Kelley
EXHIBIT NO. 335
2-14-02
M. Green

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. DEPARTMENT OF ECOLOGY and THE PORT OF SEATTLE, Respondents.	No. PCHB 01-133 DECLARATION OF JAMES C. KELLEY, PH.D.

JAMES C. KELLEY, Ph.D., declares as follows:

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

2. I am a professional ecologist employed by Parametrix, Inc., an engineering and environmental consulting firm. Parametrix Inc. provides environmental planning, engineering design, and environmental permitting services to public and private sector clients. Many of our projects involve new or expanded transportation infrastructure. The natural resource group at Parametrix, Inc. includes fisheries biologists, wildlife ecologists, wetland biologists, and water quality specialists needed for the multidisciplinary analysis of large projects. I have been employed at Parametrix for over 13 years. My educational background includes a Doctoral of Science degree (1985) from the Fisheries and Wildlife Department at Michigan State University where my studies

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focused on aquatic ecology. I have a Master of Science degree from the Department of Botany and Plant Pathology (1980) at Michigan State University where my studies focused on plant ecology and plant taxonomy. My Bachelor of Science is from the Botany Department (1978) at the University of Vermont. I have completed postdoctoral research at the University of Minnesota-Duluth (1985-1987), where I studied wetland and riparian processes.

3. In 1997, I served on the Riverine Assessment Team and Depressional Assessment Team to help develop *Methods for Assessing Wetland Function Volume I Riverine and Depressional Wetlands in the Lowlands of Western Washington* (Ecology Publication #99-115). I have professional training and practical experience in the planning, design, implementation, and maintenance of constructed wetlands for water quality treatment, and have completed treatability studies that evaluate the ability of constructed wetland systems to remove excess metals from surface water. I have developed and implemented wetland restoration plans as part of sediment remediation (including dredging, capping, and natural recovery) actions. I have prepared over a dozen presentations and publications on wetlands ecology and related topics, which are included with my resume attached to this declaration in **Attachment A.**

4. I serve as the principal consulting ecologist for the Master Plan Update (MPU) projects at Seattle-Tacoma International Airport. In that capacity, I have directed and managed the wetland and natural resource studies for the MPU, which includes the Third Runway Project, the runway safety area extensions, the South Aviation Safety Area, the development of on-site borrow areas, and related projects. I and others working under my direction have been primarily responsible for the identification of impacts to wetlands and other aquatic resources, the assessment of wetland functions, and the design of compensatory mitigation for the MPU projects. The scientific analysis and conclusions on which this declaration is based are provided in the *Wetland Delineation Report* **(Attachment K)**, the *Wetland Functional Assessment and Impact Analysis Report* **(Attachment L)**, and the *Natural Resource Mitigation Plan* **(Attachment M).**

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5. The Master Plan Update Improvements at the Seattle-Tacoma International Airport result in the permanent filling of 18.37 acres of wetland. During construction, an additional 2.05 acres of wetland will be impacted and, pursuant to Ecology's direction in the 401 Certification, will be treated as permanent wetland impacts. A complete and comprehensive mitigation plan has been developed to replace the ecological functions these wetlands provide to the local area and to the Miller, Walker, and Des Moines Creek basins. Development of the plan has followed requirements to avoid and minimize impacts to wetlands. For impacts that cannot be avoided, compensatory mitigation is provided to prevent basin losses of wetland functions.

6. Logging and farming practices have historically modified the Miller, Walker, and Des Moines Creek basins. More recent urban development has also modified stream, wetland, and upland habitats. As a result, environmental conditions in the project area are far from pristine. Approximately 80 percent of the basins has been converted from their original forested condition to residential or commercial land uses. Increased impervious surfaces have resulted in increased stormwater runoff rates and volumes, which have contributed to erosion and down cutting in high-energy reaches and increased sedimentation and habitat degradation in low-gradient reaches. Runoff from residential, commercial, and agricultural areas located in wetlands and uplands has increased input of sediment, nutrients, and pollutants to the stream. Upland and wetland riparian areas adjacent to the stream have been altered from the original forest and/or shrub cover to impervious surfaces, agricultural fields, residential lawns, or ornamental landscaping. Native plant and animal habitats have been reduced in size and fragmented, resulting in a loss of species diversity.

7. All wetlands and streams affected by the project have been subjected to historic and on-going land use disturbances.[1] These disturbances include drainage and other hydrologic modifications, partial filling, land clearing and mowing, grazing, farming, domestic pets, urban runoff, and residential development. These disturbances have removed or altered many of the

[1] These impacts are described in a report *Cumulative Impacts to Wetlands and Streams* provided as Attachment N.

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features undisturbed wetlands may have that allow them to function at their highest levels. For example, the historic conversion of forested riparian wetlands to lawn and pasture (as has occurred in portions of Wetland 18, 37, and some wetlands on the Tyee Valley Golf Course) reduces habitat value, carbon cycling and carbon export capabilities. Their and riparian functions are also affected, as their ability to deliver woody debris and organic matter to creek ecosystems is severely diminished.

8. Even the supposedly higher quality Class II wetlands that occur in the basins and would be impacted by the project are functionally degraded wetlands. Class II wetlands that occur in the Vacca Farm area are degraded by farming and hydrologic alterations. The Class II Wetlands 18, and 37, are functionally degraded by alterations that residential development, ditching, land clearing and logging have caused. A component of the project mitigation (discussed later in this declaration) is to mitigate impacts to Category IV, III, and II wetlands by restoration enhancing the functions of degraded Category II wetlands.

9. Figure 2 in Paragraph 24 of the Azous declaration identifies that 45 percent of the area of wetlands rated Category II using the Ecology system will be eliminated from the Miller Creek Basin. In making this calculation, Ms. Azous apparently did not include Wetland 43 (about 33 acres) or the Tub Lake wetland (about 17 acres) in her calculations. These wetlands are discussed on page 1-9 of the *Wetland Functional Assessment and Impact Analysis Report* (**Attachment L**). When the Tub Lake wetland (a Class I wetland) and Wetland 43 (a Class II wetland) are included in the calculation, the loss of Class II or higher wetlands from the project area is 11 percent, significantly smaller than 45 percent reported by Azous. As discussed elsewhere in this declaration, the Port's mitigation plans will compensate for the functions lost by filling all wetlands, including the Class II wetlands.

10. The Ecology ratings are assigned independent of any specific evaluation of all the wetland functions that a functional assessment similar to that completed by the Port's would provide.

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While the rating approach helps identify a general ecological value that a wetland may provide, it cannot be used to infer what the specific functional performance of a wetland may be. Likewise, the ratings are assigned independent of the level of human disturbance or degradation that a wetland may have been subjected to.

