically presented, the State and the local community could participate in the refined evaluation to establish with a degree of confidence, rather than an emotionally driven hopeful vote without the facts being known. The selected Alternative could then be implemented in a definable future; sooner rather than later.

Specific questions for the consultant: All of the following questions are related to the potential of the State and Consultant shifting project costs to the working waterfront.

1) **COE concurrence of project design: Did DES and the Consultant obtain written review and concurrence from the COE on the dredging proposal in all three Alternatives?**

2) **Pre dredge and deep water vs upland marine sediment disposal**: The DEIS requires the COE to dredge the Port Turning Basin prior to the initiation of the Estuary and Hybrid Alternatives on the premise that the Estuary Project maintenance dredges will only remove clean Deschutes Watershed sediment every five or six years. They project that these dredges could then be disposed of in a deep water location at a much reduced cost. However, with the big ship and tugboats constantly "mixing the sediments" in the surrounding areas, and the twice daily tidal actions moving water into the Lake Basin, it is unlikely that all the sediment will qualify for deep water deposit. **How does the Consultant conclude that a "quiescent stratification of new sediments over a six year period will occur"?**

3) **Who pays for pre dredge and on what schedule**? **What is the projected cost of the COE pre dredge and then a maintenance dredge every six year with upland disposal? This is a project cost. Only as a tacit agreement by the COE to pay for this cost would the cost to the State be reduced.**

4) U**se of navigational channel by city and port transient moorage:** The DEIS did not acknowledge the City's Transient Marina at Percival Landing and the Ports Transient Marina near Anthony's. Both of these marinas rely on the COE's navigational channel for commercial uses. **How has the Consultant factored in the City and Port use of the navigational channel and confirmed the DNR requirements for maintenance of these leaseholds?**

5) **Marina and DNR 30 year contracts:** The marinas are assessed both a DNR lease fee and County property tax for their designated leasehold. This also includes an annual leasehold tax and then they are obligated to maintain their leasehold, including dredging their leasehold. **How did the Consultant differentiate the marina's current legal contract obligation with the State/DNR and determine that the Estuary Project could unilaterally assign new costs as a result of the State changing the basis on which these 30 year leases were issued?**

6) **Another alternative for in basin (upper) Capitol Lake sediment disposal:** All three Alternatives provide for the early dredging of the North Basin with in-basin sediment disposal. The DEIS projects placement in expensive "cells" to prevent erosion from Deschutes annual high water flows. A simple low cost alternative exists. A semi-permanent hydraulic dredge arrangement to pump the sediment to the state's six acre 'borrow pit area near both Percival Creek and the railroad tracks would enable a simple hydraulic dredge of the North Basin with dewatering at the "borrow pit". When the dewatered sediment is full, the sediment pond would be loaded onto nearby train cars that would travel within the basin to open land near the train tracks in the Deschutes Watershed above Tumwater Falls. Permanent farm land could be purchased for routine disposal, thus retaining all of the sediment in the basin if the NZMS is documented as a true concern. **This simple alternative would eliminate most or all of the expensive "containment cells" for all of the North Basin dredges to reduce the cost of this first phase of the project. Seasonally managed, it would also substantially reduce the cost assigned to "Standby during Work Window Closures".**

Question: did the Consultant consider this sediment disposal alternative? If so, what was the cost comparison and cost savings throughout the life of the Managed Lake Alternative and the cost savings for the initial dredge of the North Basin for the Estuary Alternative?

The DEIS analysis has some significant errors, omissions, and misleading conclusions that when corrected, the DEIS first step could lead to a much improved analysis. **Additionally, a refined Adaptive Management approach will both reduce the chance of making a major error in decisions, and provide a much more achievable implementation and funding strategy. More strategically presented, the State and the local community could participate in the refined evaluation to establish with a degree of confidence (rather than a hopeful vote) that the selected Alternative will be implemented in a definable future; sooner rather than later.**

We look to additional comments from the Chamber of Commerce and the Economic Development Council to review the impact on the Community and the working waterfront. We have provided our engineering and environmentally based assessment on how the DEIS has erred. We are also providing a suggested way forward so that the "State doesn't kick the can down the road one more time."

APPENDICIES

1. CAPITOL LAKE PROTECTS BUDD INLET'S WATER QUALITY.

Assessment of Water Discipline Section 4: Affected Environment [AE].

By David H. Milne, PhD. (Faculty Emeritus, TESC, Environmental Studies.)

August 29, 2021

My questions challenge the widespread view that Capitol Lake degrades water quality (specifically dissolved oxygen) levels in Budd Inlet. That mistaken view is entirely based on WDOE's interpretations of outputs of a computer simulation model, modified in various ways to simulate different scenarios. Essentially the outputs have been interpreted by personnel who are not aquatic ecologists, and certain critical simulations (such as the ecosystem behavior of nitrogen nutrients and the effects of Moxlie Creek by itself on East Bay) have been avoided.

The premise toward which all of the following questions and discussion are aimed is to support this opposite view:

Capitol Lake safeguards water quality in Budd Inlet

and prevents it from getting worse.

In the following, **Questions** for the DEIS analysts about DEIS statements or omissions are in **Boldface**. Italicized text that follows provides illustrative reasons for the questions. **Conclusions**, where presented, are in **Boldface** at the ends of the italicized text.

Section 1. Questions about Modelling and Observations.

1-1. **Please review Ecology's exhaustive computer modeling of the contribution of phosphorus to Budd Inlet water quality and determine whether it is actually relevant to the evaluation of the Lake and Estuary alternatives.**
Phosphorus is the limiting nutrient in most lakes; Ecology's modelers have apparently assumed that that is also the case in Capitol Lake. That is not true. In most lakes, nitrogen <u>would be</u> the limiting nutrient, except that their blue-green algae add so much nitrogen nutrient to the water via their fixation of atmospheric N_2 that phosphorus becomes the nutrient in shortest supply.

Both Budd Inlet and Capitol Lake are nitrogen-limited – the latter apparently due to flushing of blue-green algae from the Lake by the Deschutes River flow-through. The fact that Capitol Lake is nitrogen-limited is mentioned in the CH2M-Hill consultants' report (1978) and can be seen at a glance in WDOE's own ____ Report (2012).
WDOE's exhaustive modeling of P, always showing no effects whatsoever on DO levels in Budd Inlet, contrasts with the fact that (to my knowledge) Ecology has never modeled the effects of N on Budd DO levels. This massive focus on irrelevant P has diverted attention from the critical importance of a veritable tonnage of N, delivered to Capitol Lake by the Deschutes River.
*[The figures that show this are in the 2012 TMDL report. Two box-plot portrayals of nitrogen and phosphorus levels proceeding upstream from the dam, the leftmost two in CL itself. The lowermost 25% of measurements ("whiskers") at the bottoms of those boxes reach zero in the N figure, don't reach zero in the P figure. The zero readings, which could be as many as 25% of all measurements, identify the limiting nutrient. I can't find my copies for inclusion here.]
(Thurston Co. Health Dept. Water Resources)

1-2. **What observational data are provided by Ecology to support the claim that "pulsed flow" from the dam affects water quality in Budd Inlet (DEIS page ___)?**
Budd Inlet resembles a classic estuary with a "fjord" at its head; that is, a topography with a shallow sill (the dam) blocking its headward extremity. High tides a foot or so above MSL regularly pour over the sill headed landward, outgoing water is blocked when the level drops to the top of the dam. (Unlike a natural fjord, Capitol Lake has a siphon in the deepest part of the North Basin that drains salt water back under the dam to Budd Inlet. This helps to prevent the formation of anoxic bottom water in the Basin.)
There is nothing about this topography that creates "pulsed flow." During spring, summer and fall, water pours steadily over the fish ladder ("top of the sill") at a rate matching the incoming Deschutes River flow to the south. The main dam gates are never opened except to lower the Lake level during winter episodes of heavy rainfall to prevent downtown flooding. This creates a rush of water into Budd Inlet for two days or so that substantially exceeds the swollen River input. This may be episodic during prolonged periods of rainfall. But the muddy floodwater thus released hugs the western shore as it exits Budd Inlet (never swerving over to East Bay) and in any event these winter episodes can't possibly influence water quality during the growing season.
"Pulsed flow" is Ecology's attempt to move the dam/estuary conversation from nutrient considerations to water dynamics, where data accessible by critics is much more difficult to locate and analyze. Real observable data supporting this idea are never cited by WDOE.

1-3. **What <u>observations</u> support the idea that Capitol Lake is detrimental to water quality in East Bay?**
East Bay is used as a surrogate for "all of Budd Inlet" by WDOE. Almost all of the claims that the Lake affects East Bay are based on computer simulations that "show" East Bay "worse" with the Lake in place than without it. No physical mechanisms are ever offered that describe how water leaving the Lake might circle the Port Peninsula and enter East Bay, or how water leaving the Lake might obstruct water entering or exiting East Bay either along the bottom or at the surface, or how any other plausible observable measurable process connects the Lake with East Bay.

1-4. **What <u>observations</u> support the idea that East Bay's local intrinsic properties are *not* the cause of its seasonal low bottom water oxygen levels?**

East Bay's Moxlie Creek has one of the highest concentrations of nitrogen nutrients of any stream entering the entire South Sound. The Creek has a very low flow, driving in turn a very slow, sluggish estuarine circulation with consequent long water residence time in East Bay. The LOTT outfall crosses the mouth of East Bay, creating a rising curtain of fresh water that may itself impede flushing and rejuvenation of the Bay's water. Why are these factors not responsible for East Bay's internal low DO episodes during late summers?

Section 2. Challenging Ecology's Computer Simulation Model TOC Claim. (This Section analyzes WDOE's model findings as background for the main **(boldface)** conclusion which precedes the analysis.)

The central flawed claim – that Capitol Lake impairs Budd Inlet's water quality – is based on the computer simulation whose output is shown below. The output is said to show that *Capitol Lake transfers more TOC [Total Organic Carbon) to Budd Inlet than would be transferred by a replacement estuary.*

Wrong.

Conclusion (in advance). The amount of TOC transferred to Budd Inlet each year is exactly the same, whether its origin be the Lake or the Estuary. The key difference is, the Estuary would transfer a large dose every day of the growing season, whereas the Lake transfers almost all of the season's TOC production at once, in late October/early November after the growing season is over.

(Introduction.) Ecology's claim that Capitol Lake puts more total organic carbon (TOC) into Budd Inlet during the growing season than a replacement estuary would do is based on the output of a computer simulation model. The Figure by WDOE showing that model's output is the oft-cited centerpiece of that flawed claim (Figure 1; shown in the DEIS as Figure 4-14, page 4-38, Water Quality Discipline Report).

The upper graph shows the concentrations of TOC in the water said by WDOE to be entering Budd Inlet from the Lake (ragged green line) or from a proposed estuary (ragged blue line) each day from January 25 to about September 15. Those amounts were *calculated* by a computer simulation of photosynthesis in those water bodies. The "pink dots" show concentrations of TOC that were *actually observed* in the Deschutes River near where it enters the south end of the Lake basin on 23 different dates.

The lower WDOE graph shows the concentrations of DIN *calculated* to be entering Budd Inlet from the Lake (green line) or an alternative estuary (blue line). The "pink dots" in that graph show concentrations

of DIN *observed* in the Deschutes River where it enters the Lake basin, on the same 23 dates when the TOC entering the basin was measured.

Excess DIN is the great enemy of good water quality (that is, high bottom water oxygen levels). The lower graph shows little or no DIN escaping to Budd Inlet during late summer in the Lake alternative (green line) but a veritable firehose torrent of DIN escaping to Budd Inlet in the Estuary alternative (blue line) all summer long. Ecology's preference is to redirect attention to the upper graph, where interpretation appears to favor their claim – but in reality it does not.

The green and blue lines on the upper graph show the amounts of TOC calculated for every day in the range of calendar dates shown. That is, for every day in that entire interval the lake (green) TOC line shows the calculated amount that is *said to be present at the dam* and therefore poised to go over it into Budd Inlet, while the estuary (blue) TOC is the calculated amount that is said to be present at the same place and therefore also poised to leave the lake basin to enter Budd Inlet, in that case with no dam present.

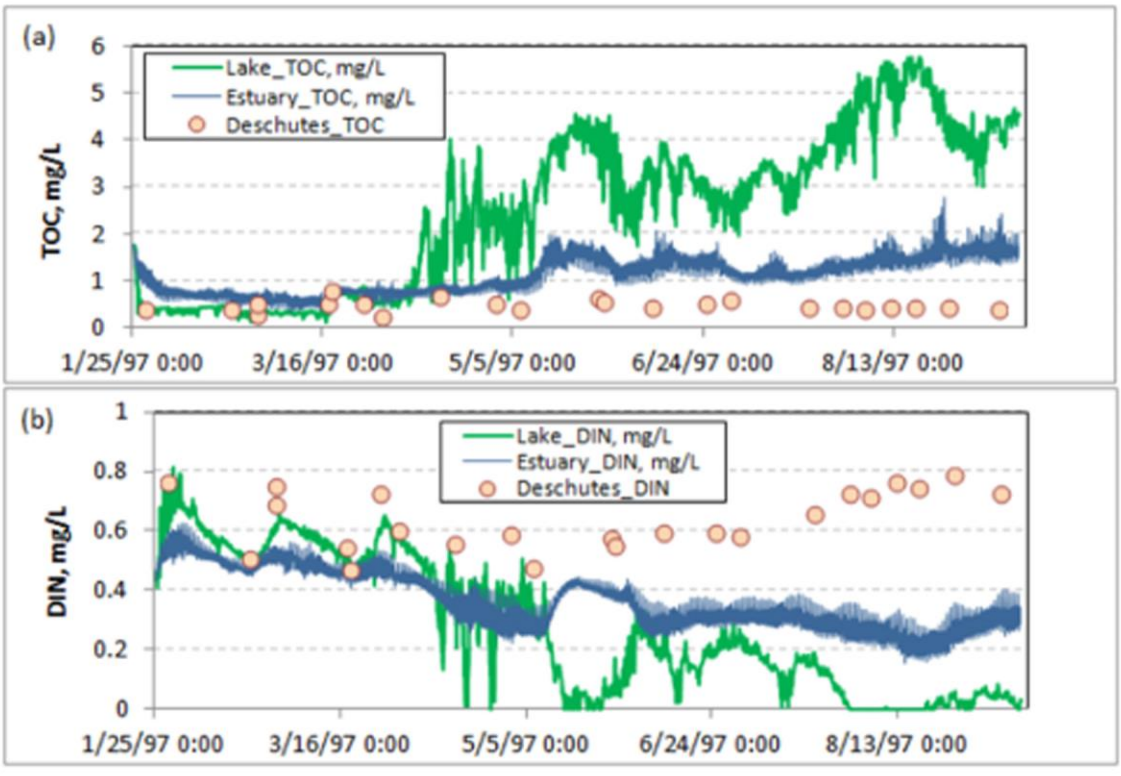

Figure 11. a) Total organic carbon (TOC) and b) dissolved organic nitrogen (DIN) concentrations <u>at the position of the Capitol Lake dam</u> under the Lake (with the dam) and Estuary (without the dam) scenarios compared with concentrations in the Deschutes River at E Street. [This Caption is Ecology's wording accompanying this graph in the document where it was presented as "Figure 11". Underlined text shows WDOE's error for the Lake case, highlighted by me.]

