POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and THE PORT OF SEATTLE, Respondents.	No. 01-133 DECLARATION OF AMANDA AZOUS IN SUPPORT OF ACC'S MOTION FOR STAY (Section 401 Certification No. 1996-4-02325 and CZMA concurrency statement, issued August 10, 2001, Related to Construction of a Third Runway and related projects at Seattle Tacoma International Airport)

Amanda Azous declares as follows:

1. I am over the age of 18, am competent to testify, and have personal knowledge of the facts stated herein.

2. I am an environmental scientist, principal of Azous Environmental Sciences and a professional wetland scientist (Society of Wetland Scientist No. 001067). I am co-editor and co-author of *Wetlands and Urbanization* (CRC/Lewis Press 2000), a 300-page text and reference book on how best to protect and manage wetlands in an urbanizing environment. This text grew out of research performed by the Puget Sound Wetlands and Stormwater Management Research Program Team, of which I was a part. The research program was funded by the Washington State Department of Ecology, U.S. Environmental Protection Agency, King County Department of Development and Environmental Services, King County Department of Natural Resources, King County Surface Water Management

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Division, and the University of Washington. I have a Masters degree in environmental engineering and science (1991) and a Bachelor of Arts in landscape architecture (1977), both from the University of Washington. I have worked as a scientific analyst for over 20 years and have specialized in natural resource science since 1991. Attached hereto as Exhibit A is my curriculum vitae.

3. Azous Environmental Sciences (AES) was asked, by the Airport Communities Coalition (ACC), to review the documentation provided by the Port of Seattle describing its proposed development at Sea-Tac airport for possible impacts to wetlands, streams and fisheries resources beginning in May 2000. The Port's Wetlands Delineation and Wetland Functional Assessment documents as well as the Natural Resources Mitigation Plans, the JARPA permit application and other documents related to activities affecting aquatic resources were evaluated in letters to the Department of Ecology and the U.S. Army Corps of Engineers dated August 16th and September 1st of 2000, and February 16th and July 6th 2001 (attached hereto as Exhibits B through E, respectively). In addition, I submitted detailed comments to Ecology and the Corps on the proposal to construct a temporary freeway interchange off of State Route 509 on May 24th and June 5th of 2000, and May 14th of 2001 (attached hereto as Exhibits F, G, and H, respectively). I have also reviewed the Port's July 2001 Low Flow Analysis/Flow Impact Offset Facility Proposal, Stormwater Management Plan as well as Ecology's recent CWA Section 401 certification decision dated August 10, 2001.

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4. . . . I understand that the ACC has filed an appeal with the Pollution Control Hearing Board challenging the Section 401 Certification (No. 1996-4-02325) and the CZMA concurrency statement, issued August 10, 2001, to the Port of Seattle. ACC has requested a stay until the questions it has raised concerning compliance with the Clean Water Act have been resolved by the Pollution Control Hearings Board (PCHB). I am submitting this declaration in support of ACC's appeal and motion for stay because I am convinced that the Natural Resource Mitigation Plan (NRMP) and related measures proposed by the Port of Seattle are inadequate to compensate for the losses in wetlands and wetland functions, and that the Port's proposal will cause irreparable harm. Once the Port's proposed alterations of wetlands and stream systems occur, including filling of wetlands, it will be impossible to restore them to their former condition. If the Board rules in Petitioner's favor at the hearing on the merits, it will not be possible for the Port to unring the bell and restore the streams and wetland systems to their original condition. Grant of a stay will, therefore, prevent the Port from taking irrevocable steps which would significantly degrade the aquatic resources of the Miller, Walker and Des Moines Creek watersheds. In short, the issuance of a stay of the Section 401 Certification will prevent irreparable harm to these wetlands and streams and preserve the status quo while the merits of ACC's appeal are considered by the Board.

5. It is universally accepted that wetlands are among the most productive ecosystems on the planet. The boundary zones (ecotones) between land and inland wetlands and streams are the principal routes for the transport of water, organic matter and

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nutrients within a watershed.[1] An emergent wetland typically will produce three or more times the organic carbon (the basis of the food web) than is produced by a similar area of upland shrub and forest land (1000 g C/m^3 versus 270).[2] The condition of plants growing in water or saturated soil provides a steady supply of water and nutrients that have the potential to support high productivity. The typically anoxic soil makes a suitable environment for nitrogen-fixing bacteria associated with the plant roots. As a result of these processes, wetland communities have a profound influence on the food web, water flow conditions and habitat available in a watershed.

