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February 28, 2003

***VIA EXPRESS MAIL AND E-MAIL***

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**Re: Comments on Final Supplemental Environmental Impact Statement for  
Columbia River Channel Deepening Project**

Dear Col. Hobernicht, Mr. Willis and Ms. Grigg:

On behalf of the Columbia River Alliance for Nurturing the Environment (“CRANE”), this letter provides comments on the U.S. Army Corps of Engineers’ January 2003 Final Supplemental Integrated Feasibility Report and Environmental Impact Statement (“FSEIS”) for the Columbia River Channel Deepening Project. We believe that the FSEIS and the Biological Opinions on which it is based are legally, economically and scientifically flawed, and offer these comments to demonstrate that

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(a) the Biological Opinions do not meet the standard set forth under Section 7 of the Endangered Species Act and consultation should be withdrawn and reinitiated, and (b) the Corps should withdraw the FSEIS and reissue a revised FSEIS that remedies the deficiencies identified in this letter.

### **I. THE FSEIS REPEATS ERRORS AND OVERSIGHTS IN THE PROJECT'S EARLIER ENVIRONMENTAL REVIEW DOCUMENTS**

The DSEIS repeats many of the same errors and oversights that appeared in the October 1998 Draft Environmental Impact Statement ("DEIS"), the August 1999 Final Environmental Impact Statement ("FEIS") and the July 2002 Draft Supplemental Integrated Feasibility Report and Environmental Impact Statement ("DSEIS"). In particular, the Corps' analysis continues to ignore the effects of significant interdependent and interrelated activities in its environmental and economic analyses. CRANE renews the objections and comments raised in Perkins Coie's letters on behalf of CRANE in response to the DSEIS and the Corps' applications to the States of Washington and Oregon for Water Quality Certification and Coastal Zone Consistency Determinations. See Correspondence from Perkins Coie to Col. Richard Hobernicht (Sept. 13, 2002) ("DSEIS Comment Letter"); Correspondence from Perkins Coie to Loree Randall (Jan. 15, 2003) and Correspondence from Perkins Coie to Russell Harding and Christine Valentine (Jan. 15, 2003) (collectively, "Water Quality and CZMA Comments"). In addition, CRANE renews the comments and objections raised by Perkins Coie on behalf of CRANE member Paul L. King, which commented upon the DEIS and FEIS. See Correspondence from Perkins Coie to Steve Stevens (Feb. 4, 1999) ("DEIS Comment Letter"); Correspondence from Perkins Coie to David B. Sanford, Jr. (Nov. 12, 1999) ("FEIS Comment Letter").

The bases for these objections and comments include, among other things, (a) CRANE's continued concern that the impacts of the Corps' proposal for dredging and dredged spoil disposal on the Lower Columbia River ecosystem have not been adequately examined and considered, (b) the Corps' failure to adequately disclose and analyze the impacts of sponsor ports' use of the dredge spoils through interrelated and interdependent actions, (c) the Corps' continued inclusion of the Gateway 3 parcel as an upland disposal site, (d) the Corps continued failure to properly assess the benefits,

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costs, and feasibility of the project, and (e) the Corps' continued failure to address comments related to the Channel Deepening Project's wetland, fish and wildlife impacts.

## **II. THE FSEIS IS FLAWED IN ITS REVIEW OF PROJECT-RELATED ENVIRONMENTAL AND ECONOMIC IMPACTS**

In addition to reiterating its previous comments regarding the issues listed above in Section I, CRANE offers the following supplemental comments on the analysis provided in the FSEIS and related documents.

### **A. The FSEIS's analysis of Project-related impacts suffers from significant methodological flaws, and misrepresents the body of knowledge about the affected ecosystem and the likely economic impacts of the Project.**

Although Sections B and C below provide more specific comments on the FSEIS's economic and biological aspects, respectively, CRANE offers the following preliminary observations that demonstrate the failings in Corps' overall approach to the FSEIS.

1. As discussed in detail in Section II(C), the Corps continues to mischaracterize the participation of Sustainable Ecosystems Institute ("SEI") in the development of Channel Deepening review documents. Throughout the FSEIS, the Corps suggests that SEI reviewed and approved of the Corps' approach in the FSEIS and DSEIS. See, e.g., FSEIS, at page 1-5. In fact, SEI has not endorsed the document nor did it "approve or disapprove" any analysis or policy action." See Correspondence from Dr. Steven Courtenay (Feb. 12, 2002) (attached as Exhibit 1).
2. The Corps has redesigned the Project to funnel dredged spoils to flowlane disposal and to Lois Island and Miller Pillar as a way to avoid ocean disposal for the first twenty years of the Project's life. See FSEIS, at page 1-7. The Corps admits that this plan is contingent upon the full implementation of the Lois Island and Miller Pillar restoration actions so that the Corps will have the necessary area to place dredged spoils it would otherwise dump in the ocean—an outcome which is less

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than certain to occur. See FSEIS, at page 4-6 (“If the restoration features in the estuary are not fully implemented, then the alternative would be to dispose of material into USEPA-designated ocean sites as described in the 1999 Final IFR-EIS.”).

3. The Corps continues to exclude the costs of several restoration projects from the cost-benefit analysis for the Project despite the fact that the FSEIS includes the restoration projects in the study area (FSEIS, at page 2-1) and describes restoration as one of the goals of Channel Deepening. See FSEIS, at page 4-31 (noting that restoration features “are considered part of the project”). The Corps justifies the exclusion of the restoration projects with the claim that they are voluntary conservation measures that are implemented to satisfy ESA Section 7(a)(1) utilizing authorities or funding that is distinct from the Channel Deepening Project. However, it is evident that the Corps has included the restoration projects in the FSEIS to create the impression that the restoration will mitigate for the impacts of the Channel Deepening Project. The Corps has exploited this distinction to have it both ways; the restoration projects allegedly add no cost to the Project, but regulatory agencies perceive them to be mitigation for the Channel Deepening Project. For example, in Exhibit K-9 (Consistency with Washington Local Shoreline Master Programs), the Corps’ description of the Channel Deepening “Project” includes the ecosystem restoration projects to demonstrate that the Corps has satisfied the regulatory requirements of local shoreline master programs and critical areas ordinances under Washington law. See FSEIS, Exhibit K-9, Consistency with Washington Local Shoreline Master Programs, at page 9 [hereinafter “Shoreline Consistency Report”]. Likewise, the Washington Department of Natural Resources views the “restoration” projects as “mitigation” for Channel Deepening. FSEIS, Vol. 4, Comment Letters on the Draft SEIS and Corps Responses, at page State-70 [hereinafter “Response to Comments”]. Because the Corps relies on the restoration projects for regulatory approval of the Channel Deepening, the costs of those project features should also be included in the FSEIS’s cost-benefit analysis.
4. Despite the fact that the operations and maintenance of the Mouth of the Columbia River (“MCR”) and the 40-foot navigation channel have been separately reviewed and authorized in the past, (see FSEIS, at pages 2-1, 6-71), the fact remains that

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access to the Columbia River Channel must come through the MCR and a deeper navigation channel will be maintained using dredging practices and disposal sites in common with the maintenance of a 40-foot channel. As a result, these actions are interrelated and interdependent and must be considered with the effects of the proposed action in the same environmental review document. However, a comprehensive and clear review has not been presented for the Channel Deepening Project. To reduce the scale of the dredging effect, the Corps has segmented the action so that continued channel maintenance is portrayed as a baseline environmental condition implemented through the no action alternative.

The environmental documents describe the Project as construction and maintenance of the deepened channel, implementation of restoration projects and location of disposal sites for Channel Deepening and operation and maintenance of MCR and the 40-foot navigation channel. While this appears to encompass all dredging, the description of the action excludes the actual operation and maintenance dredging from the action and includes only the disposal sites. This thin distinction denies the decisionmaker and the public the opportunity to fully understand the scope of the proposed action together with interrelated and interdependent dredging actions.

The environmental impacts and costs under consideration are driven by the quantities of material that are dredged and the relative location of dredge disposal. The environmental documents dating from 1999 indicate that, under most optimistic assumptions, the total amount of dredge material that must be disposed of in the next 20 years either greatly exceeds the capacity of the disposal sites set forth in the FSEIS or requires more ocean disposal than the Corps has disclosed, or requires more maintenance-intensive flow-lane disposal that shifts costs from Channel Deepening to maintenance.

The 1999 NMFS biological opinion for channel maintenance indicates that MCR maintenance requires dredging of 4-5 mcy per year or a total of 80-100 mcy over 20 years. See generally National Marine Fisheries Service, Biological Opinion on Corps of Engineers' Columbia River Channel Operation and Maintenance Program (Sept. 15, 1999) (attached as Exhibit 2) [hereinafter "NMFS Channel

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Maintenance BiOp”]. This estimate is repeated in the FSEIS. See FSEIS, at page 6-69. The NMFS Channel Maintenance BiOp also indicates that channel maintenance for a 40-foot channel will require dredging of 4-6.5 mcy per year or a total of between 80 and 130 mcy over 20 years. According to the NMFS Channel Maintenance BiOp, the total need for maintenance dredging disposal over 20 years (exclusive of Channel Deepening construction and maintenance) is between 160 mcy and 230 mcy. The U.S. Fish and Wildlife Service (“USFWS”) 2002 Biological Opinion for Channel Deepening describes total maintenance dredging as the low point in this range or 160 mcy. Estimates provided in the Corps’ 2001 Channel Deepening Biological Assessment roughly correspond with this figure, describing the channel maintenance dredging quantity at 3 to 8 mcy per year for 20 years. It is reasonable to conclude, therefore, that MCR and navigation channel maintenance alone, without Channel Deepening, will require disposal sites with a capacity of at least 160 mcy, and probably more, over the next 20 years.

In addition to maintenance of MCR and the existing navigation channel, the disposal needs of the Channel Deepening must be satisfied. The 1999 FEIS indicated that construction phase of Channel Deepening, alone, would require disposal of at least 18.4 mcy of sediment. In the 2003 FSEIS, that figure is now 14.5 mcy, but it is unclear why 4 mcy disappeared. It is also unclear whether maintenance of the deepened channel adds to the total quantity of dredge spoils generated by maintenance of the existing channel and MCR. The FSEIS never tells the reviewer what that quantity would be and how it might or might not be distinguished from maintenance of the existing channel and MCR.

Assuming, conservatively, that Channel Deepening will add only 14.5 mcy to the Corps disposal needs, the total quantity of dredge spoils (construction and maintenance) that the Corps must accommodate over the next 20 years ranges from approximately 175 mcy to 245 mcy. Yet the FSEIS for the Project identifies a total disposal capacity for upland, flow lane, and “restoration” fills of only 105 mcy—far short of needed 175-245 mcy. It might be that the Corps will resort to ocean disposal to address part of this shortfall, but the Corps has indicated that ocean disposal will not be used during the first 20 years of the project. In the end, the Corps has not disclosed the total dredging and disposal activities and impacts

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that will occur in the Lower Columbia River over the next 20 years. This violates the requirements of NEPA because it misleads the interested public and the authorizing agencies on a very significant metric by which to measure environmental impacts and economic costs for the Project.

For the same reason, ESA consultation on channel maintenance should be reinitiated under the terms of the NMFS Channel Maintenance BiOp. That opinion expires and requires reinitiation by its own terms in September 2004, or sooner if dredging will have effects not considered in the 1999 opinion. Under the Corps' proposed Channel Deepening, channel maintenance is expanded and utilizes disposal sites not previously considered by NMFS. Accordingly, consultation must address the combined effects of MCR and channel maintenance and Channel Deepening. The Corps continues to segment these portions of the Project unlawfully. CRANE incorporates by reference its comments on the Corps' most recent plans to maintain the MCR, which reiterate the interconnected and interdependent natures of these projects. See Correspondence from Perkins Coie to David C. Beach, P.E., et al. (Mar. 3, 2003).

Lawful agency decision making and meaningful public participation require that the Corps fully disclose and consider the joint environmental effects and economic costs of not only the Channel Deepening construction and maintenance, but the continued maintenance of the 40-foot navigation channel and the MCR navigation channel. Without a comprehensive disclosure and description of these connected actions, it is nearly impossible for the decision-maker and the public to ascertain whether the Corps has properly assigned the costs and environmental effects of each project. Without full disclosure, it may be that the Corps has improperly shifted some costs of Channel Deepening to future MCR and channel maintenance costs. This could be done directly by assigning the wrong percentage of costs to Channel Deepening, or indirectly by using Channel Deepening dredge spoil disposal techniques that reduce costs for Channel Deepening, but increase costs for channel and MCR maintenance (e.g., flowlane disposal or restoration and upland disposal sites that erode and become future channel maintenance issues and costs). See Response to Comments, at page State-71 (State of Washington comments that flow lane disposal is simply least-cost disposal method with high

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environmental impacts and deferred costs as sediments are repeatedly dredged). For example, the USFWS 2002 Biological Opinion for Channel Deepening describes “advanced maintenance dredging” as a practice that will occur during construction of the Channel Deepening, resulting in overdepth dredging to 48 feet as part of maintenance of a 40-foot navigation channel. See USFWS, Biological and Conference Opinion for Columbia River Channel Improvements Project, at page 9 (May 20, 2002). It is unclear whether the Corps considers advanced maintenance dredging as part of the no action alternative or the proposed action, and it is unclear whether the costs of “advanced maintenance dredging” were improperly excluded from the cost-benefit analysis for the Project even while such dredging is used to construct a 43-foot navigation channel.

5. The Corps continues to rely on the Adaptive Management Team (“AMT”) to determine whether future project modifications will be necessary without providing appropriate standards against which the AMT can measure project success or failure (see, e.g., FSEIS, at pages 4-12 (attainment of tidal marsh-intertidal flat habitat); 4-20 (bull trout critical habitat); 4-36 (Miller-Pillar restoration feature installation of final two pile dikes); 4-52-4-53 (ecosystem evaluation actions); 6-18 (application of Rodeo® to purple loosestrife)), despite the fact that the purported “[e]mphasis on recovery of . . . ESUs is now shifting to the lower Columbia River.” FSEIS, at page 4-53. As CRANE has commented in previous correspondence, the Corps and its cooperating agencies must set meaningful standards for Project success to inform adaptive management decisions if it is to achieve this crucial recovery.
6. In comments on the DSEIS, the Environmental Protection Agency called for more detail on how proposed monitoring will be used with adaptive management benchmarks and processes to trigger certain actions when and if the adverse effects of the Project are more severe than anticipated. Response to Comments, at page Federal-5. The Corps’ response reveals a major flaw in the public review process for the Project. The Corps assures EPA that a draft monitoring and adaptive management implementation plan has been sent to NMFS and USFWS for review. Remarkably, the Corps neglected to provide the implementation plan to other agencies and the interested public in the review process for the Project.

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7. The Corps continues to rely on conceptual modeling to conclude that likely Project impacts will be insignificant, despite the fact that the conceptual modeling they employ is not appropriate as a predictive device in these circumstances. See, e.g., FSEIS, at page 6-60 (“[T]he conceptual model also demonstrates that the project complies with the Survival Guidelines in ORC 635-100-135. Specifically, the analysis demonstrates that the project should not degrade water quality, reduce stream flows, affect gravel in spawning areas, or adversely affect riparian habitat.”). This issue is discussed in detail in Section II(C) below.
8. The Corps asserts that the “Shillapoo Lake restoration feature will substantially improve waterfowl and wildlife habitat management capabilities.” FSEIS, at page 4-25. Despite the involvement of Washington Department of Fish and Wildlife (“WDFW”) in the Shillapoo Lake restoration feature, questions exist as to the project’s overall benefit to habitat. A recent newspaper article notes that “the Corps, the National Marine Fisheries Service, the Natural Resources Conservation Service and the Lower Columbia Fish Recovery Board have all expressed misgivings about whether the Shillapoo Lake project is a true ‘restoration’ project and a good use of federal dollars” based on the project’s exclusion of salmon and steelhead. See Kathie Durbin, “State Wants to Revamp Lake Bed,” Vancouver Columbian (Nov. 2, 2002) <[http://www.columbian.com/11022002/front\\_pa/330842.html](http://www.columbian.com/11022002/front_pa/330842.html)> (attached as Exhibit 3). Based on these concerns, it appears that the Corps has overstated the likely benefits associated with the Shillapoo Lake restoration project.
9. The Corps proposes to limit monitoring of the fisheries surrounding Bachelor Slough to three years. FSEIS, at page 4-46. The DSEIS had allowed a five-year monitoring period. Despite consistent public and agency concern about the effects of restoration actions on Columbia River fisheries, the Corps offers no explanation for this cutback in commitment to monitoring.
10. The Corps has failed to consider the effects of the project on Green Sturgeon—a candidate species for listing under the ESA. 68 Fed. Reg. 4433 (Jan. 29, 2003) (attached as Exhibit 4). Green Sturgeon concentrate in large numbers in the Columbia River estuary during late summer when maintenance dredging occurs and Channel Deepening is planned. Id. at 4434. Most of the sturgeon

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concentrated in the Columbia River are young fish (which would be more susceptible to entrainment due to size and mobility), but mature sturgeon and even a ripe Green Sturgeon (ready to spawn) have been detected in the Lower Columbia. Id. Scientists believe that fish from all known breeding populations of sturgeon are found in the Columbia, making the entire species particularly vulnerable when there are impacts to large concentrations there in late summer.

The Corps offers no meaningful data or analysis on the effects that the Project will have on Green Sturgeon concentrated in the estuary. The Corps has not reviewed likely Project impacts on Green Sturgeon specifically, but merely asserts that its White Sturgeon analysis should be considered sufficient for both species. See FSEIS, at pages 6-5, 6-22-6-23 (“Because green sturgeon occupy similar habitat to white sturgeon, and because they are thought to behave similarly, the conclusions of the studies regarding behavior of and potential effects on white sturgeon should apply equally to green sturgeon.”). Even assuming White Sturgeon were an acceptable substitute for Green Sturgeon, the Corps has no meaningful analysis of the effects of the project on White Sturgeon. Baseline studies regarding the use of likely disposal areas by White Sturgeon are not yet complete and specifically warn that they are not suitable to analyze the effects of the Project on sturgeon. FSEIS, Exhibit K-1, Evaluation Report White and Green Sturgeon (Revised), at page 3 [hereinafter “Sturgeon Report”]. Even if it were appropriate to rely on White Sturgeon data for information about likely effects on Green Sturgeon, in the absence of reliable baseline data or effects analysis, it is impossible to conclude with sufficient certainty that Channel Deepening is unlikely to affect sturgeon habitat. This is especially true where what little data the Corps can produce indicates that “some fish were in close proximity to the Dredge Oregon on several occasions.” See Sturgeon Report, at page 4. The Corps does not even approach the expectations of the State of Washington, Department of Ecology (“Ecology”), that the Corps develop a matrix of potential adverse impacts to sturgeon, specific mitigation measures and a monitoring plan to continually assess impacts on sturgeon. See Response to Comments, at page State-33.

11. The FSEIS discloses that loose rock will be removed by mechanical dredge at the Vancouver Bar and Vancouver turning basin, in addition to the Longview site.

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See FSEIS, at 6-6. To the best of our knowledge, the impacts of loose rock removal at these sites have not been analyzed in either the FSEIS or the previous environmental documents.

12. According to the FSEIS, “[w]ater quality effects for the channel improvement project would be similar to what is encountered during maintenance of the current channel.” FSEIS, at page 6-18. The FSEIS fails to discuss the impacts of disposal on aspects of water quality other than those for which the Columbia River is already water quality limited; in particular, we note that any increase in flowlane disposal will likely result in additional turbidity and suspension of sediment. These impacts to water quality must be addressed in the FSEIS.
13. The Corps concedes that proposed critical habitat areas for bull trout, including the Project area, “serve[] as migration corridor, provide[] foraging habitat, and [provide] an overwintering area for bull trout.” FSEIS, at page 4-20. Nevertheless, the Corps contends that reinitiation of consultation with USFWS regarding bull trout critical habitat is not necessary at this time because “based on the extensive analysis found in the Corps’ 2001 BA and the USFWS’s 2002 Biological Opinion, the project will not adversely modify or destroy critical habitat in the area.” FSEIS, at pages 6-57, 4-20. As CRANE has demonstrated in previous comments on the Project, the past environmental review has not sufficiently addressed the Project’s likely environmental impacts. As a result, it is inadequate for the Corps to promise merely to reinitiate consultation upon issuance of the final bull trout critical habitat rule. Based on this imminent designation of critical habitat, the Corps and USFWS should reinitiate consultation the Project’s likely effects on critical habitat for bull trout, as required under 50 C.F.R. 402.10(a).
14. The Corps continues to misrepresent the management recommendations in the Final Washington State Sandhill Crane Recovery Plan. See generally Washington Department of Fish and Wildlife, State of Washington Sandhill Crane Recovery Plan (June 2002) (“Sandhill Recovery Plan”). Sandhill Cranes are listed endangered species in Washington. Despite the Corps’ contention that the Project is “consistent with the final plan” (FSEIS, at pages 6-59, 6-68), CRANE notes again that the Sandhill Recovery Plan specifically points to the deposition of

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Columbia River dredged spoils on the Port of Vancouver's Columbia Gateway properties as a significant threat to Sandhill Crane habitat. Sandhill Recovery Plan, at page 22. The Sandhill Recovery Plan states that

The lower Columbia bottomlands staging area is the only sandhill crane use-area in the United States adjacent to a major metropolitan area, and habitat will continue to be threatened. . . . Few, if any, alternate migrational stopover sites are available between northern California and southeastern Alaska for birds which migrate west of the Cascade Range. Habitat in the area needs to be protected if this crane flock is to survive.

Id. at 21. Nowhere in the Sandhill Recovery Plan is it suggested that development of Canada goose habitat in the Woodland Bottoms area would serve as sufficient enhancement to compensate for the loss of Sandhill Crane habitat on the Gateway properties, let alone that the enhancement "more than compensates for any impact" to the Gateway properties. Cf. FSEIS, Exhibit K-8, Consistency with Critical Areas Ordinances Including Wetland Mitigation Plan, at pages 10-11.

15. The Corps improperly determines that it is not necessary to update its Land Use section (Section 6.8.2) "because the new ecosystem restoration features and the revised disposal plan (with reduced dredging volumes, reduced rock removal volumes, reduced ocean disposal, reduced upland disposal site acreage, and reduced impacts on agricultural land, riparian habitat and wetland habitat) would have less impact on land use, air quality, noise, aesthetics, and cultural resources than would the alternatives analyzed in the 1999 Final IFR/EIS." FSEIS, at page 6-62. Despite the fact that overall volumes have been reduced, the Project proposed in the FSEIS differs in significant ways from that proposed in the FEIS. In particular, locations and methods of disposal have changed in ways that may impact land use decisions, and which require new analysis. The FSEIS should include a full discussion of land use options based upon these changes in the Project.

16. As CRANE commented in its DSEIS Comments, the Corps' HEP modeling is flawed in a number of significant ways. The DSEIS did, however, promise to "revise and update the HEP analysis by collecting data to represent all habitat

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types and reanalyze current and future conditions based on changes in individual habitat parameters” prior to completion of the pre-construction engineering and design phase. See DSEIS, at page 6-55. The FSEIS appears to delete this passage, and there is no evidence that the HEP analysis has been revisited and updated. Compare FSEIS, at page 6-64. Issues related to HEP modeling are discussed at length in Section II(C) below.

17. The Corps continues to insist that the Channel Deepening will not have the effect of causing economic development, increased urbanization or port development even while the Corps and the sponsoring Ports justify the Project on the basis of expected economic development benefits. The Corps’ position conflicts with guidance and conclusions from EPA and NMFS. In comments on the DSEIS for Channel Deepening, EPA calls on the Corps to more fully explain how proposed dredging will “effect and encourage further developments of coastal ports and industrialization in the project area.” See Response to Comments, at page Federal-3. In 1999, when the Corps engaged in consultation with NMFS regarding maintenance of the 40-foot Columbia River Navigation Channel, NMFS determined that “increased industrialization is an indirect effect of the channel maintenance.” NMFS Channel Maintenance BiOp, at page 14. If maintenance of the existing navigation channel has the indirect effect of inducing economic development and industrialization, surely deepening of the channel and maintenance of the deeper channel will have the same effect. The Corps has not only overlooked these effects, but has purposefully attempted to ignore these effects.
18. The Corps continues to insist that the Port of Vancouver's Gateway development project is an independent action. FSEIS, at page 3-16. Yet, it is also evident that the Gateway project will rely on 2.3 million cubic yards of dredge disposal by the Corps as fill for the Gateway project. CRANE has commented in detail on the Port of Vancouver’s DEIS for the Columbia Gateway development (“Gateway DEIS”). See Correspondence from Perkins Coie to Suzan Wallace (Oct. 11, 2002) (attached as Exhibit 5). Those comments are incorporated by reference, and take substantial issue with the FSEIS’s analysis of the likely cumulative impacts associated with the Gateway development—particularly the Corps’ assessment of impacts to aquatic and wildlife resources, including analysis of impacts to bald

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eagles and Sandhill Cranes. See FSEIS, at pages 6-86, 6-96. At the outset, the Gateway development is not merely cumulative with the Channel Deepening Project, but is in fact interrelated and interdependent. As such, all impacts associated with the Columbia Gateway development should be disclosed and analyzed in the FSEIS; mere cumulative effects analysis is insufficient.