Figure 1. Computer simulation outputs predicting TOC formation and DIN uptake, used by Ecology to claim that the Lake puts more TOC into Budd Inlet than would a replacement estuary. DEIS Figure 4-14, page 4-38, Water Quality Discipline Report.

Ecology's upper graph shows the Lake TOC (green line) is always higher than the Estuary TOC (blue line) during the late spring and summer. *That is the reason why the claim is made that the Lake puts more TOC into Budd Inlet than would an Estuary*.

I used the observed data shown in the graphs (the "pink dots") and Ecology's method of calculation (see Column F, Table 1 below) to present the results of the computer's calculations in a different format. *That alternative format helps to show why Ecology's claim is mistaken and misleading.*

(Methods) I displayed enlarged images of the graphs on a computer screen using Photoshop. I measured the horizontal and vertical distances of the "pink dots" from the origin. From the graph scales, I determined the dates on which those observations were made and the amount of TOC or DIN actually observed on each date. On those same dates, I also measured the heights of the green and blue graphs (x-axis to the top of the graph) and determined from those measurements the concentrations of TOC and DIN calculated by the computer for each of those dates. Using Ecology's formula converting DIN uptake to TOC created (TOC = 7 x DIN) I calculated the amount of new TOC that would result from uptake of the observed concentrations of DIN. The values I obtained are shown in Table 1 at the end of this section.

(Results) My alternative portrayals of the Ecology TOC calculations are shown in the bar graphs below (Figures 2 and 3). In both graphs, the black bars (carbon creatable from total uptake of the observed DIN (Col. F Table 1) are the same. Each black bar shows the maximum *potential* TOC that *could be created* if the photosynthesizers succeeded at taking up *all* of that day's observed available DIN.

The colored bar next to each black bar shows the computer's calculation of how much TOC *was actually created* by plants on or near that day. The green and blue bars [from Cols. D and E, Table 1] show the same values as the tops of the green and blue lines on those dates in WDOE's TOC graph (Figure 1 above. Where the black bar is much longer than the colored bar (Lake and Estuary simulations, early spring) the plants did not succeed at converting very much DIN to carbon while the water was moving through the basin. Where the colored bar is about as long as the black bar or longer (Lake simulation, growing season) the plants used up *all* of the available DIN during those days and converted it to carbon before the water reached the dam.* * See end note, this section.

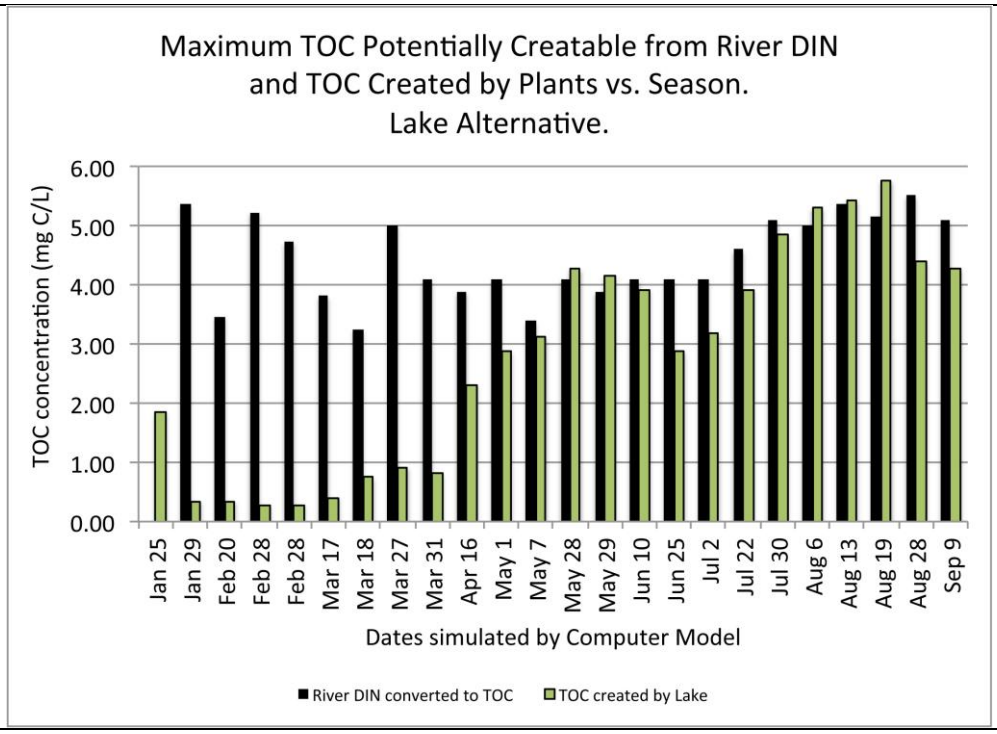

Figure 2. TOC created by Lake plants (green, from computer simulation) compared with the maximum TOC that could be created from observed DIN values (black, calculated from observed data) for 23 dates. (Cols. D and F, Table 1. See Methods, above.)

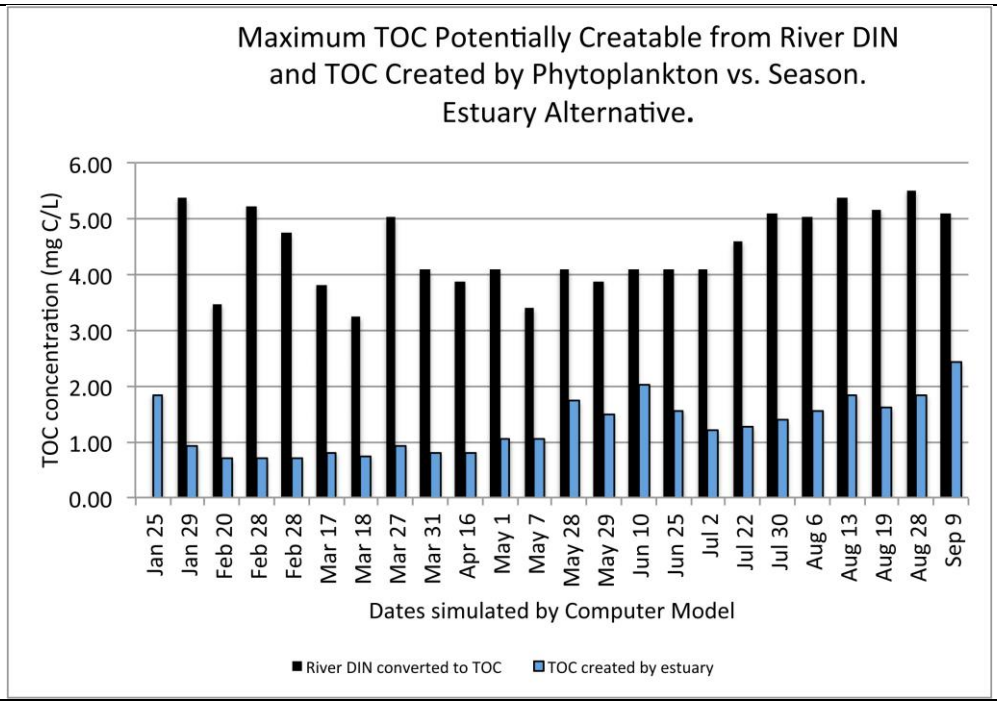

Figure 3. TOC created by Estuary phytoplankton (blue, from computer simulation) compared with the maximum TOC that could be created from the observed DIN values (black, calculated from observed data) for 23 dates. (Cols. E & F, Table 1.)

(Discussion.) Estuary Alternative. The phytoplankton in the estuary *never* succeed at converting all or even half of the DIN available into TOC before the water escapes to Budd Inlet. The escaping water carries enough DIN to more than double the amount of TOC created in the estuary itself past the dam site and out into Budd Inlet. Conversion to TOC of all of the DIN entering Budd Inlet will continue after that escaped DIN enters the Inlet, within the next day or two.

But that is outside the simulation region – "beyond the computer's view," so to speak. Tally up the TOC that forms in the inlet just beyond the simulation boundary and the result, a day or so after the estuary water escapes, is that just as much TOC is delivered to Budd Inlet as the Lake is claimed to create, each day.

Counting the TOC that forms in the Inlet as a contribution by the escaped estuary DIN, the WDOE claim that "the estuary would put less TOC into Budd Inlet than does the Lake" is false*.*

Lake Alternative. WDOE's computer simulation asserts that all of the newly minted TOC in the Lake moves to the dam. That could only happen if all of the new TOC was in the form of phytoplankton. Not so; almost all of the new TOC stays put in the plants that created it, all summer long. The "green line" doesn't show TOC at the dam site about to go over the dam; it shows the amount of new TOC created and parked somewhere, everywhere throughout the Lake each day, almost none of which moves downstream. In the real world, the TOC calculation is correct – *but what happens to the TOC is an uninformed assumption by the computer operators.*

Ecology's model is a superb simulation of the whole complex world of moving water, chemical processes including photosynthesis, complex shoreline configurations, tides, weather, seasonal temperature and river runoff changes, and every other major factor that affects the levels of dissolved oxygen (DO) from surface to bottom, over the whole extent of Budd Inlet. The marine model was easily extended to Capitol Lake – for phytoplankton. A crude lump-sum subroutine is said to have been attached to it to try to represent the activities of large plants, but that first approximation doesn't compare with the elegance and detail of the original model, can't possibly provide much help with understanding their roles, and is never mentioned by the modelers when interpreting the results.

So why would the model accurately calculate the amount of TOC formed daily in the Lake, if its focus is on phytoplankton? The answer is that phytoplankton, minute plants capable of doubling their biomass every 24 hours, would have enough time in the Lake to take up all of the available DIN. The transit time of water through the Lake varies from about 6-8 days to 15 days [p. 4-3, AE], longer in the low-river-flow days of summer. During that time, large plants and phytoplankters alike are able to convert all of the available DIN to TOC. The transit time of water through the proposed estuary, on the other hand, is only

about one day. During that much shorter time, the sparse marine phytoplankton are unable to photosynthesize all of the available DIN and half or more of the DIN "escapes" to fuel TOC formation in Budd Inlet beyond the dam site. Beyond the "view" of the computer.

(Conclusions.) The estuary and lake alternatives would deliver exactly the same load of TOC to Budd Inlet during a year's time. The estuary would deliver about half of each new daily production of TOC directly to the Inlet in the form of new phytoplankton biomass and enough escaped DIN to enable Inlet phytoplankton to make up the full TOC load the next day, every day. The lake would store all of the daily load of TOC created by plants in the lake basin, then release the whole gigantic stored TOC reservoir into Budd Inlet during a few weeks in late October and early November – after the growing season and too late to lower the DO of the Inlet's bottom water during the critical month of September.

Conclusion. Ecology's claim is false. an estuary would deliver to (and create within) Budd Inlet more TOC every day during the growing season than would Capitol Lake.

* End note.

Complication. Each colored bar in Figures 2 and 3 actually shows the calculated amount of TOC created from DIN that became available at a time earlier than the date of the bar. For the estuary, with the river water passing through it in about one day, that would be the day before. For the lake, in which the river water takes about 15 days to pass through, the colored bar shows TOC created using DIN that entered the Lake some 15 days earlier – not the black bar standing beside it on the same date. Including this "time lag effect" in the bar graphs shown here would be so gigantically complicated as to distract from the message. I have actually shown that calculation in another publication ( ). The time lag results and the simplified same-day results shown in that exercise are so similar that the simplified bar graphs presented here show the situation we need to understand with very close fidelity.

[Note added for readers who might notice this and wonder about it.]

A	B	C	D	E	F	G
	Pink DIN dots	Pink TOC dots	green line	blue line	Max TOC	Max Total
Dates of	DIN	TOC	Lake TOC	Estuary TOC	= 7xDIN	TOC

observations	mg DIN/L	mg C/L	mg C/L	mg C/L	mg C/L	mg C/L
[from graph]	observed	observed	calculated	calculated	= 7 x Col. B	Cols F + C
Jan 25			1.85	1.85		[not used]
Jan 29	0.77	0.35	0.35	0.92	5.37	5.72
Feb 20	0.49	0.35	0.35	0.69	3.46	3.81
Feb 28	0.75	0.52	0.29	0.69	5.23	5.75
Feb 28	0.68	0.23	0.29	0.69	4.74	4.97
Mar 17	0.55	0.52	0.40	0.81	3.82	4.34
Mar 18	0.46	0.75	0.75	0.75	3.25	4.00
Mar 27	0.72	0.46	0.92	0.92	5.02	5.48
Mar 31	0.59	0.23	0.81	0.81	4.10	4.33
Apr 16	0.56	0.63	2.31	0.81	3.89	4.52
May 1	0.59	0.46	2.88	1.04	4.10	4.56
May 7	0.48	0.35	3.12	1.04	3.39	3.74
May 28	0.59	0.63	4.27	1.73	4.10	4.74
May 29	0.56	0.52	4.15	1.50	3.89	4.41
Jun 10	0.59	0.40	3.92	2.02	4.10	4.50
Jun 25	0.59	0.46	2.88	1.56	4.10	4.56
Jul 2	0.59	0.58	3.17	1.21	4.10	4.68
Jul 22	0.66	0.40	3.92	1.27	4.60	5.00
Jul 30	0.73	0.40	4.85	1.38	5.09	5.49
Aug 6	0.72	0.35	5.31	1.56	5.02	5.37
Aug 13	0.77	0.40	5.42	1.85	5.37	5.78
Aug 19	0.74	0.40	5.77	1.62	5.16	5.57
Aug 28	0.79	0.40	4.38	1.85	5.52	5.92
Sep 9	0.73	0.40	4.27	2.42	5.09	5.49

Table 1. Observed and calculated values used to create Figures 2 and 3 in text. Black bars in both Figures are from Column F, green bars from Column D, blue bars from Column E. Values in Column C are not used but illustrate the small sizes of incoming existing TOC's compared to the amounts creatable from Deschutes River DIN (Col. F values).