11. The channel morphology of Miller Creek has been altered throughout the project area. Extensive areas of the channel have been armored with riprap or retaining walls, and dredged or straightened to protect property adjacent to the stream or to drain land for agricultural uses. For much of its length, dredging or straightening of the channel has occurred to increase conveyance. Ecologically valuable logs and other woody debris are nearly absent from the channel. These conditions have reduced aquatic habitat complexity, shading from riparian vegetation, and floodplain storage, and they have degraded water quality.

12. Similar land use histories have resulted in similar degradation of wetlands and streams in the Des Moines Creek basin.

13. Process to delineate and assess wetlands, and identify potential wetland impacts. The Port has used scientifically-accepted methods and standards to evaluate the presence of wetlands, the function of these wetlands, project impacts to these wetlands, and mitigation measures to avoid and compensate for wetland impacts.

14. The identification and delineation of wetlands are described in the *Wetland Delineation Report for Seattle-Tacoma International Airport Master Plan Update Improvements* (**Attachment K**). These studies were completed using the required methods outlined in the *Washington State Wetland Identification and Delineation Manual* and the U.S. Army Corps of Engineers *Wetland Delineation Manual.*

15. Based on these evaluations, areas that were determined to be wetland were flagged, surveyed and mapped. Data was collected in the wetlands and adjacent uplands to document the

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dominant vegetation types, soil conditions, shallow groundwater conditions, and the general ecological condition of the area.

16. In addition to identifying vegetated wetlands, the studies identified streams and other drainage features that convey natural surface waters at least seasonally. These areas were also flagged and delineated. Where determined by the ACOE to be "waters of the U.S." they were surveyed, mapped, and included in further analysis.

17. The ACOE made site visits to confirm wetland identifications and boundary delineations between July 1998 and November 2000. The ACOE review of delineated wetland is documented in a *Memorandum for the Record (MFR): Field Review and Jurisdictional Summary* in February 2001. All modifications to delineated wetland boundaries that were requested by ACOE during those site visits have been made and are reflected in the wetland mapping and analysis for the project.

18. In addition to determining wetland areas affected and potentially affected by the project, impacts to wetland functions were also evaluated (**Attachment L**). Consistent with implementation of Clean Water Act Sections 404 and 401, this study focused on identifying the beneficial biological and physical (hydrologic and water quality) functions that wetlands provide to the local area and their larger basins.

19. Functional assessment methodologies for wetlands typically identify and evaluate a suite of physical and biological attributes of wetlands that are indicative of wetland functions. Several functional assessment methodologies were used for guidance in preparing the functional assessment[2]. There are no standard quantitative procedures for obtaining direct measurements of wetland functions for environmental assessments, nor are any required by the Department of

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[2] These methods include locally developed *Wetland and Buffer Functions: Semi-Quantitative Assessment Methodology Draft Users Manual* (Cooke Scientific Services 1996), *Wetland and Buffer Functions: Semi-Quantitative Assessment Methodology Final Working Draft Users Manual* (Cooke Scientific Services 2000), *Wetland Evaluation Technique*, Department of the Army, U.S. Army Corps of Engineers (1987), and Indicator Value Approaches as described in Hruby, T., W. Cesanek, and K. Miller. 1995. *Estimating relative wetland values for regional planning*. Wetlands 15: 93-106.

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Ecology or the Army Corps of Engineers. Indeed, despite the significant amount of wetland research that has occurred over the past several decades, I am not aware of any wetland where the suite of ecological functions it provides has been quantitatively documented through direct measurements. The scientific literature, for most wetland functions, generally consists of a relatively small number of direct measurements of function at a relatively small number of wetlands. From this data, attempts are made to characterize various physical and ecological attributes that would indicate the functional performance of other wetlands, but there are no standard assessment methods that are applicable to the range of wetlands types found in Washington State or the project area. The Department of Ecology has recently developed a predictive model to estimate wetland functions in a variety of wetland types in western Washington[3]. However, these models were not available at the time the Port's studies were conducted and the models do not model functions of slope or non-riverine riparian wetland types (the most common and functionally important wetland types affected by the project). Due to the various limitations of the available functional analysis methods, careful observations and expert opinion are recognized as important elements in assessing wetland functions.

20. The commonly-recognized functions provided by wetlands in Puget Sound were evaluated in this function assessment study, and include:

- Supports resident and anadromous fish. Wetlands can provide direct habitat for fish, or provide indirect support to fish habitat by a number of processes.
- Provides habitat for songbirds. A variety of avian species use wetlands for foraging and nesting habitat.
- Provides waterfowl habitat. Wetlands frequently provide aquatic and semi-aquatic habitat used by waterfowl for nesting and foraging.
- Provides amphibian habitat. Wetlands with seasonal ponding may be breeding and rearing habitat for amphibians, which then disperse to adjacent upland areas.

[3] *Methods for Assessing Wetland Function. Volume I. Riverine and Depressional Wetlands in the Lowlands of Western Washington*. Washington Department of Ecology, publication #99-115. 1999.

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- Provides small mammal habitat. A variety of small mammals forage in and adjacent to wetlands. Some small mammals (American beaver [Castor canadensis] and muskrat [Ondatra zibenthicus]) live in certain types of wetlands.

- Exports organic matter. Organic matter produced in wetlands (live or dead plant material, aquatic or terrestrial insects, etc.) can be exported to downslope waters and may serve as food resources for other aquatic organisms. Carbon export can be in dissolved or particulate forms.

- Maintains groundwater exchange. Wetlands can be areas where groundwater is discharged and enters surface water drainage systems. Less frequently, they are areas where surface water collects and recharges groundwater aquifers.

- Provides flood-storage and runoff desynchronization. Wetlands in floodplains store floodwater and can reduce downstream flooding. Other wetlands slow surface water runoff rates, which can also reduce peak runoff rates in streams.

- Enhances nutrient retention and sediment trapping. Wetlands that reduce water velocities are areas where sedimentation occurs. Nutrients and pollutants are often attached to these sediments. Chemical and biochemical processes in wetlands can also remove nutrients and other chemical pollutants from surface water. These processes can improve the quality of surface water flowing through a wetland.

21. Biological and physical functions of wetlands were determined by evaluating a variety of wetland attributes that are correlated to wetland function. These attributes were identified from regional and national functional assessment methodologies and professional judgement. The attributes are interpreted to determine the quality of functions provided within the wetland, its buffer, and its associated basin. For biological functions, the attributes examined focused on structural complexity, hydrological connectivity to other aquatic habitat, hydrodynamics, habitat quality, and the degree of human disturbance. For physical functions, the attributes examined focused on hydrodynamics, hydrologic connectivity, and degree of disturbance, topographic conditions, as well as potential sediment transport. The presence, absence, and nature of these attributes helped determine the functions provided by the wetlands.