19. The Corps relies heavily on the Gateway DEIS for its conclusion that impacts associated with the Gateway development will not be significant. See FSEIS, at pages 6-97-6-99. In fact, the Port of Vancouver has decided to delay issuance of its FEIS well beyond the anticipated Spring 2003 timeframe in order to allow more time to study resources on the Gateway properties and respond to comments raised in response to the DEIS. Based on the Gateway DEIS's deficiencies, it is not appropriate to conclude that "significant mitigation . . . will counterbalance or even outweigh any adverse effects" on wetlands (FSEIS, at page 6-97), salmon (FSEIS, at page 6-98), or Sandhill Cranes (FSEIS, at page 6-99), among other natural resources. As a result, the Corps' conclusions made in reliance on the Gateway DEIS are unsupported and untenable and should be withdrawn until appropriate effects analyses are undertaken. Furthermore, although the Corps has added cumulative effects analysis for the Port of Vancouver, it still ignores relevant cumulative effects that will attend other port development along the Columbia River. For all these reasons, the Corps is unwarranted in its conclusion that the incremental impacts of Channel Deepening will not be significant when considered along with all reasonably foreseeable cumulative impacts.
20. Washington's Department of Ecology has begun an extensive and necessary study to be performed by the National Academy of Scientists to discuss the best allocation of resources on the Columbia River. See Washington Department of Ecology, "Columbia River Regional Initiative" <<http://www.ecy.wa.us.gov/programs/wr/cr/crhome.html>> (accessed Jan. 10, 2003). Among other things, the National Academy of Sciences has been charged to "[r]eview and evaluate existing scientific data and analyses related to species listed under the Endangered Species Act in the Columbia River basin." The National Academies, "Water Resource Management, Instream Flows, and Salmon Survival in the Columbia River" <<http://www4.nationalacademies.org/webcr.nsf/5c50571a75df494485256a95007a091e/0726f>> (accessed Jan. 11, 2003). Based on

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the deficiencies identified in the DSEIS Comments and Section II(A)(1) above, if the Corps obtains permits for and begins construction of the Channel Deepening prior to the completion of this study, the wide-ranging environmental and socio-economic impacts of Channel Deepening (e.g., destruction of long-standing fisheries, changing sediment transfer patterns, Channel Deepening-associated port development) will undercut and make obsolete the National Academy of Sciences' efforts. The FSEIS fails to mention any plans for coordination with this study, which will likely not only add to the baseline information available about the Columbia River, but also shape policy decisions related to the River's using biologically-based methods.

21. Exhibit I (Essential Fish Habitat) of the DSEIS provided that if squid spawning areas are found in a disposal site area, the Corps would have to adjust the location of the disposal site or place timing restrictions on its use. Compare DSEIS, Exhibit I, Essential Fish Habitat, at page 13, and FSEIS, Exhibit E, Essential Fish Habitat, at page 13. The Corps abandoned this habitat protection measure.
22. The Corps' own Eulachon and Sturgeon Studies team has provided formal comment stating their concern "that larval eulachon survival may be reduced by an increase in suspended particles," and notes that the "mortality rate or the magnitude of potential losses" from such suspended particles remains unknown. See FSEIS, Exhibit K-2, Evaluation Report Smelt (Revised), at page 2 [hereinafter "Smelt Report"]. Has the Corps adopted the Eulachon and Sturgeon Studies Team's suggested work windows to avoid smelt mortality?
23. The Project Summary and Final Recommendations associated with the Smelt Report are dated November 2002, before the Corps disclosed its change in the Project to avoid ocean disposal and rely more heavily on flowlane disposal. See Smelt Report, at page 6. The increased use of flowlane disposal alters the Eulachon and Sturgeon Studies team's conclusion that "[d]redging activities associated with channel deepening are not scheduled to occur in known areas of spawning concentrations"? Smelt Report, at page 11. The importance of this issue is compounded by the Eulachon and Sturgeon Studies team's admission that "[s]ampling limitations precluded determining the relative importance of the shipping channel as a migration corridor [for larval eulachon] relative to the rest of

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the river.” Smelt Report, at page 15. The Eulachon and Sturgeon Studies team concludes that “[p]erhaps the most realistic and reliable strategy for reducing dredging related impacts to eulachon would be to avoid dredging in areas of high spawning concentration,”—an action that would admittedly “require more research on the annual variation in use of specific spawning areas.” Smelt Report, at page 28. In sum, it is clear from the Corps’ own consultants’ comments that (a) dredging poses a significant risk to smelt populations, and (b) insufficient baseline information exists to allow the Corps to make appropriate management decisions to avoid smelt habitat while dredging.

24. The Corps research on stranding remains incomplete. In particular, existing surveys have not “specifically evaluated early season stranding when smaller fish are present.” FSEIS, Exhibit K-3, Evaluation Report Fish Stranding (Revised), at page 29 [hereinafter “Stranding Report”]. The Stranding Report also admits that the Corps’ stranding analyses will remain incomplete until detailed presence/absence data is developed. Stranding Report, at page 31. Until this data is developed, it is impossible to reach meaningful conclusions about Project-related stranding rates. Id.
25. As noted in CRANE’s previous comments and in Section II(C) below, the Corps’ existing attempts at modeling remain inadequate. The Revised Dungeness Crab Report makes clear that “[m]ore elaboration of the crab distribution-salinity model, especially concerning salinity and the movements of 1+ crab, is needed to make final recommendations on dredge timing to minimize impacts.” FSEIS, Exhibit K-4, Evaluation Report Dungeness Crab (Revised), at page 2 [hereinafter “Crab Report”]. This conclusion demonstrates that (a) existing crab modeling efforts are admitted to be insufficient to inform management decisions, and (b) more complex models are needed in order to obtain the level of predictive power necessary to implement competent management decisions.
26. The Crab Report states that “[t]he Corps’ preferred option for ocean disposal involves no disposal of construction dredge material at the deep-water ocean disposal site (DWS), as well as no disposal of Incremental Maintenance (IM) dredge material at the DWS *for the life of the project.*” Crab Report, at page 5.

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We note, however, that even under the Corps' preferred alternative, maintenance dredge spoils will be dumped in the deep water site after year 20.

27. The Corps notes that "the only potential direct effects to crab habitat are from dredging the channel in the estuary, and from use of the estuarine flowlane disposal areas . . . and the DWS. . . ." Crab Report, at page 8. The effects to crabs of any shift to flowlane disposal have not been adequately addressed in the FSEIS.
28. The Corps admits that its conceptual model was designed to address ESA-related questions, and may not be adequate to address non-ESA species and habitats. See Crab Report, at page 8 n.2 ("Because the model was developed to review impacts to salmon, there may be some components of the ecosystem that the model does not address. . . ."). Despite the Corps' contention that the conceptual model "provides the best available information regarding the lower Columbia River ecosystem and potential effects of the project" (id.), this admission demonstrates that the Corps is not in possession of information that allows it to predict Project effects on non-ESA species with any degree of reliability. In addition, the Battelle Study, which is incorporated in the Crab Report, specifically notes that "an understanding of the ways in which Dungeness crab use the estuary and how that use may or may not expose them to dredging activity is needed." Crab Report, at page 30. The Battelle Study goes on to note the lack of "appropriate site-specific data to evaluate the applicability of the Grays Harbor entrainment function," as well as "data on crab density by size class and season." Id. at page 33. Thus, all Corps consultants agree that current Dungeness crab use of the Project area is poorly understood and that further study is required in order to come to credible conclusions about the Project's likely effects on crab habitat.
29. Thus far, the Corps' efforts to obtain additional information about entrainment rates in the Columbia River have been lacking. The Crab Report's entrainment rates are based on sampling "conducted during the summer months of a single year," where low numbers of 0+ crabs are attributed to the consultant's failure to sample in "May and early June when large numbers of the 0+ crab enter the lower estuary." Crab Report, at page 54. The Corps has had years to institute studies that investigate critical stages of the crab life cycle, but they have failed to undertake the appropriate studies. This failure should not provide an excuse to

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allow the Corps to proceed with dredging in the absence of reliable information about the Project's impacts on Dungeness crabs.

30. The Corps' Crab Report includes a study entitled "Estimated Entrainment of Dungeness Crab During Dredging for the Columbia River Channel Improvement Project." See Crab Report, at page 16 et seq. [hereinafter "Entrainment Study"]. The Entrainment Study includes a disclaimer providing that the none of the preparers or their employers make "any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed. . . ." Id. at page 17. This disclaimer must call into question the Corps' reliance on the Entrainment Study's findings.
31. CRANE reiterates its previous comments that the Corps has not adequately analyzed the Project's compliance with Critical Areas Ordinances ("CAOs"), particularly with regard to Vancouver CAOs. See generally FSEIS, Exhibit K-8, Consistency with Critical Areas Ordinances Including Wetland Mitigation Plan [hereinafter, "Critical Areas Report"]. The Critical Areas Report, like other sections of the FSEIS discussed above, is unduly dismissive of the Project's likely impact on Sandhill Cranes and their habitat. See Critical Area Report, at page 10. Although Vancouver's Habitat Ordinance is not yet finalized, the ordinance is scheduled for adoption in 2003. This ordinance will likely incorporate WDFW management recommendations for State-designated priority habitats and species, including the management recommendations in the Sandhill Recovery Plan; as a result, the Sandhill Recovery Plan and its management recommendations should be considered in the Corps' review of relevant CAO provisions. The Sandhill Recovery Plan makes clear that dredge spoil disposal and development of the Gateway properties presents a serious threat to Sandhill Crane survival (Sandhill Recovery Plan, at page 21); the Corps' listing of other nearby sites where Sandhill Cranes may be sighted does not undermine the particular importance of the Gateway habitat. The Corps has not, as requested by the U.S. EPA's comments, demonstrated that "habitat preservation activities at other locations in the project area will be sufficient for" Sandhill Cranes (see Response to Comments, at page Federal-6), but has merely asserted without substantiation that habitat

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enhancement at Woodland Bottoms will be more than adequate to compensate for habitat losses at the Gateway site.

32. Elevations reported throughout the Critical Areas Report have been changed from the ranges of MSL reported in the DSEIS to the mean CRDs employed in the FSEIS. See generally Critical Areas Report. This change obscures existing differentials in elevation, replacing that measurement with a near meaningless average.
33. The Corps notes that “[f]lowlane disposal sites are not specifically designated because they vary according to the condition of the channel and the techniques used by the contractor selected to perform the work.” Shoreline Consistency Report, at page 4. This indeterminacy means that it is impossible to accurately assess the likely impacts of flowlane disposal, including the likely impacts on Dungeness crab and smelt habitat. Increased reliance on flowlane disposal, therefore, leads to increased uncertainty about the Project’s impacts on the Columbia River and its already damaged estuary.
34. CRANE continues to disagree with the Corps’ conclusion that the restoration actions will “restore and improve the habitat of native species found in the lower Columbia River ecosystem.” See Shoreline Consistency Report, at page 5. CRANE’s previous comments on the proposed restoration actions and the Project’s consistency with local shoreline programs are discussed in detail in the DSEIS Comments and Water Quality and CZMA Comments and are incorporated by this reference. As noted by the State of Oregon, neither the Lois Island nor the Miller Sands “restoration” projects actually restore the Columbia River to desired spruce and tidal marsh conditions. Both projects occur adjacent to islands created by dredge spoils and neither project is likely to recreate natural estuary conditions that pre-date anthropogenic modifications of the estuary. Instead, the projects are likely to create additional mud flats, which are abundant in the estuary. Response to Comments, at page State-8.
35. The Corps argues that “the resale of dredged materials from the Skamokawa site is of material that does not naturally occur at that site and may not constitute mining.” Shoreline Consistency Report, at page 13. See also Shoreline

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Consistency Report, at page 46 (reaching same conclusion for Cowlitz County sites). We agree with the opinion of the Ecology (see Response to Comments, at page State-51) that these activities clearly come under the rubric of mining, and are therefore subject to all related rules and regulations, including preparation of a reclamation plan. Compare Shoreline Consistency Report, at page 23 (“The Skamokawa resale site is not a mining site that will need to be reclaimed. Therefore, no reclamation plan should be necessary.”). Likewise, we agree with the Ecology’s determination that the resale of sand at the Port of Skamokawa 2 is a commercial activity, and must be conducted consistently with the State’s commercial resale provisions. See Shoreline Consistency Report, at page 14.

36. The Shoreline Consistency Report incorrectly notes that “[n]one of the disposal in Wahkiakum County has been substituted for ocean disposal.” Shoreline Consistency Report, at page 21. In fact, flowlane disposal will occur within Wahkiakum County, and that additional flowlane disposal will compensate for the delayed use of the ocean disposal site. See, e.g., FSEIS, at page 4-8, Table S4-2.
37. The Corps improperly segments the disposal of sand from later resale actions, even though its disposal plan is contingent upon such resale to provide sufficient capacity to receive projected dredge spoil volumes. See Shoreline Consistency Report, at pages 32 (listing resale activities as “not part of the Project”), 42 (planning for dumping of sand at the Reynolds Aluminum Plant and Port of Longview/International paper sites at volumes significantly in excess of capacity based upon anticipated resale).
38. The Corps concludes that the Project complies with fish and wildlife habitat standards set forth in the Vancouver Shoreline Management Master Plan (“VSMMP”). See Shoreline Consistency Report, at page 64. As noted above in Section II(A)(31), the FSEIS does not demonstrate that “proposed mitigation exceeds that required under local critical areas ordinances,” and understates a number of significant likely impacts to habitat.
39. CRANE renews its objection to the Corps’ plans to dump dredge spoils on the Gateway site. Although the Corps states that “[t]he site avoids wetlands and their buffers” (Shoreline Consistency Report, at page 67), the inevitable and

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interconnected spreading of dredge spoils throughout the Gateway property will directly affect those wetlands and their buffers, and should be analyzed in the FSEIS for its consistency with the VSMMP, among other relevant regulations. The inevitability of this development is especially apparent given the Corps' contention that dumping of dredge spoils on the Gateway property does not constitute speculative fill. See Shoreline Consistency Report, at page 69.

40. The Corps' response to VSMMP Policy 80 fails to "assess the overall value of the landfill site in its present state versus the proposed shoreline use to be created," when in fact the existing value of the Gateway property is extremely high for wildlife habitat. See Shoreline Consistency Report, at page 67.
41. The Channel Deepening will contribute to the cumulative effects of the Federal Columbia River Power System ("FCRPS"), MCR maintenance and channel maintenance in depriving the Columbia River estuary of sediment. The Corps wrongly concludes that the Project has no effect on the export of sediment to the MCR. FSEIS, at page 6-73. Because of these combined effects, the estuary has become a sediment sink that captures sediment instead of supplying sediment to the Columbia River littoral cell. See Southwest Washington Coastal Erosion Study, <<http://www.csc.noaa.gov/beachmap/html/study.html>> (accessed 2/25/03) (attached as Exhibit 6) [hereinafter "Coastal Erosion Study"]; see also Response to Comments, Comments of the Washington State Department of Ecology, at pages State-40, 44, 46; Response to Comments, Comments from the State of Oregon, at page State-24. This change in the natural processes at the mouth of the Columbia River has caused coastal erosion incidents in southwest Washington where coastal accretion once prevailed because of sediment supplied by the Columbia River. See Coastal Erosion Study.

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**B. The Corps' economic analysis fails to follow either general economic principles or the guidelines developed by the Corps itself and is sufficiently flawed that the Corps has likely overstated Project benefits.**

The Corps' economic analysis continues to ignore likely Project costs and overestimate its benefits. As detailed below, these flaws call into question the accuracy of the Corps' economic predictions.

- 1. The FSEIS fails to apply sound principles of economic analysis to comply with the Corps' obligation to determine the Project's impacts on the national economy.** In order to determine that the Project is economically justifiable, the Corps must demonstrate, with reasonable certainty, that the Project, if implemented, would produce beneficial effects in the National Economic Development ("NED") account. "Beneficial effects in the NED account are increases in the economic value of the national output of goods and services. . . ." U.S. Water Resources Council, "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies," at page 8 (Mar. 1983) [hereinafter "Guidelines for Implementation Studies"].

As discussed in detail below, the FSEIS fails to demonstrate that the proposed Project would yield such increases. Indeed, the Corps emphatically states that the U.S. economy will not change an iota as a result of the Project. Compared to the without-Project scenario, the same foreign-owned ships will call Columbia River ports and each will carry the same amount of cargo from these ports. Shippers will not, in response to the Project, alter their production levels or their shipping patterns. The Corps develops an estimate of transportation-cost savings that would be realized from the Project for the foreign-owned owners of the ocean-transport vessels, then calls this estimate into question by stating that, with the Project, the same ships would carry the same cargo as they would without it. Moreover, the Corps never attempts to quantify the amount of the savings passed from foreign vessel owners to U.S. shippers. Hence, it is impossible to determine from the FSEIS the extent to which the Project would generate increases in the economic value of the national output of goods and services.

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Ignoring requests that it measure the Project's actual economic benefits to the national economy, the Corps steadfastly has asserted that it needs to show only that, under some circumstances, vessel owners—all of whom are foreign—would realize cost savings from carrying products shipped through Columbia River ports. Then, the Corps conducts the remainder of its analysis assuming that cost savings will not materialize, apparently in an effort to avoid having to examine the Project's spillover effects on other ports and elsewhere in the economy. The Corps presents data showing that vessels often leave port with loads lighter than those that would take full advantage of the existing channel, indicating that factors unrelated to channel depth often constrain loads, but the Corps nonetheless asserts that these constraints would be relaxed if the channel were deepened.

In short, the Corps asserts in the FSEIS that the full cost-savings that foreign vessel owners would realize under a special set of circumstances should be counted as an increase in the economic value of the national output of goods and services, even though it never demonstrates the probability that these circumstances would materialize or that the Project would have any impact at all on this value. To reach its conclusions, the FSEIS arbitrarily disregards fundamental principles of economic analysis as well as the Corps' own economic-analysis manual, contradictory information regarding this project, and comments on the DSEIS that questioned its arbitrary approach to this set of issues. As a consequence, the FSEIS fails to satisfy the economic test related to the NED account.

- 2. The FSEIS arbitrarily disregards fundamental economic principles as well as the Corps' own economic analysis manuals.** The Corps has stated that the Columbia River ports operate within a "vigorous competitive environment." U.S. Army Corps of Engineers, "Corps of Engineers Response to Review Panel Comments," at page 7 (Jan. 13, 2003) [hereinafter "Response to Review Panel"]. In such an environment, the laws of economics tell us to expect sloping demand and supply curves. In a competitive market for transportation services, with sloping supply and demand curves, any reduction in transportation costs resulting from the Project should result in an increase in both the supply of and demand for

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transportation services. The Corps' own technical manual governing economic analyses explains how such a market should respond to the Channel Deepening Project:

Consider a navigation project that lowers the cost of transporting commodities by water. Deepening a coastal port or increasing capacity of a lock on the inland waterway could have this effect. In both cases, the result is a decrease in unit costs. . . . The result of the project would be to lower the costs of producing transportation services, thus shifting the supply curve to the right as shown. . . . An increase in total consumer and producer surplus results. . . . These are the project benefits. Producers and consumers realize increased surplus for the original tonnage moved as well as a surplus increase for the new tonnage moved. . . . For example, tonnage that could not move profitably at the price without the project, can now do so because of the increase in costs of providing the transportation service.

U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources, "National Economic Development Procedures Manual: Overview Manual for Conducting National Economic Development Analysis," IWR Report 91-R-11, at pages 31-32 (Oct. 1991) (attached as Exhibit 7) [hereinafter "NED Procedures Manual"]. Furthermore, the NED Procedures Manual provides that "[d]emand is the maximum quantity of a good or service people are willing and able to pay to purchase at various prices. The 'Law of Demand' states that, all other things equal, if the price of a good goes up, the quantity purchased will go down, and vice versa." NED Procedures Manual, at page 12.

Thus, if the project truly were to produce \$18,806,000 of annual transportation-cost savings in a vigorously competitive market, as the FSEIS asserts, vessel owners would respond by increasing the supply of their services to shippers, and shippers should increase the amount of goods they ship through the Columbia River ports. The Corps' analysis in the FSEIS, however, is built on the agency's contradictory assertion that there will be no such response. Vessel owners will not increase their supply of services. "[T]he same vessels with the same capacities and design drafts will call Portland with or without deepening." Response to

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Review Panel, at page 7. According to the Corps, demand will not vary with changes in shipping rates that materialize in response to the Project. Response to Review Panel, at page 3 (“The analysis does not assume that, if the channel is deepened, shippers will be more disposed to use Columbia River ports.”).

Nowhere does the FSEIS present any detailed economic analysis to back-up these assertions. It does not conduct a supply-demand analysis as outlined in the NED Procedures Manual. It does not apply the “Law of Demand” to analyze how price changes triggered by the Project would bring about a change in the behavior of any relevant party, and it further fails to trace these repercussions and their impacts on the NED account. It does not, for example, analyze the market for ocean transportation services at the Columbia River ports and estimate the elasticity of supply or the elasticity of demand for such services with respect to changes in price, then apply these to the changes in price that would result from the Project and develop quantitative estimates of how the market and the economy would be different with the Project than without it. Instead of conducting an analysis that compares the economy with the Project against what it would look like without it, the Corps assumes there would be no difference.

It similarly does not conduct a with-versus-without analysis of the market for ocean transportation services in the Pacific Northwest and along the West Coast. That is, it never estimates the sensitivity of this market to changes in transportation costs at the Columbia River ports that would result from the Project, and never develops quantitative estimates of how the Project would cause this market to be different.

In sum, by first proclaiming that the Project would be implemented in the context of vigorously competitive markets and estimating that the Project would generate substantial economic benefits, but then asserting that these benefits would not elicit any of the responses economic theory and the NED Procedures Manual say one should expect from the markets, the Corps has produced projections that can derive only from the Corps’ arbitrary assumptions that suspend generally accepted economic principles. The Corps’ analysis in the FSEIS violates some of the most basic of economic principles, and ignores its own technical manuals. Without a

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detailed market analysis justifying its assertions, the Corps' analysis is little, if anything, but arbitrary speculation.

- 3. The FSEIS arbitrarily disregards information from the Corps and the Project's local sponsors that contradicts its economic findings.** To reach its conclusions, the Corps must overlook contradictory information presented in the FSEIS and comments from others on the DSEIS.

Thus, when it assumes that the same ships will call Columbia River ports and carry the same cargo, the Corps disregards its own statements to the contrary. The agency itself acknowledges that a reduction in transportation costs for marine vessels would induce vessel owners to increase their sales of services to shippers in the Pacific Northwest, noting that "it seems unlikely that deepening the channel will have a negative impact on Portland service frequency, rather it seems more likely that a deeper channel will lead to improved service in Portland due to improved vessel operating efficiencies." See FSEIS, Exhibit M, Revised Economic Analysis, at page 41 [hereinafter "Revised Economic Analysis"]. In support of this conclusion, the Corps offers lessons from history. When the channel was last deepened, the total amount of cargo shipped from Columbia River ports tripled, even as the capacity of those vessels increased, so that the number of vessel calls per year fell slightly. Thus, the Corps looks backward and tells us that vessel owners are responsive to changes in channel depth, then looks forward and tells us that they will be similarly responsive in the future. The Corps nevertheless fails to explain why, amid all this responsiveness, the FSEIS concludes that "the same vessels with the same capacities and design drafts will call Portland with or without deepening." Response to Review Panel, at page 7.

More important, the Corps never calculates the impact that this conclusion, and the other similar conclusions described below have on its calculations of the Project's impact on the NED account. Consequently, its calculations stem more from arbitrary, unsubstantiated assumptions than from a detailed, theoretically sound economic analysis.

The FSEIS also disregards the implications of the information the Corps provides

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about the competitive nature of the market for transportation services in the Pacific Northwest. In such an environment, a reduction in costs and prices for ocean transportation services available at the Columbia River ports should induce shippers to divert to these ports cargo that otherwise would have gone through other ports. The FSEIS asserts that none of this will occur, and the arbitrariness of this assertion is discussed below in the section addressing multi-port issues.

The FSEIS also disregards comments from the Project's local sponsors and others regarding their perceptions of the Project's potential economic importance to the regional economy and their own operations. The Columbia River Channel Coalition of local sponsors and others in the region who support the Project strongly state their belief, and offer economic analyses that they claim support their position, that the economy will look substantially different with the Project than it would without it. See Columbia River Channel Coalition, "The Columbia River Channel Improvement Project," <<http://www.channeldeepening.com>> (accessed Feb. 18, 2003) ("The decision to deepen the Columbia River navigation channel will have a significant impact on the region's economy, jobs and the ability to conduct business in the global market. . . ."); Columbia River Channel Coalition, "Economics," <[http://www.channeldeepening.com/channel\\_economic.asp](http://www.channeldeepening.com/channel_economic.asp)> (accessed Feb. 18, 2003) ("Maintaining marine commerce by deepening the Columbia River Navigation Channel is critical to sustaining the region's trade-based economy."). Nonetheless, the Corps maintains in the FSEIS that the economy with the Project would be identical to what it would be without the Project.

In sum, the Corps has failed to explicitly address and reconcile significant, conflicting information in the FSEIS and to resolve the broad differences in expectations between itself and the local sponsors. This failure is indicative of the agency's failure to apply standard principles and tools of economic analysis to trace the Project's full, potential impacts on the economy and then sum these impacts to discern the costs and benefits for the NED account.

- 4. The FSEIS summarily disregards comments on the DSEIS that questioned its arbitrary analytical approach.** During review of the DSEIS, both Ernie Niemi of

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ECONorthwest and the Corps' own Technical Review Panel explicitly raised questions about the Corps' failure to describe the sensitivity of different markets to the Project, trace the economy's response to it, and calculate the resulting costs and benefits. The FSEIS disregards these comments rather than providing a substantive response to them.

A reduction in prices for ocean-transportation services should induce shippers to increase their output and shipments to foreign customers, consistent with the "Law of Demand" described in the NED Procedures Manual. Although such a response might not materialize under unusual market conditions, this response must be expected in the "vigorous competitive environment" that the Corps says exists in the hinterland to the Columbia River ports. The Corps' NED Procedures Manual demonstrates, with graphic illustrations, how this response should occur. Thus, if the Project generates reductions in transportation costs for marine vessels and the owners of these vessels pass the savings to shippers in the Pacific Northwest, then the economic principles outlined in the NED Procedures Manual dictate that the Corps should anticipate that the shippers would respond by increasing their output and shipments.

- The Corps ignores issues raised in the Niemi Report regarding cost savings to foreign vessel owners. The FSEIS concedes that shippers would enjoy some savings associated with the Project. We have commented that ambiguities in the DSEIS left open the possibility that all the cost savings would remain with foreign vessel owners. The Corps responded that "[t]he assertion that all cost reductions would automatically go to vessel owners is inconsistent with market realities." See Response to Comments, at page Stakeholders/Special Interests-108. Hence, the Corps apparently believes that shippers would, in fact, receive some of the \$18,806,000 of estimated annual transportation-cost savings resulting from the Project.