Two smaller (but important) mistaken Ecology claims are used to prop up the main flawed model claim. They are;

1) *rooted plants obtain the nutrient nitrogen they require from the sediments.*

2) *phytoplankton dominate the N/C cycling by plants in Capitol Lake;*

These mistaken claims are addressed below in two ways;

1) knowledge of the ecology of aquatic plants, and

2) real-life, real-time observations during the passage of the seasons at Capitol Lake.

The Truth. 1) Lake plants extract Nitrogen from the water – not the sediments.

One of the most abundant and typical Lake plants is *Elodea canadensis* [p. 4-4, AE]. It grows attached to the bottom of Capitol Lake and forms dense tangles that reach the surface. In aquaria stems of this species have adventitious roots that take nutrient nitrogen directly from the water, enabling them to develop buds and increase in size, all while floating free from the bottom. Coontail (*Ceratophyllum demersum*], a common free-floating Lake plant, likewise takes up N directly from the water [p. 4-4, AE]. So do other large attached and free-floating species. Many of them (particularly with smooth rooted stems and floating leaves; *Potamogeton*, e.g.) provide underwater surfaces that support a dense blanket of epiphytic diatoms and other small algae, themselves taking nitrogen from the water.

Detached floating plants (duckweed, water ferns, algae), all of them extracting nitrogen nutrients directly from the water, are not mobile enough in the Lake to be swept over the dam into Budd Inlet. Rafts of them get caught up in the tangle of attached plants, held in place at the surface, and are not free to drift in the direction of the dam until long after the summer growing season when the anchoring plants begin to senesce and decay.

Abundant large plants in lakes create an environment that is not favorable to phytoplankton. The dense tangles of leaves and stems provide shelter from fish for the small copepods, cladocerans, other crustaceans and various other zooplankters that graze down phytoplankton populations. Their grazing liberates much of the nitrogen that the consumed cells had taken up, setting it free to give the large plants

a “second chance” at extracting it. Phytoplankton thrive best in open water that is too deep for submerged attached plants. There is not much of that in Capitol Lake.

Nitrogen is a soluble entity that (unlike phosphorus) does not accumulate in sediments. That is demonstrated by the fact that when Lake cleanup operations disturbed the sediments in 2019, a flush of phosphorus temporarily raised the P concentration in the water column – but there was no such flush of N at that time [Table 4.6, p. 4-15 AE]. Rooted plants have some ability to extract nitrogen from the bottom, but compared with the amount available in the water column in Capitol Lake, the sediments are almost certainly a minor source for them.

<u>The Truth. 2) Watching Capitol Lake protect Budd Inlet</u>.

Passersby on city streets and Capitol Lake’s shores can see with their own eyes that the Lake forms TOC every day, holds most of it all summer, then releases it to Budd Inlet during late fall.

During spring and summer, observers can see floating masses of large plants forming and growing larger on the surface in the North Basin, all summer long. The floating plants become entangled in the stems and leaves of the submerged attached plants that grow up from the bottom and each whole tangled formation stays in one place. From the railroad bridge, one can watch these stationary tangles of plants growing larger and more dense as summer advances, some of the weeds showing at the surface, others forming dense submerged thickets all the way to the bottom. The submerged plant masses anchor the floating plant masses in place.

What you are witnessing is the formation, entrapment and retention of TOC in the Lake by the vegetation there, all summer long.

On occasions when a raft of floating plants breaks loose, more often than not the prevailing NW summer winds blow it southward where it piles up against the North Basin shore and the supports of the railroad bridge – or actually drifts underneath the bridge and becomes trapped and held in the Middle Basin. If by chance a raft of duckweed and other floating plants drifts northward, it becomes trapped against the concrete bulkhead of Heritage Park just east of the dam and remains there in a shallow indentation in the wall. In that shallow concavity the raft of plants remains, appearing as an unsightly mess but in reality continuing to convert DIN in the water to TOC and hold it there all summer long.

Looking down into the water flowing over the fish ladder and out of the Lake, one almost never sees a mass of plants drift over the dam during the summer. Likewise, while boating on Budd Inlet during the summer one seldom sees fragments of “lake weed” drifting out there.

Ecology asserts that TOC creation by Lake plants during the summer is performed almost entirely by phytoplankton. That would make the water cloudy. That is at odds with the facts that the lake water has met state swimming standards for clarity (visibility to four feet below the surface or more) all summer long, since year 2000 (Thurston Health Dept. data); that the water exiting the lake at the dam's fish ladder is clear, and that one can clearly see objects on the bottom while standing on the Heritage Park wall looking downward. For a view of what the water would look like with that much phytoplankton containing that much TOC in it, look at the dense, red "tomato soup" water of East Bay during late September.

After the end of the growing season (during late October and early November) prevailing winds switch to the southwest. One can then see mats of deteriorating, senescing weed drifting toward the dam and going over it via the fish ladder water. That is the time when the TOC captured by the Lake weeds finally completes its journey to Budd Inlet.

The effects of Capitol Lake on the summer formation of TOC *that we can witness directly* are 1) formation and storage of TOC during the growing season, and 2) release of the stored TOC to Budd Inlet after the growing season. No computer model is needed to understand what is going on here. By October, it is too late for the released TOC to worsen the low-oxygen bottom water situation in Budd Inlet which, for several reasons, reaches its most critical levels in September.

What Else is Wrong with Ecology's Model Claims?

I spent several years critiquing Ecology's uses of their computer simulation models and their interpretations of model outputs. There was something wrong with every one of them. I will not try to include all of those critiques here but include my assessment of three flawed claims, one of them cited in the DEIS, with two others as evidence that *all* WDOE model-based claims about negative effects of Capitol Lake should be viewed with caution.

The flawed simulations analyzed here are;

1. The Model does not reliably show that half of Budd Inlet is adversely affected by Capitol Lake. [The output presented by Ecology creates a false negative impression of the Lake's influence on the Inlet.]

2. The Model's benthic algae subroutine was inoperative in some and possibly all simulations. [This flaw created demonstrable huge errors and possibly invalidates *all* late-season forecasts of WQ violations in East Bay.]

3. The modelers have not shown us a simulation of Budd Inlet's WQ violations in its "natural" pre-modern (pre-dam) condition. [Failure to portray this obscures the fact that the "natural" Budd Inlet was as full of WQ "violations" as is the modern Inlet with the dam present.]

These anomalies are examined in the following. (Detailed analysis of all of them is presented in my report, available in full on the CLIPA website.)

1. Misleading "violations" calculations using WDOE's Model. (An Example cited by the DEIS.)

(Introduction.) Figure 4 shows WDOE computer simulation outputs that are presented in the DEIS (as Fig. 4.13, p. 4-37, Water Quality Discipline Report). *Note that these illustrations are the same as those in the DEIS but their positions are switched* (*due to technical difficulties at my end*).

The mistaken claim based on these Figures is that "Capitol Lake has an adverse effect on water quality affecting fully half of Budd Inlet."

Each colored grid cell is a location where the computer calculated at least one DO level lower than the DO standard assigned to that location during its exhaustive search between simulated January 25 and September 15, 1997. Where more than one violation was calculated for the same site during this time, the color shows the size of the most serious violation – the "worst case" of the "year" – calculated for that cell. (The clear cells show no calculated violations at all, despite thousands of simulation calculations per cell.) The scale alongside the map shows the sizes of the violations represented by the colors.

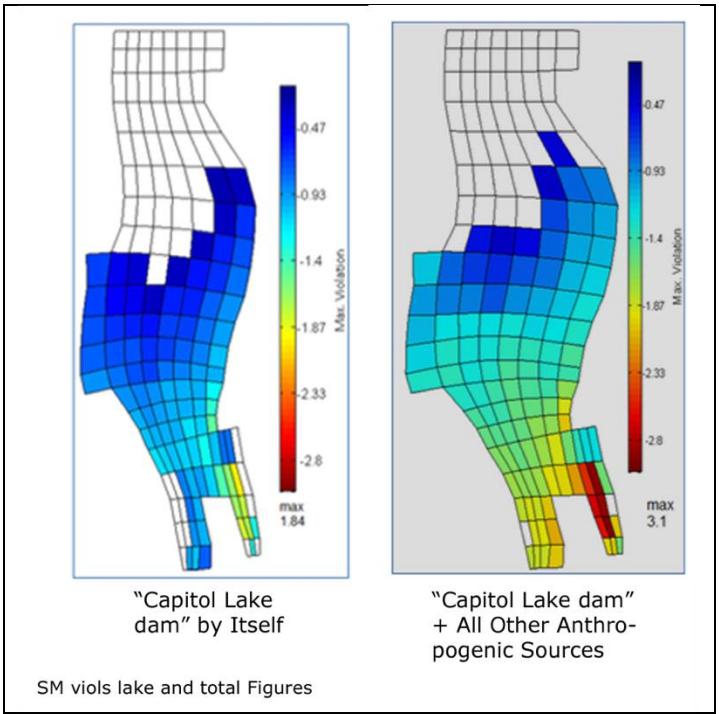

Figure 4. Caption in DEIS is "Model Predictions of DO Depletion (mg/L) From (a) the Cumulative Anthropogenic Effects and (b) Solely Due to the 5th Avenue Dam (Source:

These Figures give a visual impression that most of Budd Inlet experiences DO violations "due to all anthropogenic effects (rightmost

figure)." The supposed contribution of the "5th Avenue Dam by itself " (leftmost figure)

Ecology 2015b, Figures 8 and 9)." *NOTE. In the above depiction the positions of the "dam" and "all sources" figures are switched, relative to their positions in the DEIS.*

covers almost all of this widespread blanket of violations.

It is impossible to get anything more precise than a general impression of the supposed widespread effect of "the dam" and "all anthropogenic effects" on Budd Inlet's dissolved oxygen from Figures formatted this way. But note that on the "dam" depiction, every dark blue grid cell shows a *worst case* "violation" within the range 0.2 – 0.5 mg/L. Every light blue grid cell shows a *worst case* "violation" of 1 mg/L or less. No indication is provided of whether each "violation" occurred only once for a duration of ten minutes (one iteration interval of the simulation), or many times, or for prolonged periods of several days or weeks.

Most of the colored cells show smaller departures from the WQ standards than the computer is capable of reliably detecting. If the "blue" cells result from errors in the calculations – as they almost certainly do – an error-free depiction would show almost the entire inlet free of violations (shown below).

When the computer model was being developed, it was calibrated by comparing its calculations with actual observed values of DO and "tweaking" the parameters to bring the overall fidelity of its forecasts as close as possible to the overall pattern of the observed data. The calibration gave it a truly remarkable ability to broadly "track" developments in a complex natural system over a long span of time (Figure 5 below) – but it did not give it the pinpoint accuracy and precision needed to identify WQ violations as small as 0.2 mg/L on every calculation.

(Methods.) Figure 5 shows the DO levels at the bottom of Budd Inlet at a station [BISS BI-6] directly in front of the 5th Avenue dam. The ragged dark line shows the DO's calculated by the model during the simulation period January 25 – September 15, 1997. The circles, included by the modelers, show observed bottom water data points from the Budd Inlet Scientific Study (BISS; an exhaustive study of Budd Inlet water quality during 1996 and 1997 spanning the simulation interval) at this site and depth during that interval. The triangles are my own additions of observed values to the graph, taken by me from the BISS data spreadsheet. In principle they should all coincide with the modelers' circles. That is often but not always the case.

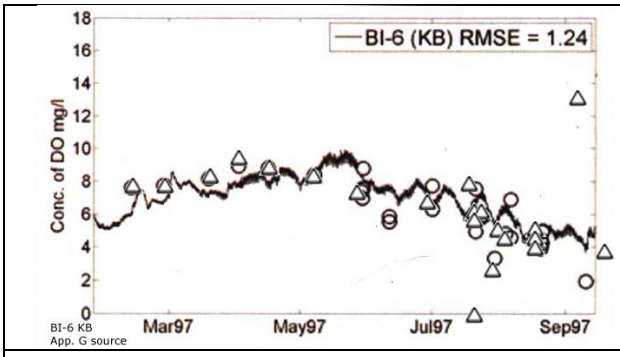

Figure 5. DO levels in bottom water at the Budd Inlet site nearest the dam (BI-6 KB). Figure is from the TMDL Appendix with an overlay of data from the BISS study (triangles) added by me. The rightmost triangle is September 24, a few days after the end of the computer simulation interval. Data source: BISS spreadsheet

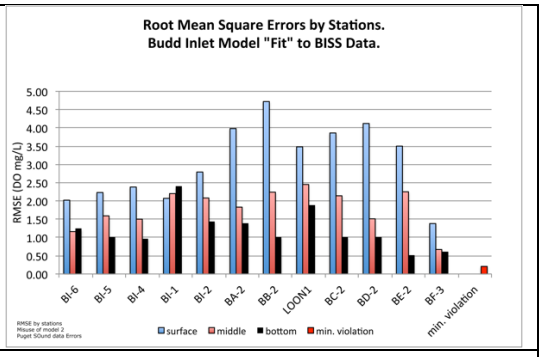

Figure 6. Values of the model's "margin of error" (RMSE) in surface, middle depth, and bottom waters at Budd Inlet stations. West Bay is to the left, Boston Harbor is at right. Far right; size of the smallest departure below DO standards that qualifies as a violation. Source of data: TMDL Appendix.

The panel at upper right shows the Root Mean Square Error (RMSE) for the calculations at this depth and site (here, 1.24 mg DO/L), determined by the modelers during the calibration process. That is the average numerical difference between the observed values (circles) and the calculated values (ragged line). On the average the computer "misses the mark" at this site and depth by 1.24 mg/L.

The WQ standard here is 5.0 mg/L. With its large margin of error, whenever a real-life DO level of 5.0 mg/L occurs here, *almost half* of all calculations estimating its value will fall below 4.8 mg/L (the violation threshold) and give a false indication of a violation. These false "errors of estimate" almost certainly make up much of the color on the Budd Inlet maps (Figure 4).