6. The Port plans to fill 18.37 acres of wetlands in the Miller, Walker and Des Moines Creek watersheds, permanently impact an additional 2.05 acres of wetlands along Miller Creek and alter the location of a portion of Miller Creek to accommodate the Third Runway. To mitigate wetland functions lost within the affected watersheds, the Port offers in-basin wetland mitigation that is dominated by enhancement of upland buffers. Sixty-seven acres (62% of the in-basin mitigation) will be enhanced upland buffer area. Just under nineteen acres (28%) of the Port's proposed in-basin mitigation acres will be enhancement of existing wetlands. An incomplete restoration is proposed for 6.6 acres of prior converted cropland (comprising 10% of the in-basin mitigation acres). No

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[1] Hillbricht-Ilkowska, Phosphorus and Nitrogen Retention in Ecotones of Lowland Temperate Lakes and Rivers, HYDROBIOLOGIA, 1993, Vol. 251, No. 1-3.

[2] Barnes and Mann, Fundamentals of Aquatic Ecosystems. Tables 4.1 and 11.1.

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compensatory in-basin wetlands creation is proposed. Table 1 shows the distribution of mitigation activities in-basin, out-of-basin and in total.

Table 1. Distribution of mitigation activities proposed for Third Runway impacts to wetland functions.[3] This table does not include the 2.05 acres of permanently impacted wetlands newly acknowledged in the 401 conditions.

	Mitigation Activity (acres)			
Location	Wetland Creation	Wetland Restoration	Wetland Enhancement	Upland Buffer Enhancement
In-Basin	0	6.6	18.61	67.01
Out-of-Basin	29.98	0	19.5	15.9
Total Mitigation	29.98	6.6	38.11	82.91

7. All wetland creation, the only mitigation activity that will directly provide all wetland functions, (29.98 acres and 22% of the of the total proposed mitigation acres in-basin and out-of basin), will be out-of-basin. With the exception of the partial restoration of an in-basin wetland proposed by the Port, all wetland functions mitigated will be located in an area near Auburn, adjacent to the Green River, well outside the watersheds sustaining the loss.

8. Therefore, it is critical that no impacts occur to the wetlands of Miller, Walker and Des Moines creeks until the Board has had the chance to review the 401 decision. It is critical because the mitigation plan proposed by the Port is fundamentally flawed, does not

[3] *Natural Resource Mitigation Plan (NRMP)*; Seattle-Tacoma International Airport; Master Plan Update Improvements dated December 2000, Parametrix, Inc. page 4-10. (Note that Table 4.1-3 in the Dec NRMP summarizing wetland mitigation activities contains an error. It reports the total mitigation area as 134.39 acres but the actual numbers add up to 132.39 acres.)

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meet the State's water quality standards and thwarts the state mandate to protect aquatic resources. Ecology's regulatory responsibility under WAC 173-201A-070 requires that "existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed." The 401 decision fails to comply with this antidegradation policy, which is what underlies the basis of Ecology's process for wetland mitigation sequencing and for assessing the adequacy of a compensatory wetland mitigation location and design.

9. There are currently approximately 37.42 acres of wetlands that are hydrologically connected to Miller Creek remaining in Miller Creek Watershed.[4] Of that set, 26.02 acres of wetlands are located in the upper Miller Creek watershed. Of those remaining, hydrologically connected wetlands, 7.05 acres will be eliminated by the Port's proposal, which is 21 percent of the wetlands remaining in the entire watershed and 27 percent remaining in the upper watershed. Eliminating such a high percentage of remaining wetlands within a fragile but viable watershed will impair, not protect, water quality, aquatic ecosystem diversity, productivity and stability resulting in significant harm, among them changes in water chemistry, reduced food web support, and alterations to invertebrate communities. The 401 Certification does not require mitigation of wetland functions within-basin. It ignores the need for reasonable assurance prior to approval that

[4] This number was derived from the Port's data identifying wetlands that are immediately adjacent or hydrologically connected to Miller Creek and from the wetland inventories provided by the Cities of Des Moines, Burien and Normandy Park. It does not include ponds or lakes.

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the management of stormwater runoff in the embankment wall and re-plumbed watersheds will afford protection to seasonal water levels in remaining wetlands and creeks. The 401 Certification permits unreasonable risks to water quality and watershed resources. Therefore no filling of wetlands should be allowed while the merits of ACC's appeal are reviewed by the Board.