22. Five biological functions were examined. These functions determine the degree to which the wetland: (1) supports resident and anadromous fish, (2) provides passerine bird habitat, (3) provides waterfowl habitat, (4) provides amphibian habitat, and (5) provides small mammal

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habitat. This assessment relied heavily on the factors incorporated into Ecology's wetland rating system as indicators of significant wildlife habitat (i.e., Category I and Category II wetlands).

23. Four physical functions provided by wetlands were also examined. These functions examined the wetlands' ability to: (1) export organic matter to downslope systems, (2) maintain groundwater exchange, (3) provide flood storage, and (4) enhance nutrient retention and sediment trapping. Wetlands with similar landscape positions, water sources, and hydrologic fluctuation (i.e., those within the same hydrogeomorphic class) were compared. Wetland groupings in the study area were determined to be:

- **Riparian.** Wetlands directly adjacent to Miller, Walker, or Des Moines Creeks.
- **Slope.** Wetlands that are generally free draining because they are on a hillside or slope.
- **Depression.** Wetlands that occur in topographic depressions, with or without restricted drainage outlets.

24. To help summarize project impacts on wetland functions, the wetlands were grouped according to their physical and biological similarities. The primary attributes that control the biological functions are the plant communities present, their vegetation structure, and the amount of habitat connectivity (particularly with other aquatic habitats). The primary attribute that accounts for physical (hydrologic and water quality) functions is whether the wetlands are riparian, slope, or depression (i.e., their hydrogeomorphic classification [HGM]). For these reasons, the U.S. Fish and Wildlife Service (USFWS) classification based on vegetation classes impacted (palustrine emergent, palustrine shrub, and palustrine forested) as well as their topographic occurrence in riparian, slope, or depression areas (i.e., its hydrogeomorphic position) were several of the primary characteristics considered when evaluating functions.

25. The functional performance of each wetland was determined based on evaluations of the physical and biological indicators of wetland function observed in each wetland, knowledge of

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other wetland ecosystems in the Puget Sound region (urban and non-urban), and professional judgement. Functional performance ratings were assigned as follows:

- **High.** The wetland contains several important characteristics required to perform the function, and lacks attributes that limit or prohibit the function from occurring in the wetland.

- **Moderate.** The wetland contains one or more characteristics required to perform the function; however, several of these may be secondary indicators. The wetland may contain one or more characteristics that interfere with or prevent optimal performance of the function in question.

- **Low.** The wetland lacks significant attributes that the wetland could perform the function in question. One or more characteristics indicating the wetland does not perform the function are typically present.

26. **Attachment B** provides a summary of the functional assessment. For each wetland function, the total area of wetlands permanently affected by the project that provide at least a "low-medium"[4] level of function are totaled. **Attachment B** also lists the general conditions that were present in a wetland to receive at least a "low-medium" rating for each function.

27. Following wetland and stream identifications, the engineering designs for Master Plan projects were mapped on wetland and stream maps. Direct impacts were considered to occur in those areas where wetlands would be filled by project development. These areas were calculated using engineering design data and survey maps of delineated wetland boundaries that were incorporated into GIS map layers, from which fill impacts were calculated.

28. Permanent direct impacts occur where fill is permanently placed in wetlands. Temporary direct impacts occur where, on a temporary basis, fill or other activities occur in wetlands during a portion of the construction period. In these areas, following construction, and per the Council of Environmental Quality regulations (40CFR 1508.20), the impact is rectified by restoring the affected environment.

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[4] The impacts to and ratings of each individual wetland and function are provided in Table 3-1 and Table 3-3, respectively, in the *Wetland Functional Assessment and Impact Analysis Report* (Attachment H).

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29. Temporary impacts[5] result primarily from the need for temporary erosion and sediment control facilities (including sediment fencing, drainage swales, and stormwater management ponds) during the construction period. The duration of temporary impacts is variable, depending on project area and specific activity but can be several years.

30. Indirect wetland impacts to wetland functions were defined as potential wetland impacts (excluding filling) that could affect the existence and ecological function of wetlands located near areas developed as part of the Master Plan. The general methodology for evaluating these impacts was to consider the changes to wetland conditions or characteristics that could occur from the project, and evaluate what effect these changes could have on wetland functions.

31. Potential indirect impacts to wetland functions or areas may result from the long-term effects of construction and operation of the Master Plan Update improvements. The following activities could potentially result in indirect impacts, and they were thus evaluated in the study:

- Placement of fill near or adjacent to wetlands
- Placement of fill in portions of wetlands
- Stormwater management upslope of wetlands
- Disturbance of wildlife from aircraft noise
- Wildlife management activities
- Excavation for retaining wall footings
- Excavation for stormwater management ponds located upslope of wetlands
- Water quality impacts from potential stormwater discharges to wetlands at construction sites.

[5] The *Natural Resource Mitigation Plan* proposes wetland mitigation for all permanent and temporary wetland impacts. Because the duration of temporary impacts exceeds 1-year, mitigation for these temporary impacts includes restoration of the affected area (see the *Natural Resource Mitigation Plan*, Section 5.2.4, Parametrix 2000) and restoration of Wetland A17 (2.85 acres of wetland and 8.6 acres of upland) as required by condition D(4) of the amended Water Quality Certification.

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- Increased turbidity and sediment runoff above water quality standards.
- Degradation of water quality such as increases in temperature, chemical content, or reductions in dissolved oxygen.
- Changes to wetland vegetation that affect stream habitat conditions, including shade and export of organic matter.
- Changes to wetland hydrology that may affect the ability of a wetland to provide base flow to streams.
- Increased noise and human disturbance.
- Changes in hydrology that eliminate special habitat conditions (i.e., hydrologic changes eliminate standing water that might be used by certain bird species).
- Changes in hydrology that alter the dominant vegetation types in the wetlands.
- Alterations of flow patterns, riparian conditions, and vegetation types that could affect organic matter export to downstream ecosystems.
- Changes in runoff patterns and timing as a result of new impervious surfaces and the stormwater management system.