But the Corps disregarded the linkage between its response to this comment and its response, or lack of response, to other, related comments. Extensive comments raised by Ernie Niemi in a critique of the DSEIS pointed out the importance of knowing just how much of the transportation-cost savings would

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be passed to U.S. shippers, rather than remaining with vessel owners or, alternatively, being passed to the foreign purchasers of the products being shipped from the U.S. See ECONorthwest, "Ambiguities and Errors in the Corps of Engineers' Economic Analysis of its Proposal to Deepen the Channel of the Lower Columbia River" (Sept. 2002) [hereinafter the "Niemi Report"]. The FSEIS, however, offers no response to this comment, i.e., it offers no quantitative estimate of the savings enjoyed by U.S. shippers. This failure indicates that the Corps has not even calculated the amount of transportation-cost savings realized by U.S. shippers and has not traced the Project's impacts on affected markets. Thus, in one place the Corps asserts that it knows that "market realities" mean the foreign vessel owners will share with U.S. shippers the transportation-cost savings resulting from the Project, but then it is unable to demonstrate that it has estimated the extent of the sharing.

The Niemi Report also explained why knowing the amount of savings passed to U.S. shippers and their response can have important implications for the outcome of the Corps' economic analysis. Agricultural products constitute most of the cargo associated with the purported transportation-cost savings that would result from the Project (all of the bulk cargo and most of the containerized cargo). The Niemi Report offered data from the U.S. Department of Agriculture showing that the prices farmers receive for agricultural products shipped through the Columbia River ports are less than their production costs. For example, every ton of wheat represents a net loss of \$50. This loss, in turn, constitutes a net reduction in the economic value of the national output of goods and services, and a reduction in the NED account.

Thus, economic principles indicate that any transportation-cost savings passed to U.S. shippers should induce them to increase output and, for most of the products shipped through the Columbia River ports, this increased output would cost more to produce than it is worth. The Corps' NED Procedures Manual makes it clear that such outcomes should be considered a direct consequence of the Project and, hence, these NED reductions should be recognized in the FSEIS among the Project's costs.

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- The Corps' responses to the Niemi Report's comments further illustrate its arbitrary disregard not only for the comments but for the underlying issues and economic principles. The Corps responds that "Niemi incorrectly states that the Corps has assumed that channel improvement will have a stimulus effect on grain exports." See Response to Comments, at page Stakeholders/Special Interests-108. This response misrepresents the comment in the Niemi Report, which did not say the Corps had assumed such a stimulus but instead observed that the Corps had not analyzed the issue. See Niemi Report, at page 12 ("The DSEIS offers no explanation of these costs or of the related, national economic impacts that would accompany the channel-deepening-project's stimulus to grain exports."). This criticism remains true. The Corps has conceded that shippers, including grain producers, will share the ocean transportation-cost savings stemming from the Project. The Corps' NED Procedures Manual describes the economic principles that indicate such savings should stimulate additional grain production. The Niemi Report offers evidence indicating that the additional grain production would reduce the NED account. Despite the weight of this evidence, the FSEIS still provides no explanation of the related costs and impacts on the national economy.
- The Corps refuses to analyze the effects of agricultural subsidies on the cost-benefit analysis, which are certain to impact the NED account. The Corps responds that "Niemi's suggestion that the Corps should perform an analysis on U.S. agricultural policies is inconsistent with Corps policy." See Response to Comments, at page Stakeholders/Special Interests-108. In addition, the Corps responds that "[t]he issue of agricultural subsidies and the impact of such subsidies are far outside the scope of this analysis. This issues would need to be addressed to Congress for consideration." Id., at page Stakeholders/Special Interests-111. These responses misrepresent and disregard the actual comments in the Niemi Report, which does not ask the Corps to comment on agricultural subsidies. Instead, the Niemi Report describes conditions under which the proposed Project could directly cause a reduction in the economic value of the national output of goods and services—the NED account—by stimulating additional production of agricultural products that are worth less than they cost to produce. That the production of these products also is

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influenced by agricultural subsidies is immaterial to the Corps' obligation to consider the Project's impacts. If the Project directly would result in a reduction in the NED account, then the Corps' should measure it and include it in the economic analysis. The Corps' analysis already considers costs associated with the Project's impacts on other subsidized goods and services, such as diesel fuel and the contributions to the Project from subsidized local ports (see FSEIS, Exhibit L, Revised Cost Estimate Summary, at page 7); its decision to ignore costs associated with the Project's impacts on agricultural products is arbitrary.

In sum, the Niemi Report identified ambiguities in the Corps' reasoning regarding these questions: (1) What is the anticipated distribution of the transportation-cost savings stemming from the Project, and what portion of the estimated transportation-cost savings resulting from the Project will be enjoyed by U.S. shippers? (2) To what extent will U.S. shippers respond to these savings by increasing output? (3) What will be the impacts on other ports and related facilities?<sup>1</sup> (4) If the Corps continues to maintain that the savings will trigger a zero increase in output, what are the economic conditions that will keep the vigorously competitive market from increasing output, as predicted by generally accepted economic principles? (5) If, as the Corps asserts, the Project will induce zero change in the behavior of shippers and vessel owners, then how can it produce a real increase in the value of the goods and services produced by the national economy and a net benefit for the NED account? and (6) If the Corps concedes that the savings will directly trigger a non-zero increase in output, what will be the NED impacts? The Corps, in the FSEIS, has failed to answer these questions.

- The Corps fails to respond to critical issues raised by the Benefit Panel. The Benefit Panel of the Technical Review Panel ("Benefit Panel") also raised questions about internal inconsistencies in the Corps' analysis of the effects on

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<sup>1</sup> Questions about the impacts on diversions of cargo from other ports are addressed below in Section II(B)(5).

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supply and demand stemming from the transportation-cost savings resulting from the proposed project. See generally Original Review Panel Comments and Benefit Review Team Opinions on Responses (Jan. 10, 2003) [hereinafter “Benefit Panel Comments”]. On the supply side of the market, for example, the Benefit Panel Comments point out the inconsistency in the Corps’ argument that the same number of ships would call Columbia River ports, even though the total amount of cargo would remain unchanged and the deeper channel would allow each ship to carry a larger load. “The revised analysis actually appears self-contradictory. . . . Since the analysis assumes no cargo growth, it is *necessary* to reduce frequency to obtain the benefits of scale economies and greater vessel utilization.” Benefit Panel Comments, at page 9 (emphasis in original).

In other words, the Benefit Panel was saying that, if, with the completion of the Project, the same ships would carry the same amount of cargo then the Project cannot reduce the costs of transporting the cargo. If it does not reduce the costs of transporting the cargo, the Project would not yield the economic benefits estimated by the Corps. The Project can produce benefits in only two ways: either a larger amount of cargo can be shipped on the same ships, which will be more heavily laden in the deeper channel, or the same amount of cargo can be shipped on a smaller number of ships, which will be more heavily laden in the deeper channel. Loading the same amount of cargo on the same ships, as the Corps assumes in its analysis, cannot yield economic benefits.

Nowhere in the FSEIS does the Corps come to grips with this “necessary” condition for the Corps to demonstrate that the Project will produce economic benefits. In its direct response to the Benefit Panel Comments, the Corps diverts attention from and, in the end, disregards the Benefit Panel’s concern by talking about related, though distinct issues. For example, the FSEIS addresses capacity constraints and vessel utilization: “Capacity. Some shippers are unable to ship their product through Portland due to capacity constraints. . . . This results in a high level of vessel utilization for carriers that choose to call Portland.” Response to Review Panel, at page 5. This analysis does not explain how a deeper channel would reduce the transportation costs of the

same ships carrying the same cargo. Indeed, the Corps' statement about capacity constraints reinforces the Corps' self-contradictory statements on this issue. If shippers cannot now ship through the Columbia River ports because of current capacity constraints, and if the Project would ease the constraints, then more cargo should flow. The FSEIS, however, arbitrarily forecloses this possibility.

5. **The FSEIS arbitrarily overlooks potential economic costs resulting from the proposed Project's impacts on other U.S. ports and related facilities.** The DSEIS failed to calculate the Project's impacts on other ports, instead asserting that the Project would stimulate no change in the flow of cargo to other ports or in the economic value of the national output of goods and services they produce. In response to the DSEIS, the Corps received comments urging it to correct this omission.

- “[T]he Corps has ventured into multi-port issues by considering Portland’s capture (from Tacoma) and benefits to non-Portland cargo (mostly from Tacoma). Moreover, the Corps has assumed there would be no cargo growth in large part to avoid a multi-port analysis, and that assumption leads to an inescapable analytic dilemma. . . .” Benefit Panel Comments, at page 3.
- “Although apparently reasonable at the time, the absence of a multi-port analysis is no longer reasonable in light of recent information.” Benefit Panel Comments, at page 2.
- “The document does not offer a multi-port, economic analysis of the project that explicitly traces how the project would affect the dynamics of the competition between the Port of Portland and its competitors.” Niemi Report, at page 40.

The FSEIS also does not contain a detailed, multi-port analysis. Hence, it provides a seriously incomplete picture of the Project's potential impacts on the NED account. Because the Corps has failed to demonstrate that it has fully analyzed all the Project's potential impacts, one cannot have confidence in the Corps' conclusion that the economic benefits of the proposed Project outweigh its costs.

Indeed, in the absence of a multi-port analysis, the available evidence supports the presumption that the reverse is true: the Project's costs outweigh the benefits and implementing the Project would diminish the NED account. The Corps' explanation for its failure to conduct a multi-port analysis is (a) based on faulty economic reasoning, (b) contradicted by evidence provided in the FSEIS, (c) inconsistent with the Corps' economic analysis manual, and (d) disregards or misconstrues comments on the DSEIS regarding this issue.<sup>2</sup>

- 6. The Corps' failure to conduct a multi-port analysis is based on faulty economic reasoning and contradicted by evidence provided in the FSEIS.** The most thorough explanation of the Corps' reasoning for failing to conduct a multi-port analysis is offered not in the FSEIS but in the Corps' Response to Review Panel. In this document, the Corps asserts that a multi-port analysis is not needed because if it were conducted it would produce an estimate of the Project's benefits that is even higher than the estimate in the FSEIS: "[W]e would like to argue that a multi-port analysis would inevitably result in higher project benefits as compared to the current method of analysis." Response to Review Panel, at page 1.

The Corps' reasoning in support of this assertion, however, is more sleight-of-hand than economic analysis. A retracing of its argument reveals that the Corps has provided misleading information and made arbitrary decisions that are inappropriate, given the significance of the Project's potential negative impacts on

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<sup>2</sup> In its discussions with the Benefit Panel, the Corps apparently revealed that the term, "multi-port analysis," has a specific meaning within the Corps' regulations. The Benefit Panel later clarified that it was not talking about these technical requirements of the Corps' regulations, but the analytical principle of looking at the Project's full ramifications. In economics jargon, the concern is that the Corps conducted only a partial-equilibrium analysis that drew a line around the Columbia River ports, froze the ships calling them and the cargo flowing through them, and then conducted a limited economic analysis within this line. In doing so, the Corps arbitrarily rejected the alternative of conducting a broader, more general equilibrium analysis, taking into account the Project's impacts on vessel owners, shippers, agricultural producers, other ports, and so forth. These comments use the term "multi-port analysis" in the same manner as the Benefit Review Panel intended: namely, as shorthand to refer to the Corps' failure to conduct this broader analysis.

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other ports, related facilities, and others, and given the agency's obligation to provide a clear, thorough analysis of these impacts.

The Corps observes that “[t]here are two primary components of multi-port analysis: cargo volumes and transportation costs.” Response to Review Panel, at page 1. It then argues that its estimates of cargo volumes flowing through the Columbia River ports following the Project's completion is conservative and, hence, any increase in volumes would increase the Project's benefits. In other words, the Corps sees any increase in cargo flowing through the Columbia River ports solely as an economic benefit.

Such reasoning misses the point of a multi-port analysis. In a true multi-port analysis, the Corps would not stop after estimating the economic benefits that might materialize in the Columbia River area if the Project attracted to this area cargo that otherwise would have been exported from Puget Sound ports. Instead, it also would recognize that these benefits might materialize only because the shift imposes costs on the Puget Sound ports and other U.S. transportation facilities. The net effect would be determined only through an empirical analysis that compares the benefits and costs on a multi-port scale. The Corps fails to conduct any empirical analysis, or even to consider the potential costs the project might impose on other ports and related facilities.

The Corps instead says the costs never will materialize, because the Project would not induce shippers to send cargo to Columbia River ports rather than to Puget Sound ports. The Corps offers no analysis of the kind required to support this conclusion, such as estimates of changes in prices resulting from the Project or estimates of the sensitivity of different parties—shippers, vessel owners, other ports, etc.—to changes in these prices.

To substantiate its assertion that there will be no diversions from other ports, the Corps offers two, separate, non-quantitative explanations. On the one hand, the Corps says the Project would not cause cargo to be diverted from Puget Sound ports because the reduction in ocean transportation rates brought about by the Project would be insufficient to outweigh the higher inland transportation costs of

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shipping cargo to Puget Sound rather than to Portland. See Response to Review Panel, at page 2 (“The difference in inland costs to and from the two port areas is so great that it far exceeds any reasonable estimate of vessel operating cost differences between the two areas. It is clear that, if a multi-port analysis showed any difference in volumes between the with-project and the without-project conditions, the benefits of the project could only increase relative to the current analysis.”).

This argument fails, however, because the Corps’ data on inland transportation costs are irrelevant and its underlying reasoning is specious. The Corps mixes apples and oranges when it compares the difference between relative inland transportation costs of shipping containerized cargo in the Puget Sound and Portland markets, and concludes that this difference is larger than the total ocean transportation cost. The data on inland transportation costs measure the *average* for all cargo shipped from a give sub-region of Portland’s hinterland to the two ports. To understand the Project’s impacts on shipping patterns, one must consider the *marginal* differences in inland transportation costs for individual shippers, and how these would be different, with- vs. without-the-Project. Even though, on average, it is cheaper for shippers in Portland’s hinterland to ship cargo to Portland, the marginal costs go the other direction for a considerable number of shippers and a large portion of the cargo. At some economic borderline between the two areas, the marginal costs are the same for shipping to Portland or to Puget Sound, and it is near this line that the two areas compete for cargo. The Corps presents a graph showing that, in 2000, almost 40 percent of the containerized cargo generated in Portland’s hinterland was exported through Puget Sound. See Response to Review Panel, at page 3.

Furthermore, the Corps concedes that shippers’ decisions are sensitive to changes in the sum of ocean rates plus inland rates. “For much of the agricultural and forestry products exports, the lowest total rate (inland+ocean) will dictate the route of choice.” Response to Review Panel, at page 4. If inland rates do not change—and the Corps offers no evidence that they would change in response to the Project—then *at the margin* shippers’ decisions must be sensitive to changes in ocean rates alone. The Corps estimates that the Project would lower ocean rates

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for containers shipped through the Columbia River ports by at least 17 percent. See Revised Economic Analysis, at page 37 (“By 2008, . . . [p]er ton transportation costs shift from \$14.30 to \$11.83, a transportation cost savings of \$2.48 per short ton.”). Regardless of the average inland transportation costs, if they remain unchanged by the Project, then this reduction in ocean transportation costs on the Columbia River represents a marginal change in the total shipping costs and, hence, should induce shippers near the inter-port economic boundary to divert their cargo away from Puget Sound.

The Corps never conducts this marginal economic analysis nor does it describe its implications for the NED account. Consequently, its first explanation for its assumption that the Project would have no inter-port impacts has no substance.

Instead, the Corps brushes everything aside with its second explanation, an assertion that, as the Project lowers ocean transportation rates on the Columbia River it also would cause them to fall the same in Puget Sound. Hence, shippers would not see any change in the differential in the total (= inland + ocean) shipping rates and shippers would not change their preferences for Portland over Puget Sound. See Response to Review Panel, at pages 4, 5 (“It is expected that carriers in the Puget Sound will continue to be rate-competitive with Portland carriers.”); (“If there were a competitive response in the Puget Sound, it would likely occur within the realm of carrier rate competition, and would not constitute are [sic] real cost change.”).

Elsewhere, however, the Corps totally undermines the validity of this expectation. In response to a comment on the DSEIS raising the possibility that vessel owners calling Columbia River ports would keep for themselves the costs savings resulting from the Project, so that U.S. shippers would see none of the benefits, the Corps responded that such an outcome is precluded by “market realities” that leave owners of vessels in Puget Sound unable to lower their prices to offset any lowering of prices in the Columbia River. See Response to Comments, at pages Stakeholders/Special Interests-108 (“In general, the container shipping industry is in a state of over-capacity, and U.S. exports are outnumbered by imports to such an extent as to lead to extremely marginal export rates. Rates are so low that

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shippers are concerned about the viability of continued service.”); Stakeholders/Special Interests-111 (“[C]ontainer vessel owners are currently receiving extremely low margins, and westbound rates are so low that analysts are unsure that rates could possibly go lower.”).

In sum, the Corps has not offered a coherent chain of credible evidence to support its claims that (1) the Project would not divert cargo away from Puget Sound and other ports, and (2) if cargo were diverted, the Project’s benefits would be even greater than those the Corps has estimated in the FSEIS. Instead, the Corps has built its case on irrelevant data, and a self-contradictory line of reasoning that crumbles under scrutiny.

Thus, it seems reasonable to anticipate that the Project would result in cargo being diverted from Puget Sound and other ports, creating economic costs for them as it generates economic benefits in the Columbia River area. These costs would include, for example, the stranding of equipment and facilities at these ports, leaving them unused and reducing the value of the goods and services associated with them. Such reductions should be shown as costs in the NED account, but the accounting in the FSEIS shows no entry for them. Neither the Corps nor anyone else can judge the Project’s overall impact on the national economy absent an investigation of these costs. The Corps has not presented in the FSEIS the results from such an investigation and, hence, it has reached its economic conclusions based on its arbitrary assumption that these costs do not matter.

- 7. The Corps’ failure to conduct a multi-port analysis is inconsistent with guidance documents produced by the agency, including its NED Procedures Manual.** The Corps is obligated to proceed with the Project only if it can demonstrate that it will increase the economic value of the national output of goods and services, consistent with protecting the nation’s environment, and pursuant to national environmental statutes, applicable executive orders, and other federal planning requirements. Federal law provides that “[i]n the case of any water resources project-related study authorized to be undertaken by the Secretary, the Secretary shall prepare a feasibility report . . . . Such feasibility report shall describe, *with reasonable certainty*, the economic, environmental, and social

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benefits and detriments of the recommended plan and alternative plans considered by the Secretary. . . .” 33 U.S.C. § 2282(a) (emphasis added).

The Corps has produced numerous documents providing commentary, analysis, and guidance regarding this obligation. Comparing the FSEIS to these documents reveals that, by the agency’s own yardsticks, the Corps has not met its obligation.

The Corps has in recent years recognized the reality that port-expansion projects in one place can impose costs on other ports, with an overall negative impact on the national economy.

- An analysis of dredging needs of the nation’s ports, prepared for the Corps’ Institute for Water Resources observed, “Planned terminal development in North America is currently 10.2 million TEUs, while growth in TEU traffic through 2005 is forecast at 7.8 million.” See Planning and Management Consultants, Ltd., “The National Dredging Needs Study of Ports and Harbors: Implications to Cost-Sharing of Federal Deep Draft Navigation Projects Due to Changes in the Maritime Industry,” at page 9 (May 2000) (internal citations omitted) (prepared for the U.S. Army Corps of Engineers, Institute for Water Resources).
- Port managers have warned that expanding the scope of the Corps’ nationwide channel deepening projects to more ports will, eventually, lead to negative economic returns on the taxpayer’s investment. This conclusion was reinforced in 1998 by the Corps’ Institute for Water Resources, which stated that, “[t]axpayers are paying for competing ports to expand their services, resulting in duplicative services offered within a geographic region.” See Michael Grunwald, “A Race to the Bottom,” Washington Post (Sept. 12, 2000) <<http://www.washingtonpost.com>> (accessed Sept. 12, 2000).
- “Navigation improvement for channels and harbors are often extremely successful for regional development. . . . If the increased activity is simply a transfer from another harbor, . . . there is no real benefit to the nation. The multiport emphasis in navigation project analysis arises largely from this concern that projects could do nothing but continuously reslice the same pie

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instead of increasing the size of the pie, if careful planning and analysis are not used.” NED Manual, at page 67 (internal citations omitted).

The FSEIS makes it clear that the Portland District of the Corps believes the proposed project will *not* increase the size of the pie. The Corps’ analysis is built on the assumptions that, with or without the Project, the same ships will make the same calls at Columbia River ports and provide the same services to shippers, who will ship the same goods. If the Project will, in fact, leave the pie unchanged, as the Corps asserts, the NED Procedures Manual requires that the agency demonstrate convincingly that the Project will do something other than merely reslice the pie, leaving the national economy worse off. The FSEIS has not satisfied this obligation. Rather than providing a multi-port analysis, or some substitute that constitutes “careful planning and analysis,” as demanded by the NED Procedures Manual, the Corps arbitrarily disregards the NED Procedures Manual’s requirements. In its place, the Corps substitutes an ad hoc, ex post cobbling together of irrelevant data and a line of reasoning that is contradicted by economic theory, comments and evidence offered in response to the DSEIS, and evidence contained in the FSEIS itself.

8. **The FSEIS also fails to follow Corps guidance requiring it to address the Project’s potential economic externalities, i.e., impacts on other ports and their derivative facilities.** The NED Procedures Manual makes it clear that the Corps is obligated to give full consideration to the Project’s spillover effects on others: “Many activities provide incidental benefits for people for whom they were not intended. Other activities indiscriminately impose incidental costs on others. These effects are called externalities. . . . Negative externalities make someone worse off without that person being compensated for the negative effect. . . . *The NED principle requires that externalities be accounted for in order to assure efficient allocation of resources.*” NED Procedures Manual, at pages 21-23 (emphasis added). Thus, the Project’s potential spillover effects on Puget Sound ports and other facilities constitute externalities for which the NED principle requires full accounting. The FSEIS fails to meet this requirement.

Yet another perspective comes from comparing the certainty with which the Portland District of the Corps has asserted that this Project will have no multi-port

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effects with the larger agency's clear skepticism for such a position. "In recent years Corps' analysts have more and more recognized that U.S. export and import activity is a very competitive business. Commodity increases at one port often come at the cost of commodity decreases at another port. Market shares are constantly changing. *This fact cannot be denied in a complete analysis.*" U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources, "Guidelines for Risk and Uncertainty Analysis in Water Resources Planning," IWR Report 92-R-1, at page 38 (Mar. 1992) (emphasis added) (attached as Exhibit 8) [hereinafter "Guidelines for Risk and Uncertainty"]. The Portland District of the Corps denies this fact, however, making assertions that reject even the possibility that the Project will exert any influence whatsoever on inter-port competition. See Response to Review Panel, at pages 3, 7.

Contrary to guidance from its manuals, the FSEIS fails to offer an appropriate economic analysis of the Project's marginal impacts and its potential negative externalities on Puget Sound ports, transportation facilities derivative to them, or others. Nowhere does the FSEIS trace the market power of shippers, foreign vessel owners and foreign purchasers of U.S. products shipped through Columbia River ports and, hence, the FSEIS offers no estimate of the extent to which transportation cost savings resulting from the Project will be shared among these groups. Nowhere does the FSEIS quantify the sensitivity of shippers' production and shipping decisions to their expected share of the transportation cost savings. Nowhere does the FSEIS trace the negative externalities, i.e., economic costs that would materialize if the shippers, in response to the Project, diverted cargo to Columbia River ports. Nowhere does the FSEIS analyze other potential externalities that reasonably should be expected to materialize from the Project's impacts on other components of the transportation system.

- 9. The Corps' failure to conduct a multi-port analysis is based on a disregard for and misconstruction of comments on the DSEIS regarding the necessity of conducting a multi-port analysis.** The Corps' arguments for not conducting a multi-port analysis arbitrarily ignore issues and approaches raised in comments on the DSEIS. Specifically, the Corps merely restates the Benefit Panel's opinion that "[a]lthough apparently reasonable at the time, the absence of a multi-port

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analysis is no longer reasonable in light of recent information.” Response to Review Panel, at page 3.

However, the Benefit Panel expanded its comment by describing the analytical dilemma the Corps had created by assuming that the proposed Project would not alter either the ships calling Columbia River ports or the cargo shipped through them. The dilemma manifests itself in this manner: if the same vessels would call and carry the same cargo, with or without the Project, the Project would not yield any economic benefits. To generate economic benefits, either the same vessels must carry additional cargo (generating transportation cost savings by taking advantage of the deeper draft) or fewer vessels must call to carry the same cargo as would be carried without the Project (similarly generating transportation-cost savings by taking advantage of the deeper draft).

The Corps’ response to these comments avoids the heart of the issue at hand. The Corps fails to present calculations resolving the inherent contradiction in its predictions that the same vessels can generate transportation cost savings by carrying the same amount of cargo at deeper drafts and greater amounts per vessel. Instead, the Corps waves its arms around data showing that the differential in the average inland transportation costs between Portland and Puget Sound is larger than the total ocean transportation cost. As explained above, this comparison is irrelevant to predicting the costs and benefits associated with the Project.

The Niemi Report, in a section titled “Spillover Effects on Other Ports,” also offers comments on the DSEIS, raising issues about the costs stemming from the Project that might materialize outside the Columbia River area: “The Corps . . . does not analyze the proposed project’s potential impacts on the competition between the Columbia River ports and their neighbors. It is clear, though, that there would be some competitive impacts, and, hence, a non-zero probability that at least some of the project’s benefits would come at the expense of spillover costs imposed on these other ports.” Niemi Report at page 38.