If filling of wetlands is allowed now, the wetlands will be permanently altered resulting in significant degradation of these urban watersheds. Filling wetlands will result in the clearing of habitat, compaction and disturbance of the native hydric soils, elimination of chemical functions afforded by the mixing of soil and water and the destruction of hydrologic functions so critical to maintaining baseflows in the creeks. Restoring these functions after fill activities have occurred is unlikely to be successful.

10. A recent study by the National Academy of Science (NAS) found that the time for reaching equivalency for soil, plant and animal components in wetland restoration projects ranged from more than three to 30 years for soils, 10 years or more for below ground biomass and more than five to 10 years for establishing a target species composition with the *higher time frames representing wetlands with greater damage.*[5] Re-establishing pre-disturbance conditions by removing stockpiled fill material, once it is deposited, will not restore wetland functions within a reasonable time frame. The wetlands which the Port proposes to fill, and to utilize for temporary roads, erosion control, staging and stockpiling

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will be heavily damaged by these activities which severely compact and disturb soil, interrupt drainage patterns and eliminate habitat functions. According to the NAS study, these high disturbance activities will significantly reduce the success of any restoration effort. In addition, restoration will requires many years to reach equivalency resulting in a significant temporal loss of wetland functions within the watershed -- effectively a permanent loss.

11. The Port has also failed to monitor and establish pre-disturbance water levels in the wetlands that will be affected by the Third Runway construction, making it impossible to effectively recreate predisturbance hydrology, the primary determinant of wetland functions. Water levels were recorded only once in 2000 and three times in 2001, and then only in some but not all of the wetlands to be filled. Monitoring was too sparsely sampled to be representative of conditions or seasonal changes making it unusable to define pre-construction hydrology. Sampling occurred almost exclusively during a low rainfall year and is therefore not representative of normal conditions.

12. The Port should not benefit from this failure to establish accurate pre-construction conditions for wetland hydrology, which would inhibit the ability to repair injury if a stay were not granted and the 401 decision later overturned. Even before the 401 was issued, the Port had eliminated some groundwater flows and cleared vegetation in apparent anticipation of approval. It has also stockpiled huge quantities of imported fill

[5] Compensating for Wetland Losses Under the Clean Water Act. National Academy of Sciences Committee on Mitigating

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around and near numerous wetlands, altering their hydrology and microclimate. The Port's delay in establishing essential data while it altered the pre-construction landscape makes it impossible to rely on the sparse data belatedly gathered as accurately representing pre-construction wetland hydrologic conditions.

13. In effect, the Port's failure to establish a baseline for the wetlands it plans to eliminate would make it doubly impossible to return to the status quo if a stay were not granted, but the Section 401 Certification were later overturned. The degree of disturbance that comes with filling wetlands and the paucity and inadequacy of pre-disturbance hydrologic data render a successful restoration virtually unattainable once fill activities have begun. If the Port is allowed to pursue fill operations in wetlands there will be immediate and irreparable harm to these wetlands.

14. Turning to the merits of the 401 decision issued by DOE, it is clear that the Port's mitigation proposal will fail to compensate for wetland functional losses in the Miller, Walker and Des Moines Creek watersheds because impacts to wetlands are underestimated both in area and in the value of wetland functions provided. The Port has proposed a mitigation package that is unresponsive to the impacts that will occur.

15. I first reported discrepancies in the Port's wetland impact area accounting practices in a comment letter sent to Ecology dated over one year ago, August 16, 2000, followed by comment letters stressing the same concern in September 2000, and February

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Wetland Losses. National Academy Press, Washington DC. 2001 Pre-Publication Copy. P. 36 Table 2.2.

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and July of 2001. For example, I found irregularities in the Port's determinations of the area comprising temporary versus permanent impacts. According to the Port, "temporary" impacts from the project include the construction and use of temporary access roads, temporary sediment and erosion control ponds, staging areas and stockpiling areas in wetlands.[6] These are all activities that severely compact and disturb soil, interrupt drainage patterns and adversely impact habitat functions. Furthermore construction activities in these wetlands are planned to occur over several years and clearly cannot be appropriately categorized as temporary.