32. A key component of the indirect impact analysis was to consider the potential fragmentation of wetlands. Fragmentation impacts were evaluated by considering if, given the remaining fragment of wetland and the future project condition, the wetland would be capable of providing the suite of biological and physical functions it currently does. For habitat functions, where the remaining wetland would, as a result of mitigation, be incorporated into enhanced and protected buffers, it would remain functional because it will remain connected to other wetlands and riparian areas. If, however, a wetland fragment were to remain isolated from other more significant habitat, its functions would be impaired, and the indirect impact was considered significant. In these cases, the area of the wetland fragment was added to the amount of direct impacts. For physical

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functions, the changes in hydrologic, runoff, disturbance, and other conditions were evaluated to determine if additional indirect impacts would reduce and fragment wetlands.[6]

33. A large number of hydrologic and engineering studies were completed to assure the accuracy of the wetland impact analysis. Key studies were included as appendices in the *Wetland Impact and Functional Assessment Report*, and are:

- *Third Runway Embankment Construction - Temporary Impacts to Wetlands and Erosion and Sedimentation Control*
- *Geotechnical Engineering Report for the Third Runway Embankment Construction*
- *Borrow Areas 1, 3, and 4 – Projected Impacts to Wetlands*
- *Preservation of Wetlands in Borrow Area.3*
- *Third Runway MSE Wall Subgrade Improvements*
- *Third Runway Embankment – Effects of Infiltration on Base Flow*
- *Low Streamflow Analysis for Miller, Walker, and Des Moines Creeks*
- *Analysis of Indirect Impacts to Wetlands from SR 509 Temporary Interchange*
- *Stormwater Detention Pond Designs for the Miller Creek Basin*
- *Feasibility of Stormwater Infiltration*
- *IWS Lagoon #3 Expansion Footprint*

34. Avoidance and Mitigation of Wetland Impacts. The primary strategy in addressing potential project impacts was avoidance and minimization of impacts to wetlands and streams. The key actions taken to avoid these impacts are listed in **Attachment C.** The result is the design of a "least damaging practical alternative" to avoid and minimize wetland and stream impacts. Where impacts to wetlands and streams were found to be unavoidable, compensatory mitigation is proposed such that there is no net loss of wetland functions or area.

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[6] A detailed analysis of ACC claim regarding fragmentation impacts is provided in Response to Comments of Azous Environmental Sciences, February 16, 2001 response #15 – 17, attached to the Declaration of Steven Jones.

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Mitigation Summary

35. The compensatory wetland and stream mitigation projects and their area are summarized in **Attachment D.** This attachment shows that for the 18.37 acres of permanent and the 2.05 acres of temporary impact, over 167 acres of land will be permanently protected as mitigation. The 401 Certification requires the Port to execute and record restrictive covenants to protect the 167 acres of mitigation area. The forms of these restrictive covenants are included in the *Natural Resource Mitigation Plan* (**Attachment M**). The covenants require that the mitigation areas be preserved in a natural state, prohibiting future development activity. The geographic scope of the mitigation areas to be protected by the covenants is depicted on the drawings at **Attachment H.**[7] The ecological functions that are targeted in the design of these mitigation projects were based on the functions impacted by wetland loss (see **Attachment B**). For each mitigation site, I have listed in **Attachment E** the planned ecological functions to be provided at the mitigation site and the physical or ecological attributes that are included to assure the sites provide these functions. The attributes listed in **Attachment E** are the same or similar attributes that were used in the functional assessment report (see **Attachment L**, pages 2-3 through 2-5) to rate the functions of the impacted wetlands. These are the types of attributes that are generally recognized as indicators of wetland function.[8]

36. The mitigation plan proposes mitigation areas in excess of impact areas to account for the short term temporal losses of wetland functions (losses of function over the time period required for the mitigation sites to develop) and for potential uncertainty in mitigation success.[9] The recommended preference for selecting wetland mitigation sites in Washington is as follows: (1) on-

[7] These drawings do not include the two additional mitigation areas added by the 401 Certification decision – Wetland A-17 and the area adjacent to Borrow Area 3. Drawings for these two areas are currently being prepared.
[8] See *Methods for Assessing Wetland Functions. Volume I. Riverine and Depressional Wetlands in the Lowlands of Western Washington.* Washington Department of Ecology Publication 99-115. 1999.
[9] The uncertainty in the ultimate success of the mitigation projects is greatly reduced by careful design that is based on several years of observations of mitigation site conditions. Uncertainties are further reduced by requirements to a 15-year monitoring period, identification of enforceable performance standards, planning of contingency options, and an adaptive management approach to monitoring the projects.

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site and in-kind; (2) off-site, within the watershed, and in-kind; (3) off-site, out of the watershed, and in-kind; and (4) off-site, out of the watershed, and out-of-kind. The Port's proposed mitigation for wetland impacts has followed these recommendations. Therefore, most mitigation for impacts to wetland, stream, and floodplain functions are on-site and in-kind, occurring within the Miller and Des Moines Creek basins.

37. Mitigation for the Master Plan Update projects focuses on impacts to streams and wetlands by restoring and enhancing stream and wetland functions, especially to Class II wetlands. In the Miller Creek basin, the 401 Certification requires the Port to implement the following specific mitigation:

- Restore natural channel morphology, habitat complexity, and instream habitat along an approximately 1.4-mile reach of Miller Creek extending from south of Lora Lake to Des Moines Memorial Drive.

- Restore floodplain, floodplain wetlands, and riparian areas along the upper reaches of Miller Creek, and re-integrate floodplains and adjacent wetlands with the stream.

- Restore, replace, and enhance wetland and aquatic habitat functions to the currently degraded lacustrine, stream, floodplain, and riparian wetland system along the upper reaches of Miller Creek.

- Maintain wetland hydrology and base flow functions in wetlands adjacent to the embankment fill by providing surface water drainage features to convey groundwater and surface water runoff from the new embankment to downslope wetlands.

- Restore and enhance wetland and aquatic functions, and protect the long-term viability of these systems by establishing native forested buffers around wetlands and aquatic systems from Lora Lake to Des Moines Memorial Drive.

- Restore habitat connectivity in the upper reaches of the Miller Creek basin by providing a continuous forested wetland and riparian corridor connecting currently fragmented wetland, aquatic, and riparian habitats between Lora Lake and Des Moines Memorial Drive.

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38. To accomplish these objectives, mitigation projects will be concentrated in two areas along the upper reaches of Miller Creek: (1) Lora Lake and the Vacca Farm and (2) Miller Creek and its riparian zone between Lora Lake and Des Moines Memorial Drive.