The FSEIS fails to respond to this section of the Niemi Report. Instead, in a response to a subsequent chapter, the Corps chooses to categorize concerns about

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the inter-port, competitive impacts as issues of regional economic transfers that are inappropriate for examination in the FSEIS:

The Niemi report confuses regional with national benefits. . . . Niemi seems to have the opinion that the benefits of the Columbia River project are a result of increased port revenues at the Port of Portland, which should then be offset by decreased port revenues at the Puget Sound ports. This is not the case. The benefits of the project are based on transportation cost savings, rather than rate transfers.

See Response to Comments, at page Stakeholders/Special Interests-115. The Corps offers this and related responses even though the Niemi Report incorporated statements from the Institute for Water Resources (“IWR”) seconding the Niemi Report’s concerns. Thus, the Corps mischaracterized the straightforward language of the Niemi Report about “spillover costs imposed on other ports” as an issue regarding the rates and revenues of the different ports. Id. (emphasis added). This response indicates the Corps either does not understand or has simply failed to meet its obligation to investigate “spillover costs,” a widely recognized synonym for “negative externalities.”

The Corps also arbitrarily brushes aside similar concerns derived from a report by the Corps’ Institute for Water Resources and reported in the Niemi Report, responding that “[w]hile the general statement quoted from the IWR report is interesting, it does not apply in this regional context.” See Response to Comments, at page Stakeholders/Special Interests-115. The statement to which the Corps refers comes from the IWR, the Corps’ research arm, and highlighted the transportation system’s excess capacity regarding containerized traffic. This study raises the possibility that further increases in capacity, such as the Project, are not economically justifiable. The Corps offers no substantiation for its declaration that economic behaviors and conditions in this region make the IWR’s statement inapplicable.

The Corps compounded its mischaracterizations and arbitrary disregard for the economic concerns expressed in the Niemi Report by an expression of faulty economic reasoning. The Corps states that “[t]he Niemi report also fails to

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recognize that the Corps benefit calculation assumes that the Puget Sound increases its market share in the Portland hinterland, which also makes the 'stranded infrastructure' argument moot." See Response to Comments, at page Stakeholders/Special Interests-115. If, as the Corps assumes, the Puget Sound ports compete with Portland and would be able to capture cargo from Portland's hinterland even with the Channel Deepening Project, it seems reasonable that the Puget Sound ports would capture even more cargo without the Project. After all, the Corps has avowed that a "vigorous competitive environment" exists. Thus, symmetry demands that the converse also seems reasonable: implementing the Project will, indeed, leave stranded investments at the Puget Sound ports and in the facilities derivative to them.

In reality, the Project's impacts on the other ports and facilities are not issues that can be resolved by mere assertions. They are empirical issues that can be evaluated only through a multi-port analysis, which the Corps has not conducted. Its failure to do so leaves the FSEIS inadequate to support any decision to implement the Project. The Corps' responses to the Benefit Panel and the Niemi Report demonstrate that it has approached multi-port issues with scrambled reasoning, supporting our conclusion that the FSEIS's economic analysis is seriously flawed. The Corps' failure to address earlier comments regarding its obligation to complete a multi-port analysis reinforces the conclusion that the Corps' analysis of the Project's economic benefits and costs excludes arbitrarily the potential costs associated with the Project's impacts on other ports. Without careful examination of these impacts and costs, there is no way of knowing if the Project, as proposed by the Corps, will come even close to the benefit-to-cost ratio reported in the FSEIS.

- 10. The FSEIS fails to describe the full, potential, economic risks and uncertainties associated with the Project.** No one can predict the Project's future economic impacts with certainty. To guard against the possibility of investing large sums of money in the Project only to find that the projected economic benefits are lower and the costs higher than expected, leaving the national economy worse off, the Corps is obligated to provide a full discussion of the various factors that might bring about such an outcome and describe the

likelihood that, in actuality, the Project's benefits will not outweigh its costs.

The DSEIS's discussion of risks and uncertainties associated with the Project failed to meet this obligation. The Corps' discussion in the FSEIS remains inadequate. As argued throughout these comments, the Corps (1) arbitrarily disregards guidance provided by the Corps' own manuals on these topics, (2) mischaracterizes and disregards questions raised regarding its treatment of the Project's risks and uncertainties in the DSEIS, and (3) inappropriately passes to the Technical Review Panel the burden of the Corps' obligation to provide a thorough discussion of the potential uncertainties and risks associated with the Project.

**11. The Corps' discussion of uncertainties and risks in the FSEIS is inconsistent with guidance provided by the agency's Guidelines for Risk and Uncertainty.**

The Corps introduces the "Risk and Uncertainty" section of the FSEIS with these statements: "While this analysis has attempted to present a most likely scenario, it is certain that things will happen that will be considered unlikely at the time of this analysis. *In no particular order, and without specifying specific numbers of upside or downside risks, some of the potential issues that could impact the benefits are: . . .*" See Revised Economic Analysis, at page 42 (emphasis added).

The Corps' presentation, as outlined by these statements is inconsistent with guidance provided by the Corps' own manual on risk and uncertainty. See generally Guidelines for Risk and Uncertainty. A summary statement in the Guidelines for Risk and Uncertainty says that consideration of risk must include an assessment of the probabilities associated with alternative possible outcomes: "Risk is defined as a situation where the decision maker knows all the alternatives available but each alternative has a number of possible outcomes. Thus, the decision maker no longer knows the outcome of each alternative. In this region, probabilities are assigned to each outcome." Id. at page 7. In contrast to this guidance, the Corps acknowledges in the FSEIS that its assessment of risk does not consider all the possible outcomes for various alternatives, and it does not assign probabilities to each outcome. Instead, the Corps considers only some of the possible outcomes and quantifies no probabilities.

The Guidelines for Risk and Uncertainty also offer guidance about the scope of an assessment of risks and uncertainties, advising that the appropriate approach is to broaden rather than narrow the scope. Notably, “[i]t is the analyst’s job to identify, clarify, and quantify areas of risk and uncertainty wherever possible, especially for those pieces of information which have a substantial influence on either the choice of an alternative and/or its size and cost.” Guidelines for Risk and Uncertainty, at page 17. In contrast to this guidance, the Corps arbitrarily has not identified, clarified or quantified areas of risk and uncertainty as required. For example, the “Risk and Uncertainty” section of the FSEIS:

- Does not discuss the possibility, let alone quantify the probability, that bulk cargo will be lower than the Corps’ projections, lowering the Project’s benefits.
- Discusses the possibility, but does not quantify the probability, that Portland’s capture of containers generated in its hinterland will be lower than the Corps’ projections, and does not discuss the possibility that the production of containers in the hinterland will be lower than the Corps’ expectation, lowering the Project’s benefits.
- Does not discuss the possibility that the Project might be delayed, raising its costs relative to its benefits.
- Does not discuss the possibility or quantify the probability that cargo the Corps expects to move through Columbia River ports will, instead, move through other ports, lowering the Project’s benefits.
- Does not discuss the possibility or quantify the probability that the economy of the Pacific Northwest and the containerized cargo it produces will evolve, so that, instead of exporting low-value, high-density agricultural and forest products, it increasingly will export products with less density, lowering the Project’s benefits per container.
- Does not discuss the possibility or quantify the probability that changes in regional climate resulting in declining snowpack may reduce summer runoff

and lower river levels so that ships cannot fully take advantage of the deeper channel, thus lowering the benefits from the Project.

- Does not discuss the possibility or quantify the probability that changes in regional climate may constrain the production of agricultural products to lower levels than the DRI-WEFA forecasts.
- Does not discuss the possibility or quantify the probability that adverse climate conditions may interact with human-caused impacts on aquatic habitat, increasing the severity of risk to salmon and other species, and increasing the costs the Corps and Project sponsors incur to establish and maintain the deeper channel and larger disposal sites.
- Does not discuss the possibility or quantify the probability that the different levels and distributions of the transportation-cost savings among U.S. shippers, foreign vessel owners, and foreign purchasers of U.S. goods, will materialize and trigger market behaviors different from the Corps' projections, resulting in fewer Project benefits.
- Does not discuss the possibility or quantify the probability that the number of ships calling Columbia River ports will be smaller than the Corps' projections, lowering levels of service and reducing the Project's benefits.
- Does not discuss extraordinary costs that might materialize outside the 15 percent contingency included in the cost estimate. These include higher costs for diesel, reflecting extraordinary price increases, and higher costs for remediation of hazardous wastes, if any materialize during the Project.

This list is not intended to be a comprehensive list of variables that the Corps has omitted from its "Risk and Uncertainty" section of the FSEIS. The complete list would include variables relating to costs, as well as benefits.

The Guidelines for Risk and Uncertainty also make clear the importance of not narrowing an economic analysis to a single scenario:

Planners should identify and consider multiple without-project conditions. The rationale for this is clear: we can not have the most probable future condition unless we have identified more than one possibility. Plan formulation may concentrate on the most probable condition but alternative scenarios should be carried forward in the planning process. A more robust plan can be formulated and selected by evaluating how various plans perform in alternative futures.

Guidelines for Risk and Uncertainty, at page 17. In contrast to this guidance, the FSEIS does not—indeed, cannot—evaluate how the Project performs in alternative futures because the FSEIS does not carry forward through the economic analysis alternative scenarios regarding the numerous variables that would define alternative futures. Thus, the Corps offers its “most likely” scenario without specifying other possible outcomes. The FSEIS, for example, does not define and then test the Project against alternative futures reflecting concurrent differences in these and other variables:

- The evolution of the Pacific Northwest’s economy and the products it ships.
- The volume and tonnage of each type of cargo shipped through Columbia River ports.
- The number of vessels calling Columbia River ports.
- The distribution of transportation-cost savings resulting from the project among foreign vessel owners, U.S. shippers, and foreign purchasers of U.S. products.
- The costs to and benefits for the national economy materializing from shippers’ response, in terms of their production and shipping decisions, to their share of the transportation-cost savings.
- The impacts on other ports and facilities derivative to them.
- The response to the Project of other ports and facilities derivative to them.

- Environmental conditions and their impacts on the costs of establishing and maintaining the deeper channel and disposal sites.
- Regional climate and its impacts on the production of exportable goods, summer river levels, and vessel operations in the river.

In sum, the Corps has arbitrarily disregarded guidance in the agency’s manual, which reflects generally accepted principles of risk analysis. Instead, it arbitrarily addresses just a few of the variables that generate risk and uncertainty about the Project’s net benefits, and arbitrarily fails to offer any assessment of the probabilities associated with outcomes other than the Corps’ “most likely” projection. It has not specified and tested the Project against any multi-variable scenario representing less favorable conditions than the “most likely” scenario. Clearly, under such less favorable conditions, the Project would have both higher costs and lower benefits. Furthermore, the Corps has not specified the probability that the “most likely” scenario will materialize, or even demonstrated that its “most likely” scenario is, in fact, just that. Thus, it is impossible for a decisionmaker or member of the public—or, indeed, the Corps itself—to know the degree of uncertainty associated with its economic projections and its benefit-to-cost ratio from reading the FSEIS.

- 12. The Corps has arbitrarily mischaracterized and disregarded questions raised regarding its treatment of the Project’s risks and uncertainties.** The Niemi Report raised numerous questions about the failure of the DSEIS to provide a complete, transparent, and unambiguous accounting of the risks and uncertainties that underlie the Corps’ estimates of the Project’s costs and benefits. In accordance with generally accepted principles of risk analysis, the Niemi Report further asked the Corps to evaluate not just the risks and uncertainties associated with a few variables individually but also of the cumulative risks and uncertainties associated with all of them. The FSEIS mischaracterizes and disregards these requests, setting aside questions about risks and uncertainties associated with individual variables and failing to provide an overall assessment of the cumulative risks and uncertainties from multiple variables.

The failure to describe cumulative risks is especially arbitrary and unresponsive to

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comments provided on the DSEIS. As discussed throughout this section, the FSEIS fails to identify and consider alternative scenarios, and to evaluate the risks and uncertainties they create for the proposed Project. Instead, in the “Risk and Uncertainty” section of the FSEIS the Corps arbitrarily selects and discusses “*some of the potential issues that could impact the [Project’s] benefits.*” Revised Economic Analysis, at page 42 (emphasis added). The selection of these variables appears arbitrary: the Corps never explains the criteria it used to decide which of the issues warranted consideration and which did not. Furthermore, the Corps’ failure to identify and evaluate the cumulative risks and uncertainties associated with multiple variables is inconsistent with guidance provided by the agency’s own Guidelines on Risk and Uncertainty:

In general, more complex techniques are appropriate as planning proceeds from the initial development and the screening of alternatives to the analysis and presentation of the final set of alternative plans. For example, sensitivity analysis—testing the sensitivity of the outcome of project evaluation to variation in the magnitude of key parameters—may be most useful and applicable in the early stages of planning, when the concern is to understand single factors or relatively general multiple-factor relationships. *Multiple-factor sensitivity analysis, in which the joint effects or correlations among underlying parameters are studied in greater depth, may be more appropriate in the detailed analytic stage than in the screening stage.*

(1) Similarly, analysis of risk and uncertainty based on objective or subjective probability distributions would be more appropriate in the detailed analytic stage than in the early screening stage. Although hydrologic and economic probabilities may be used in the screening stage, *the full use of independent and joint probability distributions, possibly developed from computer simulation methods, to describe expected values and variances, is more appropriately reserved for the detailed stage.*

Guidelines for Risk and Uncertainty, at pages 77-78 (emphasis added). The FSEIS represents the final, most detailed stage of the Corps’ analysis. Nonetheless, and

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in contrast to the guidance provided by the Guidelines for Risk and Uncertainty, the FSEIS is notable for its total lack of any “multi-factor sensitivity analysis” of the Project’s risks and uncertainties and its failure to use “joint probability distributions” to test the Corps’ estimate of the Project’s expected benefits against different assumptions regarding multiple variables simultaneously.

The Corps’ Guidelines for Risk and Uncertainty also makes it clear that there is no valid excuse for not conducting a sensitivity analysis that jointly looks at the uncertainties and risks associated with multiple variables:

Fleet composition is one of the least certain aspects of a deep draft project. While existing fleet composition is relatively easy to document, it is extremely difficult to project future fleet composition. Future fleet composition depends on technological trends such as wider beam, shallower draft vessels and a movement toward less labor-intensive loading and off-loading technologies. Changes in land-side technology, such as the advances in handling and moving container cargo, can be as important as changes in navigation technology for future fleet composition. Assumptions about future fleet composition go a long way toward determining transportation cost savings and cannot be overlooked as important sources of benefit uncertainty.

The future fleet depends on ever-changing itineraries of shipping lines, port development in foreign countries and competing American ports, excess supply or demand of shipping capacity, world commodity prices, and a complex host of other factors. With multiple forecasts being made for each of these factors comes cumulative uncertainty. When commodity forecasts are combined with forecasts of vessel size, the potential for compounding errors due to unrealized forecasts is not hard to imagine.

Vessel operating costs are another source of potential uncertainty. Deep draft vessel costs prepared by the Institute for Water Resources are subject to the same uncertainty and problems that inland waterway

vessel costs are. The nature of this uncertainty is generally neither understood by nor available to field personnel.

Guidelines for Risk and Uncertainty, at page 39. The FSEIS stands in sharp contrast to this discussion and prescriptive advice. Nowhere does it contain an analysis of the “potential for compounding errors” if the Corps’ forecasts regarding fleet composition, commodity forecasts, vessel operating costs and numerous other variables fail to materialize.

13. **In addition to the specific requirements of the Guidelines for Risk and Uncertainty, general standards of risk analysis dictate that the Corps’ should take a broad—not a narrow—approach in considering the possibility that multiple variables will concurrently fail to yield the benefits expected in the Corps’ benefits-to-costs ratio.** Here too, the FSEIS fails, repeatedly slamming the door on comments asking it to adopt this broad approach. For example, when the Niemi Report asked the Corps to investigate the possibility that the deeper channel might attract larger ships and create additional risk of collisions and other accidents, the Corps responded that the possibility is minimal or non-existent: “In fact, the Corps’ analysis assumes that vessels on the Columbia river are unlikely to significantly exceed the size of current vessels. . . . The Columbia River pilots have a very good safety record navigating these vessels on the river system and we do not expect this to change when the project is implemented.” See Response to Comments, at page Stakeholders/Special Interests-112. The Corps never considers the possibility that these assumptions are incorrect, directly contradicting not only the guidance quoted above, but also specific instructions in the Guidelines for Risk and Uncertainty. See Guidelines for Risk and Uncertainty, at page 38 (“Because absolute safety can’t be guaranteed, risk-cost trade-offs should be part of any project design optimization. Assessment of in-channel collisions often entail low probability-high consequence event problems. If collisions have not occurred it may be difficult to extrapolate probabilities of their occurrence.”).
14. **The FSEIS also is notable for failing to comply with another related directive from the Guidelines on Risk and Uncertainty that mandates presentation of forecasts using mean values with calculated distributions.** This directive, presented in outline format, warns against reliance on single numbers to represent

the forecast of future cargo amounts for each future year:

Risk and Uncertainty Management. . .

A. Identify key risk and uncertainty issues and the results of the analysis for the decisionmaker. . . .

4. Present forecasts, with project conditions, benefits, costs, and BCRs [benefit-cost-ratios] as mean values with calculated distributions, or as a range of values, instead of as single numbers.

Guidelines for Risk and Uncertainty, at page 62.

In preparing the FSEIS, the Corps did just what this directive tells it not to do. Consider, for example, its treatment of risks and uncertainties associated with its commodity-flow forecasts. These forecasts lie at the heart of the Corps' estimate of the Project's benefit-cost ratio and, hence, it is especially important that the Corps describe fully the likelihood that expected levels of commodity flows will not materialize and the Project will not yield the expected benefits for the national economy. Nonetheless, with respect to these forecasts, the FSEIS does not present benefit-cost-ratios as mean values with calculated distributions representing uncertainty in the forecasts. It does not present benefit-cost-ratios as a range of values. Instead, it presents a single benefit-cost-ratio based on a single forecast—which the Corps calls the “most likely” scenario—of future flows for each type of commodity. One has no way of knowing, for example, if the probability that the worst-case scenario—with markedly lower benefits and higher costs—will materialize is only one percent less than the probability that the most-likely scenario will materialize.

**15. The FSEIS mischaracterizes and disregards comments regarding individual sources of risks and uncertainties.** For example, the Niemi Report offers data from a report published by the Corps' IWR indicating that, all else being equal, delaying the Project four years would reduce the benefit-cost ratio in the DSEIS

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below 1.0. The Niemi Report also asks the Corps to incorporate this information in its sensitivity analysis, to reflect uncertainty inherent in the Project's timing.<sup>3</sup> The Niemi Report observes that this uncertainty is not symmetrical, that is, the Project probably is less likely to be accelerated than delayed. The Corps' response brushes aside these concerns about how delay costs might affect the Project's benefit-to-cost ratio as speculation and asserts it has no obligation to describe delay costs for the American public in the FSEIS. See Response to Comments, at page Stakeholders/Special Interests-111 ("The Niemi report speculates about potential cost increases if funding is delayed. These concerns will be forwarded to Congress, as they are not appropriate to integrate into an economic analysis, but could be appropriate for Congress to consider, as national priorities are set.").

On its face, the Corps' assertion that it is "not appropriate" to integrate the effects of potential delays in its sensitivity analysis is absurd, arbitrary and inconsistent with the Corps' own guidelines. "It is the analyst's job to identify, clarify, and quantify areas of risk and uncertainty *wherever possible, especially for those pieces of information which have a substantial influence on either the choice of an alternative and/or its size and cost.*" Guidelines for Risk and Uncertainty, at page 17 (emphasis added). The Corps' refusal to integrate into the FSEIS the evidence cited in the Niemi Report indicates the agency arbitrarily decided not to "identify, clarify, and quantify areas of risk and uncertainty *wherever possible.*" Moreover, despite the fact that data provided in the Niemi Report quotes from a report prepared by the Corps' own researchers, the Corps arbitrarily decided that delay costs—costs capable of reducing the benefit-cost ratio to zero—are not among "those pieces of information" that can exert a substantial influence on the Project's cost.

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<sup>3</sup> In fact, Project delay is quite likely, since it does not appear that federal funding for the Channel Deepening Project has been included in the President's budget. See Jim Barnett and Tom Detzel, "Budget Slaps BPA, Dredging Proposal," [OregonLive.com](http://www.oregonlive.com) <<http://www.oregonlive.com>> (accessed Feb. 4, 2003) (attached as Exhibit 9).

- 16. The Corps also brushes aside comments in the Niemi Report pointing out that the DSEIS did not provide information regarding the risk of workers' injury and death associated with the Project.** The Niemi Report observes that if these risks are not fully reflected in the Corps' estimate of labor costs, the Corps has underestimated the Project's costs. The Corps responds that "[p]otential problems in the labor market with regard to adequate insurance coverage for on-the-job injuries are outside the scope of Corps analysis." Response to Comments, at page Stakeholders/Special Interests-112. This response mischaracterizes and disregards the substance of the comments in the Niemi Report, which did not ask the Corps to address "potential problems in the labor market," but instead asked the Corps to demonstrate that it has fully and appropriately estimated the Project's labor costs.

The Corps' position regarding labor costs also violates directives in its manual concerning this and other externalities. The NED Procedures Manual explicitly provides that "[n]egative externalities make someone worse off without that person being compensated for the negative effect. . . . The NED principle requires that externalities be accounted for in order to assure efficient allocation of resources." NED Procedures Manual, at pages 21-23 (emphasis in original). In this case, if wage rates do not account for the full costs of working on the Project, then any uncounted costs constitute an externality. The Niemi Report offered evidence indicating a high likelihood that such externalities are present. The Corps is obligated to determine if such costs exist and, if so, to quantify them.

- 17. The Corps also mischaracterized and disregarded comments about factors outside the Corps' control that might affect the Project's ability to generate the expected level of economic benefits.** Among these are the on-going and expected changes in global and regional climates. The Niemi Report asked the Corps to evaluate the risks and uncertainties these changes generate for the Project and refers to studies estimating the extent to which global climate change will influence precipitation patterns and, hence, streamflows in the Columbia River Basin. The Niemi Report observes that these studies indicate climate change may affect the potential benefits produced by the Project by limiting the production of agricultural and other cargo shipped through Columbia River ports and by reducing summer flows in the river, so that vessels could not take full advantage of

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the deeper channel.

The DSEIS failed to consider these possibilities, and, in the FSEIS, the Corps dismisses them with sweeping arrogance, noting that “[t]he uncertainties associated with global climate change and any potential impacts to Pacific Northwest exports are so great that any integration of the assumption would be irresponsibly speculative.” See Response to Comments, at page Stakeholders/Special Interests-110. The arbitrariness of this statement is amazing, for it says that the uncertainties are so great that they are too trivial for the Corps to consider them in its analysis of risks and uncertainties. The Corps offers no substantiation for its dismissal of the studies’ projections of future climate change in the Columbia River Basin. It is the agency’s failure to consider climate change that is irresponsible when the evaluation of this Project looks out over the next 50 years, and when even recent evidence, offered by the Corps itself, indicates that low streamflows can reduce the River’s flow and limit the ability of vessels to take advantage of a deeper channel. See Revised Economic Analysis, at page 42 (“[D]uring the 2000 to 2001 period that was used to assess the bulk fleet, there were periods of time when vessel draft was restricted to a maximum of 38 or 39 feet due to shoaling and low water conditions.”).

- 18. The Corps has inappropriately used the opinions of the Technical Review Panel as an excuse not to provide a complete and transparent accounting of the potential uncertainties and risks associated with the Project.** The Corps dismisses comments in the Niemi Report about the absence of a thorough analysis of uncertainties and risks associated with the Project, relying on opinions expressed by the Technical Review Panel to satisfy its analytical obligation. For example, the Corps offers as one response to comments the following statement: “The comment [from the Niemi Report] states that the commodity projections are overly optimistic and cause unjustified inflation of the Project benefits. A review panel of four independent economists came to a completely different opinion. According to the review panel, the Corps’ projections are not only reasonable, but are likely understating the benefits of the project.” See Response to Comments, at page Stakeholders/Special Interests-111.

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The Corps' response demonstrates that the Corps has failed to meet its obligation to define alternative scenarios, carry them forward in the analysis, and test the Project against them to provide a thorough, transparent evaluation of the Project's risks and uncertainties. The Corps also misrepresents the substance of the Benefit Panel's statement.

With all respect due its members, the Technical Review Panel's opinions constitute just one piece of information about some of the Project's risks and uncertainties. The Technical Review Panel (1) openly ignores other risks and uncertainties, such as climate change, (2) fails to offer any statistical analysis of risks and uncertainties, and (3) never defines and evaluates alternative scenarios involving differences in multiple variables. Neither the Technical Review Panel nor its members have stated that the opinions presented by the Technical Review Panel constitute a full response to the Corps' obligations, as outlined in the Guidelines for Risk and Uncertainty. The Technical Review Panel has not been charged or allowed to respond—directly or otherwise—to detailed questions in the Niemi Report and other comments about the Corps' failure to demonstrate the statistical uncertainty in its projections. There is no evidence that they have even reviewed the comments prepared for the DSEIS.

Thus, by citing the Technical Review Panel's opinions as justification for the Corps' arbitrary conclusion that some risks and uncertainties do not exist or are immaterial, the Corps does no more than abdicate its obligation "to identify, clarify, and quantify areas of risk and uncertainty wherever possible, especially for those pieces of information which have a substantial influence" (see Guidelines for Risk and Uncertainty, at page 17) on the Corps' selection of the proposed Project as its preferred alternative and on its assessment of the Project's potential costs and benefits.

19. **By mischaracterizing and disregarding comments on its evaluation of risks and uncertainties associated with the Project, the Corps has inappropriately dismissed pieces of information identifying variables that can have a substantial influence on the Project's economic costs, benefits, and benefit-to-cost ratio.** In asking for clarification of the Corps' commodity-flow estimates, the

Niemi Report identified specific examples where the Corps' projections were analytically inconsistent: for instance, the projections, with no justification for the difference, sometimes appear linked to an entire 40-year period and sometimes to just the most recent few years. See Niemi Report, at pages 15-18, 39-43. The Niemi Report observed a pattern of choices that, absent explanation, might indicate the Corps chose relevant time periods to arbitrarily favor projections of higher future cargo flows. In addition, the Niemi Report asked for evidence that the Corps' projections were statistically reliable (highlighting examples where the DSEIS's projections seemed unjustified by the pattern of cargo flows in past years), as well as documentation of the ability of the Corps' forecasting models to replicate these past patterns. The Corps ignored these requests and issues.