16. I also disagreed with the Port's assumption that filling only part of a wetland will leave the remnant portions intact with all original functions, just located in a smaller area. For example, the Port, in its March 19th, 2001 response to the Corps' question about this issue, argued that "reductions in wetland size will result in little or no impact to wetland functions" and claimed that small remnants, such as the 0.04 acres remaining of Wetland R1, the 0.03 acres remaining of Wetland A12, should not be included in tallies of permanent impacts. The Port argued that such wetlands will continue to provide one for one area replacement of all functions found in the original wetland.[7]

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[6] Response to Corps Request for Information– Section 404(b)(1). May 11, 2001. STIA Masterplan Update Improvements. 50248448.02, p. 63.

[7] *Reponse to 2000 Public Notice Comments [Draft] Azous Environmental Sciences, March 19, 2001.* Master Plan Update Projects-Section 404/401 Permits. Seattle Tacoma International Airport, p. 5 Item 15.

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17. The Port and Ecology failed to address this issue for over a year until the 401 decision was actually issued in August 2001. That decision acknowledged for the first time that these "temporary" losses in wetland area would be permanent; but then, incredibly, deferred the mitigation plan for these losses to a future negotiation. The need for additional wetland mitigation was raised well before the 401 was issued and should have been addressed in the mitigation requirements prior to approving the 401. These unreported and unmitigated wetlands losses add to the already multiple sources of risk to the watershed resources of Miller and Walker Creeks

18. The Port's mitigation package is far removed from Ecology's longstanding guidelines for appropriate mitigation activities and ratios.[8,9] The majority of the Port's proposed mitigation is out of kind and out of watershed. It is unrelated to the functions eliminated or the needs of the watersheds affected. This approach cannot be scientifically supported as protecting beneficial uses within the watershed nor does it even replace them in-kind within the Water Resource Inventory Area (WRIA). No wetlands creation is proposed in the affected watersheds, only enhanced planting of buffers and some wetland areas.

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[8] *How Ecology Regulates Wetlands*, Washington State Department of Ecology, Publication 97-112 (Revised April 1998). See discussion on Compensatory mitigation regarding adequacy of mitigation methods.

[9] *Wetland Mitigation Ratios: Defining Equivalency*, Shorelands and Coastal Zone Management Program, Washington State Department of Ecology Publication Number 92-8, February 1992. See discussions on recommended mitigation ratios.

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19. A review of the mitigation activities proposed by the Port shows that with the exception of the 6.6 acre prior converted wetland "restoration" (called Vacca Farm) located in the Miller Creek watershed the remaining 60.4 acres of in-watershed mitigation is enhancement; 41.8 acres of enhanced buffer and 18.61 acres of enhanced wetland. The failure of enhancement activities to compensate for loss of actual wetlands is well documented in the scientific literature[10, 11] yet the Port is arguing and DOE has accepted enhancement of an upland buffer and remaining wetlands as an equivalent functional exchange for permanently eliminating the functions provided by 20.42 acres of existing wetlands. Here, the riparian and slope wetlands targeted for elimination by the Port have far superior water quality and water storage functions in comparison to the upland buffer the Port would restore as compensation.[12, 13] Moreover enhancement of the Miller Creek riparian buffer and remaining wetlands could actually reduce those areas' effectiveness for water quality and storage functions because of disturbance to the soil.[14] Such an exchange of functions is not based on sound science and does not represent true mitigation.

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[10] Compensating for Wetland Losses Under the Clean Water Act. National Academy of Sciences Committee on Mitigating Wetland Losses. National Academy Press, Washington DC. 2001 Pre-Publication Copy.

[11] *Wetland Mitigation Evaluation Study Phase 1*, Department of Ecology Publication No. 00-06-016, June 2000. DOE found only 14% of enhancement projects met performance standards for the mitigation.

[12] Dunne and Black 1970. *Partial area contributions to storm runoff production in permeable soils.* Water Resources Research 6:1296-1311.

[13] Dunne and Leopold 1978. Water in Environmental Planning. San Francisco, W. H. Freeman.

[14] Shaffer, P. W and T. L Ernst. 1999. Distribution of soil organic matter in freshwater emergent/open water wetlands in the Portland, Oregon Metropolitan Area. Wetlands 19:505-516.

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20. The Society of Wetland Scientists (SWS) published a paper defining the meaning of wetland restoration in August 2000. The Society's objective was to remove the current ambiguity in the use of the word, which has lead to a broad range of inappropriate projects proposed under the restoration umbrella. Wetland restoration is defined by professional wetland scientists as "actions taken in a converted or degraded natural wetland that result in the establishment of ecological process, functions and biotic/abiotic linkages and lead to a persistent resilient system integrated within its landscape". The objective of a restoration should be a persistent resilient system integrated with the surrounding landscape that results in the reinstatement of driving ecological processes (these include hydrology, biological processes such as decomposition and predation and biochemical processes like nutrient cycling.