Figure 6 shows the simulation's RMSE values at all Budd Inlet sites and depths where BISS data are available. (These are taken by me from the modelers' graphs similar to Figure 5; those graphs are available in TMDL Appendix G.) West Bay (BI-6, 5, and 4) and East Bay (BI-1, 2) sites are leftmost, Boston Harbor is rightmost.

Rightmost in Figure 6 is the size of the smallest departure from the local WQ standard that is defined as a "violation;" 0.2 mg/L or more below the standard. For confidence that most calculations can identify a violation that small, the RMSE would need to be 0.2 mg/L or smaller. The computer searches for that small difference (or greater) during each calculation with a simulation tool whose calculations routinely range over the whole lengths of the larger bars.

This seems like an exercise that requires using confidence limits. It is not a straightforward statistical situation; each calculated value is not independent of the value immediately pre-

ceding it. I approximated what a solution might look like by envisioning a "confidence limit" of 2.0 mg/L applied to the whole inlet, determining the numerical values of the "violations" shown in the colored cells of Figure 7 and clearing all cells that showed "violations" that were less than 2.0 mg/L throughout. For this exercise I used the "all anthropogenic sources" depiction of Budd Inlet (from Figure 4 above).

I copied Ecology's color key (bar to the right of Figure 4) and fitted a regular numerical scale to it. Using Photoshop software I selected the colors in various grid cells of the

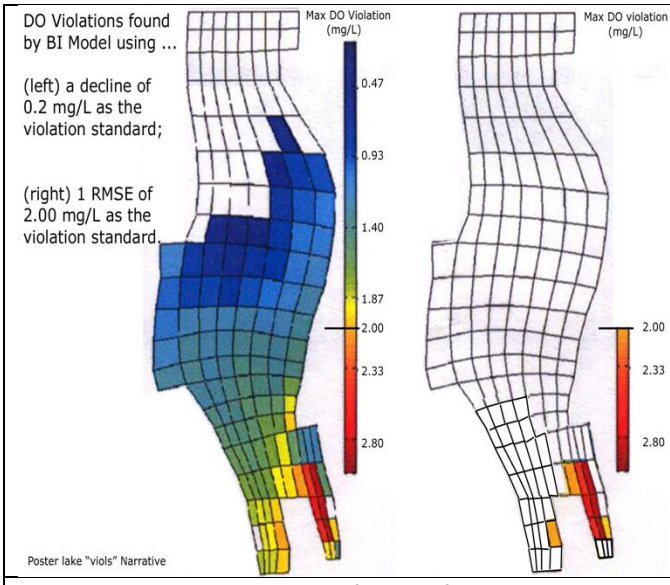

Figure 7. Areas in Budd Inlet flagged for violations where Ecology's calculated values are (a, left) 0.2 mg/L or more below the standard or (b, right) >= one RMSE (in this example, 2.0 mg/L or more below the standard). The modelers' colored scale (a) shows the maximum amount by which each colored square is in "violation." Source: a) Poster 2014; b) Author's calculation presented in Power Point OK2, 2014.

"*All Anthropogenic Effects"* figure (Figure 7a). Photoshop highlighted all identical colors in other grid cells *and also that color on the scale bar*, where my graduated scale enabled me to read the numerical violation value of each highlighted cell. Where those "violation" values were less than 2.0 mg/L, I deleted the color in those cells. The result is shown in Figure 7b.

Figure 7b shows that if a confidence limit is used, many fewer "violations" are identified For these, our confidence can be high that they are large, real indications of WQ problems. In passing, most of them are in East Bay, which almost always has the worst water quality in Budd Inlet in real life.

(Discussion.) I was not the only one who questioned the ability of the model to make fine-grain discoveries with such a broad-brush simulation model. Personnel of the HDR engineering firm asked the modelers about accuracy in the firm's comments on Ecology's draft SPSDOS Report (2013). In their words:

"*Page 19: The DO decreases calculated by the model range from 0.2 to 0.4 mg/L in limited areas due to point sources. These are very modest changes in the DO levels in these locations. Due to these small calculated DO decreases, the following question arises: Is the model sufficiently accurate to predict these DO decreases? And more importantly, is there sufficient confidence in the DO decreases calculated by the model to mandate expensive nitrogen removal upgrades at point source treatment facilities to reduce nitrogen loadings?*"

The Department of Ecology did not respond to the HDR query (Clark, 2016).

2. Was Ecology's benthic algae simulation subroutine operative during their simulations of Budd Inlet?

Although this question was not addressed in the DEIS (to my knowledge) it illustrates the grounds for doubting all of Ecology's proclamations about the "damage" done to Budd Inlet by Capitol Lake, stemming from their modeling efforts. If this subroutine was not operative, a critically important mechanism for adding dissolved oxygen to the bottom water was overlooked. WORST CASE: ALL OF THEIR CALCULATED EAST BAY "VIOLATIONS" COULD BE NONEXISTENT.

The Figure showing the simulation graph for station BI-6 above (Figure 5) shows evidence that the model was operating without a key subroutine. In that Figure, a triangle data point from the BISS spreadsheet, placed on that graph by me, shows the highest observed DO value at the dam site bottom water of the entire simulation interval near the end of September. The modelers did not include that data point in their graph, instead showing a circle data point (not found by me in the BISS data) near the bottom of the graph on that date.

On that date, bottom water had the highest observed DO of the entire season while the computer calculation "showed" the lowest DO of the season.

Similar portrayals of the same spectacular error in the calculations were also shown by Ecology for that same date for two other shallow locations, BI-1 and BI-2 in East Bay.* Weather and

tide data show that that was a sunny day with a very low tide at about noon. The depth of the water was only a few meters at that time and those places. The high *observed* DO values at the bottom in all three places were undoubtedly due to photosynthesis by benthic algae. The modelers appear not to have noticed these huge discrepancies between the calculated and observed values.

The TMDL Appendix shows that the model has a subroutine for benthic algae photosynthesis. It evidently was not "turned on" when these calculation errors were made. One of the affected grid cells (BI-1; the lowermost colored cell in the middle of East Bay) is adjacent to the "critical cell" used by Ecology as a bellwether of the water quality situation throughout all of Budd Inlet.

If the subroutine was never in use throughout Ecology's extensive simulation program, *the accuracy of virtually all of their results is in question.* Specifically, operation of the benthic algae subroutine would raise bottom water DO levels in the extensive shallow water of much of Budd Inlet, particularly during the high-sunshine, low-streamflow, warm-water days of September.

Two East Bay sites of these giant model failures are routinely shown to have the worst bottom water DO violations in all of Budd Inlet. These East Bay "violations" are routinely used to brand all of Budd Inlet as "damaged" by Capitol Lake. It is imperative that the DEIS researchers learn whether the benthic algae subroutine was operating during WDOE's many simulations. If they were not – then ALL of Ecology's Budd Inlet simulations are suspect.

*Full disclosure. The graphs for at least one (and possibly both) of the two East Bay locations, BI-1 and BI-2, have a data circle included by the modelers actually showing the observed high bottom DO value (at the position of my added triangle) on that date. The calculated estimates are as far off the mark as in Figure 5 above; no comment on this giant discrepancy is offered by the modelers.

3. **What does Ecology's "violations map" for the pre-modern, pre-dam "Natural Budd Inlet" look like? Please obtain it and display it in the Final EIS alongside and in the same format as the "5th avenue Capitol Lake" violations map (DEIS Figure 4 above).**
   WDOE has never presented a picture of the DO violations calculated for the "pre-modern natural" Budd Inlet estuary alongside comparable pictures of violations due to "the dam by itself" and "all anthropogenic effects." Since the pre-modern Inlet is the "control" against which the modern Inlet should be compared, this is a striking departure from usual scientific convention.
   In case WDOE "can't find it" or wants to substitute a map in a different format, I have used WDOE data and techniques to show what it looks like (see Figure __ below).

(Introduction.) The following two figures are the only ones, to my knowledge, in which WDOE shows data that can be used to construct a conventional grid map of Budd Inlet showing water quality (low DO) violations occurring in the pre-modern "natural" water body condition before the dam and intensive human activities began to influence it. The leftmost map shows the DO standards for the main Inlet (green) and the southernmost portion (orange), respectively 6.0 and 5.0 mg/L. The "violation thresholds" (level below which the DO must drop to qualify a grid cell as "in violation" of the standards are 5.8 and 4.8 mg DO/L (0.2 mg/L below the standards).

The rightmost depiction (b) shows the "natural" Budd Inlet grid map with the lowest ("worst case") dissolved oxygen level found by the computer during the whole simulation interval (Jan. 25 – Sep.15, 1997) in each grid cell. These are *not* "violations;" they are actual lowest DO levels of the "year" as calculated by the simulation model, represented by colors. The colors are mostly bland pale greens and blues that are basically indistinguishable to the naked eye. A scale bar shows the same colors, but its irregular gradations make it equally useless to try to read by eye. Note that the scale bar resembles those used in Ecology's more conventional depictions of grid maps (Figure 4 above) in that the blue end is at the top, but this one shows the *highest DO's* at the top whereas the others show the *smallest violations* at the top.

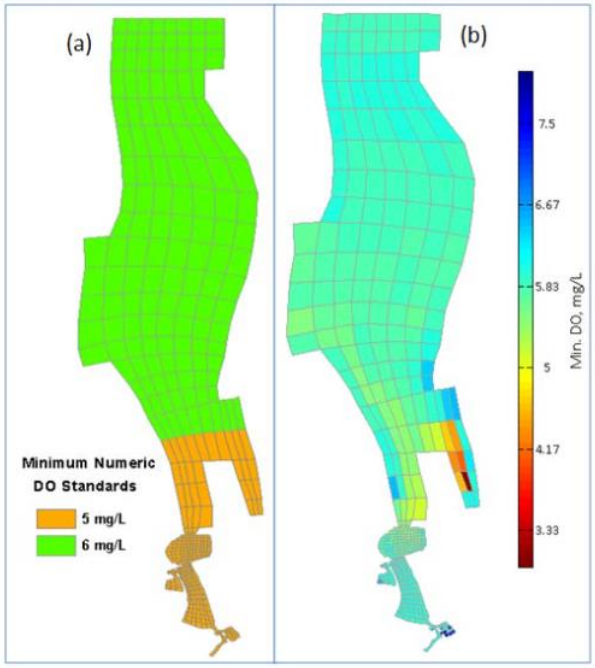

Figure 8. (a). Modern water quality standards that apply to Budd Inlet. (b) Minimum dissolved oxygen levels in Budd Inlet as calculated by the modelers for 'natural' waters before they were altered by human activity. (In Fig. 8, the "Capitol Lake" area is an estuarine extension of West Bay.) Source: Both images constitute Figure 7 (p. 32) in the SM Report.

(Methods.) The eagle eye of the Photoshop software provides a tool that can unscramble the seemingly impenetrable presentation shown in Figure 8b. The key is that a color selected by Photoshop in any grid cell becomes simultaneously selected in every other cell with the same color, *and also becomes selected on the scale bar*. From its selection on the scale bar, one can determine the actual numerical DO value in the selected grid cells.

Displaying Figure 8b in Photoshop, I first added regular gradations to WDOE's DO mg/L color scale bar to make it readable. (The numbers on the original scale are, fortunately, spaced linearly from near-top to near-bottom, making this possible. My "corrected" scale bar is not shown here.) Then, one by one, I selected the color of all of the grid cells in WDOE's bland-colors map (Figure 8b), noted the DO reading indicated by the same color on the now-readable scale bar, then wrote the calculated DO levels in the corresponding grid cells on a paper copy of the grid map. The paper copy thus ended up with the numerical value of its lowest seasonal DO mg/L concentration hand written in every cell.

For all of the cells on the paper copy whose DO's showed "violations" (DO's < 5.8 mg/L green zone, < 4.8 mg/L orange zone) I hand calculated the sizes of the violations in those cells (violation mg/L = 5.8 mg/L minus calculated minimum DO of the "year" green zone, 4.8 mg/L minus calculated minimum DO of the "year" orange zone). The paper copy now had the smallest DO concentration of the year written in every cell; those with violations also had the size of the violation written as a second notation in the affected cells.

To proceed, it was now necessary to obtain a "corrected" copy of the scale bar used by Ecology to indicate the colors of violations of various sizes (WDOE's uncorrected bar is shown in Figure 4 above). I had already corrected that scale bar for the "confidence limits" exercise described above. I simply used that one to link numeric violation sizes with colors here. (It was created by adding linear numeric scale gradations in the same manner as described for the corrected bar used here.)

I created a Budd Inlet grid map with all cells empty, as a Photoshop figure. I identified all of the cells on the Photoshop map with violation sizes penciled in on the paper map. For each such cell, I selected the numerical value of its violation on the corrected violations scale bar, which displayed the color that ought to go in that cell. Using Photoshop's color transfer tool, I "painted" each such cell.

(Results.) The result of this monstrously labor-intensive procedure is the Budd Inlet "Natural Estuary Violations" map shown in Figure 9a using Ecology's conventional method of violations portrayal. For comparison Ecology's own "Capitol Lake by Itself" map with their own uncorrected scale bar is shown in Figure 9b.

(Discussion.) The "Natural Budd Inlet" violations map resembles the "Modern Capitol Lake" violations map in broad overview and differs from it in some details. One might expect that "natural" Budd Inlet would have many fewer DO violations than "modern Budd Inlet with dam by itself." For DEIS purposes, it would appear that Capitol Lake has buffered Budd Inlet from widespread additional DO violations that would be expected from decades of modern developments in the Deschutes River watershed and may even have improved it.

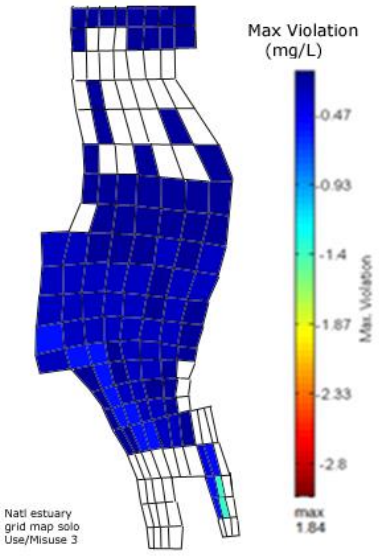

Figure 9a. Dissolved Oxygen standards violations in the "Natural" (Pre-Modern, pre-dam) Budd Inlet Estuary. See text for derivation.