39. In the Des Moines Creek basin, mitigation is designed to restore wetland and stream functions, and to mitigate for potential indirect effects to wetland hydrology. To replace functions impacted by Master Plan Update improvements and to restore and enhance aquatic and wetland habitat in the Des Moines basin, the 401 Certification requires the Port to implement the following specific mitigation:

- Enhance water quality and fish habitat, and restore stream conditions in Des Moines Creek by establishing a forested buffer along at least 1,200 linear feet of the west branch of Des Moines Creek

- Restore and enhance wetland and aquatic habitat by replacing the existing turf grass wetland with a native shrub wetland at the Tyee Valley Golf Course, adjacent to Des Moines Creek

- Avoid, minimize, and mitigate potential indirect hydrology impacts to wetlands adjacent to the borrow areas by directing groundwater seepage and/or surface water runoff to wetlands near the borrow areas

40. The Port will also establish basin trust funds to promote local stream restoration projects in the Miller and Des Moines Creek basins ($150,000 in each basin).

41. The Port has planned and designed the necessary stormwater conveyance, detention, and treatment facilities to manage runoff from both newly developed project areas and to retrofit existing developed airport areas. These facilities will not only mitigate potential stormwater runoff impacts from new construction impacts but they will also help to reduce existing peaks flows to further mitigate the impacts of airport stormwater discharges. Detention storage provided for Master Plan Update improvement projects will exceed that normally required by local regulations, and result in additional mitigation of stormwater impacts from project areas, including reduced peak stormwater runoff impacts on Miller, Walker, and Des Moines Creeks.

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42. The mean annual 2-year flow in Des Moines Creek, Miller Creek, and Walker Creek are currently less than 1 cubic foot per second. The Port has designed mitigation to prevent low flow impacts to the creeks. This includes infiltrating stormwater at certain stormwater detention facilities. Additional mitigation to prevent low stream flow impacts includes storage vaults which will collect stormwater during the winter months and release it during low flow periods. These mitigation actions will prevent impacts to aquatic habitat and fish movements.

43. The STIA Master Plan Update improvement projects are not expected to impact existing water quality. As described in greater detail in other declarations submitted by the Port, stormwater generated by Master Plan Update improvements will be collected and treated using water quality BMPs that are designed in compliance with the *Stormwater Management Manual for Puget Sound* (e.g., bioswales, filter strips, wet vaults, infiltration). Most urban development in the Miller, Walker, and Des Moines Creeks basins was constructed prior to requirements for stormwater treatment. The creeks receive pollutants that include: heavy metals, oils, and grease derived from nearby highways; fecal coliform from failing residential septic systems and adjacent farms; and suspended solids and litter carried in urban runoff. They also receive increased levels of phosphorus and nitrogen from fertilization of landscaping or cultivated areas. Sources of many of these pollutants will be removed as part of the Master Plan Update improvements. Because actions to mitigate water quality impacts are part of new development, the quality of future stormwater runoff will be equal to or better than current stormwater quality. A detailed discussion of water quality benefits and mitigation is included in the *Stormwater Management Plan*.

44. The Port's mitigation plan avoids creating new wetlands in the affected stream basins and it includes some off-site mitigation for reasons of aviation safety. Wetlands provide attractive habitat for waterfowls, flocking birds, and other wildlife that pose serious hazards to aircraft. In the United States, wildlife strikes annually result in over $300 million in direct damage and associated costs, and over 500,000 hours of aircraft down time. Since 1960, at least 78 civillian aircraft and

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201 civilian lives have been lost worldwide to wildlife strikes. Since 1960, at least 250 military aircraft and 120 military personnel have been lost because of wildlife strikes.[10] FAA Advisory Circular 150/5200-33 provides that land uses that are wildlife attractants, such as wetlands, must be sited no closer than 10,000 feet from turbine aircraft movement areas. The FAA imposed this requirement as a condition of federal funding for the Third Runway project in its 1997 Record of Decision at p.26-27. The Animal Damage Control Office of the U.S. Department of Agriculture, in a letter to the U.S. Army Corps of Engineers dated April 15, 1998, describes the bird strike safety concerns at STIA and strongly recommends against the creation or enhancement of wetlands within 10,000 feet of the STIA runways.[11]

45. The Port searched for wetland mitigation sites in the Des Moines, Walker, and Miller Creek basins that could be used to provide replacement wildlife habitat; however, these basins are almost totally within the 10,000-ft exclusion area for wildlife habitat mitigation[12]. Areas within these basins that are more than 10,000 ft from existing runways were found not to be suitable for mitigation due to their small size, developed nature, forested condition, or the lack of hydrologic conditions necessary to support wetlands.

46. To mitigate for the loss of wildlife habitat due to the Master Plan Update improvements, the Port will construct wetland mitigation off-site on a 65-acre parcel in the City of Auburn. This mitigation will provide high-quality, diverse, forested, shrub, emergent, and open water wetland habitats and functions to a site where these functions are currently absent or degraded. This mitigation will provide greater habitat functions to a greater diversity of wildlife because it will provide a greater diversity of habitats, greater areas of habitats, and provide habitats that lack the

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[10] See *Wildlife Hazard Management at Airports, USDA and FAA,* December 1999. Pages 1-2

[11] The FAA Advisory Circular and the U.S.D.A. letter are included in **Attachment I** to this declaration. See also, General Responses GR-1 and GR-2, dated April 2001, attached to the Declaration of Steven Jones, for a more complete discussion of bird strike hazards and reasons for not creating new wetlands at the airport.

[12] This issue was addressed in Section 7.2.3 of the *Natural Resource Mitigation Plan* (Attachment M) and in response to comments received during public comment periods (see General Response 1, page 16, Response to 404/401Comments, March 2000).

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past and on-going disturbances that have reduced wetland habitat quality in the areas of wetland impact.

47. The off-site mitigation involves wetland restoration, wetland creation, and wetlands enhancement. The mitigation establishes 17.2 acres of forested wetland, 6.0 acres of shrub wetland, 6.2 acres of emergent wetland, 0.60 acres of open water, and 19.5 acres of emergent wetland habitat. These habitats will be protected with approximately 15.9 acres of forested upland buffers.

48. The mitigation planning and designs are based on scientifically-recognized methods to create, restore, and enhance wetlands and streams, and are sustainable over time. Planning for the sites has carefully evaluated site conditions (soil, hydrology, vegetation, and landscape conditions) to determine restoration approaches that will establish desired ecological functions in a sustainable manner, following agency guidelines[13]. The extensive review of these plans by the public and agency staff has resulted in the incorporation of numerous modifications to assure successful mitigation. For example, the applicable recommendations of recent King County assessments of mitigation projects have been included in the Port's plans[14] As planned, the mitigation also meets the Society of Wetland Scientists' definition of wetland restoration[15], as summarized in **Attachment F.** The mitigation planning also incorporates many other recommendations[16] regarding mitigation including: development of multiple functional goals; development of multiple performance-based monitoring standards for the key ecological elements to be established; and identification of contingency measures, including an adaptive management approach to monitoring and extension of the monitoring period to 15 years. The mitigation sites are assured long-term protection by restrictive covenants that legally protect them from other uses. These approaches are designed to

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[13] The mitigation was planned and evaluated in accordance with the interagency publication *Guidelines for Developing Freshwater Mitigation Plans and Proposals*. Washington State Department of Ecology publication #93-74. 1993.