21. In contrast to this scientific position, the in-basin wetland restoration planned for Vacca Farm purposefully lacks habitat for biological processes due to aircraft safety concerns. Further, the "restoration" will remove much of the peat soils (that, along with water, provide biochemical processes) in order to create flood storage, although, typically peat soils are valued and conserved in a wetland restoration-- not eliminated. The resulting wetland "restoration" will lack adequate hydrology to fully restore its functions, because Vacca Farm is designed such that the majority of the wetland will receive water only during extreme storm events such as a 100-year flood, effectively reducing the wetland's value for biological support. The grading plan shows the wetland will be excavated so that any water is quickly discharged via an approximately 200 foot wide shallow swale to Miller

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Creek. The "restored" wetland will not convey water sufficient to maintain wetland functions.

22. The Port's functional assessment of the wetlands it plans to fill identifies important wetland functions provided under current conditions (see Figure 1 on next page). The highest-ranking wetland functions being eliminated from the watershed in the greatest proportion are wetland acres that provide nutrient sediment trapping (76%), groundwater discharge/recharge (71%), habitat for small mammals (70%), and passerine bird habitat (68% of the wetland acres). Fifty percent are highly valued for export of organic material, forty-eight percent are ranked moderate-to-high for providing amphibian habitat, and forty-three percent of the wetland acres being eliminated are ranked moderate-to-high for anadromous fish habitat.

23. Significantly, *92 percent* of the eliminated wetlands are low-to-moderate for waterfowl habitat, and *80 percent* are low-to-moderate for flood storage. These are proportionally the *lowest*-ranking functions among all the wetlands being eliminated, yet waterfowl habitat and flood storage are the primary wetland functions targeted for replacement in the Port's Natural Resource Management Plan (NRMP).[15] This grossly misplaced emphasis serves to create the impression of mitigation where no effective mitigation in fact exists. The mitigation proposal appears to be tailored to the needs of the project rather than the requirements of the Clean Water Act.

[15] NRMP Table 1.3-1 and pages 1-1 and 1-2.

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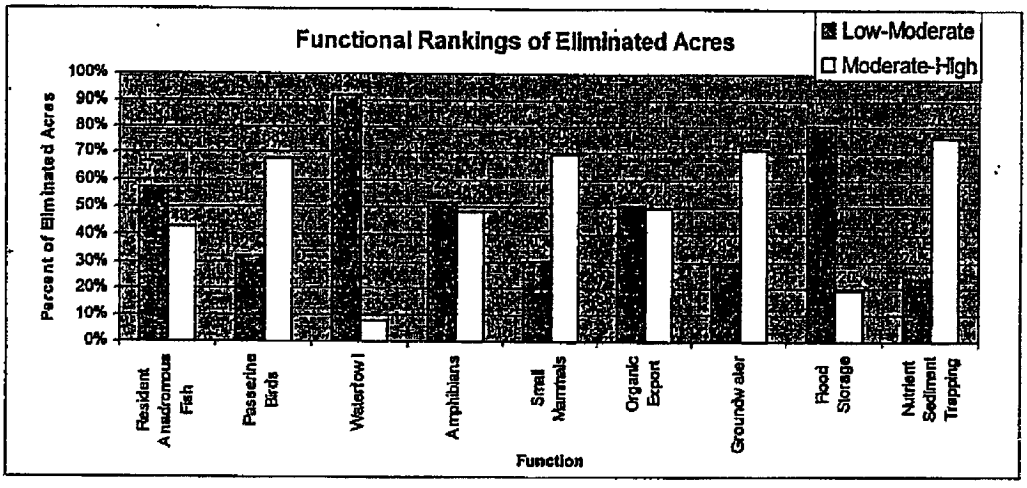

Figure 1. Functional rankings of wetlands eliminated.