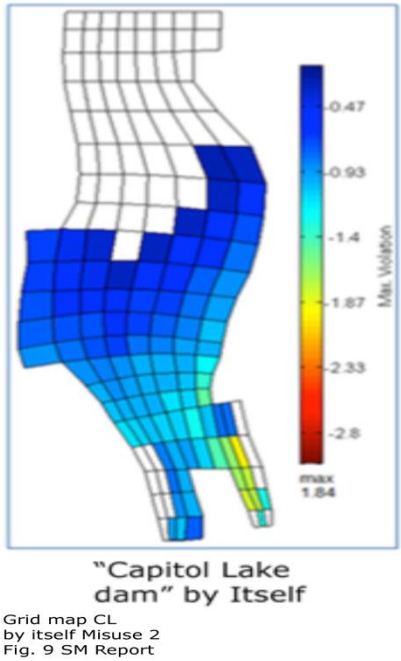

Figure 9b. Dissolved Oxygen standards violations in Modern Budd Inlet with the dam. (Same as Fig. 4 [left] above.) Source of that Figure;: Ecology's SM Report's Fig. 9, p. 34.

Ecology may have obtained a similar result by actually performing the simulation that would reveal it. If they have done so, they have never (to my knowledge) presented it to the public. They gave no response to my report of this particular finding, except to change their format of showing "violations" maps to

prevent Photoshop analysis and to announce that "natural" Budd Inlet had no water quality violations whatsoever (in a slide show presentation; I have their modified image but can't easily cite the source).

(Conclusion.) Capitol Lake has protected Budd Inlet from additional low oxygen water quality occurrences over the 70-odd years since the dam was built.

(Conclusions; Overall.) ***Capitol Lake does not have the widespread negative effect on Budd Inlet shown in DEIS Figure 4.13. Capitol Lake does not contribute more TOC to Budd Inlet (in total, and in particular during the growing season) than would an estuary. Ecology's proclamations of the extent of WQ violations attributable to Capitol Lake throughout Budd Inlet are based on an assumption of accuracy that the model doesn't possess, on DO calculations that fail to portray critical shallow bottom water oxygen production by benthic algae in East Bay, and in absence of showing the extent of WQ violations in "natural" (pre-dam) Budd Inlet.***

2. COE POSITION ON DAM/ESTUARY ISSUES – EMAIL CORRESPONDENCE

The PSNERP Decision to Not Fund

The Deschutes Estuary Project

PSNERP – (Puget Sound Nearshore Estuary Restoration Project) is a study partnership made up of members of the Army Corps of Engineers and WDFW. Formed in 2001 to determine the ecologic needs of Puget Sound, PSNERP offers independent, expert opinion regarding Puget Sound ecosystems. Twice, PSNERP has denied funding for the Deschutes Estuary Project, based on its analysis of the benefit to cost ratio, as well as other factors such as community support and risk to feasibility. An important risk to feasibility that was identified for the Deschutes in the context of the PSNERP study was the potential to increase sedimentation in the Federally authorized and maintained navigation channel. In essence, the Corps couldn't support one program (Ecosystem Restoration) which increased costs to it's program responsibilities to maintain navigation since removal of the dam would increase sediment aggradation in the

Federal Navigation Channel resulting in negative impacts on Corps operations and maintenance of the channel.

The following emails were sent between April 18th and July 7thin 2015. They are presented here in chronological order to explain why PSNERP determined twice to not fund ("de-couple") the Deschutes Estuary Restoration Project. This presentation is necessary because no formal documentation of this decision from PSNERP reportedly exists.

Senders of these emails are identified as follows:

Jack Havens - (bike and fish @…) Co-chair CLIPA

Margen Carlson - Deputy Asst. Director – Habitat, Washington Department of Fish and Wildlife (WDFW)

Theresa Mitchell - Puget Sound Nearshore Ecosystem Restoration Project, Washington Dept. of Fish & Wildlife Habitat Program | Restoration Division

Allen Miller – CLIPA Board of Directors member

Karen Fraser – Senator, State of Washington 22nd District

Jessie Winkler, Chief, Civil Works Branch, U.S. Army Corps of Engineers, Seattle District

After hearing that the Deschutes Estuary Project was "de-coupled", Jack Havens sends an email asking Margen Carlson (WDFW) what that term means.

From: bikeandfish@comcast.net [mailto:bikeandfish@comcast.net]
Sent: Saturday, April 18, 2015 11:32 AM
To: Carlson, Margen L (DFW)
Subject: De-coupling

Margen,

Thanks for the productive meeting with CLIPA last Thursday regarding the Deschutes Estuary Restoration Project.

You informed us that the project was "de-coupled". Could you explain to us what that term means and its ramifications.

Thank You,

Jack Havens, CLIPA

Carlson replies a few days later:

From: Carlson, Margen L (DFW) [mailto:Margen.Carlson@dfw.wa.gov]
Sent: Friday, April 24, 2015 8:33 AM

To: bikeandfish@comcast.net
Cc: Davis, Jeffrey P (DFW)
Subject: RE: De-coupling

Good morning Jack,

I enjoyed meeting with you and the other CLIPA members last week, as well. I apologize for my delayed reply – I've had the pleasure of spending most of this week in our regional offices, which has kept me away from the computer.

In our meeting, I mentioned that neither the Washington Department of Fish and Wildlife, nor the Army Corps of Engineers is pursuing the restoration of the Deschutes Estuary. This is the reason Deputy Director Joe Stohr referred to PSNERP and Deschutes Estuary restoration as "de-coupled." Preliminary restoration designs do of course appear in older materials from the Puget Sound Nearshore Ecosystem Restoration Project because it was part of the analysis at one time, as were nearly all the other medium and large river mouths in Puget Sound.

Thank you again for the meeting and for the chance to provide some clarification in follow up.

Regards,

*Margen

Margen Carlson
Deputy Assistant Director – Habitat
Washington Department of Fish and Wildlife
600 Capitol Way N., Olympia, Washington 98501-1091
(360) 902-2229 – office

Havens asks Carlson why the de-coupling took place.

From: bikeandfish@comcast.net [mailto:bikeandfish@comcast.net]
Sent: Friday, April 24, 2015 2:04 PM
To: Carlson, Margen L (DFW)
Cc: Davis, Jeffrey P (DFW)
Subject: RE: De-coupling

Margen,

Thanks for the response. I will be reporting this information to the Alliance for a Healthy South Sound (AHSS) Council soon. Some Council members may want to know why the de-coupling occurred. Can you or anyone else provide me with the reason/s why this was done. (Highlight added at the time of original email writing.)

Thank you for your help.

Jack Havens

Carlson responds by having Theresa Mitchell (more familiar with the workings of PSNERP) to respond to Havens.

From: Carlson, Margen L (DFW)
Sent: Friday, April 24, 2015 2:38 PM
To: bikeandfish@comcast.net; Mitchell, Theresa C (DFW)
Cc: Davis, Jeffrey P (DFW)
Subject: RE: De-coupling

Theresa,

Could you please speak to the reasons Deschutes Estuary restoration was not advanced via PSNERP (see highlight below)? I believe the answer has to do with a potential conflict between the Army Corps' navigation mandate and its ecosystem restoration mandate. It may also have related to the comparison among potential projects of ecosystem benefit/cost analyses. I can follow up with you on Monday if you have any questions about this request.

Many thanks, and have a great weekend.

*Margen

Mitchell responds to Havens and Carlson

From: Mitchell, Theresa C (DFW) [mailto:Theresa.Mitchell@dfw.wa.gov]
Sent: Friday, April 24, 2015 2:51 PM
To: Carlson, Margen L (DFW); bikeandfish@comcast.net
Cc: Davis, Jeffrey P (DFW)
Subject: RE: De-coupling

All –

Margen you are correct. Essentially, the Corps could not support one program of the Corps (Ecosystem Restoration) increasing costs to another program of the Corps (Navigation) and they were unwilling to consider it further. Removal of the 5th Avenue dam would very likely increase sediment aggradation in the Federal Navigation Channel adjacent to the site (Port of Olympia navigation channel), resulting in unacceptable negative impacts to the current Corps operations and maintenance of that channel.

Best,

Theresa Mitchell

Puget Sound Nearshore Ecosystem Restoration Project
Washington Dept. of Fish & Wildlife
Habitat Program | Restoration Division
360.902.2750 - office
www.pugetsoundnearshore.org

Senator Karen Fraser references her meeting with WDFW

-----Original Message-----
From: Fraser, Sen. Karen [mailto:Karen.Fraser@leg.wa.gov]
Sent: Monday, June 08, 2015 6:28 PM
To: allen@atmlawoffice.com; Jay Manning; 'Robert Wubbena'

Cc: Hunt, Rep. Sam; Reykdal, Rep. Chris
Subject: FW: Deschutes (UNCLASSIFIED)

I met with Dept of Fish and Wildlife today. They are in alignment with the Corps of Engineers priorities as stated below.

Senator Fraser references email letter from Jessica Winkler US Army Corps of Engineers

-----Original Message-----
From: Winkler, Jessica NWS [mailto:Jessica.G.Winkler@usace.army.mil]
Sent: Thursday, May 28, 2015 4:30 PM
To: Fraser, Sen. Karen
Subject: Deschutes (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Senator Fraser,
Thank you for the conversation this morning regarding the Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) and the Deschutes Estuary.
As discussed, the Corps in coordination with WDFW has not identified the Deschutes project to move forward for further consideration under the PSNERP study based on our analysis of the benefit to cost ratio, as well as other factors such as community support and risk to feasibility. A important risk to feasibility that we identified for the Deschutes in the context of the PSNERP study was the potential to increase sedimentation in the Federally authorized and maintained navigation channel. Although the Corps and WDFW are not evaluating the Deschutes further under the PSNERP study authority, the Corps has not developed a formal position on the dam removal at Deschutes outside of PSNERP. If a non-Federal entity proposed to remove the dam at Deschutes, they would be required to coordinate that proposal with the Corps under our Section 408 permitting process (33 U.S.C. 408).

The Seattle District website for the PSNERP project contains links for the entire draft feasibility report/environmental impact statement. Appendix G specifically addresses the ecosystem benefit model. As requested, the last page of Appendix G includes the list of the numeric benefits of each of the sites we evaluated and is attached.

http://www.nws.usace.army.mil/Missions/CivilWorks/ProgramsandProjects/Projects/PugetSoundNearshoreEcosystemRestoration.aspx

In 2012, the Puget Sound Nearshore Ecosystem Restoration Project contracted an A/E firm to complete the conceptual designs for 36 sites. The reports and other key PSNERP documents are located at the below listed link. The conceptual design report on the Deschutes Estuary is also attached.

http://www.pugetsoundnearshore.org/cdr.html

Please let me know if you have any further questions or concerns. I also wanted to thank you for your quick and informative response on the status of PSNERP in the budget! Jessie

Jessie Winkler
Chief, Civil Works Branch
U.S. Army Corps of Engineers, Seattle District
4735 East Marginal Way South
Seattle, WA 98134
206-764-3462

Classification: UNCLASSIFIED
Caveats: NONE
Senator Fraser states her findings upon speaking to the Corps- “the environmental benefits of Deschutes dam removal are strikingly low!”

---------- Forwarded message ----------
From: Fraser, Sen. Karen <Karen.Fraser@leg.wa.gov>
Date: Tue, Jul 7, 2015 at 9:20 PM
Subject: Re: Capitol Lake
To: Allen Miller <allen@atmlawoffice.com>
Cc: Denny Heck <denny@theheckhome.com>, Robert Wubbena <rwubbena@gmail.com>, Denis Curry <denisc733@aol.com>, Jack Havens <bikeandfish@comcast.net>, "Owen, Brad" <Brad.Owen@leg.wa.gov>, Chris Liu <chris.liu@des.wa.gov>, "Arlen Harris (DES)" <arlen.harris@des.wa.gov>

Hello all---
I spoke with the Corps. The essence of what they say is the following.

They have highly deprioritized habitat work by them on the lower Deschutes mainly because the environmental benefits of this project (dam removal) are very low compared to environmental benefits of other proposed projects in Puget Sound. They have quantified this and I have their list. The environmental benefits of Deschutes dam removal are strikingly low !

They take other factors into secondary consideration in the rankings, such as "risks". In this case, a major risk is the silting up of the shipping channel.

They have now given high priority to about 11 projects in Puget Sound.
Judging by the very low numerical ranking of Deschutes dam removal, it seems unlikely to be a viable project for a very long time, if ever.

Hope this is helpful.

---Karen

Sent from my iPad

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3. FISHERIES REPORT

Capitol Lake or Estuary Habitat Strengths Appear To Be Equal For Our Hatchery Chinook Run.

October 6, 2018,

(Revised May 8, 2019)

Jack Havens, DVM

Introduction

For decades an abundance of information regarding the fall hatchery Chinook run in the Deschutes River has circulated through our community. Much of this information appears to be questionable as it has inferred that Capitol Lake has a deleterious effect on this salmon run when compared to an estuary. Many community members and public officials have been led to believe these unsubstantiated claims are factual.

The purpose of this paper is to provide the community and its elected officials with information most all of which is from publicly funded research regarding the relationship between Capitol Lake and its hatchery Chinook run. We believe that objective readers will conclude that Capitol Lake has little or no net deleterious effect on its Chinook run. Although not a claim of this paper, when marine predation and Budd Inlet toxicity to these fish is considered, Capitol Lake could be considered advantageous when compared to riverine and estuarine conditions.

Focus has been given to the Chinook species here because of its critical importance (80%) to the diet of Puget Sound's ESA endangered Orcas . Chinook salmon are the preferred prey of Southern Resident Killer Whales.[1] Consequently, the #1 goal of the Southern Resident Orca Task Force is to increase Chinook abundance.[2]

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[1] NOAA Fisheries, www.fisheries.noaa.gov/species.killerwhales

[2] Southern Residence Orca Task Force, November 16, 2018. Cascadia Consulting Group.

Brief Background:

In 1954, the State and Olympia community modified the Deschutes watershed to create the first salmon run above Tumwater Falls, producing more salmon than at any time throughout recorded history. The introduction of fish ladders, concrete baffles, electric motors, steel fences, piping, pens and pumps provided the infrastructure for the highly successful hatchery Fall Chinook run. About 4 years before these modifications were made Capitol Lake had been created primarily for its aesthetic and recreational value to the community as a whole. Both of these amenities – the infrastructure for the new hatchery Chinook run and Capitol Lake itself - have worked in concert to make the Deschutes urban watershed area exceedingly valuable to virtually everyone in the Thurston County community.