[14] See response to Comment 1 of State Senator Julia Patterson's letter of November 12, 1999 contained in *Response to Comments on Permit Reference No. 1996-4-02325*, Port of Seattle, March 2000.

[15] See *Position Paper on the Definition of Wetland Restoration*, Society of Wetland Scientists, August 6, 2000.

[16] See *Compensating for Wetland Losses Under the Clean Water Act, Advanced Copy*, National Research Council, Washington, D.C. 2000, pages 1-8.

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ensure that wetland functions are ultimately replaced and that the duration of temporal impacts are minimized.

49. The ACC [17] has questioned the effectiveness and sustainability of compensatory wetland mitigation projects. A study of 45 mitigation sites has been completed by Ecology. While many mitigation projects evaluated in that study have not yet met performance standards, it is important to note that none have been in place for longer than 7 years, and only 5 have been in place for 6 years or longer[18]. Evaluation of mitigation for the Auburn Downs racetrack and West Point Treatment plant (personal observations) demonstrate that wetland and buffer mitigation composed of native plants similar to those planned by the Port is effective and sustainable over time. Monitoring at the Auburn Downs Racetrack mitigation site indicates that in only 4 years, shrub communities average 46 percent cover and forest communities average 37 percent cover.[19] These results demonstrate that the rapid development of dense plant cover is achievable in wetland mitigation sites. Since many of the desired functions on mitigation sites are dependent on vegetation growth and structure (e.g. habitat, carbon export, nutrient cycling, water quality improvement), they would likewise be readily established on the mitigation sites. Other studies evaluating wetland mitigation have not concluded that mitigation be abandoned, but that they include increased design efforts, increased and clear performance standards tied to functional attributes, and longer monitoring periods. The Port's mitigation projects have incorporated many of these recommendations in its design and monitoring plan. Most significantly, each mitigation project includes numerous performance standards for hydrology, soils, vegetation, and other conditions. Monitoring of these variables and evaluating against the performance standards will form a basis for the Port to implement contingency and adaptive management actions if performance standards are not met. Given the fact that the Port's plan is responsive to recent recommendations designed by experts to

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[17] See *Declaration of Amanda Azous*, paragraph 19, 11 September, 2001.

[18] Table 1 pages 58-59. *Washington State Wetland Mitigation Evaluation Study.* Phase 1: Compliance. Washington Department of Ecology. 2000.

[19] See *Auburn Racetrack Year Four Monitoring Report.* Northwest Racing Associates, Auburn, Washington.

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improve the performance of mitigation (see paragraph 47), and that the plans include elements that few other mitigation projects have fully addressed, ACCs assertions regarding the sustainability of the Port's Mitigation are unfounded.

50. *In-Basin Mitigation Will Replace Lost Wetland Functions.* Contrary to the ACC's allegations, the mitigation plan required by the 401 Certification will fully replace the wetland functions lost to wetland filling. In fact, the in-basin elements of the mitigation plan, alone and without considering the benefits of the Auburn mitigation project, will replace the wetland functions lost to filling (except for avian habitat). The amount of mitigation area that the mitigation plan provides for each wetland function is summarized in **Attachment** E, where the acres of impact are compared to the acres of mitigation, by function. In the following paragraphs, I describe how the mitigation plan replaces each function identified in the affected wetlands. The mitigation will result in stream and riparian wetland conditions that are at least as good, and possibly better, than they are at present.

51. The enhancement and restoration of wetlands and riparian buffers in the Miller and Des Moines Creek basins has been carefully planned to replace the functional attributes of the wetlands impacted by the project. The fact that other mitigation actions other than wetland creation can replace the wetland functions lost as a result of the MPU, is the basis for the recommended mitigation ratios present in wetland guidelines and standards.[20] Riparian buffers (wetland and upland) are recognized as providing shade, organic carbon water quality, and habitat functions that protect adjacent stream systems[21]. The restoration and enhancement actions proposed by the Port's mitigation plan are expected to be especially effective in replacing and restoring functions since, concomitant with the restoration and enhancement actions, land use practices that cause on-going degradation of wetlands and streams are being removed and replaced by the mitigation. These

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[20] see Table 5 in *Water Quality Guidelines for Wetlands*, Washington Department of Ecology, Olympia Washington, 1996.
[21] Analysis of riparian buffer functions are provided in *Management Recommendations for Washington's Priority Habitat: Riparian*. K. Knutson and V. Leaf, Washington Department of Fish and Wildlife, Olympia. 1997.

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methods also take advantage of the naturally occurring soil and hydrologic conditions that promote the establishment of wetland and other native plant communities.

52. The information collected and evaluated during the wetland delineation, the assessment of wetland and stream functions, and the analysis of potential project impacts to these functions were used to develop the mitigation plan. This mitigation plan was prepared to meet mitigation requirements for "no net loss" of wetland function or area. The mitigation was designed, to the extent possible given concerns for aviation safety identified by FAA and the Port[22], to replace functions within the affected sub-basins. Contrary to the assertion of Ms. Azous, all mitigation is proposed in the same Water Resource Inventory Area (WRIA 9) where the impacts occur. For all functions except avian habitat, the functions are mitigated in the same sub-basin as where the impacts occur.

53. The ACC has identified functional losses and landscape changes associated with the filling of slope wetlands[23], and this analysis is incorrect. For the wetlands in this project area, the primary functional differences between HGM classes are related to the wetland's hydrologic functions. The affected wetlands, across HGM classes, provide similar habitat functions that are dependent on the vegetation types present. In mitigating functions of various HGM classes, the following was considered:

- **Slope** wetlands that are located in areas where groundwater surfaces, provide groundwater recharge, water quality, and water conveyance functions. The ecological significance of this surface water is baseflow support to Miller Creek or other downslope wetlands.

- **Riparian** wetlands provide conveyance functions, floodplain storage, and water quality functions. Providing equivalent floodstorage and stormwater management facilities will replace these functions.

- **Depression** wetlands provide stormwater detention and water quality functions. Providing equivalent floodstorage and stormwater management facilities will replace these functions.

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[22] See Section 7.2.3 of the *Natural Resource Mitigation Plan*.
[23] See *Declaration of Amanda Azous*, paragraph 19, September 11, 2001.