**20. The Corps provides no documentation of the statistical reliability of its commodity-flow projections or of the level of confidence the public should have in its "most likely" projections or of the probability that future cargo flows will be less than these projections.** In effect, for each type of cargo, the Corps has offered historical data and future projections, and failed to demonstrate how the latter builds on the former. For example, the Corps' projection shows total export tonnage growing, when historical data show it has declined for more than a decade and, by 2000, was 25 percent below its peak level. Niemi Report, at page 6. Also, the Corps' projection shows wheat/barley exports growing, even though the historical record shows an absolute decline. Niemi Report, at page 17. Similar incongruities exist for other types of cargo, but the FSEIS provides no credible explanation for the discrepancies.

**21. When the Corps' contractor provided high and low bounds on its forecast for each commodity, the Corps arbitrarily chose an alternative in-between, sometimes the midpoint, sometimes not, with no analysis to justify its choice as the most likely scenario.** See generally Revised Economic Analysis. The midpoint would be the most likely only if the statistical analysis showed that the distribution of probabilities has a normal, or bell-shaped, pattern. Selecting something other than the midpoint would be justified only if statistical analysis showed an appropriate, non-normal distribution. Nowhere in the FSEIS does the Corps provide any statistical information justifying its commodity-forecast

selections. Indeed, the graphic data in the contractor's reports indicate distributions that are unlikely to provide a statistical basis for the Corps' selection of the most likely scenario. Instead, the most the Corps offers to substantiate its selection of the most likely scenario is a footnote reference to a conversation with a staff member from one of its contractor firms. Revised Economic Analysis, at page 31.

22. **The FSEIS's record is inconsistent with generally accepted standards of statistical forecasting, which, among other things, require calculating the level of confidence in a projection and using a forecasting model to look backward to see how well it would predict historical levels.** Despite a specific request in the Niemi Report to demonstrate such statistical evidence regarding its forecasts, the Corps ignored these standards totally, and instead relied on the Technical Review Panel for an assessment of its projections. See Response to Comments, at page Stakeholders/Special Interests-109 ("In order to provide confidence in the forecasts, a review panel consisting of four independent economists studies and commented on the analysis.").

There is no way to judge the validity of the Technical Review Panel's opinions, however, because neither the Corps nor the Technical Review Panel has offered evidence that the Technical Review Panel conducted any statistical analysis of the projections. The Technical Review Panel, of course, cannot guarantee that future commodity flows will fail to meet either its own expectations or the Corps' "most likely" projections. Thus, even when the Technical Review Panel's opinions, which are not based on a statistical analysis of risks, are taken at face value, the FSEIS fails to provide a quantification of this aspect of the risks and uncertainties inherent in the benefits associated with the Project. The same is true of other aspects of the Corps' analysis for which it claims the Technical Review Panel's opinion justifies the Corps' analytical lapses and findings.

23. **The disconnect between historical commodity flows and the Corps' projections is also inconsistent with the Corps' Guidelines for Risk and Uncertainty.** The Guidelines for Risk and Uncertainty observe that, if there were relevant historical

data exist, they should be employed using appropriate statistical methods to derive future projections.

Risk and uncertainty arise from measurement errors and from the underlying variability of complex natural, social, and economic situations. If the analyst is uncertain because the data are imperfect or the analytical tools crude, the plan is subject to measurement errors. Improved data and refined analytic techniques will obviously help minimize measurement errors. . . . The question for the analyst is whether the randomness can be described by some probability distribution. *If there is an historical data base that is applicable to the future, distributions can be described or approximated by objective techniques.*

Guidelines for Risk and Uncertainty, at page 76 (emphasis added). In this instance, there is no ambiguity about the historical data—the Corps knows exactly how much wheat, barley and other cargo was exported historically. If the Corps considers these data relevant to the projections, then it should show the statistical linkage and level of confidence it yields for each projection. If the Corps considers the historical record irrelevant, then it should explain why. As it stands, the FSEIS is silent on these issues. Hence, the FSEIS provides inadequate support for the Corps' benefit-to-cost ratio, and it is appropriate to conclude that the Corps' findings rest largely on its own arbitrary decisions and assumptions.

24. **Moreover, the Corps has misrepresented the Benefit Panel's comments, which did not give unqualified support for the Corps' analysis.** For example, the Benefit Panel's endorsement of the multi-port issues and commodity flows states, "[t]he Corps has not, in fact, resolved all the issues raised in the context of a multi-port analysis, but these issues would not appear to have a direct material effect on project justification." Benefit Panel Comments, at page 14. The first part of this statement makes it clear that the Benefit Panel has not been given full information about these issues, and offers its opinion about the apparent absence of a direct material effect on the analytical results, based on incomplete information. Indeed, the Benefit Panel goes on to state that "[a]s becomes apparent in subsequent comments and opinions . . . the assumptions and analytic steps the Corps has taken to avoid a multi-port analysis have created internal dilemmas and potential

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contradictions in the benefits analysis.” Id., at page 4. The Benefit Panel later fleshes out the contradictions and dilemma:

In short, the assumption of no cargo growth leads to a situation where benefits can only be obtained at the cost of diminished service. This dilemma has not been resolved in the revised estimates analysis. . . . Other things being equal, reduced vessel calls would tend to shift cargo to other ports.

Id., at page 8. The Technical Review Panel is forced to conclude that “[a]lthough the panel recognizes the Corps’ efforts to examine the implications of different empty/load scenarios, the scenarios do not resolve the issue.” Id., at page 7.

**25. Furthermore, the Corps has an obligation to go beyond its own “most likely” scenario, the Technical Review Panel’s opinion, and even a statistical analysis of the uncertainty inherent in its projections of future commodity flows. It must explicitly consider the possibility that future commodity flows will fall far short of their projections. The Corps’ own Guidelines for Risk and Uncertainty demonstrate the folly of not doing so:**

Commodity forecasts are, again, a major source of uncertainty. Recent experience teaches a valuable object lesson. During the energy crisis of the 1970s world demand for U.S. coal was booming. Many forecasters and port authorities thought this strong demand could go nowhere but up. History has proven the inaccuracy of forecasts and the volatility of world commodity markets. The gradual recognition of the increasing interdependence of the world's national economies, growing concern with the “twin deficits problem” of our national debt and trade deficits present analysts with a substantial challenge. Discerning what these developments mean to world demand for U.S. goods and U.S. demand for imports is highly uncertain.

Guidelines for Risk and Uncertainty, at page 38.

26. **In sum, the Corps fails to follow the guidance of its own internal manuals and fails to provide a direct and forthright response to substantive comments on the DSEIS that posed serious questions about the scope and accuracy of its evaluation of risks and uncertainties associated with the Project.** Thus, it is impossible to tell from the FSEIS how these risks and uncertainties affect the Project's benefits, costs and benefit-to-cost ratio. The Corps' failure to evaluate them should not be interpreted to mean that substantial risks and uncertainties do not exist or that the Corps or the Technical Review Panel have assessed them appropriately and demonstrated their insignificance. Instead, the Corps' discussion of the Project's risks and uncertainties is wholly inadequate to support a reasoned, informed decision to implement the Project.
27. The FSEIS arbitrarily fails to consider alternative plans that would make use of underutilized capacity at ports elsewhere and generate a larger benefit-to-cost ratio. The Corps is obligated to consider and weigh the Project against reasonable alternatives that might provide the same economic benefits at lower cost. Federal law requires that "[i]n the case of any water resources project-related study authorized to be undertaken by the Secretary, the Secretary shall prepare a feasibility report. . . . Such feasibility report *shall describe, with reasonable certainty*, the economic, environmental, and social benefits and detriments of the recommended plan and *alternative plans* considered by the Secretary. . . ." 33 U.S.C. § 2282(a) (emphasis added). The FSEIS fails to consider an alternative that would divert cargo from the Columbia River to Puget Sound, and new information provided by the Corps indicates that the net economic benefits of such an alternative very well could exceed those of the Project.

The Corps asserts in both the FSEIS and its responses to comments on the DSEIS its qualitative belief that the market for ocean transportation of goods from the Pacific Northwest is highly competitive. Many of the containerized goods, which represent the bulk of the economic benefits associated with the Project, can be shipped either through Portland or through Puget Sound. There is an economic boundary where the costs of going in one direction are equal to those of going in the other. Moving away from the boundary, a cost differential materializes—small at first—causing cargo to be sent in one direction rather than the other, but the

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highly competitive nature of the market means that a small change in costs could reverse its direction. The proposed deepening of the Columbia River channel would alter the costs of shipping goods via the deepened channel and, the Corps' assertion to the contrary notwithstanding, divert cargo from other ports.

The Corps also has revealed, but only qualitatively, that Portland and the Puget Sound ports differ significantly in terms of their ability to accommodate additional cargo. "Some shippers are unable to ship their product through Portland due to capacity constraints. . . ." See Response to Review Panel, at page 5; Response to Comments, at page Stakeholders/Special Interests-108 ("In general, the container shipping industry is in a state of over-capacity. . . ."); Response to Review Panel, at page 4 ("The amount of capacity in the Puget Sound far exceeds the capacity in Portland. . . . The Corps' analysis reflects an expectation that Puget Sound carriers will continue to draw substantial amounts of cargo out of the Portland hinterland, and that Portland's capture rate will decline slightly over the period of analysis."); Response to Comments, at page Stakeholders/Special Interests-108 ("In general, the container shipping industry is in a state of over-capacity, and U.S. exports are outnumbered by imports to such an extent as to lead to extremely marginal export rates. Rates are so low that shippers are concerned about the viability of continued service."); Response to Comments, at page Stakeholders/Special Interests-111 ("[C]ontainer vessel owners are currently receiving extremely low margins, and westbound rates are so low that analysts are unsure that rates could possibly go lower.").

These statements have important implications. Transportation costs already are lower for cargo shipped through Puget Sound. Furthermore, the transportation system in Puget Sound has excess capacity, which in economic terms means that the marginal costs of increasing its use are zero or nearly so. In contrast, the transportation system in Portland has insufficient capacity relative to demand, which means that additional cargo can transit through the port only with significant marginal costs. The "vigorous" competition between Puget Sound and Portland for containerized cargo means that, at and near the margin, there may exist opportunities to divert cargo from Portland to Puget Sound at minimal cost to

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the national economy.

Thus, the information newly provided by the Corps raises the possibility that the net benefits of the Project might be dominated by an alternative that diverts to Puget Sound (and, perhaps, other ports) some cargo that otherwise would go to Portland and the other Columbia River ports. The FSEIS fails to identify and analyze such an alternative. As argued throughout this Section, in failing to conduct a multi-port analysis, the Corps disregarded not only standard economic principles, but also guidance and directives from its own manuals and comments provided on the DSEIS. As a result, it appears that the Corps may have arbitrarily decided to avoid doing such an analysis, fearing that it would reveal that an alternative favoring Puget Sound ports is economically more favorable than deepening the Columbia River channel.

28. **The FSEIS reports that its economic calculations are based on an assumption that the price of diesel used in the Project will be \$0.90 per gallon.** See FSEIS, Exhibit L, Revised Cost Estimate Summary, at page 7 [hereinafter “Revised Cost Estimate Summary”]. Given the uncertainties of the world oil markets, it is prudent for the Corps’ analysis of risk and uncertainty to consider a scenario where diesel prices are markedly higher than \$0.90 per gallon.
  
29. **The FSEIS likely underestimates costs associated with possible remediation of hazardous waste.** The FSEIS acknowledges that the implementation of the Project may encounter costs associated with remediation of hazardous wastes, and says the cost estimate for coping with hazardous wastes is included as part of the contingencies for the overall cost estimate. Revised Cost Estimate Summary, at page 4. This contingency appears to be a percentage of baseline costs, which are based on the planning, estimation and design phase of the Project. In reality, though, if the Corps does encounter hazardous wastes, there is no reason to anticipate that the remediation costs will be any given percentage of planning, estimation and design costs. Given the reality that actual remediation costs can quickly balloon, it is prudent for the Corps’ analysis of risk and uncertainty to consider a scenario where remediation costs are markedly higher than the contingency amount.

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30. **The FSEIS fails to estimate costs associated with potential environmental damage that may materialize as a result of the Project.** Instead, it has asserted that because its environmental impacts will be “insignificant, minor, short-term, limited, and transitory” it is justified in omitting the costs of environmental damage from its cost estimates. Response to Comments, at page Stakeholders/Special Interests-111. Given the degree of uncertainty that exists regarding future environmental conditions and how they might interact with the Project, it is prudent for the Corps, in its analysis of risk and uncertainty, to consider a scenario where environmental costs are markedly higher than zero.
31. **As noted above in Section II(A)(3), the FSEIS fails to include in its cost estimates the \$20 million costs associated with ecosystem restoration projects, asserting that these costs are not part of the Project.** Given that the regulatory agencies reviewing the Project are relying upon ecosystem restoration projects as mitigations, these costs should be included in the analysis.
32. **The FSEIS shows markedly lower costs for the Project, relative to the DSEIS, but has not fully explained the changes.** In particular, it has not explained the apparent shift of costs from the construction phase to the maintenance costs during subsequent years. This shift has implications for the benefit-to-cost ratio because costs in future years are discounted to a smaller present value, thus increasing the ratio, all else being equal. Given the uncertainty about whether costs should be counted during the construction or the subsequent phases of the Project, it is prudent for the Corps, in its analysis of risk and uncertainty, to consider a scenario where these costs are included in the construction phase.
33. **The Corps ignores important negative externalities.** Under the Corps’ NED Procedures Manual, the Corps is required to incorporate the costs of negative externalities into the cost-benefit analysis for Channel Deepening. In the FEIS and again in the FSEIS, the Corps has concluded, incredibly, that the Channel Deepening will impose *absolutely no negative externality costs* on third parties. The Corps’ conclusion is contradicted by the likelihood that Channel Deepening will impose significant external costs on third parties that would materially alter the cost-benefit ratio had the costs been considered by the Corps.

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First, it is admitted that the Project will adversely affect salmon, groundfish, crabs and other fisheries that have commercial and recreational value. See U.S. Army Corps of Engineers, Biological Assessment, Columbia River Channel Improvements Project, at page 10-1 (Dec. 28, 2001) (“potential for dredging and disposal operations to adversely affect listed species”); FSEIS, at page 4-21 (ecosystem restoration features are likely to adversely affect listed species); EFH Report (effect on essential fish habitat), Sturgeon Report (effect on sturgeon), Smelt Report (effect on smelt), Crab Report (effect on Dungeness crab); see also Response to Comments, Comments of the State of Oregon, at page State-6 (select and net pen fishery will be destroyed by Channel Deepening). Yet, the Corps makes no attempt to assign economic value to these costs and include them in its cost-benefit calculations.

Second, the Corps has not considered the significant costs the Project will impose through alteration of the Columbia River littoral cell, leading to intensified coastal erosion in Southwest Washington. Both the State of Oregon and the State of Washington recognized that Channel Deepening could intensify coastal erosion that has emerged in the last decade. See Southwest Washington Coastal Erosion Study. Until recently, coastal Washington benefited from a long-term trend of accretion, but coastal erosion “hot spots” have caused significant damage since 1993. See Washington Department of Ecology, “Kaminsky Report on Coastal Erosion,” <[http://www.ecy.wa.gov/programs/sea/swces/products/publications/papers/kaminsky\\_tcs00.pdf](http://www.ecy.wa.gov/programs/sea/swces/products/publications/papers/kaminsky_tcs00.pdf)> (Washington State has incurred nearly \$70 million in coastal erosion response costs since 1993). In reviewing the Corps’ sediment budget for the Lower Columbia River, Oregon and Washington recognized that the estuary has become a sink for sediment where, historically, it supplied sediment to the Columbia River littoral cell. See, e.g., Response to Comments, Comments of Washington Department of Ecology, at page State-40. The Channel Deepening Project intensifies this problem by removing more sediment each year than the Columbia River now transports into the estuary. See FSEIS, Exhibit J, Revised Columbia River Sediment Impacts Analysis, at page 19; Response to Comments, at page State-44 (each year, the Columbia River transports only two million cubic yards of sediment into the estuary). Construction and maintenance of the deeper channel removes sediment from the

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system by placing dredge soils in upland sites or fixed restoration fills. Significantly, the Corps has now deferred use of ocean disposal sites as a last resort, further starving the Columbia littoral cell of sediment. The result is intensive coastal erosion events with “potential for hundreds of millions of dollars in damages.” Southwest Washington Coastal Erosion Study.

The State of Washington has asked the Corps to lead a regional effort to manage dredge material disposal sites to reverse coastal erosion and restore active sand transport from the Columbia River to the coastal littoral cell. Response to Comments, at page State-46. The Corps responded to the State’s comment by inviting the State to pay the incremental costs of a modified project that disposes of dredge materials in a way that mitigates coastal erosion and restores natural processes. Id. The Corps’ remark further verifies that coastal erosion has a direct cost when property is damaged, or a shadow cost that the Corps recognizes as the added cost of disposing dredge materials in a manner that sustains the Columbia littoral cell. Either way, the damage costs and the solution costs were not considered by the Corps in its cost-benefit and project feasibility analysis.

Under Corps’ guidance, this is precisely the sort of externalized cost that should be weighed in a cost-benefit analysis. NED Procedures Manual, at page 23 (providing example of flood control project that imposes negative externality costs by promoting flooding of third parties downstream). The Corps failed to consider coastal erosion costs of the Channel Deepening Project despite clear evidence that the Project contributes to the increasingly severe environmental consequence of changes to the Columbia River sediment budget.

For all the reasons stated in this Section, CRANE renews its objection to the Corps’ economic analysis for the Channel Deepening Project.

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**C. The FSEIS fails to correct serious biological errors that appeared in the DSEIS, undermining the Corps' conclusions about the Project's likely effects on the Columbia River ecosystem.**

Despite claims in the FSEIS to the contrary, the Corps presents little new scientific data to support its claims that the Project will have insignificant effects on the Columbia River ecosystem.

1. The Corps asserts that the restoration of benthic communities at the Miller-Pillar restoration site will occur within two years after the disturbance. FSEIS, at page 4-35. The Corps also attempts to justify the Miller-Pillar restoration by pointing to other locations where tidal marsh fringes have successfully established themselves. FSEIS, at page 4-35. These examples of success in establishment do not translate directly to success at the Miller-Pillar site because the Corps has merely assumed that successful sites and the Miller-Pillar site are the same in all characteristics, and furthermore ignores the fact that it has taken 60 to 80 years for these successful fringes to develop. Tidal marsh systems created in estuaries in British Columbia have proven to be far slower at achieving desired results than predicted, and in some cases have never achieved desired function. See, e.g., N.K. Dawe, et al., "Marsh Creation in a Northern Pacific Estuary: Is Thirteen Years of Monitoring Vegetation Dynamics Enough?," 4 Conservation Ecology 12, at <<http://www.consecol.org/vol4/iss2/art12>> (2000) (attached as Exhibit 10). Thus, it appears that the Corps' predictions for restoration of tidal fringe marshes assume the most favorable conditions, and are likely overly optimistic.
2. The Corps has delayed implementation of the final two pile dikes until "attainment of successful results and completion of the first two cells." FSEIS, page 4-36. As CRANE has noted in its previous comment letters, the Corps cannot judge the "attainment of successful results" in a project where no monitoring targets have been identified. In the absence of monitoring targets, the Corps cannot define success or failure. The Corps routinely holds its outside permittees to a standard that requires specific yearly and end of project monitoring standards, but fails to hold itself and its own projects to the same standards.

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3. As noted above in Section II(C)(1), the Corps points to success stories about establishment of tidal marsh fringes without answering critical questions about the importance of particular site characteristics and the timeframe for successful establishment. These comments apply equally to the sections of the FSEIS that address the Lois Island Embayment. In addition, the Corps still has is no estimate of current productivity losses, nor of current biological use of the Lois Island Embayment. See FSEIS, at pages 4-23, 4-33. In the absence of this critical baseline data, it is impossible to analyze the likely impacts of the Lois Island Embayment restoration project. In sum, the Corps' conclusion that the restoration sites will be improved based on the Project actions turns on the success of mitigation, yet the FSEIS offers no estimate of current productivity and no estimate of long-term losses, given the long time period required to produce a tidal marsh fringe. See generally Scott A. Matern, et al., "Native and Alien Fishes in a California Estuarine Marsh: Twenty-one Years of Changing Assemblages," 131 Transaction of the American Fisheries Society 797-816 (2002) (discussing the variability of biological communities in a California estuary monitored for twenty-one years) (attached as Exhibit 11).
4. The Corps offers best professional judgment but no data to support its conclusion that export of insects from Webb and Woodland Bottoms will be negligible. See FSEIS, at page 4-20. The Corps' assumes that the only production subsidies from this system to the estuary are through drift of larval insects without support—an assumption contradicted by both theory and empirical fact. See Gary A. Polis, et al., "Toward an Integration of Landscape and Food Web Ecology: The Dynamics of Spatially Subsidized Food Webs," 28 Annual Review of Ecology and Systematics 289-317 (1997) (attached as Exhibit 12); Robert L. Jeffries, "Allochthonous Inputs: Integrating Population Changes and Food-Web Dynamics," 15 Trends in Ecology and Evolution 19-22 (2000) (attached as Exhibit 13); Richard S. Ostfeld, et al., "Pulsed Resources and Community Dynamics of Consumers in Terrestrial Ecosystems," 15 Trends in Ecology and Evolution 232-37 (June 2000) (attached as Exhibit 14); S. Nakano and M. Murakami, "Reciprocal Studies: Dynamic Interdependence Between Terrestrial and Aquatic Food Webs," 98 Proceedings of the National Academy of Sciences 166-70 (2001) (attached as Exhibit 15). An increase in insect faunal import cannot be forecast if the present

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subsidy is unknown. Other unanswered questions raised in this Section of the FSEIS include: What will the actual loss of insect contribution to the system be and what percentage of total production is this? What percentage of seasonal production does it represent? How long would the subsidy be interrupted and at what time is the increase projected to occur? Id. In the absence of data of this kind, it is premature for the Corps to conclude that Martin Island mitigation actions will benefit outputs of “Critical Habitat Insect.” See FSEIS, at page 4-21.

5. Initial temporary and long-term substantial impacts on growth and productivity must be clarified and defined in terms of a numerical model of fish and invertebrate growth. FSEIS, at page 4-21. The FSEIS fails to do this.
6. The Corps does not provide discussion of the impact on Shillapoo Lake’s restoration design and outcome if the Corps or sponsor ports are unable to obtain rights to the three cells currently under private ownership. FSEIS, at page 4-25. In addition to concerns about the ecological value of this “restoration” project discussed above in Section II(A)(8), this simple real estate dilemma could substantially reduce any possible benefits associated with the Shillapoo Lake project.
7. The Corps relies on monitoring to trigger each phase of the Tenasillahe Island restoration project. See FSEIS, at page 4-40. The comments on monitoring provided in Section II(C)(30) apply to this restoration action as well. The Corps offers no legitimate reason to exclude seasonality and the various important water quality variables from its monitoring. These elements are critical to the ecosystem’s function and must be monitored properly.
8. The Corps offers no discussion of the impacts to Bachelor Slough that will result from the anticipated continued dredging. See FSEIS, at page 4-45. The FSEIS provides no quantitative estimate of the value of this habitat, other than the “accounted value” obtained through HEP modeling, which has no demonstrated relationship to the actual habitat values of Bachelor Slough. See detailed discussion below at Section II(C)(44). Furthermore, why has there been no discussion of the current temperatures in the system and the expected effects on temperature that will be associated with the Bachelor Slough restoration project?

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See FSEIS, at page 4-43. The Corps offers no plan to monitor use of Bachelor Slough following Project completion in order to compare it with present use of the area. See FSEIS, at page 4-46. Even if the Corps were to implement monitoring, it would difficult to design a competent monitoring program given the apparent lack of baseline information about existing Bachelor Slough operations.

9. Section 4.8.7 attempts to assign economic value to the proposed ecosystem restoration features. See generally FSEIS, at pages 4-46-4-51. The FSEIS does not illuminate how the Corps' valuations were derived; without a more transparent valuation process, it is impossible to provide independent analysis of this Section's conclusions. Nonetheless, it does not appear that data analysis played a central role in this valuation process. The Corps' reliance on consensus rather than data analysis indicates that policy considerations, rather than scientific considerations, may have been the primary determinant of "value." In addition, this exercise focuses on the value of the *completed* project, and does not appear to take into consideration either values associated with current uses or the temporary impacts of construction and rehabilitation activities prior to completion and associated losses of value.
10. In its new Section 4.9, the Corps describes Ecosystem Evaluation Actions by which the Corps will attempt to gain "additional understanding [of] the lower Columbia River ecosystem." FSEIS, at page 4-51. Despite this goal, the Corps fails to present evaluation actions that are actually designed to obtain this information in a scientifically reliable fashion. For instance, the Corps' description of Ecosystem Evaluation Action 1 does not describe such basic research information as the number of transects to be taken, the type of sampling to be undertaken on those transects and the number of samples to be taken at each transect. See FSEIS, at page 4-52. Important as Cathlamet Bay may be, as CRANE has noted in its previous comments, the numerical modeling used throughout the FSEIS is unverified: therefore, the Corps' conclusions about the Bay's particular relative utility are premature. In its current state, the Corps' model is not a reliable predictor of ecosystem behavior. Nevertheless, if, as the Corps asserts, Cathlamet Bay is of especially high importance, it is clear that a single transect in Cathlamet Bay would be insufficient to sample a large and environmentally critical area. As it is, the Corps' only existing baseline

information for Cathlamet Bay was gathered in the space of a single sample year. FSEIS, at page 4-33. Samples obtained during this time were insufficiently replicated in space and time. In addition, the data is over twenty years old. Therefore, the Corps' knowledge about variability of physical and biological characteristics at Cathlamet Bay is subject to a tremendous amount of uncertainty. In fact, both uncertainty and incertitude are high in this case—the Corps knows very little about Cathlamet Bay. What little it does know is very out of date and comprises only a small amount of what needs to be known in order to predict changes to the system with confidence.