More recently, proponents of an estuary have claimed that Capitol Lake is harmful to our hatchery Chinook salmon run and have demanded that the Lake be re-converted to an estuary. We find their reasoning to be lacking in factual support.

The fishing community (gillnetters and non-tribal sport fisherpersons) has been and is currently benefitting from the salmon run utilizing Capitol Lake as a rearing habitat and an in-migrating escapement conduit. "Returns to the river of marked and unmarked hatchery fish have been exceptionally good."[3] (Note, this was 1955 and is relative to the era.)
Importantly, but not part of this paper, the entire community and state are benefitting from the vast array of other qualities of the Lake - aesthetic, social cohesion, economic, financial, etc. The Lake appears to have served as an optimizing management strategy for all. By sharing the Lake with everyone, the strategy serves the fishing community and the entire community in a balanced fashion.

Current knowledge regarding rearing juvenile Chinook in a lake environment is incomplete:
Some proponents of the elimination of Capitol Lake have claimed that lakes as habitat are harmful to Chinook salmon production. However, according to Koehler and other researchers, "Little is known about use of lacustrine (lake) habitats by juvenile ocean-type Chinook salmon…..To better manage existing populations and aid in designing recovery strategies for ocean-type Chinook salmon using lacustrine environments, basic information on the ecology of juvenile Chinook salmon rearing in this habitat is needed." [4]

[3] Engstrom-Heg R. T. 1955, *Environmental relationships of young Chinook Salmon in Capitol Lake and the Deschutes River System.* Washington Department of Fisheries, Olympia, Washington. 76pp
[4] M. Koehler, K. Fresh, D. Beauchamp, J. Cordell, C. Simenstad, D. Seiler *Diet and Bioenergetics of Lake-Rearing Juvenile Chinook Salmon in Lake Washington,* 2006. Transactions of the American Fisheries Society 135: 1580-1591. 1581 pp) p. 1581

Note the plural nature of "populations" and "environments", which suggests the applicability of these research findings to other lakes nurturing juvenile Chinook salmon.

Juvenile Chinook can and do thrive in a lake environment:
The above study concluded the following: "Lake residence is a rare life history for ocean-type Chinook salmon (e.g. Burger et. al. 1985) but our results suggest that the juvenile Chinook salmon can feed and grow well in this habitat."[5]

"Further east, Chinook are a particularly important game fish in the Great Lakes, where their abundance is maintained by large-scale artificial propagation."[6]
The following excerpt is from "Diet and Bioenergetics of Lake-Rearing Chinook Salmon in Lake Washington". "Despite the heavily altered nature of Lake Washington and the relatively short time Chinook salmon have used this system, feeding and growth performance of juvenile salmon in littoral habitats of Lake Washington were comparable to those for Chinook salmon rearing in estuarine and riverine environments. (e.g. Healey 1982; Simenstad et. al. 1982; Rondorf et. al. 1990; Miller and Simenstad et. al. 1997; Duffy 2003)….."[7]
Similarities should be noted: Capitol Lake like Lake Washington, has been used for only a short time by chinook salmon. Both are urbanized lakes. Juvenile Chinook populations in both lakes enter and leave within similar seasons (approximately March –July). Both Chinook juvenile populations predominately consume chironomid pupae and Daphnia spp. Thus, findings by Koehler et al. regarding juvenile Chinook in Lake Washington could well be relevant to this species in Capitol Lake. (Engstrom-Heg 1955, Koehler et al. (2006).

According to Thurston County Health Department data, bottom water in Capitol Lake is well oxygenated throughout the year, this includes April – July (the Chinook juvenile rearing period) and during the return period, July through September, when these fish return (mostly September).[8] "The deep portions of the lake are kept well aerated by the inflow of river water which, being colder and heavier than the lake water, follows the bottom of the old channel during the summer months."[9]
It should be noted that maintenance dredging of the Lake as well as riparian planting along the Deschutes River will further improve temperature and oxygen conditions in Capitol Lake.[10] (Inexplicably, maintenance dredging has not been performed here since 1986.)
Froth in Budd Inlet noted just below the tide-lock and fish ladder indicates a serendipitous infusion of O2 which would be absent should those structures be removed.

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[5] (Koehler and others, p. 1587
[6] Behnke, Robert. Trout and Salmon of North America, 2002, Chanticleer Press.
[7] Koehler, and others p.1589
[8] Milne, D. H. 2015 Capitol Lake: The Healthiest Lake in Thurston County. 17 pp. Available on CLIPA's website, www.savecapitollake.org/documents/healthiest-lake.html

[9] Engstrom-Heg. p. 4
[10] Capitol Lake Alternatives Analysis, pp 31 -32
http://des.wa.gov/sites/default/files/public/documents/About/CapitolLake/21-CapitolLake AlternativesAnalysisFinalReport(July200.pdf

Capitol Lake insects support bats, Chinook and Coho

Aquatic insects, an important source of food for juvenile Chinook (and our ecologically valuable Yuma and Little Brown bat populations), thrive in conjunction with Capitol Lake in great part due to the freshwater Lake's uniquely high benthic (bottom) oxygen content. According to both Koehler and Engstrom-Heg, juvenile Chinook reared in Lake Washington and Capitol Lake prefer Chironomidae and Daphnia sp. as primary food sources. Capitol Lake, of course, has significant populations of both.[11] These naturally occurring foods are available to Chinook fry which would otherwise require months of feeding manufactured food pellets before maturing to the smolt stage. *(Author's note: One of Capitol Lake's intriguing displays of natural processes are the billions of surface rise forms created by these juvenile salmon as they eat the adult chironomids resting on the Lake's surface. This phenomenon may be observed from mid-April through mid-July before these fish depart on their marine journey and is used by the community as a unique educational opportunity to teach species interdependence.)*

It is interesting to note that (regarding coho salmon) "The contents of the stomachs of 38 silver [coho] of the 1953 and 1954 broods, mostly from the Percival Cove area, revealed the diet of these fish to be substantially the same as that of the Chinook salmon."[12] This observation may have important ramifications for establishing a future sustainable coho run aided by the nutrient-rich Capitol Lake.

Regarding the release of juvenile Chinook salmon into Capitol Lake, Robert Engstrom-Heg, fisheries biologist, has stated **"The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival, either for better or worse."[13]** (The lower Deschutes River just above Tumwater Falls was used as a brood stream from 1946-1950, thereby allowing comparison of survival rates before and after construction of Capitol Lake.[14])

Engstrom-Heg continues, **"The data…show growth of Chinook salmon in Capitol Lake to be extremely rapid, greatly exceeding that attained by fish of the same stock held in hatcheries."[15]** (Note, this finding appears to negate the idea of any advantage to raising the juveniles to the smolt stage in a hatchery setting.) These conclusions appear to corroborate the conclusions of M. Koehler and others.

According to Mr. Wayne Daley, Sr. Fisheries biologist, "I do not believe that turning the lake into a mudflat will enhance or improve the existing salmon and trout populations of the watershed. The restricted flow of water into the area above 4th street will not provide the typical flushing that would occur in an undisturbed estuary."[16]

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[11] Engstrom-Heg, p. 38

[12]Engstrom-Heg, p. 39

[14] Engstrom-Heg, p. 7

[15]Engstrom, Heg, p. 11

[15] *Engstrom-Heg, p.77*

[16] Daley, Wayne, Sr. Fisheries Biologist. Opinion letter, March 21, 2011. http://www.savecapitollake.org/documents/impact-on-fisheries.html

Interestingly, Deschutes River Fall Chinook escapement for 2017 numbered over 30,000 (probably 33,000). This compares favorably with averages of about 10,000 over the last several years.[17]

Loss of shoreline vegetation will reduce Chinook habitat quality.
It seems likely that Capitol Lake's massive overhanging shoreline vegetation will be almost totally destroyed due to the salinity increases of an estuary. This canopy currently offers shade and protection from predators, so valuable for Chinook juveniles. Loss of this vegetation or access to it will reduce habitat quality.

Removing the tide-lock will allow toxics now in Budd Inlet to infiltrate Capitol Lake basin endangering Chinook and by extension, Southern Resident orcas.
Budd Inlet has furans, dioxin, and other toxic hydrocarbons which are currently prevented from infiltrating Capitol Lake basin by the tide-lock.[18] More than a dozen cautionary and advisory warning signs issued by the Thurston County Health Department populate the shores of lower Budd Inlet warning humans to keep themselves and pets away from the water. Showering is advised after contact with either sand or water from this area.

Priest Point Park signage referencing Ellis Cove

Advisory reads: "Water and Soil Pollution. Shower after contact with sand or water from this area." Please note the "Caution At Low Tide, Mud Flats Are Dangerous PLEASE KEEP OFF".

[17] Pylon, Lee. Washington Department of Fish and Wildlife. Pers. Comm. May, 2018
[18] Capitol Lake Alternatives Analysis.
http://des.wa.gov/sites/default/files/public/documents/About/CapitolLake/21-CapitolLake AlternativesAnalysisFinalReport(July200.pdf

Thus, sensitive juvenile Chinook salmon that spend April, May, June and possibly July developing in the food rich Capitol Lake basin are spared exposure to these toxics during that time period. It seems logical that harbor seals, sea otters, cormorants, (ESA endangered) orcas, and other predators benefit from this barrier.

The Southern Resident Orca Task Force Report and Recommendations of November 16, 2018 makes clear that PCB's, PBDE's, PAH's, and CEC's (contaminants of emerging concern) present serious threats to Chinook and Southern Resident orcas.[19] According to that report and the Department of Ecology website, it appears that most if not all these contaminants are found in Budd Inlet. Chris Wilke, Director of Puget Soundkeepers has stated that Budd Inlet is significantly contaminated and is of serious concern to that watchdog organization.[20]

An important quote from the Task Force Report is: "Adult Chinook Salmon are a major source of persistent toxic chemicals to Southern Resident Orcas."

The toxic infiltration threat into the Capitol Lake basin appears to have been under-investigated by those conducting the decision making process.

Cost benefit ratios for the tide lock removal project appear to be relatively poor.

Engstrom-Heg's assessment that "The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival, either for better or worse." is important for this reason: Although not a controlled experiment, the assessment suggests that (unlike removal of the Elwha dams) removing the tide lock would likely yield no significant increase in fish production. The **hundreds of millions of dollars** saved by retaining the Lake and continuing with the Lake Management Plan could protect funding to improve other more potentially productive rearing and spawning areas in Puget Sound.

One example: according to then Thurston County Commissioner Bud Blake, Thurston County-owned fish barrier culverts total 336 and block many miles of natural spawning grounds. It is possible that most or all of these spawning grounds could be recovered using money from the above savings. Note, these culvert restorations will likely benefit coho, chum, cutthroat and perhaps steelhead. Less likely Chinook.

Another example: We must understand that stormwater is the #1 cause of pollution in Puget Sound and pavement is the #1 contributor to that source.[21] Urban Runoff Mortality Syndrome is now widely recognized.[22] Effectively addressing this problem is terribly expensive, but nevertheless is a critically important future public investment.

[19] Southern Resident Orca Task Force Report and Recommendations, November 16, 2018. Cascadia Consulting Group.

[20] Wilkie, Chris, Lecture, Thurston County League of Women Voters Public Forum, April 2, 2019.

[21] Wilkie, Chris. Lecture, League of Women Voters Symposium, April 2, 2019.

[22] Wilkie, Chris. Lecture, League of Women Voters Symposium, April 2, 2019.

This cost benefit position is reportedly supported by the PSNERP decision of March, 2013 to de-couple (remove) the Deschutes Estuary Restoration Project from its funding list.[23] [24] [25](See various emails from WDFW managers Margen Carlson and Theresa Mitchell) and Washington State Senator Karen Fraser. The last two persons had verbal contact with Puget Sound Nearshore Ecosystem Restoration Project (PSNERP) administrators regarding this decision. (Available upon request, Jack Havens, bikeandfish@comcast.net).

An overlooked but serious cost of re-conversion is the physical risk associated with a mudflat in our urban area (as warned by Thurston County Health Department signage). In late March of 2017 a man was rescued by Olympia Fire Department after becoming entrapped in the mud of the tidal mudflats near Priest Point Park.[26] Presumably a less fortunate outcome might have ensued with a rising tide had rescuers not been alerted.

In addition to toxicity induced disease, predation on Juvenile Chinook in an estuary appears to have been inadequately researched.

The importance of predation on Chinook juveniles in Lake Washington has been stressed by researchers as follows: "….increasing the amount of food available to the juvenile Chinook salmon in Lake Washington will not materially contribute to improve the status of this population. Efforts to rebuild Chinook salmon populations in this basin should therefore focus on the influence of other lake related factors, such as predation, disease, and other life stages."[27]

Regarding Capitol Lake, marine predation below the 5th Avenue tide gate is recognized as a problem for migrating salmon in this run.[28] However, re-converting Capitol Lake to an intertidal mudflat will quadruple the number of marine water compression points (bottlenecks caused by the railroad trestle, Deschutes Parkway bridge, I-5 bridge and fish ladder at Tumwater Falls) available to predators such as harbor seals, otters, herons and cormorants. Regarding predation in Capitol Lake itself, Engstrom-Heg states the following: "Predation upon young salmon in the lake is probably negligible".[29] (Emphasis added.) It should be noted that Capitol Lake lacks northern pikeminnow (Ptychocheilus oregonensis) which is a significant predatory fish in Lake Washington.[30]

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[23] Carlsen, Margen, Deputy Assistant Director – Habitat, Washington Department of Fish and Wildlife pers. communication email April 24, 2015. (Available by contacting Jack Havens at bikeandfish@comcast.net.)

[24] Mitchell, Theresa C., Puget Sound Nearshore Ecosystem Restoration Project, Washington Department of Fish and Wildlife – Habitat Program. Pers. Communication April 27, 2015

[25] Fraser, Senator Karen @leg.wa.gov. email July 9, 2015. http//sdc.wastateleg.org/fraser/contact/

[26] *The Olympian*, Amelia Dickson, 4/1/17, "Olympia Firefighters rescue man from tidal flats near Priest Point Park"

[27] Koehler and others, p.1589

[28] Capitol Lake Alternatives Analysis, June, 2009, 21, 23, 25 pp http://des.wa.gov/sites/default/files/public/documents/About/CapitolLake/21-CapitolLake AlternativesAnalysisFinalReport(July200.pdf

[29] Engstrom-Heg, p.42 and p. 78

[30] Beecher, Hal. Personal written communication.