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54. The mitigation enhances and restores slope, depression, and riparian wetlands. However, most wetlands restored are those in riparian areas. The significant hydrologic functions of slope wetlands (groundwater discharge) are mitigated by the embankment design and low flow mitigation. The embankment design collects water that falls on non-paved surfaces and conveys it to Miller or Walker Creeks. The seasonal discharge of this water to the streams is impacted by the design, in that greater amounts of water are discharged during the late spring and summer months compared to pre-construction conditions. This impact is positive in that streamflow will be supplemented by discharge from the embankment during months when low streamflow are becoming ecologically significant. For these reasons, landscape changes and functional losses will not occur because impacts to the unique functions of slope wetlands are avoided.

55. The detention and water quality functions provided by the several small wetland depressions affected by the project are replaced through stormwater detention facilities, stormwater management BMPs, and through the removal of land uses in the mitigation areas that generate water pollutants. For these reasons, landscape changes and functional losses will not occur because impacts to the unique functions of depression wetlands are avoided.

56. In the following paragraphs, I discuss each of the commonly-recognized functions provided by wetlands in Puget Sound (that were assessed in the *Wetland Functional Assessment and Impact Analysis Report,* discussed above), and I describe how the mitigation plan replaces each of the functions that would be lost when the wetlands are filled.

57. *Resident/Anadromous Fish.* The new Miller Creek stream channel will provide improved fish and other aquatic habitat because it is designed with a number of beneficial features to cutthroat trout and other organisms that are lacking in the present stream. The primary characteristics provided by the design are large woody debris (LWD), woody riparian vegetation, and substrate variability. Each of these features will enhance fish and aquatic habitat. Increased amounts of woody riparian vegetation will result in increased shade, allochthonous inputs (food

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sources in the form of coarse particulate organic matter [CPOM] and terrestrial invertebrates), and sources of woody debris. Increased LWD generally provides habitat complexity, including small plunge pools, fish cover, invertebrate substrates, variable water depths and velocities, etc. These conditions will provide nesting, resting, and forage habitat for fish and other aquatic life. Increased streambed variability in the form of gravel, wood, and CPOM will also increase the diversity of invertebrate habitat. The function of large woody debris and other organic matter in providing fish habitat and food resources for fish is well understood and documented (see Chapter 5 in *Streamside Management: Forestry and Fishery Interactions*, E. Salo and T Cundy eds, Institute of Forest Resources, University of Washington, Seattle; Chapter 12 of *Stream Ecology: Structure and Function of Running Waters,* J, Allen. 1995. Kluwer Academic Publisher, Boston).

58. The shallow water along the margin of Lora Lake will be improved aquatic habitat compared to existing conditions. The replacement of lawns and riprap with plantings of riparian tree and shrub vegetation will improve aquatic habitat by providing shade and organic matter input (woody debris, leaf matter, and insects) that will support fish and other aquatic life.

59. The more than 51 acres of mitigation in Miller Creek buffer areas occurs along over 1.4 miles of Miller Creek. It consists of riparian uplands and wetland, much of which was developed as residential lawns, pasture, or a small nursery. Over 1,800 linear feet of a small tributary channel will also be enhanced. Over 10.25 acres of riparian wetlands will be enhanced and restored in this area. In addition, throughout the stream reach, fish enhancement including woody debris, bank improvements, and substrate improvements will be added to enhance fish habitat. About 2 acres of wetlands subjected to temporary construction impacts will be restored following construction.

60. In 4 locations, instream enhancements to Miller Creek will improve habitat for fish and other aquatic organisms because of the new beneficial features that will be added to the stream that are currently lacking. The primary features provided are LWD, woody riparian vegetation, substrate variability, and removal of riprap. Each of these features will enhance fish and aquatic

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habitat. Increased amounts of woody riparian vegetation will result in increased shade, allochthonous inputs (food sources in the form of CPOM and terrestrial invertebrates), and sources of woody debris. Increased LWD generally provides habitat complexity, including small plunge pools, fish cover, invertebrate substrates, variable water depths and velocities, etc. These conditions provide nesting, resting, and forage habitat for fish and other aquatic life. Increased streambed variability in the form of gravel, wood, and CPOM will also increase the diversity of invertebrate habitat. Removal of riprap will provide more natural channel banks that improve invertebrate habitat and forage areas for fish. Buffer enhancement will increase the types and amounts (terrestrial insects, plant detritus, etc.) of organic matter inputs to the stream, thus increasing forage resources for fish and invertebrates. Placement of LWD will trap other organic matter where it can be processed by aquatic organisms, support invertebrate populations, and increase food resources for fish (see page 152 of *Streamside Management: Forestry and Fishery Interactions.*

61. The Tyee Valley Golf Course Mitigation Area is over 6 acres in size and includes restoration of wetland and buffer functions to the golf course. The area includes over 700 linear feet of Des Moines Creek. Enhancement of floodplain wetlands and stream buffers will provide indirect improvements to fish and aquatic habitat. Increased amounts of woody riparian vegetation planted in the wetland and buffer will result in increased shade and organic matter inputs to the stream, including food sources and woody debris that improves habitat. These conditions improve the quality of the stream for nesting, resting, and forage habitat for fish and other aquatic life. Restoration of floodplain wetlands (converting golf course vegetation to shrub wetland) will increase carbon production, some of which will be exported to the stream during flood events, rainy periods, or through movement in groundwater (in the form of dissolved organic carbon).

62. The Auburn mitigation area is not designed to provide fish habitat. Some warmwater fish may use the open water and flooded emergent portion of the wetlands. Some indirect support to

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downstream ditch systems (including Auburn Creek) could occur in the form of organic matter export during flood events or periods of groundwater discharge.

63. *Passerine Birds.* While not a specific goal of the mitigation, the increased amounts of woody and forest vegetation will provide additional and improved habitat for forest-dwelling bird species. Planting trees and shrubs around Lora Lake could increase forage opportunity for some birds such as kingfisher. Vegetation in the Miller Creek buffer mitigation area, and wetland and buffer plants at the Tyee Valley Golf Course mitigation site, will produce insects that a variety of passerine birds forage upon.

64. The Auburn mitigation site will provide multi-canopied forested, shrub, and emergent wetland communities. The complex vegetation structure and plant communities (containing vertical diversity, snags, debris structures, and food sources) will provide high quality habitat to a variety of forest and wetland bird species. These elements will provide resting, nesting, and foraging habitat for passerine birds. Because of the diversity of habitats at this site and the absence of the past and on-going disturbances to the impacted wetlands, the areas will provide increased habitat functions for birds, small mammals, and amphibians.