11. Evaluation Action 2 (“ascertaining coastal cutthroat trout use of tidal marsh habitat in the Columbia River estuary”) suffers from many of the same flaws discussed above for Evaluation Action 1. See FSEIS, at page 4-52. No evidence exists, or is presented, to support the contention that the variability of juvenile cutthroat use of tidal marsh habitat in space and time can be adequately captured by a two-year pre-construction monitoring effort, or that two years of post-construction data would be sufficient to detect any Project-related changes. The Corps fails to identify or discuss at what level a change would be said to occur (that is, what level of change in use is determined to be a significant change and why), nor does the FSEIS present any quantified estimate of the statistical power of Evaluation Action 2 studies to detect a change in coastal cutthroat use of tidal marsh. Evaluation Action 2 appears to be based upon no study design, no sampling methodologies and offers no plan to determine *actual* coastal cutthroat use habits through telemetry studies—the only acceptable mechanism for assessing actual habitat use.
12. Evaluation Actions 3 and 4 include further data collection for the three years post-construction, in addition to the single year of pre-construction data collected in 2002. FSEIS, at page 4-52. There is no indication that the three-year period of post construction monitoring has been chosen based on any principled determination that three years is an acceptable monitoring window. In a dynamic system, pre-construction sampling must be of sufficient replication in space and time to adequately describe the variability in the system. One or two years of widely separated sampling, like that conducted by the Corps, is totally insufficient for this task. See Daniel L. Bottom and Kim K. Jones, “Species Composition,

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Distribution, and Invertebrate Prey of Fish Assemblages in the Columbia River Estuary,” 25 Progress in Oceanography 243-70 (1990) (commenting on the variability of biological elements of the ecosystem) (attached as Exhibit 16) [hereinafter “Species Composition, Distribution and Invertebrate Prey”]; Kim K. Jones, et al., “Community Structure, Distribution, and Standing Stock of Benthos, Epibenthos, and Plankton in the Columbia River Estuary,” 25 Progress in Oceanography 211-41 (1990) (same) (attached as Exhibit 17) [hereinafter “Community Structure, Distribution, and Standing Stock”]; Richard D. Brodeur, “The Importance of Various Spatial and Temporal Scales in the Interaction of Juvenile Salmon and the Marine Environment,” Alaska Fisheries Science Center, National Marine Fisheries Service, Seattle, WA (unpublished paper) (1997) (attached as Exhibit 18) [hereinafter “Importance of Various Spatial and Temporal Scales”]; Charles A. Simenstad, “The Relationship of Estuarine Primary and Secondary Productivity to Salmonid Production: Bottleneck or Window of Opportunity?,” National Marine Fisheries Service, Seattle, WA (unpublished paper) (1997) (attached as Exhibit 19) [hereinafter “Relationship of Estuarine Primary and Secondary Productivity”]; Carl J. Walters and C.S. Holling, “Large-scale Management Experiments and Learning by Doing,” 71 Ecology 2060-68 (1990) (attached as Exhibit 20). There is no ecological reason to assume that the Corps will be able to determine if a change has even occurred, much less able to gauge the duration, magnitude and intensity of this change. In addition, the Corps has neither justified its choice of monitoring targets (where such targets exist) nor identified those targets quantitatively. Finally, and perhaps most importantly, the Corps has not adopted standards for when an action will be considered successful, i.e., how near to the target a successful result must lie. The Corps has failed to provide any substantive response to previous comments raising these concerns and replicates the same elementary scientific study design flaws in the FSEIS. Whether or not recognized experts in the field have participated in the Corps’ studies, these basic scientific problems must be addressed if the Corps is to uphold its duty under NEPA.

13. In response to previous comments about the use of conceptual models to determine likely effects of the Channel Deepening Project, the Corps responded with statements about the qualifications of Dr. Thom, the peer-review process this

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model underwent, and the use of other conceptual models in other scenarios. We do not question Dr. Thom's ability to craft a conceptual model, and we acknowledge that conceptual models are used in other areas to organize initial thought processes. We would caution the Corps, however, that the general consensus on the "River Continuum Concept" since 1995 has been that it is only useful for Western montane streams. See Barry L. Johnson, et al., "Past, Present, and Future Concepts in Large River Ecology," 45 BioScience 135-41 (Mar. 1995) (attached as Exhibit 21); Mary E. Power, et al., "Hydraulic Food-Chain Models: An Approach to the Study of Food-Web Dynamics in Large Rivers," 45 BioScience 159-67 (Mar. 1995) (attached as Exhibit 22). CRANE stands by its critique of the Corps' conceptual modeling as outlined in previous comment letters, and offers the following additional context for our conclusion that the FSEIS's use of the conceptual model as a predictive tool is not appropriate. CRANE also points out that Dr. Robert Dillinger did not attend, nor did he comment upon, the SEI panel proceedings.

14. The Corps contends that "[t]he Columbia River conceptual model is a valid, peer-reviewed integration of existing scientific knowledge into a tool useful for understanding how the fundamental components of the river's ecosystem interact. This integrated understanding will substantially assist in assessing the effects of the channel improvement project on salmonids. The conceptual model is the most comprehensive model for the Columbia River developed to date." Response to Comments, at pages Stakeholders/Special Interests-79-80. Based on the minutes from the SEI panel process, summarized in excerpts from the transcripts below, it appears that the conceptual model on which the FSEIS relies on was the first and only conceptual model developed in the course of analyzing Project effects. As CRANE has noted in its previous comments, this conceptual model may be adequate as an initial modeling effort, but is entirely insufficient as a final predictive model.

To repeat observations made in CRANE's previous comments, the conceptual model, as designed, serves only as an organizational tool. Because the model is completely theoretical, providing only the most rudimentary framework of how the system might operate, it establishes nothing about how the system operates in fact.

Review of the SEI panel's meeting minutes makes clear that the panel of invited scientists understood very well that the conceptual model could not be used for prediction or to actually understand how such a system functions.<sup>4</sup> See, e.g., SEI Panel Proceedings, Minutes of June 7, 2001. The panelists also expressed surprise that such a model had not been developed sooner in the process, when it could have informed early research development that would have increased understanding about the actual ecosystem. Id. Indeed, the panelists' comments provide abundant support to CRANE's on-going criticisms of the Corps' modeling efforts.

15. The Corps has not established sufficient groundwork to support an adaptive management program. Critical baseline information is lacking, and without that baseline information, the Corps can neither establish credible monitoring parameters nor assess their variability with any accuracy. The Corps' proposed

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<sup>4</sup> The SEI transcripts document the following exchange among the panelists:

*Curtis:* I have a question and a concern. If you're concerned about the modeling, it seems like you want to be sure you're modeling the right thing. I'm not at all convinced that salinity is a dominant factor in determining the success of these young salmonids in the estuary. Are you?

*Casillas:* No.

*Curtis:* I'm not either. So it concerns me that we're spending a lot of time on the salinity model and we haven't got our eye on the ball. I'm worried about those shallow habitats, too, but rather than doing a dance, that's what we should be talking about. What do you need to define those shallow habitats?

*Boesch:* Well, if you're talking about altering the geomorphology of an estuary, the first-order question is how it would affect the salinity because that gives you indicators of a lot of other things.

*Curtis:* I understand. But is what they have on salinity enough? And accept that it's enough and say so. It's time to start talking about the things that we think are more directly involved with survival, or success, of these fish in the estuary.

SEI Panel Proceedings, Minutes of June 7, 2001 (emphasis added). This discussion highlights panelists' concern for the need to move beyond conceptual work to matters directly impacting survival.

monitoring program for the Project provides only a starting point for baseline identification, but actual monitoring efforts would require the extension of the monitoring parameters at least as far out in time as the baseline assessment. This is perhaps the greatest weakness of the proposed monitoring and adaptive management program proposed by the Corps, which is especially troubling since the FSEIS proposes to defer all management decisions to the monitoring and adaptive management phases.

16. The Corps challenges CRANE's comments on salmonid stomach content. An examination of the works cited by the Corps demonstrates that the Corps' conclusions about salmonid feeding preferences are likely the result of the fact that the mean fullness for any salmonid stomach is less than 1 percent (approx. 0.5%). We reiterate that it is unlikely that some of the species listed are preferred prey of salmonids. It is more likely that the importance of these prey items has been grossly overstated through low numbers of stomachs bearing prey and low numbers of prey in the few stomachs that are not empty. In addition, most infaunal benthic invertebrates, with the exception of mollusks, provide less consumable organic matter and correspondingly greater amounts of indigestible chitin; therefore they supply a lesser amount of food value than do epibenthic organisms such as mysids, or planktonic animals such as *Daphnia*. Furthermore, the Corps' assumptions about foraging strategy have been made without visible data support, indicating that its theories have not been adequately assessed, or even stated. NMFS's macroinvertebrate assessments were neither synoptic, nor comprehensive in their coverage of invertebrates because the sampling methodology used very small (3.25 cm) core samples; as a result, as mentioned in CRANE's DSEIS Comments, the composition of the benthic community in the area was grossly undersampled, as only small, sedentary forms will be collected using this gear.
17. The SEI transcripts reveal that the panelists did not consider models for temperature because the Corps already understood that Project actions would lower water temperature by at least two degrees, and did not want temperature to be considered in any of the modeling. See SEI Panel Proceedings, Minutes of April 28-29, 2001. What effect did this modeling decision have on the Corps insistence in its Response to Comments that impacts on fish growth are related to

salinity rather than temperature, and the agency's resistance to models that instead focus on temperature? See discussion below at Section II(C)(18).

18. The Corps' Response to Comments takes issue with CRANE's use of Fechhelm as an example of the influence of temperature and salinity on salmonids. See Response to Comments, at page Stakeholders/Special Interests-80. This response to CRANE's comment fails to understand important and fundamental concepts of fish biology.

- First, the general concepts of euryhalinity and stenohalinity provide absolutely no illumination in this case. The range of salinities that these fish are able to tolerate, and the range occurring in their environment, are far more important elements. If a fish is less tolerant of salinity, as is the case for broad whitefish (compared to juvenile estuary-inhabiting salmonids), the negative impact on growth should be greater than it would be for a salinity-tolerant fish, as the intolerant fish is expending energy that could be used for growth for osmoregulation.
- Second, if a fish is less euryhaline and encounters more saline water, the same thing should occur. Coregonids are at least salmonids, unlike the zebra danios being used by the NOAA-Fisheries Northwest Fisheries Science Center to determine the effects of toxic chemicals on endangered salmonids. The purpose of using phylogenetically similar organisms is to decrease uncertainty between measurement endpoints and assessment endpoints; thus, use of phylogenetically similar organisms is clearly preferred under the Ecological Risk Assessment principles. Thus, we can expect that responses to salinity from phylogenetically similar fish provide data with less inherent uncertainty and more likely reliability than studies that compare phylogenetically dissimilar species.
- Third, the study stated that it took place during the growth period of the fish, which is in summer. Therefore, extreme winter conditions were not present.
- Fourth, salinity in the study area varied from 0 ppt to 30 ppt, with temperatures from 3-18 degrees Celsius—conditions as variable as the Columbia River.

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- Fifth, the Corps' comments about daylight swings are not relevant, as the fish are dormant during the winter.
  - Sixth, even cursory examination of the regression lines would have demonstrated that the association with salinity was extremely minor, even when evaluated alone. The fact that salinity could not be discounted did not take away from the dominant role that temperature played.
  - Seventh, statements suggesting that the Sagavarnirktok River delta is not an estuary are not supported by fact. The Sagavarnirktok River mouth flows into the sea, forming an estuary that meets the definition of "estuary" every bit as well as the Columbia River.
  - Finally, this study appeared in the peer-reviewed, published literature, unlike many of the documents cited in the FSEIS.
19. The Corps rejects CRANE's contention that habitat value and assessment should occur on a landscape matrix scale. CRANE reiterates that best available science strongly supports the use of a landscape-level process to truly understand the functions of the components of an ecosystem, and has since the publication of Wien's paper in 1989. See John A. Wiens, "Spatial Scaling in Ecology," 3 Functional Ecology 385-97 (1989) (attached as Exhibit 23). The agencies have ignored this accepted scientific approach, which should have been adopted and formed the basis of all environmental review at the Project's outset. As CRANE has stated in its previous comments, the Columbia River is an extremely dynamic environment. The Corps' FSEIS and underlying environmental review documents have failed to demonstrate that the Corps or other agencies understand this dynamic environment's workings in any meaningful way. Adoption of the landscape approach is essential in a dynamic system of this kind. See, e.g., Carolyn T. Hunsaker and Daniel A. Levine, "Hierarchical Approaches to the Study of Water Quality in Rivers: Spatial Scale and Terrestrial Processes are Important in Developing Models to Translate Research Results to Management Practices," 45 BioScience 193-203 (1995) (attached as Exhibit 24). Especially in light of the already degraded conditions of the River and estuary, "expert opinion" cannot

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replace detailed baselines and descriptions of processes as bases for management decisions.

20. The models employed in the FSEIS continue to suffer from a lack of verification. See DSEIS Comments, at page 21. Review of the SEI panel transcriptions reveals that verification was a key issue for the panelists, who raised some of the same concerns that have been raised in CRANE's previous comments:

*Boesch:* **So the question remains is the modeling good enough for the objectives.** Cathy pointed out, 'Don't think only about salinity objectives.' **You have to ask that question, 'Is it good enough?' rather than, 'Is it as good as it can be?' Because that may be something everyone would like to achieve, but it may not be necessary to answer these questions.**

*Baptista:* For a very different type of change, much more substantial than what we are talking about here, I will show tomorrow some results that indicate that changes for the higher range of river discharges may actually be more significant for the river than for the lower range of river discharges. Again, I'm not a biologist. I'm a physicist, interpreting data and putting it in a context that fisheries researchers seem to understand.

*Bartell:* Rob, you keep calling this a screening calculation. What would you do to the model to take it beyond that characterization?

*McAdory:* **I'd want to verify it against a large data set.** I don't know if there's one thing you could do; the more data you compare it to, the more time you take to run it, and the more detailed it is. Things like that. There does come a point when you feel like to answer whatever questions you have, you're wasting your clients' money. But for the purposes for which it was designed, I feel it adequately answers the questions. I'm not sure I'd do anything to it. We're just trying to understand what the order of magnitude of salinity changes are coming up due to this deepening, and then let a biologist tell whether that's important or not.

*Bartell:* How deep would the channel have to be before you think could lighten up the system in terms of salinity?

*Berger:* By the way, I don't know what the actual depths were run here, but it was more than the three-foot deepening.

*McAdory.* Yeah, it was eight feet because we assumed there was going to be maintenance. I don't know, if you made it deep enough, you might make it very hard for that salinity to get out at all.

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***Berger: At some point, you're getting pretty far away from verification, and you're putting a lot of confidence in whatever turbulence model you've got behind this thing. Well, of course, it gets turned off when you stratify it. If you get away from verification, I think you can get in trouble.***

*McAdory:* In this case, if you really look at the places where dredging is proposed and how much different that is from where they are, especially after they do maintenance dredging now, you're talking about an extremely small change to the cross-section of the system to all aspects of the system. I don't think anybody expects large salinity changes in the boundaries for these minor changes, given that everything else is the same. **However, we're perfectly willing to be surprised and we do find some surprising results occasionally.** For instance, your question instead of making it deeper had been make it a lot wider, then Charlie [*Berger*] would've given you some another answer from something we learned recently. So, you start off with some idea of where you're going, but you don't always get where you think you're going. So, I think the results are reasonable, and if we're still talking about whether we should invest more in the salinity order of magnitudes, I'm not sure I'd do it a whole lot differently.

See SEI Panel Proceedings (emphasis added). This discussion indicates that model verification is important (see also Naomi Oreskes, et al., "Verification, Validation, and Confirmation of Numerical Models in the Earth Sciences," 263 Science 641-46 (1994) (attached as Exhibit 25)), has not been done, and that the system is variable enough to surprise even the modelers. Based upon the transcript above, the SEI panelists clearly did not necessarily expect the system to perform as modeled.

21. The Corps responds to CRANE comments about the potential for an ETM shift by concluding that "[t]he effect of the potential shift in ETM location on distribution of nutrients in the estuary is expected to be so small that it cannot be measured. These potential effects to the ETM are not anticipated to measurably effect salmonids." See Response to Comments, at page Stakeholders/Special Interests-80, 83-84. This is not responsive to CRANE's comments and inquiries regarding the ETM. CRANE continues to note that the timing of any shift in the ETM may change related biological functions considerably. The Corps simply states that the associated biological changes would be unmeasurable and without consequence, but offers no supporting empirical data and no model runs. This provides one of the more egregious uses of best professional judgment, and is just one of a number of "armchair" biological assessments that appear in the FSEIS and

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that should not, in all scientific conscience, be made without quantitative support. The FSEIS's biological/ecological analysis assumes, unrealistically, that as long no change in the magnitude of an event occurs, changes in duration and intensity, and timing also do not matter. The FSEIS fails to offer credible responses to any of these comments.

22. The Corps takes issue with CRANE's previous comments noting that the Corps' conclusions regarding the effects of Channel Deepening on habitat productivity and food webs appear to be based on the assumption that small or no changes in the physical environment. See Response to Comments, at page Stakeholders/Special Interests-71. The Corps points to the difficulty of predicting biological changes from small physical changes, but notes nonetheless that "because the models had predicted change and there is some uncertainty over the potential for long-term effects, a monitoring program is being developed in cooperation with the agencies to assess any potential long-term changes." Id. The Corps concludes that "[i]n the event the monitoring program shows a detectable change, it will be brought to the adaptive management group." In addition to reiterating CRANE's previous comments on this subject, we note that the Corps admits that its quantitative baseline is lacking. In the absence of quantitative baseline information, the Corps and the ATM are incapable of making quantitative determinations regarding the relative importance of any particular ecosystem element to the function of the system. Without quantitative baseline information, monitoring is worthless because change cannot be detected if baseline levels are not understood. In addition, review of the SEI transcripts reveals that this issue of quantification was of particular concern to the panelists:

*Bartell:* The other issue was the location of ETM.

*Casillas:* Right. To me, that's a general sort of question about estuarine function. Again, the linkage to salmon would be somewhat distant. **One way to look at would be to say, 'If the ecosystem is operating properly, then it's to the benefit of salmon.' How we qualify and quantify that with that measurement is a bit shaky at this stage.** But I would ask Karl (*Eriksen*)-- one of the original questions I had -- on the input of sediment and the sediment change, how do you think that affects the ETM per se? Is it driven by what's coming into the system? Do you have any sense of that? You know, the reduction we have of 5.3 to less than

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I over the past 30 years, shall we say. Do you characterize that as having some impact on the ETM, and do you know that it has or hasn't?

*Eriksen:* No, I don't know that it's had any impact. ETM is essentially the turbulent front of the salt wedge, and it might lower the concentrations a little bit, only of sediment...

*Casillas:* But would that be something that we want to go after as one measure from general ecosystem health?

*Boesch:* **The sediments in the ETM are basically recycled sediments, they're re-suspended sediments, they're not necessarily sediments that are being actively put out at that time. Secondly, the biological importance of the ETM, at least based on studies elsewhere, has very little to do with the fact that it's a TM. It's that the physics, which creates the ETM, also is important in aggregating larvae and food, and things of this sort, independent of what the turbidity is in that particular system. So it's a coincident thing that the physics that results in a turbidity maximum has biological significance.** So, the question is, 'What do we know about the effect of changing channel morphology on the location of the ETM and the characteristics of it?' As a physical phenomenon, and not just the fact that it's high turbidity.

*Tortorici:* When we raised those issues about the ETM, that's what we were driving at. Is a physical change in the system going to affect the ETM, and if so, in what manner, and what can we say about that? **And whatever that change is, large or small, then how do we value that change as insignificant, more significant, whatever.** We had taken a look at the modeling input-output table as it was being developed. If you look at the left side of the column, it talks about hydraulic parameters of concern, and I'll just read them off: Salinity, ETM, surface water elevation, depth, velocity, shear stress, suspended sediments, and temperature. In having our in-house discussions, we thought that the top five to take a look at from a modeling standpoint would be salinity, surface water elevation, depth, velocity, and temperature. And then following that, in a more nested sense, suspended sediments.

*Goldman:* **I wouldn't agree on the suspended sediments from what we've been finding in the Bay Delta. It's a major factor in the fertility of the system. I think it ought to move up in priority, right toward the top.**

*Casillas:* Did I hear you correctly? You were saying to elevate suspended sediments?

*Goldman:* **Yes. In terms of importance. One thing, you've got automatic filter feeders in there and they take in sediment, along with any organic detrital material that they can use for food. If you've got more suspended sediment, they get less nutrition as they pass food**

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**automatically through their guts. Plus the euphotic zone is so greatly reduced by turbidity. In fact the Bay Delta system, according to the most recent studies, is really limited by turbidity.**

*Boesch:* I think there's no question that primary production in this estuary is limited by turbidity, too. I guess the point in hand is the degree to which we think changing the morphology of the lower estuary by deepening it by three feet is going to change the suspended sediment distribution.

*Boesch:* **Just listening to Ed's presentation and the critique of the salinity model, I agree that the focus on salinity is a response variable which, in terms of affecting the salmon alone, is a very unidimensional analysis when, in reality, these organisms are responding to a lot of other variables. . . .**

SEI Panel Proceedings, Minutes of April 28-29, 2001 (emphasis added).

23. The Corps relies heavily on the "peer-review" process offered by the SEI panel. See, e.g., Response to Comments, at page Stakeholders/Special Interests-79 ("Contrary to the comments the conceptual model has substantial verification as it is based on multiple empirical studies. . . . [T]he comments concerning reliance on 'professional judgment' badly mischaracterize the peer review process through which the conceptual model was evaluated extensively by a nationally recognized scientific panel assemble by SEI as well as by scientists at NOAA Fisheries and Corps who have substantial expertise about the Columbia River."). Despite this comment, we note the following pertinent discussion from the SEI panel proceedings:

*Courtney:* **The group also heard the panel's suggestion that you adopt as quantitative and as explicit an approach as possible.** Nevertheless, the panel understood the use and the need for a conceptual model that will tie things together. We heard some interest in hearing more about upstream areas. Also heard a suggestion in terms of prioritization of the concerns raised during the consultation documents and the reconsultation process. Suggestion that we go through Document 2 in light of the conceptual model. Put on record that the regulatory agencies need to have ALL of that addressed, even though we may elect to try to deal with the things that are most burning. Nevertheless, from a process point of view, regulatory agencies are going to want to see all of those things considered.

**Casillas:** From a general perspective, I don't think there's much disagreement. The issue is how much data exist to support the underpinnings of those particular processes in this system. We don't have the information about how processes support salmon. The *Progress in Oceanography* volume is based on one year of data. The system is very dynamic, so it's unlikely that one year of data will characterize the system in an effective way.

**Dunne:** What you're uncertain about are the rates of the processes that are represented by the arrows. And you're saying that is it that one side of the debate estimates that a certain arrow may be either not quantitatively important, or would not be quantitatively affected by the dredging process, and the other side of the argument says we don't know that?

**Casillas:** I think it's more fundamental than that. It's not a question of the arrows.

**Larson:** There is a lack of knowledge, but there's also a fair amount of knowledge on how these processes go on. There's a fair base of knowledge, which our EIS and BA were based on. Like Ed (Casillas) says it's not a conclusive array of knowledge, but it's still enough to move ahead with an assessment of what we feel the impacts would be.

SEI Panel Proceedings, Minutes of May 15-16, 2001 (emphasis added). This exchange among the panelists demonstrates that Larson's comment is not supported either by the panel or by the data. It is likewise clear that Casillas feels that *no evidence* exists to support the conceptual model's predictions, which is not surprising, since the conceptual model was not based on synoptic data collection, if indeed there was any data collection at all.

24. The Corps states that "[t]he conceptual model functioned well in helping to ensure that parameters and linkages between parameters were considered. Contrary to [CRANE comments], the analysis was done using best available scientific information pertinent to the Columbia River system and channel improvement project." See Response to Comments, at page Stakeholders/Special Interests-79. As CRANE has noted in its previous comments, a quantitative model based on the Adaptive Environmental Assessment and Management ("AEAM") protocols would have provided a much stronger modeling base. These protocols would have yielded a model capable of determining sensitivity of model parameters and predicting outcomes, and would have supported a true adaptive

management program. Furthermore, we note that Walter Pearson of the Battelle Marine Sciences Laboratory provided an overview of the conceptual model to the SEI panel, including a description of how the model would be used to describe ecosystem function and interactions relative to effects of the Project on fish. The panel questioned exactly how the model addresses the effect of the Project on habitat opportunity. Pearson responded as follows: "This information is not the analytical tool for the quantitative analysis. This is a tool to help us organize the information, and at some point figure out what's important to look at analytically." See SEI Panel Proceedings, Minutes of May 15-16, 2001.

25. As noted in CRANE's previous comments, the FSEIS continues to fail to provide appropriate sensitivity analyses. The mere existence of a biological process and potential linkages does not determine the value of those processes and linkages to fish populations. Without a determination of sensitivity, the Corps cannot draw linkages between salmon and the Project's effects and cannot properly evaluate or predict Project effects. We note that the SEI panel raised these concerns in its review of the conceptual model:

*Boesch:* Having said that... I'm trying to reason aloud... **I think the process among the agencies could be better informed by sitting down and specifically identifying those parameters that NMFS is concerned might be changed as a result of the channel deepening. Then examine the evidence, have a discussion, have a debate, and then come to some specific resolution rather than a general view that we don't understand the periphery well enough.** Well, what is it about the periphery in terms of those key environmental characteristics that we have less than adequate confidence about? And how can I convince you that that won't be affected, or alternatively, what further analysis can we do to narrow that uncertainty?