It is noteworthy that the author has heard no discussion from estuary proponents regarding the threat to juvenile Chinook from increased predation or toxicity posed by removal of the tide lock.

Fifth Avenue salmon viewing platform: a valuable, unique outreach investment not easily replicated with an estuary.

The Fifth Avenue salmon viewing platform is close to downtown and spans the narrow outflow and fish ladder from Capitol Lake into Budd Inlet. The popular viewing platform represents a valuable outreach investment for community education and enrichment, recognized as an integral part of salmon enhancement. Each year, thousands of pedestrians walking to and from the Olympia downtown use this structure to learn about salmon life history and predation. Docents from Stream Team (funded by Lacey, Olympia, Tumwater and Thurston County) use this structure to teach many hundreds if not thousands of people the unique characteristics of our Chinook salmon. A close-up, bird's eye view of returning Chinook in a populated area would not be easily replicated with an estuary.

Capitol Lake removal represents questionable civic planning philosophy:

In addition to the already existing fish producing infrastructure as mentioned above, a new fish hatchery with its concrete and steel buildings and pond infrastructure is being funded for the riparian area of the Deschutes River at Pioneer Park independently of the Capitol Lake issue "including whether or not the Fifth Avenue dam is removed."[31] Biological waste nutrients will likely enter this watershed from this hatchery to some degree. Funding is being requested and supported by WDFW and the Squaxin Island Tribe.

Community members must ask why we should accept the potentially polluting man-made hatchery structures while the major proponents of the new hatchery oppose Capitol Lake in no small part because it is "not natural". This begs the question, Should the demands of the fishing community take priority over the needs and values of the community at large?

Estuary advocates have opposed dredging and plant harvesting Capitol Lake: According to the Capitol Lake Alternatives Analysis – Public Review Draft and other experts, these fish would unquestionably benefit from dredging and aquatic plant harvesting Capitol Lake because of:

a) cooler temperatures which would contribute to higher Lake and Budd Inlet DO (dissolved oxygen), and

b) fewer aquatic weeds and algae production, a condition which would contribute to higher DO in Budd Inlet.

With these findings in mind, it would seem beneficial to our Chinook juveniles if Capitol Lake would be dredged according to the original plan of every 5-10 years. Again, the Lake was last dredged partially in 1986 and is at least 3 decades overdue. The most recent claim is that dredging must be matched with the management plan selected. However, dredging the Lake must occur under <u>any</u> management

[31] Unsworth, Jim, PhD, Director Washington Department of Fish and Wildlife, letter of April 18, 2017.

scenario. It does seem likely, however, that the lack of dredging (and harvesting aquatic weeds) reduces aesthetic appeal to most and contributes to an impression that "the Lake must be unhealthy". Strategic harvesting of aquatic plants is performed in many lakes but has been rejected for Capitol Lake. Adequate explanation for this rejection using documented and verified facts may very well not exist.

Other Assertions Which Lack Factual Support

Assertion: The dam kills fish: Fact: The 5th Avenue tide-lock is not a dam and does not have either a turbine or spillway, characteristics considered almost totally responsible for juvenile salmon mortality in the nine Columbia River and Snake River dams.[32]

Assertion: The Lake produces directional disorientation for the salmon:
Fact: Dams of the Snake and Columbia are thought by many to reduce river current speed causing salmon juveniles to become directionally disoriented over the course of hundreds of miles. Such claims that Capitol Lake is similarly detrimental appear to be without foundation. The two mile stretch from Tumwater Falls to the 5th Avenue tide lock has a relatively high flow which could technically qualify it as a river.[33] "Exchange of water {in Capitol Lake} is much more rapid than in most lakes." (brackets added).[34]

Assertion: Stray juveniles are excluded from rearing in Capitol Lake:
Fact: Seining studies performed by the Squaxin Island Tribe have shown that a relatively high percentage of Chinook juveniles residing in Budd Inlet in the summer originate in watersheds other than the Deschutes and Nisqually and might use estuarine waters if extended into Capitol Lake basin. This is an interesting finding and must be acknowledged.
The following must be considered: 1.The relative numbers of these stray juveniles would likely be exceedingly small compared to the relatively large numbers rearing in Capitol Lake. Also, we don't know what percentage of their natal run these fish represent. That percentage is likely to be relatively small. 2. If our goal is to increase absolute numbers of Chinook, this could be accomplished by increasing fry numbers placed in Capitol Lake (assuming rearing capacity will allow). 3. If our goal is to increase genetic diversity, adding fry from the remote watersheds to Capitol Lake would help to accomplish that outcome. 4. We must consider that should an estuary be re-established, the number of stray juveniles who might use it may be smaller than the increased number of juvenile deaths brought about by the increased compression points of the estuary (discussed on page 9) reducing total juvenile Chinook numbers. (More research is needed.) 5. The same argument applies to the serious threat posed by Budd Inlet contaminants which are currently separated from Chinook juveniles by the tide lock. 6. Employing

[32] Montgomery, David R. *King of Fish – The Thousand Year Run of Salmon,* 2003. Westview Press. 186 pp
[33] Personal communication with Robert Holman and John DeMeyer
[34] Engstrom-Hegg, p 4

the Percival Creek Extension (discussed on page 16) could facilitate the movement of these "foreign" Chinook juveniles into a smaller estuary which the extension would create.
Noted researcher Dr. Hal Beecher, PhD fisheries biologist, has stated regarding the issue of fish from other rivers, "I think that (stray juveniles from other watersheds) is a really weak argument for removing the lake."

Assertion: "High temperatures" in the Lake are harmful to salmon:
Fact: Regarding temperature in Capitol Lake, the following findings are revealing: "In general, lake temperatures are similar to river temperatures throughout fall, winter and spring months. In the summer, however, only those temperatures at the bottom of the lake in the river channel remained synonymous with river temperatures above, which reached a maximum of 63 degrees F."[35]. This suggests that a properly maintained Lake, periodically dredged, provides cool water for juvenile Chinook and access to cool channel water for returning adults. The Lake's artesian systems obviously contribute to these more favorable temperatures. Also, see previous section (page 7) on **"Loss of shoreline vegetation".**

Note: Under any proposed management plan, temperature elevations in the Capitol Lake basin will occur due to the effects of the Deschutes River and Black Lake. Both water bodies are listed for temperature violations under the Department of Ecology 303 (d) list. Capitol Lake is not.

Assertion: The "steep salinity gradient" is a problem for the Chinook:
Fact: With regard to the salinity gradient experienced by Chinook juveniles as they travel from freshwater of Capitol Lake to more brackish estuarial waters of Budd Inlet (and the reverse for returning adults), we must be reminded of Engstrom-Heg's findings following the conversion of the intertidal mudflat to Capitol Lake: "The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival, either for better or worse."[36]
Salt water does exist just above the tide locks in otherwise freshwater. This provides a salinity gradient. It must be recognized that with dam removal, Chinook juveniles released from the planned hatchery at Pioneer Park or elsewhere on the Deschutes River will experience essentially the same salinity gradient at the base of Tumwater Falls.
It is noteworthy that neither Koehler et. al. or Engstrom-Heg or Beecher mention a steep salinity gradient as a physiological problem for these juveniles.

The following table has been compiled by Hal Beecher, PhD Fisheries biologist to more easily understand relative advantages for Chinook of each management system, Capitol Lake or estuary.[37]

[35] Engstrom-Heg, p. 13
[36] Engstrom-Heg, p. 11

Chinook salmon life-stage & season	Factor influencing salmon survival, growth, and production	Capitol Lake	Unimpounded estuary
Juvenile – Jan-Jun	Food supply	Chironomids. Engstrom-Heg (1955) indicated early Capitol Lake provided food supply that supported very good growth compared to other Puget Sound systems. Koehler et al. (2006) indicates high value of chironomids as food for young Chinook in Lake Washington. Chironomid population might have adjusted as Capitol Lake aged, so current data on Chinook salmon growth and/or chironomid abundance would be informative, but in absence of new data, the best information seems to suggest favorable feeding conditions in the lake.	Some chironomids in upper reach and Percival Cove; replaced by marine plankton in marine water.
	Predation	Fish-eating birds, cutthroat trout (relatively few)	Fish-eating birds, staghorn sculpin (*Leptocottus armatus*), dogfish shark (*Squalus acanthias*),
	Dissolved oxygen (DO)	Tumwater Falls ensures near saturation.	Tumwater Falls ensures near saturation.
	Temperature	Temperature very similar under either management option.	Temperature very similar under either management option.
	Salinity	Fresh water	Salinity transition fluctuates with tide, but at highest extent only moves about a mile upstream, so that this is unlikely to be a physiological factor. It could be an ecological factor in influencing food supply and predators.
	Pollutants	Pollutants from automotive and other sources in the urban environment of Capitol Lake as well as agricultural inflow from the Deschutes watershed may be present, but data are needed to answer this.	Pollutants in sediments in Budd Inlet might be washed farther upstream with the tide, depending on the degree to which those pollutants are dissolved or suspended and moved into the estuary.

		Pollutants from Budd Inlet are blocked.	Sampling the distribution and concentration of sediment pollution in different parts of Budd Inlet would be informative as would more detailed consideration of the chemistry and adsorption of the pollutants.
Juvenile – Jul-Aug	Food supply	*Daphnia* replace chironomids as a high-quality food for juvenile Chinook (Engstrom-Heg 1955; Koehler et al. 2006)	*Daphnia* in Percival Cove and closer to Tumwater Falls in pools; replaced downstream in tidal reach by other arthropods
	Predation	See above (Jan-Jun)	See above (Jan-Jun)
	Dissolved oxygen (DO)	See above (Jan-Jun). Higher temperature can reduce DO. DO is influenced positively by ratio of surface area to volume (S:V), which is high in the relatively shallow Capitol Lake.	See above (Jan-Jun). Higher temperature can reduce DO.
	Temperature	Although high S:V favors DO, it can also lead to greater heating when air temperature and direct solar radiation are a major factor in the hot months. Data from Engstrom-Heg (1955) suggest that temperatures remain acceptable for salmonids, with more preferred temperatures in the channel. Deposition and shallowing of Capitol Lake could have changed the temperature and DO conditions in Capitol Lake. Current data would be informative.	Temperature would change little from Tumwater Falls.
	Salinity	See above (Jan-Jun)	See above (Jan-Jun)
	Pollutants	See above (Jan-Jun)	See above (Jan-Jun)
Returning adult – Aug-Sep	Food supply	NA	NA
	Predation	Harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) are excluded from Capitol Lake but prey on Chinook salmon waiting to enter the lake. Once in the lake, adult salmon are safe from these larger predators while the salmon try	Harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) could have access to the base of the falls where salmon aggregate in high density. Seals and sea lions often ascend rivers many miles in pursuit of salmon – I have seen them far up the Fraser,

		to find the entrance to the Tumwater Falls fishway. River otters (*Lutra canadensis*) could get access to salmon at the base of the falls, but I have not seen them there.	they are well-known at Bonneville Dam, and they have been reported well up the Nisqually River. This could be a major predation opportunity where salmon have much less opportunity to avoid predators than they have in Budd Inlet below the bridges. River otters could also access salmon, but may be deterred by larger seals and sea lions.
	Dissolved oxygen (DO)	See above (Jul-Aug)	See above (Jul-Aug)
	Temperature	See above (Jul-Aug)	See above (Jul-Aug)
	Salinity	See above (Jan-Jun)	See above (Jan-Jun)
	Pollutants	See above (Jan-Jun)	See above (Jan-Jun)

CLIPA's Managed Lake Options For Consideration

Coho Restoration Project:

With the exception of modest spawning in Percival Creek, there has likely never been significant sustainable spawning of native or wild salmon in the entire Deschutes River watershed, including the Capitol Lake basin. Again, this is primarily due to the existence of Tumwater Falls as an upstream migration barrier. (With the exception of limited numbers of chum, salmon do not spawn in saltwater.) Although Percival Creek's spawning habitat has been seriously harmed by human development in its upper reaches, CLIPA's proposed "Coho Habitat Restoration Project" in lower Percival Creek could help to provide a modest sustainable fishery for wild coho, and possibly steelhead and chum in this watershed. The plan is simple: provide ample woody debris and engineered log jams strategically in Percival Creek. WDFW should decide if adequate spawning habitat still exists in Percival Creek to support the cost of this project.

Percival Creek Extension Plan:

Percival Creek currently empties into Capitol Lake. Some have speculated that a direct access from Percival Creek to Budd Inlet could possibly benefit easier passage of juveniles and adults into and out of this waterway. A sinuous, meandering channel just west of the current north basin of Capitol Lake and emptying into the southwest corner of Budd Inlet could accomplish this.

Tidal flows for improved ingress of stray juvenile salmon (from watersheds other than the Deschutes) for rearing might possibly be increased by this re-channeling. WDFW should evaluate the wisdom of this strategy.

A Community Dilemma

Our community is faced with the following dilemma: Much of the above information has not been shared with community members through the media or public forums.
Unfortunately, this author and others have heard the following widespread but scientifically unsupported claims at public meetings, discussions with estuary advocates, and interviews with citizens, including elected officials. These claims illustrate mischaracterization of Capitol Lake and include: "Capitol Lake dam is just like the Elwha dams.", "Capitol Lake is suffocating our salmon.", "Capitol Lake is the cause of the recent downturn of Chinook numbers in South Sound.", "All dams are bad! They kill fish!", "Capitol Lake is starving our salmon.", "The toxicity of Capitol Lake has prevented the Tundra swans from returning.", "The en masse die-off of sticklebacks is due to Capitol Lake.", "Capitol Lake's a cesspool." "Get rid of that Lake, it spews its toxins into Budd Inlet every second!" "Cost is irrelevant!" These claims have circulated throughout our community for years and have been detrimental to the attainment of a well-reasoned decision on this issue. Obviously, when repeated enough times, they tend to become accepted as fact. Perhaps these claims have an enhanced appeal to many of us who are concerned about past environmental neglect in other areas.