24. The Port has repeatedly stated in its documentation that the wetlands affected by the Third Runway project are largely of low quality and severely degraded. Figure 2 shows the Department of Ecology's ratings of wetlands, reported by the Port, in the Miller and Des Moines Creek watersheds. Starting at the left of each chart in Figure 2, the first bar shows the proportion of wetlands being eliminated for each of the three pertinent DOE ratings. The second bar shows the percent of wetland acres in the Port's entire project area that have that rating and are being eliminated. For example, the Miller Creek Basin chart in Figure 2 shows that 58 percent of the wetlands eliminated by the Third Runway project in the Miller Creek watershed are rated Class II. It also shows that fully 45 percent of all the Class II wetlands identified within the Miller Creek watershed project area will be

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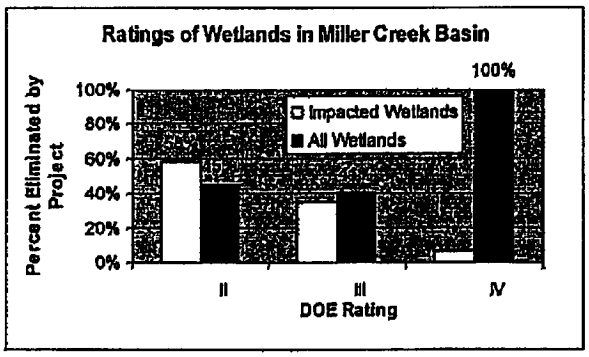
eliminated.[16] The bar charts in Figure 2 illustrate that the majority of wetland acres being eliminated for the Third Runway project in the Miller Creek watershed are more highly rated Class II wetlands, rather than lower quality Class III and IV wetlands. This evidence directly contradicts the repeated statements made in the Port's NRMP and Wetland Functional Assessment that the wetlands to be eliminated are degraded to the extent that they provide few valuable functions.[17]



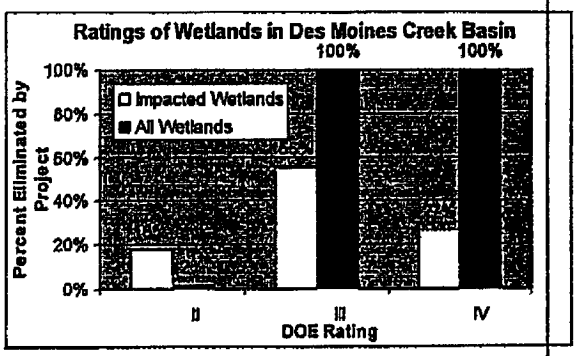


Figure 2. Department of Ecology (DOE) ratings for wetland acres eliminated.[18]

25. The Port's own data (shown in Figures 1 and 2) clearly show the importance of the wetlands within the Miller and Des Moines Creek watersheds for improving water quality, particularly their role in reducing nitrogen export, for habitat, for their role in

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[16] Ideally the second bar would show the percent of wetlands being eliminated *in the watershed* by DOE rating but that data was not available.

[17] NRMP Section 2 and Wetland Functional Assessment Section 4.

[18] NRMP Table 2-1.1 is source of data for charts.

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moderating seasonal water levels, and for production of organic carbon.. Reducing .. remaining wetlands within these watersheds will alter stream hydrology in Miller, Walker and Des Moines creeks, permanently remove wetland habitat with no replacement, and will affect fish communities by altering the food web and increasing the supply of nitrogen to the estuary at the mouth of the creeks.[19]

26. This shift carries enormous consequences for both resident fisheries as well as for species that use the lower reaches of the affected creeks but may not be resident, such as Chinook. This is because detrital food sources are essential to the development of invertebrate communities on which salmonid fish species feed. Reductions in the area of the slope and riparian wetland systems located adjacent to the creeks are certain to affect productive capacity and therefore fish production.[20] The 401 Certification offers no effective mitigation for the loss of these wetland functions.

27. Fundamentally the 401 decision accepts a Port proposal to replace apples with lemons. There is no documented scientific basis for how the Port's proposal for buffer enhancement, wetland enhancement and a partial wetland restoration will compensate wetland functional losses within the affected watersheds.

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[19] Nitrogen is a limiting nutrient for phytoplankton production in coastal waters, the reduction of wetlands within the watershed could result in increased eutrophication in the shoreline environment.

[20] *Dissolved Organic Material and Trophic Dynamics, R. S. Wotton, BioScience, Vol. 38, No. 3.*

[21] Compensating for Wetland Losses Under the Clean Water Act. National Academy of Sciences Committee on Mitigating Wetland Losses. National Academy Press, Washington DC. 2001 Pre-Publication Copy, p 108.