*Courtney:* I'd like to point your attention to the third bullet, which is what sort of variation should we look at? High flow, low flow... Should we also try to see that in terms of annual variation? Are there other things we need to consider? Temperature of the water coming down? How would we try to get a handle on looking at several factors at once. There are well-tried techniques of sensitivity analysis which do exactly that. And partition variance in terms of inter-annual, or daily, or seasonal, etc., tidal variation - would that be a useful exercise? And where one of the parameters would be channel deepening or not? That would then give you a context in which to understand how much of the variance would be associated with the channel

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versus what I've heard from Rob's and Karl's presentations, which is that it's a highly variable system inherently.

*Dunne:* I think the pattern is more responsive to flow and to topography than it is to anything else -your exercise will not tell us anything we don't already know. **What we're still not getting our heads around, and I don't know whether it's possible, is that the biologists would say, 'Look, if you could predict patterns of temperature and salinity through that estuary at the following range of flows (and, by the way, the low flow can easily be checked by going to the USGS web site)...**

**Suppose for every month of the year, you've got predictions of temperature, salinity, etc. If you did that, you would know where all the flies are living, etc., and then you could say, 'Here's a kind of time series of flow in the Columbia, including its extremes, and here's how this project changes the volume of habitat, for example. Again, it requires the biologists to say, 'This is what these critters need.'** It seems to me you'd get more answers out of direct modeling like that than you would by running a sensitivity analysis. I think we probably know what the answers are most like to be sensitive to, and then when we know that, I don't think we're going to do anything about it. I would say that you want to be concerned about the effect of the channel averaged over some significant amount of time. That would take into account whether you lose a year-class, have a bad energy crisis, or low flow, and so on. We need to simulate a range of discharges that take into account these rare events. You want to do it for the purpose of answering the questions, where do the bugs live, and where can the fish survive, and so on. Not just isolate the sensitivity to a variant.

SEI Panel Proceedings, Minutes of May 15-16, 2001 (emphasis added). This discussion illuminates the fact that in May 2001, regulatory agency biologists and physicists were still grappling with how to understand an unverified model of the Columbia River system, much less an actual entire system. With regard to the need for additional research regarding linkages, Casillas went on to observe:

Do I think we need more spatial resolution than was done? The answer is yes. And more emphasis on the periphery, as we said. And, as Antonio showed, if the simple divisions that he made that were based on the CREDDP study point to that the estuary responds differently to various forcings, and so at least that seems to be a starting point to make those divisions. We had talked in our discussions that maybe if there's another set of even further divisions that we want to make -- we haven't looked at that yet -- but that's something we may want to consider. If the time frame allows this, I don't know.

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SEI Panel Proceedings, Minutes of May 15-16, 2001. Casillas identifies the criticism that CRANE has raised in several comment letters; namely, that best professional judgment cannot quantify changes, nor can it establish the ranges of variation that have influence. Actual data is needed to fulfill those objectives—data the Corps has not yet collected.

26. The Corps has not established monitoring and evaluation metrics. See FSEIS, at page 6-16. Although the Corps has begun discussion of how additional data for monitoring will be gathered, no data-based numbers have been identified to guide monitoring efforts, nor has there been any discussion of the statistical techniques that will be used to compare the observed and expected results. Appropriate statistical analysis is the hallmark of competent study design. Furthermore, there has not been any indication that the Corps has considered the spatial and temporal variability associated with the as-yet unidentified outcomes. Without knowledge of this variability, it will be impossible to determine whether a change that occurs in any of the monitored elements results from natural variability, or is the result of the Project. The FSEIS contains no evidence that the study design will be crafted to reflect the unknown spatial and temporal variability, nor that sufficient statistical power will be generated to adequately determine whether monitoring goals are met. Based on the data provided in the FSEIS, it appears unlikely, if not impossible, that the Corps could engage in competent study design at this time. The ability to assess existing variability and effect size (i.e., the amount of change in the mean values that will indicate that a significant change has taken place) is an integral part of power determination. All these steps rely on data collection—data collection that has not yet occurred. Even where data have been collected, their measurements are so out of date and insufficiently sampled as to make it virtually impossible to determine with an appropriate degree of certainty whether a change has occurred. Despite the Corps' statements to the contrary, the criteria presented in the 2001 BA and 2002 Biological Opinions fail to address this issue even peripherally. Indeed, CRANE lodged the same criticism against each of those documents. Still, the Corps could have simulated the linkages and processes with the extremely sparse and grossly out-of-date data sets it did have available. Even with the extremely high levels of uncertainty associated with these data sets, the resulting quantitative model would have been infinitely better than the complete

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lack of any quantifiable and verifiable conclusions associated with the conceptual model. See, e.g., Carl J. Walters, et al., "Ecosystem Modeling for Evaluation of Adaptive Management Policies in the Grand Canyon," 4 Conservation Ecology 1, at <<http://www.consecol.org/vol4/iss2/art1> (2000) (attached as Exhibit 26) (demonstrating application of the modeling process successfully to Grand Canyon water release).

27. The SEI panel also raised concerns about the Corps' lacking base of knowledge and the concomitant problems associated with developing a monitoring program:

*Courtney:* It sounds to me at the end there that you're making a pitch for what needs to be monitored. You talked about your various metrics. Is there anything in your proposed metrics that we've got information on that can be used in helping us evaluate the impacts of this proposed action? Or are your metrics essentially things that we should be looking at in the future?

*Simenstad:* The ability to predict potential change is key because of salinity restructuring on benthic communities and vegetative habitat in key locations like the interface at Cathlamet Bay. In other words, if that interface moves appreciably, there's going to be a response by the benthic and vegetative community. Trying to predict that I think is quite important.

*Boesch:* What sort of salinity changes would be meaningful in shallow water?

*Simenstad:* Overlaying benthic community structure with the salinity structure from the CREDDP studies, it would suggest that the mean isohaline would be an important feature. The important thing is how good is our ability to predict that in shallow-water habitat because that's where the critical change is going to be.

*Boesch:* Question from the last workshop as to whether the model is accurate for Cathlamet Bay. In answering my question just now, you talked more about mean condition, rather than low flow, high flow.

*Simenstad:* More the means rather than the extremes that sets the vegetation and benthic community.

*Boesch:* So a model of extreme low-flow conditions might be useful? (Yes)

*Quinn:* What are the physical things that are likely to be connected to these metrics?

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*Simenstad*: The physical changes, the attributes, that are going to be most important, are the vegetation and the benthic communities in those systems.

**Whitney: The real challenge is to explicitly link these measurable metrics in terms of diversity of landscape to capacity in say \_\_\_\_\_. To me, that's the challenge, to relate it to a model such as CRI. You want to link your landscape attributes to capacity as well as to productivity.**

**Simenstad: I don't think you can disconnect opportunity and access because the physical environment will potentially limit access to capacity. Just measuring capacity won't necessarily reflect actual access.**

**Whitney: I guess my point is... At what point in your exercise do you explicitly link these measurable attributes of salmon life history...**

**Simenstad: Basically, I think you have to do that empirically to determine what the timing and characteristics of different life history types that occupy those various habitats in various regions through that system. I don't think we can extrapolate; we just do not have data at that level. We really don't know what the timing, the life history structure, and what the habitat utilization is that we could use to build that linkage.**

SEI Panel Proceedings, Minutes of May 15, 2001 (emphasis added). Dr. Simenstad's comments reiterate his comments at the 1997 Symposium dealing with the Columbia River estuary. See generally Simenstad, "Relationship of Estuarine Primary and Secondary Productivity." Namely, scientists did not know any more about the Columbia River estuary in 2001 than they did in 1990 during the first Columbia River estuary symposium. Furthermore, even the studies comprising the 1990 knowledge base were significantly limited by the fact that they were based on a single year's sampling. See, e.g., Bottom and Jones, "Species Composition, Distribution, and Invertebrate Prey"; Jones, et al., "Community Structure, Distribution, and Standing Stock." This fact directly contradicts the Corps' assertion that uncertainty regarding the estuary has been reduced, and makes even clearer that uncertainty also has not declined with the passage of time.

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28. CRANE has offered previous comments on the lack of information about prey utilization and habitat-forming processes in the estuary's dynamic environment. See DSEIS Comments, at 21. We note that the SEI panel raised similar concerns:

*Boesch*: I'd just like to say that you [NMFS] don't really have a choice but to try to understand the present-day relationships between the fish and the habitats and then assume that the values are the ones you're going to manage for. I'm actually, despite other lines of questioning, fairly optimistic about being able to tackle that. Already you've had Dan's [*Bottom*], Antonio's [*Baptista*], and Si's [*Simenstad*] analysis of the historical changes - - trying to model historical changes in depth and flow -- very valuable to understand that in the long term. You have the analysis, some of which Si showed in terms of the changes in the desirable habitats in terms of wetlands and so on. So, I think we have a strong basis of reasoning that those are valuable as opposed to some of the alternatives.

**The question that I have, though, is that one of the things about estuaries, the common pitfalls that people get into in trying to understand and manage them, is that they think they're static features. And really they're quite dynamic and ephemeral. Inherently, they're about change. I would urge you rather than always thinking about the past, to think about the future in terms of what are the opportunities to manage for positive values with the changes that are taking place.**

Case in point: Si talked about the deposition that's taking place on the tidal flats. The point is to think about the future in terms of the changes that would be taking place in that context. Channel deepening maintenance is just one of those changes. Then determine where are our opportunities to manage those processes constructively for the value of the habitat. Rather than always thinking about what we want to reconstruct some picture of the past. It's Dorian Grey; you're not going to get there.

*Casillas*: In terms of characterizing habitat change, we think much further, in an integrated sense.

**The question will be, and we understand the difficulty is really trying to arrive at the crux of the biological consequences of those changes. That is where we all agree we will have difficulty**, but we will feel much better. For instance, if the outcome in an integrative evaluation of a physical set of matrices is evaluated, and we find that there is no change by however you evaluate it, we'll feel much better from that perspective. It won't answer the question that there won't be any impact, but we'll feel much better to let the project proceed with some monitoring going on. But, on the other hand, if we in fact see some differences with an integrative set of physical attributes that we see does in fact change in response to this

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evaluation, or this impact, then the question becomes how do we evaluate that in a biological context. And there is no clear way yet other than to develop a weight of evidence from the information we know as to how to interpret that information. That will be arrived at probably by regional consensus of those experts who have appreciation of the problem and the situation to gain a better understanding for the agencies, then to proceed and make a decision of how they will go.

CRANE has argued in its previous comments and continues to assert that the only way to “feel better” about the decisions made is to have sufficient understanding of, and quantitative data on, the ecosystem in question.

***Dunne:* You say we’re not going to get to the level of uncertainty reduction that we all feel... science just doesn’t do that. Can you say these are the things we need to know before we feel better.**

***Casillas:* That’s the question I’ve been wrestling with for this project -- how will we know if we should or shouldn’t feel better?** What we did in the report that we recently finished is to develop a family of curves to describe how the system responds in relation to physical features that we think are important over a variety of different conditions and ask the question, ‘What has changed?’ If we then impose this project on that evaluation, and ask, ‘Can we see any further change, or not?’

We know the system has changed through the modifications that have occurred over the past 100 years, and then we ask, ‘Did it change much more when we imposed this change on it?’ We can’t really resolve any change with the accuracy that we have. **I think at least two things: One, do we know that we can see change with the evidence that we have, which we have documented already under constraints that we’ve imposed, and two, that we will have evidence that no change will occur when we impose the proposed change in the system. Now the problem will be what happens if we do see further change in addition to the historical change? And that will be a dilemma for us.**

***Courtney:* Does the panel see the connection between the PFC and the conceptual model?**

***Boesch:* It says here that it’s going to provide ‘descriptive and qualitative indications’ - yes, could do that -- ‘of how historical conditions -- no, not that I heard -- ‘and/or a PFC’ -- no because it didn’t give some specific indicators, criteria that were used in the other PFC example. So I’d say the conceptual model has a long way to go to meet two of the three expected uses.**

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***Tortorici: Fair enough.***

*Dunne:* I'd like to get a sense of how you think you will be able to integrate PFC with this matrix.

I don't understand how you can incorporate historical conditions when they're so poorly, or incompletely, understood. We hardly even understand current conditions, let alone historical conditions. What's your strategy or timeline?

***Tortorici: That's what we're struggling with. We're essentially using our best professional judgment of what's in the literature.*** What we need to do next is to send that around to the scientists in the region and ask them where can you get the information from to build those more detailed metrics? ***Because of the general lack of information, I suspect it's going to rely heavily on their best professional judgment. It's going to be an evolving thing. We're going to have to have more regional consensus and more peer review of it to make sure that the information that's being used in it is coming together from the group of scientists.... I realize it's not the most precise answer, but it's kind of where we're at. I really wanted to have this by the end of the year.***

Historically, there were certain habitat features that were important to the fish, and we have a sense of those I believe and so let's take a look at those features and try to use that information in some way to value what's going on in terms of current baseline and overlaying this project on top of it. I wouldn't say that we're trying to reconstruct historical conditions. We're just trying to learn from historical conditions as a methodology to help us with what we see right now.

The Corps does not address the panelists' concerns about the model's ability to provide descriptive and qualitative assessments of potential changes; furthermore, the transcript of this discussion indicates that the regulatory agencies were and are well aware of the shortcomings of the conceptual model (i.e., that it cannot be used for prediction, and that the Corps would be forced to rely on best professional judgment concerning the impacts because of its failure to craft a predictive model based on real data). Based on these failures, it is clear that the Corps simply does not have enough information to permit determination of the value of any habitats to the various juvenile stages of salmonids. The models cited by the Corps cannot determine actual impacts, but can only predict them in the loosest sense, and without scientific support. Until those models are verified, the Corps cannot provide a valid quantitative assessment of Project-related habitat loss.

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Nonetheless, the Corps' responses to comments repeatedly point to this unverified model as if its predictions are fact.

29. The FSEIS repeats problems associated with risk and uncertainty addressed in CRANE's previous comment letters. See DSEIS Comments, at 21. In response to CRANE's criticisms about the use of best professional judgment ("BJP"), the Corps quotes Holloway for the proposition that "some types of risk assessments require extensive use of BJP." Response to Comments, at page Stakeholders/Special Interests-85. Holloway never claims that BJP is science, which undermines the Corps' admission that it relies heavily on this method of assessment. The use of BJP yields results that are uncertain to an unquantifiable extent; reliance on BJP can, therefore, infuse a study with overwhelming uncertainty. The cited Holloway article describes only elements necessary for a scientifically-based assessment, and is not, as the Corps suggests, a whole-hearted endorsement of the use of BJP in the place of scientifically sound studies and data assessment.
30. The Corps also quotes R.T. Lackey for the proposition that "[t]he decision to use risk assessment is a heavily value-laden decision. Technical expertise cannot substitute for values and priorities in ecological risk assessment; these are issues of policy and not science." The Corps is correct that BJP is inherently value-laden and that risk assessment decisions are largely policy-driven. Still, in order to make informed decisions about what society considers to be acceptable levels of risk, the Corps' risk managers must consider some baseline data. At the very least, the Corps must be able to quantify the level of risk inherent in these policy decisions; the FSEIS's reliance on BJP and limited data constrains the Corps' risk managers in their ability to perform even this meager environmental review function.
31. As CRANE has noted in its previous comments, risk assessment analysis can only be done using a simulation model and examining the output under a suspected range of conditions. See DSEIS Comments, at 21. The Corps has not prepared a simulation model or examined the likely outcomes of various risk scenarios. If any risk assessment has been undertaken, it appears to be some strange sort of "verbal risk assessment," which is not identified as an appropriate methodology in any risk-assessment handbook.

32. As a number of comments above suggest, baseline sampling is essential to risk assessment, and the FSEIS simply does not provide the level of information needed to undertake that task. In particular, with regard to the Corps' invertebrate sampling, we note that a baseline rarely means a single year's, or even two consecutive years, of sampling. An examination of the variability associated with the Corps' sampling conducted suggests that two years is insufficient time to adequately understand the area. See generally Bottom and Jones, "Species Composition, Distribution, and Invertebrate Prey"; Jones, et al., "Community Structure, Distribution, and Standing Stock"; Brodeur, "The Importance of Various Spatial and Temporal Scales." This is especially true when dealing with species that are early colonizers, such as Corophium, because they tend to be forced out of more stable areas.
33. With regard to mobile epibenthos, the Corps continues to ignore basic species characteristics (i.e., mobile epibenthos' tendency to mimic drift organisms, yet be sufficiently high up in the water column to be ingested by a visual predator with a terminal mouth) in its analysis of salmonid prey activity. The reasons for ignoring this assemblage are based solely on the basis of two studies of fish stomachs with virtually no food in them. See discussion above at Section II(C)(16). The Corps improperly excludes mobile epibenthos from its baseline analyses; without consideration of this important element of the ecosystem, the Corps' conclusions regarding the likely effects of Project actions, including the restoration projects, cannot be considered complete or accurate.
34. The Corps continues to rely upon an unpublished paper by Bottom et al. (2001) for many of its conclusions regarding the monitoring program. This paper is still listed as a "draft" and has been unavailable for independent review. Without independent verification of its content, it is impossible to determine whether its conclusions are valid.
35. As CRANE has noted repeatedly, a successful monitoring program depends upon being able to 1) choose variables sensitive enough to change to detect any Project-related changes, 2) be able to understand the background variability associated with the variables of interest to be able to sort out effect from noise, 3) choose variables that have a demonstrated cause-effect relationship with the actions of the

Project, 4) choose variables such that their changes will produce detectable changes in the target populations, 5) design sufficient spatial and temporal extent to the sampling so as to a) capture that variability and b) determine an effect, and 6) have sufficient sample size to provide sufficient power to any comparisons. This cannot be done without first having some notion of what the values might actually be. Certainly, none of these requirements can be met if, as is the case in the FSEIS, a monitoring program is based upon the predictions of an unverified model.

36. The Corps' responses to comments SS-170 and SS-171 (a) point again to the "unprecedented work of the SEI panel and consultation process" to conclude that levels of uncertainty have been reduced to appropriate levels, (b) mischaracterize CRANE's comments regarding to demand the total elimination of uncertainty, and (c) purport to cite Holling to support the Corps' assertion that any remaining uncertainty is acceptable and can be dealt with through modeling. See Response to Comments, at pages Stakeholders/Special Interests-76-94. CRANE reiterates its previous comments on adaptive management below to correct the Corps' apparent misunderstanding.

Adaptive management uses the principles of adaptive environmental assessment and management ("AEAM") to establish and predict outcomes, reduce uncertainty about variability and conduct sensitivity analyses. In order to have an effective adaptive management program, the three groups of uncertainty that this process must deal with are:

- a. That which cannot be eliminated or reduced, but whose magnitude and relative importance can be estimated (the estimation of magnitude and importance should be quantitative rather than qualitative). These comprise the 'unknowable responses' or 'true surprises' that arise from the ever-changing character of ecosystems and their response to unprecedented perturbations,
- b. That arising from lack of understanding and principles. These comprise such elements as control and replication and the difficulties associated with nonlinearity and spatial scaling, which make transferring results

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difficult, (these arise from measuring variables at a smaller spatial and temporal scale, then attempting to interpret them at a scale greater or lesser. Linkages and interacting elements, if not understood, tend to make these extrapolations difficult) and

- c. Data quality, which includes the determination of which parameters are most relevant and monitoring program design.” Data quality is perhaps the most important element of uncertainty for this Project, or at least the element of uncertainty that must be dealt with first, as all other forms of uncertainty derive from and are compounded by data uncertainty.

Other factors that must be dealt with include: incertitude, errors in certitude (quantitative departures from the truth), incomplete data, anecdotal data gathered with no statistical design (BJP), inappropriate extrapolation, temporal and spatial variation of the measured parameter, and the inadequacy of models. All of these must be identified, assessed, and addressed as part of any adaptive management program. See C.S. Holling (ed.), Adaptive Environmental Assessment and Management (1978); C. Walters, “Challenges in Adaptive Management of Riparian and Coastal Ecosystems,” 1 Conservation Ecology 1-22 (1997) [hereinafter “Challenges in Adaptive Management”]; C.J. Walters, Adaptive Management of Renewable Resources (2002); J. Houlahan, “Big Problems, Small Science,” 2(1) Conservation Ecology 1-3 (1998); K. Rogers, “Managing Science/Management Partnerships: A Challenge of Adaptive Management,” 2(2) Conservation Ecology 1-6 (1998). All of these comments were made in relation to the DSEIS, and the concepts of which they are a part were considered critical by both the SEI panel members and the agencies. Despite this unanimity of opinion, the Corps fails to undertake the research actions and underlying preparatory work necessary to perform these tasks.

The current adaptive management program still addresses none of the above concerns. There are no environmental benchmarks against which to measure progress or initiate changes in procedures. A number of authors have stated that even in well-designed adaptive management programs, lack of implementation and coordination among agency personnel can defeat the very purpose of adaptive management. Walters, “Challenges in Adaptive Management”; Stephen C. Ralph

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and Geoffrey C. Poole, "Putting Monitoring First: Designing Accountable Ecosystem Restoration and Management Plans," in Restoration of Puget Sound Rivers 226-47 (D.R. Montgomery, et al. (eds.)) (attached as Exhibit 27) [hereinafter "Putting Monitoring First"]. Therefore it is even more important to have these elements well-described, with potential "fixes" and "changes in direction" identified, along with their predicted outcomes.

Finally, CRANE's commentator was trained in developing and using AEAM by Holling and Walters in 1977. In keeping with not only the spirit, but also the letter of this training, the commentator consistently states that "incertitude can be eliminated, but that uncertainty can only be minimized."

37. We reiterate the comments and criticisms of the Corps' adaptive management approach raised in prior CRANE comment letters. Ralph and Poole in their paper concerning the theory and reality of how adaptive management is conducted discuss these issues at length. See Ralph and Poole, "Putting Monitoring First." As the Corps has not provided significant response to CRANE's previous comments, we offer the following additional information from Ralph and Poole for its consideration:

**Consequently, our attempts to implement iterative, adaptive restoration or management actions will also fail unless managers and researchers: (1) alter their current conceptual models about the relationship between monitoring and management/restoration; (2) design and implement monitoring programs before planning restoration/management actions; (3) recognize the need for hierarchical monitoring programs and learn how to implement them; and (4) eliminate myths about monitoring, including the assumption that we can generate reliable new information about management and restoration actions simply by observing their outcomes.** In order for monitoring programs to provide reliable and timely information required by iterative and adaptive approaches to ecosystem restoration and management, **monitoring programs must serve as a scientifically rigorous framework for "Empirical Management" of natural resources.** To accomplish this, managers and researchers must work **together first to design hierarchically-structured monitoring experiments and then to plan on-the-ground management and restoration actions that serve as experimental manipulations** within the context of the monitoring experiment. Unlike current approaches, this empirical approach has the potential to generate rigorous new scientific information about the efficacy of implemented actions and therefore could support adaptive, iterative improvement in management and restoration plans."

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**We believe that adaptive management has failed largely because many processes implemented under the label “adaptive management” have only superficial similarities to the concept outlined by Holling (1978).** To illustrate, we contrast Holling’s Adaptive Management (HAM), a science-based process, with the more commonly initiated process, which we term “socio-political adaptive management” (SPAM).

Holling’s Adaptive Management is a complete resource-management paradigm designed to provide a means of addressing the uncertain ecological risks associated with land-use and water-use decisions. **In theory, Holling’s Adaptive Management builds a credible scientific foundation by envisioning land-use activities (e.g., laying out timber sales, setting prescribed fire, building roads, stream restoration, and so on) as experimental manipulations that are implemented within the context of well-designed monitoring experiments.** This strategy seeks to simultaneously generate economic value *and* scientific understanding of ecosystem response to human activities (see also Holling and Meffe 1996; Walters 1997).

Socio-political adaptive management concepts emerge from socio-political decision-making processes (Chapter 6). Socio-political adaptive management concepts generally assume that an *independent* monitoring effort will be able to document any negative ecological impacts associated with continued land use, even though monitoring is not typically viewed as a series of well-designed experiments. **In part because of their genesis in the policymaking realm, socio-political adaptive management concepts often are scientifically incomplete and ineffective. Often, they are based on only casual or uninformed interpretations of Holling’s Adaptive Management.**

Explicitly recognizing the role of the socio-political adaptive management concept in consensus-building processes underscores Lee’s (1999) first conclusion ...by revealing that **socio-political adaptive management has little utility beyond facilitating consensus-building processes.** Any resulting consensus-based management/restoration plan is unlikely to induce adaptive social learning and changes in behavior.

There are two reasons for this failing. **First, consensus-building processes typically focus first and foremost on the nuts-and-bolts of determining allowable or acceptable management actions (e.g., defining best management practices, determining when they should apply, and deciding which should be mandatory and which should be voluntary).** Therefore, the consensus process results in a relatively complete blueprint for management actions, but no more than a statement of need for a monitoring plan and a requirement that it be developed in the future. Although management actions and monitoring programs are originally envisioned as interdependent activities (Figure 2a), **management actions typically**

**are designed to proceed prior to implementation of the monitoring program** (Figure 2b). The process may be well-intentioned and earnest, but **the substance and schedule of the monitoring plan is often poorly defined**. Thus there is little economic or political impetus to carry through on the monitoring component of the agreement. **Given that adequate monitoring is both time-consuming and expensive, planned monitoring programs are sometimes not implemented; even when implemented, they may be short-lived**. This results ultimately in the failure of the planned adaptive process and the loss of the opportunity to collectively explore the efficacy of agreed-to management decisions. Monitoring programs that do not last long enough to generate new information result in a linear rather than iterative process (Figure 2c). **The burden of proof to show the harmful effects of management decisions thus remains with the ecological system at risk, with no real prospect for lessening that burden through learning.**

**Second, monitoring programs that accompany socio-political adaptive management plans typically fail to recognize that reliable new information can only be generated by conducting well-planned scientific experiments. This requires generating credible hypotheses and designing monitoring experiments to adequately test these hypotheses.** Although some have argued that monitoring must be approached as an experiment with testable hypotheses (Walters 1986; Conquest and Ralph 1998; Currens et al. 2000), contemporary socio-political adaptive management plans tend to result in scientifically ineffectual monitoring programs (Walters 1997).