Summary

This report does not propose that either management system, lake or estuary is superior in providing rearing for juvenile Chinook salmon.
However, based upon the above findings mostly from publicly funded research, the following statements appear to be true:

- "Little is known about use of lacustrine habitats by juvenile ocean-type Chinook salmon."
- "Juvenile Chinook can and do thrive in a lake environment."
- Juvenile Chinook reared in Lake Washington and Capitol Lake prefer Chironomidae and Daphnia sp. as primary food sources **found only in freshwater** - Capitol Lake's approximately 264 acres has significant populations of both due to its exceedingly high benthic (bottom) oxygen content.
- Replacing the freshwater of Capitol Lake with marine water would destroy these food sources and may require the alternative of rearing juveniles for an extended period (likely 3-4 months)

in a densely populated hatchery environment while being fed manufactured food. This may be one reason why, **"The data…. show growth of Chinook salmon in Capitol Lake to be extremely rapid, greatly exceeding that attained by fish of the same stock held in hatcheries."**

- Removing the tide lock will allow toxic marine water now in Budd Inlet to infiltrate Capitol Lake basin possibly adversely affecting young juvenile Chinook salmon by adding almost 2 miles of toxic water to their outmigration.

- "The data do not indicate that the conversion of Capitol Lake to freshwater had any great effect on survival either for better or worse."
- Stripping the nearshore vegetation currently supported by freshwater Capitol Lake will likely degrade Chinook juvenile habitat by removing tall natural cover and shade.
- Predation on juvenile Chinook salmon in an estuary's intertidal mudflat apparently has never been adequately researched in the Capitol Lake – estuary issue. Re-converting Capitol Lake to an estuary will likely quadruple the number of marine water compression points which are advantageous to predators of Chinook.

These oversights could result in additional stress on our Chinook and threatened Southern Resident orca population.

- Despite almost universal understanding that juvenile Chinook (and community aesthetics) would benefit from the strategic dredging and plant harvesting in Capitol Lake, such efforts have been opposed for decades by those who prefer an estuary/intertidal mudflat, which reduces the Lake's aesthetic appeal to almost everyone and gives the false impression that the Lake is somehow "sick".
- In addition to naturally supporting Chinook health, freshwater aquatic insects are also an important source of food for our community's iconic Yuma and Little Brown bat population whose members thrive in large part due to the existence of Capitol Lake.
- The **hundreds of millions of dollars** saved by retaining the Lake and continuing with the Lake Management Plan could protect funding to improve other more productive rearing and spawning areas in Puget Sound.

Many of these facts have not been shared with community members and public officials. These omissions and others may be contributing to a higher probability for poor decision-making.

Recommendations:

What can we do long term?

Determining which rearing environment is best for Deschutes River Chinook salmon will require a serious commitment of time and money to reduce uncertainties to a desirable level. "Studies to provide actual data to inform these uncertainties would require a series of years, as annual variation in most of

the factors in the Capitol Lake-Budd Inlet area, not to mention the Pacific Ocean feeding and growing areas, can be considerable, with numerous factors interacting in complex ways."[38]

What can we do now?

1. Certainly, resumption of water quality sampling in Budd Inlet and Capitol Lake could and should be accomplished relatively quickly and inexpensively. Persistent toxic hydrocarbons should be included in this sampling (and assessed by hydrologic mixing modelling.)
2. Dredging the northern basin and strategically harvesting aquatic plants in the northern and middle basins could be performed to better assess the degree of positive effects of those neglected improvements.
3. Obtain neutral, third party reviews of a) the toxic effects on Chinook juveniles due to the expansion of toxic marine water into the Capitol Lake basin, b) Coho Restoration Project and c) Percival Creek Extension Project.
4. Increase efforts to further restore the systemic health of the Deschutes River and Percival Creek with engineered logjams, use of woody debris, riparian planting, reduction of human biological waste (encampments and sewage overflow) and human debris and possibly the creation of sediment traps.
5. Invest in treating stormwater outfall to Budd Inlet, Capitol Lake, Percival Creek, and the Deschutes River.

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Citations from Quotes

Citation #6 contains a quote from a secondary publication. The author did not read this entire publication but relied on the quote.

Review

Dr. Jack Havens

Dear Dr. Havens:

A major focus of your paper is how Capitol Lake affects Chinook salmon (*Oncorhynchus tshawytscha*) in the Deschutes River (and, secondarily, in Percival Creek). A number of factors have been suggested as influencing Chinook salmon survival, growth, and production, and the paper addresses these and how they are influenced by Capitol Lake or estuarine habitat conditions. I suggest it might be useful to put these in table form, separating outmigrant (fry-juvenile-smolt) from returning adults.

Chinook salmon life-stage & season	Factor influencing salmon survival, growth, and production	Capitol Lake	Unimpounded estuary
Juvenile – Jan-Jun	Food supply	Chironomids. Engstrom-Heg (1955) indicated early Capitol Lake provided food supply that supported very good growth compared to other Puget Sound systems. Koehler et al. (2006) indicates high value of chironomids as food for young Chinook in Lake Washington. Chironomid population might have adjusted as Capitol Lake aged, so current data on Chinook salmon growth and/or chironomid abundance would be informative, but in absence of new data, the best information seems to suggest favorable feeding conditions in the lake.	Some chironomids in upper reach and Percival Cove; replaced by marine plankton in marine water.
	Predation	Fish-eating birds, cutthroat trout (relatively few)	Fish-eating birds, staghorn sculpin (*Leptocottus armatus*), dogfish shark (*Squalus acanthias*),
	Dissolved oxygen (DO)	Tumwater Falls ensures near saturation.	Tumwater Falls ensures near saturation.
	Temperature	Temperature very similar under either management option.	Temperature very similar under either management option.
	Salinity	Fresh water	Salinity transition fluctuates with tide, but at highest extent only moves about a mile upstream, so that this is unlikely to be a physiological factor. It could be an ecological factor in

			influencing food supply and predators.
	Pollutants	Pollutants from automotive and other sources in the urban environment of Capitol Lake as well as agricultural inflow from the Deschutes watershed may be present, but data are needed to answer this. Pollutants from Budd Inlet are blocked.	Pollutants in sediments in Budd Inlet might be washed farther upstream with the tide, depending on the degree to which those pollutants are dissolved or suspended and moved into the estuary. Sampling the distribution and concentration of sediment pollution in different parts of Budd Inlet would be informative as would more detailed consideration of the chemistry and adsorption of the pollutants.
Juvenile – Jul-Aug	Food supply	*Daphnia* replace chironomids as a high-quality food for juvenile Chinook (Engstrom-Heg 1955; Koehler et al. 2006)	*Daphnia* in Percival Cove and closer to Tumwater Falls in pools; replaced downstream in tidal reach by other arthropods
	Predation	See above (Jan-Jun)	See above (Jan-Jun)
	Dissolved oxygen (DO)	See above (Jan-Jun). Higher temperature can reduce DO. DO is influenced positively by ratio of surface area to volume (S:V), which is high in the relatively shallow Capitol Lake.	See above (Jan-Jun). Higher temperature can reduce DO.
	Temperature	Although high S:V favors DO, it can also lead to greater heating when air temperature and direct solar radiation are a major factor in the hot months. Data from Engstrom-Heg (1955) suggest that temperatures remain acceptable for salmonids, with more preferred temperatures in the channel. Deposition and shallowing of Capitol Lake could have changed the temperature and DO conditions in Capitol Lake. Current data would be informative.	Temperature would change little from Tumwater Falls.
	Salinity	See above (Jan-Jun)	See above (Jan-Jun)
	Pollutants	See above (Jan-Jun)	See above (Jan-Jun)
	Food supply	NA	NA

Returning adult – Aug-Sep	Predation	Harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) are excluded from Capitol Lake but prey on Chinook salmon waiting to enter the lake. Once in the lake, adult salmon are safe from these larger predators while the salmon try to find the entrance to the Tumwater Falls fishway. River otters (*Lutra canadensis*) could get access to salmon at the base of the falls, but I have not seen them there.	Harbor seals (*Phoca vitulina*) and California sea lions (*Zalophus californianus*) could have access to the base of the falls where salmon aggregate in high density. Seals and sea lions often ascend rivers many miles in pursuit of salmon – I have seen them far up the Fraser, they are well-known at Bonneville Dam, and they have been reported well up the Nisqually River. This could be a major predation opportunity where salmon have much less opportunity to avoid predators than they have in Budd Inlet below the bridges. River otters could also access salmon, but may be deterred by larger seals and sea lions.
	Dissolved oxygen (DO)	See above (Jul-Aug)	See above (Jul-Aug)
	Temperature	See above (Jul-Aug)	See above (Jul-Aug)
	Salinity	See above (Jan-Jun)	See above (Jan-Jun)
	Pollutants	See above (Jan-Jun)	See above (Jan-Jun)

In most cases, what can be said is qualitative, not quantitative. There is nothing you have mentioned that makes a strong case that salmon production would increase significantly, if at all, with the conversion of Capitol Lake to a free-flowing estuary. Likewise, there is no clear case that salmon production would decrease. Studies to provide actual data to inform these uncertainties would require a series of years, as annual variation in most of the factors in the Capitol Lake-Budd Inlet area, not to mention in the Pacific Ocean feeding and growing areas, can be considerable, with numerous factors interacting in complex ways. By making conditions as favorable as possible in the terminal area, the fish will be in the best condition to survive the marine years, and allowing as many returning adults to spawn as there is suitable spawning (and subsequent incubation and rearing) habitat will increase the probability of good return. However, it is noteworthy that natural conditions did not allow a population of Chinook salmon to live in the Deschutes River, and only human intervention in our lifetime established this population.

In the Introduction, you mentioned the critical importance of Chinook salmon in the diet of the resident orcas (*Orcinus orca*). Wikipedia cites National Marine Fisheries Service (2008). "Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*)" (PDF). National Marine Fisheries Service, Northwest Region, Seattle, Washington as a source for diet information.

Note that mustelid predation is from river otters (*Lutra canadensis*), which I have watched catching adult steelhead and which, despite the name, occur in Puget Sound and Straits (abundant in San Juan Islands). Sea otters (*Enhydra lutris*) live on the outer coast and the most inland I have seen one was Neah Bay; they eat mollusks, crustaceans, and echinoderms, although if they found a dying adult salmon they might eat it.

Where discussing a situation with the lower dam removed to make a more connected estuary, I suggest using the term estuary more, as calling it a tidal mudflat sounds more derogatory (e.g. p.3). It's certainly appropriate to state that a significant feature of an estuary is tidal mudflat.

You mentioned tundra swans (*Cygnus columbianus*) on Capitol Lake during winter. My experience with them there is limited even though during much of the 1980s I ran around Capitol Lake regularly (roughly weekly), always watching what waterfowl were present. I do not recall seeing them until quite recently, I believe since 2010, and definitely since 2005.

You also mentioned three-spined stickleback (*Gasterosteus aculeatus*) mortality as being attributed by some to the dam creating Capitol Lake. In Wydoski & Whitney (1979; Inland Fishes of Washington, University of Washington Press, Seattle and London; there is a 21st century edition of this book, but I don't have it) these sticklebacks are reported to die following breeding in the spring. They can be abundant in fresh and saltwater, so a post-spawning mortality might be quite noticeable. Attributing such mortality to blocked migration would require considerable evidence. A quick Google search turned up an article (Jolanta Morozinska-Gogol, 2015, Changes in the parasite communities as one of the potential causes of decline in abundance of the three-spined sticklebacks in the Puck Bay, Oceanologia 57 (3): 280-287) from Poland (this is a circumpolar species) about mortality associated with parasite load. That's a subject where you are the expert.

Other minor comments

On p. 4 in the last full paragraph, delete the "[like Capitol Lake]" and "Brackets added" and instead add a following sentence, such as "Capitol Lake, like Lake Washington, has been used for only short time by Chinook salmon and findings by Koehler et al. (2006) may be relevant to Capitol Lake as well as to Lake Washington, given the similarity of diets in the two lakes (Engstrom-Heg 1955, Koehler et al. 2006)."

On p. 7, the discussion of county-owned fish barrier culverts is relevant to salmon and trout in general (as well as lampreys and sticklebacks), but the preference of Chinook salmon for larger streams, as you mention elsewhere, means that most culvert improvement will benefit coho, chum, cutthroat, and perhaps steelhead, but Chinook are less likely to be benefitted by them. The state and county have legal obligations to improve fish passage at these, so that financial obligation exists.

On p. 8, you cite Engstrom-Heg (1955) as stating predation is negligible in the lake. It might be worth pointing out that Capitol Lake lacks northern pikeminnow (Ptychocheilus oregonensis) that is a significant predatory fish in Lake Washington (Koehler et al 2006) as well as in the Columbia River (where there has been a bounty fishery for this native minnow).

On p. 10, you mention less predator shielding with dredging. Given the scarcity of predators in Capitol Lake, is this relevant. I presume you are referring to sit-and-wait ambush predators (fish), rather than fish-eating waterfowl. If you are talking about waterfowl, then vegetation may shield the young salmon.

On p. 11, Daphne should be *Daphnia*. I suspect that was a spellcheck action. (I always thought that a company based in Washington state should have programmed its spellcheck in WORD to accept Walla Walla!)

On p. 13, you point out that salmon do not spawn in saltwater. Chum salmon are borderline. I see them spawning in areas of Hood Canal streams that are reached by high tides.

On p. 14, you accidentally omitted quotation marks around the sentence about spewing toxins.

(In the same paragraph is the quote about all dams are bad. There was a time in the 1990s when, as a WDFW employee [or WDG or WDW, depending on year], I worked with USFWS, ODFW, NMFS, and Umatillas to consider getting the Corps to add a dam to the Walla Walla basin in Oregon to store water to release for fish when irrigators had taken all the river water. Other solutions were eventually found through extensive negotiations.)

I think trying to put some order instead of just sentiment into the issue is very commendable. Obviously there are a lot of uncertainties. Getting more certainty would be a major undertaking (although some water quality sampling may be relatively inexpensive and quick), but given the costs of existing options, better understanding will certainly improve the discussion and inform the decision-making.

Sincerely,

Hal A. Beecher, Ph.D.

From: Hal Beecher [mailto:halbeecher@comcast.net]
Sent: Wednesday, October 03, 2018 12:09 PM
To: bikeandfish@comcast.net
Subject: Capitol Lk

Jack - I think I forgot to address that issue of fish from other rivers. I think that is a really weak argument for removing the lake. The percentage of fish from those rivers (primarily Nisqually, I assume) would be a small percentage of the production of those rivers, with percentage diminishing as distance from Budd Inlet increases.

Hal

Review

3010 Capitol Blvd.

Olympia, WA 98501

2 October 2018

Note: On May 22, 2019 following minor revisions, Hal Beecher wrote, “Yes, you can still list me as a reviewer.”