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28. As noted earlier, the National Academy of Sciences (NAS) recently issued a comprehensive study evaluating the efficacy of wetland mitigation practices under the Clean Water Act. The study reaffirmed that the functions of a wetland proposed for fill need to be precisely characterized and quantified, as should the functions of the proposed compensatory mitigation.[21] The NAS study also concluded that mitigation is often focused on too few functions, leaving out functions that are critical to the watershed, such as hydrologic connectivity and hydrogeomorphic characteristics. Since hydrology is the important determinant of wetland functions, best available wetland science requires that restoration and mitigation in Miller and Des Moines Creek watersheds result in mitigation that re-establishes the wetland functions in a hydrogeomorphic context to improve the likelihood of actually mitigating the lost wetland functions.[22] Finally the NAS study identified that a watershed perspective is essential to understanding the cumulative effect of permitted decisions and that if functional tradeoffs in equivalency are permitted as part of a mitigation plan those tradeoffs must be quantified and understood to ensure the watersheds affected remain functioning at the highest level attainable.[23] There is no evaluation or quantification of the proposed wetland functional exchanges, such as recommended in the NAS study, in the Port documentation.

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[22] Shaffer, P. W., M. E. Kentula and S. E. Gwin. *Characterization of Wetland Hydrology Using Hydrogeomorphic Classification.* Wetlands, Vol. 19, No. 3, Sept. 99, pp. 490-504.

[23] Compensating for Wetland Losses Under the Clean Water Act. National Academy of Sciences Committee on Mitigating Wetland Losses. National Academy Press, Washington DC. 2001 Pre-Publication Copy, Page 127-128.

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29. The importance of quantifying functional exchanges cannot be emphasized enough because as permitted wetland alterations change the number, types and positions of wetlands on the landscape, maintaining the diversity of hydrologic regimes becomes more difficult and increasingly critical to preserving the diversity of functions provided by wetlands.[24, 25, 26, 27] The 401 Certification accepts a plan which does not provide assurance of actual mitigation for the loss of critical wetland functions, and is instead based on a Port proposal for largely ineffectual enhancement activities.[28] The tables and accompanying discussion in the Port's NRMP claim that individual listed activities will mitigate for other listed losses, but the Port does not demonstrate through quantitative analysis or scientific references that the activities proposed will, in fact, mitigate for the wetland functions eliminated.

30. The NAS study also confirms that an evaluation of whether the mitigation adequately offsets the impacts cannot be completed without an analysis of the cumulative losses of wetland functions within the watersheds. These cumulative losses include

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[24] Kentula, M. E., R. E. Brooks, S. E. Gwinn, C. C. Holland, A. D. Sherman, and J. C. Sifneos. 1992. An approach to Decision Making in Wetland Creation and Restoration. Island Press, Washington DC, USA.

[25] Holland, C. C., J. E. Honea, S. E. Gwinn and M. E. Kentula. 1995. *Wetland Degradation and Loss in a Rapidly Urbanizing Area of Portland Oregon.* Wetlands 15:336-345.

[26] Bedford, B. L. 1996. *The need to define hydrologic equivalence at the landscape scale for freshwater wetland mitigation.* Ecological Applications 6:57-68.

[27] Gwin, S. E., M. E. Kentula and P. W. Shaffer, 1999. *Evaluating the effects of wetland regulation through hydrogeomorphic classification and landscape profiles.* Wetlands 19:477-489.

[28] Shaffer, P. W and T. L Ernst. 1999. *Distribution of soil organic matter in freshwater emergent/open water wetlands in the Portland, Oregon Metropolitan Area.* Wetlands 19:505-516.

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impacts to regional and local recharge, hydrologic and habitat functions of remaining wetlands and uplands, degradation due to planned and unplanned disturbances resulting from construction and airport operations, and whether the regional scope of alterations occurring to wetland resources affects the future sustainability of the fisheries resources of Walker, Miller and Des Moines Creeks. To date there has been no cumulative impact assessment completed by the Port. Significantly, correspondence from both the U. S. Army Corps of Engineers and EPA have pointed out the need for such an analysis.