We illustrate this point by outlining several commonly held and deeply entrenched “myths” about monitoring and argue that most contemporary monitoring programs are built upon one or more of these myths, each of which can eliminate necessary scientific rigor from monitoring programs.

***Myth 1: We can monitor anything, it's just a matter of figuring out how.***

Because of real-world limitations arising from political, technical, and budget realities, some ecosystem responses are more easily measured over time than others. **Yet managers often set management benchmarks without considering our ability to accurately and repeatedly determine the status and trend of the benchmark (e.g., Poole et al. 1997).** Natural resource management goals, such as salmon recovery, need to be framed in terms of what we can (and will) measure so that we can determine success or failure. In contrast with contemporary management planning, management goals (in the form of benchmarks) should be set *after* determining what we are politically, technically, and financially able to measure.

***Myth 2: We can learn from our management actions alone.***

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**Landscapes and watershed processes that control the expression of salmon habitat can vary substantially in how they respond to disturbances** (Reeves et al. 1995). For example, the frequency and magnitude of sediment inputs from steep unstable hillslope terrain will increase in proportion to logging and road building in comparison to similar timber harvest activities conducted in flat terrain with few erodible features. **In part because of this variability, management actions conducted outside of the context of a rigorous experimental design do not generate new knowledge that is broadly applicable. In the absence of an experimental control, there is no way to determine whether the effect of the management action or the effects of other events and processes are linked to observed changes.** Traditionally, land managers have taken a trial-and-error approach, where future decisions may be made based upon implementing a management action to “see what happens” and figuring they “would not do it again if the desired outcome is not achieved.” **If the outcome “looks good” based on limited, informal observation over a short period of time, the activity is assumed to have succeeded. This approach can lead to innumerable problems, such as the increasing frequency of perceived “acts of God” which result from delayed or cumulative effects of management activities.**

***Myth 3: Monitoring can be a separate activity from management; i.e., an adequate monitoring program can be developed in response to proposed management or restoration actions.***

If monitoring is to generate new information, it has to be approached as an experiment that tests hypotheses about the effects of management actions. If monitoring represents such an experiment, management activities (whether intended to restore watersheds or extract resources) must be planned as experimental manipulations associated with the monitoring experiment.

Thus, for monitoring to fulfill its requisite role in a rigorous, iterative and adaptive strategy for natural resource management, on-the-ground actions must be planned within the context of a monitoring experiment, not after-the-fact.

Interestingly, debunking any of these myths results in the same conclusion — monitoring programs must be designed *before* agreeing on management benchmarks, *before* determining what management actions are appropriate, and *before* laying out management or restoration activities across the landscape. **In other words, for adaptive management to succeed, on-the-ground activities must be designed *within the context of rigorous monitoring programs. Therefore, monitoring programs must be designed first.***

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The Corps' proposed monitoring and adaptive management plan clearly fit the definition of Ralph and Poole's "SPAM," committing all the sins highlighted in the paragraphs above.

38. The Corps' Exhibit I (Essential Fish Habitat ("EFH")) includes statements about river depth and productivity that are not supported by data, and are unlikely to be accurate. See FSEIS, Exhibit I, Essential Fish Habitat Assessment (Revised), at pages 3-4 [hereinafter "EFH Report"]. In addition, the EFH Report includes statements about habitat loss and gain that are not supported by any assessments of actual habitat use. Although the Corps concludes that the habitats in question are non-unique, common sense tells us that if organisms are using the habitat, that habitat must be important for some reason. See id. The Corps' determination that these habitats are not unique demonstrates a lack of understanding about why organisms choose habitat, and is not supported by either accepted theory or data. As noted below in Section II(C)(39) with regard to the Corps' HEP process, the conflation of potential habitat with actual habitat is intellectually bankrupt, and undermines the Corps' overall EFH conclusions.
39. The Corps responds to CRANE's previous comments on and criticisms of the HEP procedure by (a) reasserting that the HEP analysis is sufficient "to establish baseline habitat value of disposal and mitigation sites," (b) confirming that the HEP analysis was intended to be used as a substitute for wetland delineation, and (c) rejecting the suggestion that appropriate habitat assessment would take place at the landscape matrix scale. Response to Comments, at page Stakeholders/Special Interests-91. As none of these responses addresses the major problems raised in CRANE's previous comments, we reiterate those comments here. Furthermore, we note that:
- As noted above in Section II(C)(19), since 1989, best available science has strongly supported use of a landscape-level process to understand the functions of the various components of an ecosystem. Such an approach is especially critical in a dynamic system like the Columbia River and its estuary, where the risk associated with improper modeling is high.

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- The Corps' use of its HEP model remains suspect because each HEP is designed as a single-species approach to evaluating *potential* habitat. The authors of each HSI state quite clearly that this method does not measure actual habitat use, and cannot serve as a replacement for actual population data. Credible HEP and HSI modeling efforts require the input of detailed analyses; the Corps' analysis appears only to consider similarity of dominant cover types for breeding purposes, which is clearly insufficient to support a more expansive modeling effort.
- The Corps fails to define the concepts of "habitat needs" and "habitat" in a clear and justifiable fashion in relation to its HEP modeling. There has been a tremendous amount of criticism of the implied definitions used in this document, especially in the published scientific literature. See, e.g., L.S. Hall, et al., "The Habitat Concept and a Plea for Standard Terminology," 25 *Wildlife Society Bulletin* 173-82 (1997) (attached as Exhibit 28). The Corps' definition of these terms is unacceptably limited. The FSEIS apparently defines habitat as "dominant plant cover." Instead, habitat should be regarded as a function of the actual use of a resource by an animal or plant. In addition, a number of the species-specific HSIs used in the FSEIS fail to follow the procedures outlined in Anderson and Gutzwiller (1995), the guidance document cited by the Corps. Therefore, the Corps' HEP process is fatally flawed, because the Corps' HEP makes no distinction between the mere presence of plant types and their actual use as habitat. See Trent L. McDonald and Lyman L. McDonald, "A New Ecological Risk Assessment Procedure Using Resource Selection Models and Geographic Information Systems," 30 *Wildlife Society Bulletin* 1015-21 (2002) (attached as Exhibit 29) [hereinafter "A New Ecological Risk Assessment"]. The Corps' approach fails to provide quantitative assessment of habitat quality, as it relates to use, and therefore, no "significance" can be attached to the conclusions drawn from the modeling.
- Another essential element of modeling is the inclusion of habitat suitability curves, which are entirely absent from the Corps' efforts. The Corps also uses some models developed in the late 1970s and early 1980s, which are badly outmoded and need to be updated using the reams of data generated on these

species in the intervening time period. An even greater flaw in the Corps' approach is that most HSI curves they have generated are based on little or no quantitative data. See FEIS, App. G, Wildlife Mitigation. Despite purporting to provide a linear regression analysis, the Corps fails to document any role of interaction effects between and among the various levels of each resource. This is critical, as the resources used by organisms do not exist in absence of one another. Scientists have long recognized the importance of interaction effects. See, e.g., Peter C. de Ruiter, et al., "Energetics, Patterns of Interaction Strengths, and Stability in Real Ecosystems," 269 Science 1257-60 (Sept. 1995) (attached as Exhibit 30). As a result, the scientific community regards the use of HEP processes and associated "potential" HSI that use habitat models that lack not only verification and calibration, but which are also based on habitat use theory, as invalid. See, e.g., Mark S. Boyce and Lyman McDonald, "Relating Populations to Habitats Using Resource Selection Functions," 14 Trends in Ecology and Evolution 268-72 (1999) (attached as Exhibit 31) [hereinafter "Relating Populations to Habitats"]; Bryan F.J. Manly, et al., Resource Selection by Animals: Statistical Design and Analysis for Field Studies (2002) (attached as Exhibit 32); Michael S. Mitchell, et al., "Test of a Habitat Suitability Index for Black Bears in the Southern Appalachians," 30 Wildlife Society Bulletin 794-808 (2002) (attached as Exhibit 33); John A. Bissonette, "Linking Landscape Patterns to Biological Reality," in Landscape Ecology and Resource Management: Linking Theory with Practice 1-14 (John A. Bissonette and Isle Storch eds.) (2003) (attached as Exhibit 34).

- The Corps continues to ignore sources like McDonald and McDonald 2002 and Mitchell et al. 2002, which describe the necessary elements of setting up an HSI that can be used to generate predictions concerning *actual* habitat use. Despite the recent dates of these publications, their approaches have been well known since the 1980s. Notably, none of the elements described by Mitchell were used in the HEP process established by the Corps' working group. No telemetry studies were conducted to see whether and how populations actually use the existing areas. No population surveys were conducted over space and time to attempt to tie the presence of resources to the USFWS assessment of quality. The Corps' HSIs were constructed almost entirely of anecdotal

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sighting data from other portions of the country. The assumption that these models could be applied throughout all ecoregions of the United States has been tested and shown to be invalid. See Jeffrey J. Louckmas and Richard S. Halbrook, "A Test of the Mink Habitat Suitability Index Model for Riverine Systems," 29 Wildlife Society Bulletin, 821-26 (2002) (attached as Exhibit 35) [hereinafter "Test of the Mink HSI"].

40. CRANE reiterates its comments questioning the HSI employed for Great Blue Herons. As we have noted in past comments, prey population size, not diversity of cover types, is consistently cited as the most important of the foraging site characteristics. Furthermore, the use of this HSI calls for adequate ground-truthing to ensure that prey population characteristics are met. Despite the Corps' assertions in responses to comments to the contrary (see Response to Comments, at page Stakeholders/Special Interests-79), examination of the Appendix G of the 1999 FEIS, which was purported to contain these data, reveals that the Corps' methodologies are extremely inadequate. Other than a site visit to ground-truth aerial photo information, no field investigations were undertaken. As a general matter, the Corps failed to undertake any HSI model verification, despite the fact that model verification is critical to the use of the HSI approach. See Michael Morrison, et al., Wildlife-Habitat Relationships: Concepts and Applications (Chs. 5 and 10) (1998) (attached as Exhibit 36) (stating that HSI model verification is essential to the use of the HSI approach) [hereinafter "Wildlife-Habitat Relationships"].
41. CRANE reiterates its comments questioning the sufficiency of the mink HSI, and notes that recently published literature has pointed out the lack of utility of this entire HSI. See Louckmas and Halbrook, "Test of the Mink HSI."
42. As discussed above in Section II(A)(14), the Corps contends that the Project complies with the Sandhill Recovery Plan. We note, however, that this document specifically states that the proposed mitigation for filling does not address the needs of Sandhill Cranes, but rather other waterfowl. Sandhill Recovery Plan, at page 25. No work has been done by either the Corps or the sponsor ports to establish how many birds use the affected habitat, for how long, and in what specific locations. The State estimates use by approximately 4000 birds, with at

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least 1000 Sandhill Cranes using the area for overwintering. Id. The Corps assumes the limiting factor for Sandhill Cranes is food, but has not actually established limitation factors based upon real data. The Sandhill Recovery Plan specifically warns that destruction of Sandhill Crane habitat in the Vancouver Lowlands will present a challenge to species survival; the Corps presents no plan to address this serious concern.

43. In its analysis of water quality effects, the Corps describes the Project-related impacts as a “short-term increase in turbidity and sediment suspension” from “initial deepening” and “initial restoration.” FSEIS, at page 4-16. Similarly, the Corps describes the adverse effects of the Channel Deepening and restoration projects as “temporary.” Id., at pages 4-19, 4-21. The Corps’ characterization of water quality and fishery effects as temporary is inconsistent with the description of the proposed action and misleading for agency decision-makers. The Channel Deepening will require year-round construction activities for two years followed by unending annual maintenance dredging between the months of May and October. FSEIS, Exhibit J, Revised Columbia River Sediment Impacts Analysis, at page 25. The Corps cannot pretend that continuous and never-ending dredging of the Columbia River and estuary will have only temporary water quality effects associated with the initial construction of the deeper channel and implementation of “restoration” fills. Channel maintenance will continue indefinitely and the environmental impacts of maintenance cannot be artificially separated from those of construction. They are connected actions and the maintenance will include maintenance of the deeper channel. Moreover, the disposal sites described in the FSEIS and subject to Corps approval will be used for channel maintenance. Any description of effects on water quality and fisheries as temporary is highly misleading. Even the Corps’ description of the Miller Sands and Lois Island “restoration” projects demonstrates that water quality and listed salmonid effects are not accurately characterized as temporary. In one case, the disposal site will be access via a sump that will be continuously operated for years until the Lois Island site is filled. At the location of the sump, hopper dredges will discharge several million cubic yards of dredge spoils during repeated visits. The other site will also be subject to repeated discharges of dredge spoils over a period of 15 to 20 years.

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In each restoration project, the Corps will continuously deposit dredge spoils in water to raise the bottom elevation of hundreds of acres of the Columbia River. Water quality will obviously be repeatedly impacted until in-water disposal ends in 15 to 20 years. Then, it will take some time for the impacted area to reach equilibrium and begin to recover. Thus, even the proposed restoration projects will adversely affect approximately 5 to 7 salmon life cycles. It strains credibility when these effects are described as temporary.

44. The Corps' analysis of the effects of the project on White and Green Sturgeon is utterly inadequate. The Project will likely have severe impacts on sturgeon in at least three ways: (1) entrainment during dredging, (2) burial and loss of feeding opportunities because of flow lane disposal, and (3) burial and loss of feeding and rearing areas due to ecosystem "restoration" fills within the estuary's waters.

The likelihood that the project will adversely affect sturgeon is evident. The dredging will occur at depths where juvenile and adult sturgeon are found. The dredging will occur when sturgeon, including migrating Green Sturgeon, are present. Flowlane disposal will occur at depths of 35 to 65 feet, where sturgeon are found. FSEIS, Exhibit E, Section 404(b)(1) Evaluation (Revised), at page 7. Even the "restoration" projects will cause adverse effects. For example, the Lois Island restoration site is a rearing area for sturgeon, and the Corps has acknowledged that sturgeon rearing and presence are especially high around Lois Island restoration project and its associated dredging sump. Response to Comments, Comments of the State of Oregon, at page State-6.

The Corps analysis of effects on sturgeon relies on a study that merely confirms the presence of White Sturgeon in the channel dredging and disposal areas. See generally Sturgeon Report. The study confirming the presence of sturgeon expressly disclaims any utility for describing the effects of dredging on sturgeon. Id., at page 1. In fact, a study of the effects of the Project on sturgeon will be conducted and a report prepared *after* the close of public comment and *after* the expected timing of the Corps' decision on Channel Deepening. FSEIS, at pages 6-5, 6-22, 6-23, 6-38, 6-30. The need for study and the timing of its completion

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suggest that the Corps' analysis of effects on White Sturgeon and Green Sturgeon is entirely unreliable. See Response to Comments, Comments of the Washington Department of Ecology, at pages State-33-34 (confirming that the Corps has a long way to go on basic understanding of sturgeon presence, habitat use and dredging effects). As the WDFW notes, the Corps needed to assess the effects of the action on sturgeon and design mitigation *before* authorizing the project for construction. See Response to Comments, at pages State-57, 58. As it is, WDFW points out that the Corps is rushing the Project to authorization and construction, and precluding any attempt by WDFW to adequately protect sturgeon through avoidance and mitigation conditions.

45. The Corps failed to consider the effects of the Project on species of Lamprey that are now the subject of petitions for listing under the ESA. Petition for Rules to List Four Species of Lamprey (Jan. 23, 2003) (enclosed as Exhibit 37). Lamprey species, including those inhabiting the Columbia River, are experiencing a marked decline in population due to human activities and impacts. Id., at pages 8-9, 32-38, 44. Lamprey juveniles, known as ammocoetes, are particularly vulnerable to entrainment, burial and mortality during dredging because they burrow in estuary mud. Id., at 51, 58. This is particularly so for river lamprey, which concentrate their life cycle in the lower river estuaries such as the Columbia River estuary. Id., at 15.
46. In summary, the Corps' refusal to incorporate landscape elements into their analysis is a rejection of the continued advances in the science and the requirements of Best Available Science as they have stood for a number of years. See Morrison, et al., Wildlife-Habitat Relationships; Boyce and McDonald, "Relating Populations to Habitats"; Jianguo Liu and William W. Taylor, "Coupling Landscape Ecology with Natural Resource Management: Paradigm Shifts and New Approaches," in Integrating Landscape Ecology into Natural Resource Management 3-20 (Jianguo Liu and William W. Taylor eds.) (2002) (attached as Exhibit 38); John A. Wiens, et al., "Integrating Landscape Structure and Scale into Natural Resource Management" in Integrating Landscape Ecology into Natural Resource Management 23-67 (Jianguo Liu and William W. Taylor eds.) (2002); Julie M. Brennan, et al., "Focal Patch Landscape Studies for Wildlife Management," in Integrating Landscape Ecology into Natural Resource

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Management 68-91 (Jianguo Liu and William W. Taylor eds.) (2002) (attached as Exhibit 39); Rebecca L. Schneider, et al., “Aquatic-Terrestrial Linkages and Implications for Landscape Management,” in Integrating Landscape Ecology into Natural Resource Management 241-63 (Jianguo Liu and William W. Taylor eds.) (2002); Virginia H. Dale, et al., “A Landscape-Transition Matrix Approach for Land Management,” in Integrating Landscape Ecology into Natural Resource Management 265-93 (Jianguo Liu and William W. Taylor eds.) (2002); Daniel T. Rutledge and Christopher A. Lepczyk, “Landscape Change: Patterns, Effects, and Implications for Adaptive Management of Wildlife Resources,” in Integrating Landscape Ecology into Natural Resource Management 312-33 (Jianguo Liu and William W. Taylor eds.) (2002); John B. Dunning, “Landscape Ecology in Highly Managed Regions: The Benefits of Collaboration Between Management and Researchers,” in Integrating Landscape Ecology into Natural Resource Management 334-46 (Jianguo Liu and William W. Taylor eds.) (2002); William W. Taylor, et al., “Integrating Landscape Ecology into Fisheries Management: A Rationale and Practical Considerations,” in Integrating Landscape Ecology into Natural Resource Management 366-89 (Jianguo Liu and William W. Taylor eds.) (2002); Richard J. Hobbs and Robert Lambeck, “An Integrated Approach to Landscape Science and Management,” in Integrating Landscape Ecology into Natural Resource Management 412-30 (Jianguo Liu and William W. Taylor eds.) (2002); Monica G. Turner, et al., “Bridging the Gap Between Landscape Ecology and Natural Resource Management,” in Integrating Landscape Ecology into Natural Resource Management 433-60 (Jianguo Liu and William W. Taylor eds.) (2002); Manly, et al., Resource Selection by Animals; Mitchell, et al., “Test of a HSI for Black Bears”; Bissonette, “Linking Landscape Patterns”; Therese M. Donovan and Allan M. Strong, “Landscape Theory and Population Dynamics,” in Landscape Ecology and Resource Management: Linking Theory with Practice 35-54 (John A. Bissonette and Isle Storch eds.) (2003); Thomas C. Edwards, et al., “Modeling Multiple Ecological Scales to Link Landscape Theory to Wildlife Conservation,” in Landscape Ecology and Resource Management: Linking Theory with Practice 153-76 (John A. Bissonette and Isle Storch eds.) (2003); Isle Storch, “Linking a Multiscale Habitat Concept to Species Conservation, in Landscape Ecology and Resource Management: Linking Theory with Practice 303-20 (John A. Bissonette and Isle Storch eds.) (2003). Instead, the FSEIS is based upon a

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methodology that has no theoretical underpinning and little empirical support. The Corps' system functions only as a form of accounting, and does not expand the Corps' actual understanding of the ways in which the Columbia River systems function. The Corps' efforts are further undermined by the paucity of baseline knowledge about the Columbia River ecosystem.

Given this deficit of understanding, it is especially problematic that the Corps has rejected comments about improvements in its approach by stating merely that it does not agree with the commentator's criticisms and suggested approaches. This failure to respond is especially alarming because a number of criticisms raised by CRANE and others are well documented in cited published scientific literature. Rather than reject valid criticisms out of hand, we continue to request that the Corps provide, among other things, detailed habitat suitability, demonstrated use and critical habitat data as required by the published scientific literature. See A.J. Kerkhoff, et al., "Toward a Panther-Centered View of the Forests of South Florida," 4 Conservation Ecology 1 (2000) (attached as Exhibit 40); Robert J. Fletcher and Rolf R. Kofold, "Habitat and Landscape Associations of Breeding Birds in Native and Restored Grasslands," 66 Journal of Wildlife Management 1011-22 (Oct. 2002) (attached as Exhibit 41); S. Douglas Cram, et al., "Northern Bobwhite Population and Habitat Response to Pine-Grassland Restoration," 66 Journal of Wildlife Management 1031-39 (Oct. 2002) (attached as Exhibit 42); Heather I. Johnston and John T. Ratti, "Distribution and Habitat Selection of Canyon Wrens, Lower Salmon River, Idaho," 66 Journal of Wildlife Management 1104-11 (Oct. 2002) (attached as Exhibit 43); Brett G. Dickson and Paul Beier, "Home Range and Habitat Selection by Adult Cougars in Southern California," 66 Journal of Wildlife Management 1235-45 (2002) (attached as Exhibit 44); Terrell D. Rich, "Using Breeding Land Birds in the Assessment of Western Riparian Systems," 30 Wildlife Society Bulletin 1128-39 (2002) (attached as Exhibit 45); Brent E. Jamison, et al., "Invertebrate Biomass: Associations with Lesser Prairie-Chicken Habitat Use and Sand Sagebrush Density in Southwestern Kansas," 30 Wildlife Society Bulletin 517-26 (2002) (attached as Exhibit 46); Keith B. Aubry and Catherine M. Raley, "Selection of Nest and Roost Trees by Pileated Woodpeckers in Coastal Forests of Washington," 66 Journal of Wildlife Management 1104-11 (Oct. 2002) (attached as Exhibit 47); David R. Brown, et

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al., "Demographic Effects of Habitat Selection by Hermit Thrushes Wintering in a Pine Plantation Landscape," 66 Journal of Wildlife Management 407-16 (April 2002) (attached as Exhibit 48); Cameron L. Aldridge and R. Mark Brigham, "Sage-Grouse Nesting and Brood Habitat Use in Southern Canada," 66 Journal of Wildlife Management 433-44 (April 2002) (attached as Exhibit 49); Hartwell H. Welsh and Amy J. Lind, "Multi-Scale Habitat Relationships of Stream Amphibians in the Klamath-Siskiyou Region of California and Oregon," 66 Journal of Wildlife Management 581-602 (July 2002) (attached as Exhibit 50); Louis Provencher, et al., "Breeding Bird Response to Midstory Hardwood Reduction in Florida Sandhill Longleaf Pine Forests," 66 Journal of Wildlife Management 641-61 (July 2002) (attached as Exhibit 51); Joseph M. Kolowski and Alan Wolf, "Microhabitat Use by Bobcats in Southern Illinois," 66 Journal of Wildlife Management 822-32 (July 2002) (attached as Exhibit 52); Joel M. Budnick, et al., "Effect of Habitat Characteristics on the Probability of Parasitism and Predation of Bell's Vireo Nests," 66 Journal of Wildlife Management 232-39 (Jan. 2002) (attached as Exhibit 53); Richard L. Hutto and Jock S. Young, "Regional Landbird Monitoring: Perspectives from the Northern Rocky Mountains," 30 Wildlife Society Bulletin 738-50 (2002) (attached as Exhibit 54); Dorothy M. Feckse, et al., "Field Evaluation of a Habitat-Relation Model for the American Marten," 30 Wildlife Society Bulletin 775-82 (2002) (attached as Exhibit 55); John C. Kilgo, et al., "A Test of an Expert-Based Bird-Habitat Relationship Model in South Carolina," 30 Wildlife Society Bulletin 783-93 (2002) (attached as Exhibit 56). At the most basic level, all habitat composition models must be verified prior to use in decision-making. See Morrison, et al., Wildlife-Habitat Relationships. By contrast, the Corps offers no data to support any of the conclusions derived from its HEP modeling, and none of the models used in the USFWS HEP analysis have been verified. This critical failure alone demonstrates that the Corps has not undertaken the competent or cutting edge approach to modeling it purports to offer, and undermines its conclusions about the likely effects of the Project on the Columbia River ecosystem.

### III. CONCLUSION

For all the reasons set forth above and in CRANE's previous comment letters, including the DSEIS Comments, the FSEIS's analysis of the likely environmental and

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economic effects of the Channel Deepening Project is inadequate and fails to meet the requirements of federal law. Not only does the FSEIS continue to rely on bad science and bad economics to reach the conclusion that Channel Deepening should proceed, but it is based upon Biological Opinions from agencies that reached their no jeopardy conclusions in a manner that was arbitrary and capricious. In addition, the Corps has made significant changes to the Channel Deepening program and new species have emerged for listing since the issuance of the NMFS and USFWS 2002 Biological Opinions. For these reasons, CRANE requests that NMFS and USFWS withdraw their consultations, and that the Corps develop a new Channel Deepening Project proposal that addresses the failings described in this letter and in CRANE's previous comment letters, and complies with federal law.

Sincerely,

Mark W. Schneider

MWS:sk

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cc: (with enclosures) CRANE  
(without enclosures—*Enclosures Available Upon Request*)

The Honorable Gary Locke  
The Honorable John Kitzhaber  
The Honorable Maria Cantwell  
The Honorable Patty Murray  
The Honorable Gordon Smith  
The Honorable Ron Wyden  
Congressman Brian Baird  
Congressman Earl Blumenauer  
Congressman David Wu  
The Honorable John Iani, U.S. Environmental Protection Agency  
Mr. Robert Lohn, NOAA Fisheries  
Mr. Michael Crouse, NOAA Fisheries  
Ms. Cathy Tortorici, NOAA Fisheries  
Ms. Anne Badgely, USFWS  
Ms. Loree Randall, WDOE  
Mr. Russell Harding, ODEQ  
Ms. Christine Valentine, ODLCD