31. Evaluation of the cumulative loss of wetlands is also important because the Port relies on what it claims are high levels of dissolved organic carbon (DOC) found in both Des Moines and Miller Creeks as limiting the biological availability of zinc and copper found in the Port's storm water runoff, effectively reducing the toxicity of Port stormwater to fish.[30] DOC derives from the breakdown of detrital material by bacteria and fungi. The comparatively high levels of DOC found in Des Moines Creek and particularly the levels found in Miller Creek are a result, in significant part, of the contribution of organic material from existing wetlands. It is noteworthy that, although Ecology's 401 acceptance of the Port's conclusion of no adverse effects to fish and other aquatic organisms from discharges of zinc and copper relies on the presence of high concentrations of dissolved carbon, there is no discussion of the *source* of that carbon or the fate of that source after the Port's project

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[29] *Response to 2000 Public Notice Comments [Draft]. Azous Environmental Science*, March 19, 2001. Master Plan Update Projects-Section 404/401 Permits. Seattle Tacoma International Airport, p. 11 Responses 34-38.

[30] *Pacific Coast Salmon Essential Fish Habitat Assessment, P.4-8.*

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is built. In fact, the DOC concentrations on which the Port depends to reduce partially the toxicity of zinc and copper in its stormwater discharges originate in the wetland systems they propose to degrade and eliminate.

32. The 401 also appears to rely on the Port's claim that replanting Vacca Farm, identified as a former wetland, will increase the potential for carbon export (DOC) functions from the area, providing mitigation for the loss of the role existing wetlands play.[31,32] However, this overlooks that the Port's proposal is to excavate and regrade the soils at Vacca Farm. Although subsequent planting of trees and shrubs might eventually improve organic carbon export, nutrient cycling and sediment trapping at Vacca Farm, it is unlikely to occur any time in the near future as the most productive soils will be excavated and graded. As a result, the production of organic carbon will likely be significantly diminished for many years.[33]

33. The issue of organic carbon is also important in evaluating the functional role Miller and Walker Creek wetlands play in providing food web support to the creeks.[34] Part 230.31(a) and (b) of the federal Section 404(b)(1) Guidelines are instructive here. They

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[31] Response to Corps Request for Information – Section 404(b)(1). May 11, 2001. STIA Masterplan Update Improvements. 50248448.02. Table 30, p. 70.

[32] *Response to 2000 Public Notice Comments [Draft] Azous Environmental Sciences, March 19, 2001.* Master Plan Update Projects-Section 404/401 Permits. Seattle Tacoma International Airport, p. 11 Items 34-38.

[33] Day, F. P. Jr. and J. P. Meginigal 1993. *The relationship between variable hydroperiod, production allocation, and belowground organic turnover in forested wetlands.* Wetlands 13:115-121.

[34] This issue was previously discussed in February 16, 2001 comments by Azous Environmental Sciences to USACE and DOE.

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refer to potential impacts that alter or eliminate populations in lower trophic levels, such as detrital (accumulated organic debris) feeders, and thereby impair the energy flow of primary consumers (such as herbivores) to higher trophic levels (such as predatory salmon). The guidelines go on to point out that the reduction and possible elimination of food chain organism populations can decrease the overall productivity and nutrient export capability of an aquatic system. What this means is that, in addition to the threat of lead and zinc directly affecting stream chemistry, the metals that are expected to bind to organic carbon (DOC) instead of fish gills are still likely to end up in the food chain when filter and detrital feeders consume the organic carbon, resulting in significant adverse consequences to the entire aquatic community.[35] Understanding that organic carbon is both the basis of the food web in Miller and Des Moines Creeks *and* the Port's argument for justifying its project's increasing of zinc and copper loadings in the creeks, it is reasonable assurance to require a more rigorous analysis of the Port's claim that water quality standards will be met and the food web will not be affected. What has been offered to date by the Port and in the 401 decision offers no basis for concluding that water quality standards will be met.

34. The Port's proposal and Ecology's 401 Certification depart from best available scientific knowledge of how to evaluate and effectively mitigate for wetland functional losses inherent in the Port's proposal. Ecology's 401 decision permits a project that ignores

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[35] See discussion on Aquatic Invertebrate Response to Zinc Exposure in Fundamentals of Urban Runoff Management. Horner, R. R., J. J. Skupien, E. H. Livingston and H. E. Shaver. Terrence Institute and USEPA. August 1994. Pp. 51-52. Study indicated intermittent episodes of low loadings (0 to 30 µg/L) of zinc resulted in significant reductions in live Amphipods.

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basic science-based principles of wetland protection and wetland loss mitigation. If that decision is implemented before the Board can review its merits, irreparable harm to the watersheds will occur.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

DATED this 11 day of September, 2001, at Seattle, Washington.

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