65. *Waterfowl.* The Miller and Des Moines Creek mitigation sites are not planned to provide waterfowl habitat functions, for reasons of aviation safety.

66. The Auburn mitigation site will provide waterfowl habitat in open water areas, submergent aquatic bed vegetation, and seasonally flooded emergent vegetation. These areas will provide a diversity of cover and food sources that will provide habitat for waterfowl, including feeding, resting, and nesting habitat.

67. *Amphibian habitat.* In Puget Sound, amphibian species using non-flooded wetland and riparian wetlands typically prefer habitats dominated by woody plant communities. In the Vacca Farm mitigation area, the conversion of farmland to shrub and forested wetlands and buffers will improve habitat conditions for amphibians. The restored floodplain wetlands will provide

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habitat for adult amphibians and breeding habitat (logs and forest soils) for species that breed in non-aquatic habitat (e.g., red-backed salamander, ensatina). The removal of riprap from the margin of Lora Lake will provide breeding habitat for amphibians that require surface water for breeding. The mitigation site will also improve amphibian dispersal because of the new South 154th Street bridge that will span the floodplain of Miller Creek, and removal of the existing bridge, which prevents movement of amphibians through riparian areas. The mitigation will also improve connections to upstream, forested wetlands located north of the existing airfield.

68. The wetland and buffer enhancements that replace lawns and homes in the Miller Creek Wetland and Buffer Mitigation Area will improve conditions for amphibians by enhancing riparian wetlands. This enhancement will provide improved habitat for adult terrestrial amphibians. Improved habitat for terrestrial breeding amphibians (e.g., red-backed salamander, ensatina) will be provided by increased amounts of forest vegetation and woody debris in the Miller Creek buffer and riparian wetlands. The mitigation site will also improve amphibian dispersal because of improved connections to habitat at Vacca Farm, Lora Lake and other riparian wetlands.

69. The wetland and buffer enhancements in the Tyee Valley Golf Course Mitigation Area will replace golf course turf grass will improve conditions for amphibians by restoring floodplain wetlands that provide habitat for terrestrial adult amphibians. Improved habitat terrestrial breeding species (e.g., red-backed salamander, ensatina) will be provided by the increased amounts of shrub vegetation and woody debris. The mitigation site will also improve amphibian dispersal because of improved connections to other riparian areas and Wetland 28.

70. The wetland mitigation in Auburn will establish open water ponds with flooded emergent vegetation will provide breeding and rearing habitat for several amphibian species. The open water will provide habitat for the adult phases of aquatic species. Forested wetlands and upland buffers will provide habitat for terrestrial adult life phases. Mitigation includes placement of

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logs and other woody debris, and topographic diversity that will provide habitat structure for amphibians.

71. *Small Mammals.* Small mammal habitat in the Vacca Farm mitigation area will improve as a result of the new vegetation to be planted in the riparian areas. Restoring wetlands will improve habitat for small mammals by creating a diversity of forage and cover habitat for them. Logs and woody vegetation added to the site will provide denning and forage. The new 154th Street bridge and demolition of the existing bridge will improve habitat connectivity for small mammal, because the new bridge will span the floodplain and allow unimpeded passage of small mammals. The restoration also improves habitat connectivity to Wetlands 1 through 9, which are located north and east of the site.

72. In the Miller Creek wetland and buffer mitigation area, the planting riparian vegetation in riparian areas and restoring wetlands will improve habitat for small mammals by creating a diversity of forage and cover habitat for them. Increased woody vegetation and debris will provide denning and forage areas. The new 154th Street bridge and demolition of the existing bridge will improve habitat connectivity for small mammals using the Miller Creek buffer.

73. Planting vegetation in riparian areas and restoring wetlands in the Tyee Valley Golf Course mitigation area will improve habitat for small mammals by creating a diversity of forage and cover habitat compared to the existing turf grass. Increased woody vegetation and debris will provide denning and forage areas. The mitigation site will also improve amphibian dispersal because of improved connections to other riparian wetlands and Wetland 28.

74. At the wetland mitigation in Auburn, the existing tall grasses on the site provide habitat for small mammals. However, conversion of the area to forest and shrub wetlands will improve habitat for forest and wetland-associated mammals. The increased vegetation structure will provide a greater variety of denning areas, a greater diversity of food sources, and greater cover than are on the site at present. The mitigation area will contain greater amounts and more diverse habitat

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than is present in wetlands at the airport. This habitat will not be subjected to the historical and on-going disturbances found in the impact area, and thus will provide higher levels of function compared to them.

75. *Export Organic Matter.* There are relatively high levels of dissolved organic carbon (DOC) in Miller Creek (see pages 7-19 through 7-22 of the *Biological Assessment* for the project). The high levels of DOC are found upstream and downstream of wetlands to be filled by the project. The large areas of peat soil in the upper portion of the basins (at Tub Lake –about 15 acres; and at the Vacca Farm area and the wetlands located north of the existing airfield –39 acres) are a likely source of DOC to the creek. The planned mitigation does not result in the destruction of a peat system. In fact, the grading of the Vacca Farm area for mitigation purposes will result in a net removal of about 0.1 acres of peat soil.[24] The addition of productive wetland plant communities and lowering the land surface elevation would return peat forming processes by reducing the oxidation of organic carbon to carbon dioxide gas, and promote decay pathways that result in production of DOC and further accumulation of peat. For these reasons, there is no reason to believe that DOC concentrations in the creek would be altered. In the Des Moines Creek basin, restoration of shrub plant communities on mowed golf course wetlands that occurs on about 5.5 acres of peat wetland will enhance organic matter production and export to Des Moines Creek.

76. The ACC[25] cites literature regarding soil organic matter at mitigation sites in Portland, Oregon and incorrectly uses this information to claim that functions dependent on organic matter cannot be replaced by the Port's mitigation. The fallacy of the ACC argument is that the studies cited are from areas of palustrine open water habitats, which were created by excavating a pond in an existing wetland. The Port does not take this mitigation approach, and the results of the study examined by ACC are thus not applicable to the Port's project. It is not surprising open water

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[24] There are 0.59 acres of peat soil that are filled by the project in the Vacca Farm area, as shown in Table 3-1 of the *Wetland Functional Assessment and Impact Analysis Report.*

[25] See paragraphs 10 and 29 of the Declaration of Amanda Azous, September 11, 2001.

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wetlands accumulate organic matter at slow rates because in these systems there is little production of vascular plant materials that decay relatively slowly in anaerobic environments, and thus little annual contribution of organic matter to the soil. In contrast, the Port proposes restoring a woody plant community on existing wetlands or riparian areas where such has been removed. In this situation, woody plant parts and leaf litter, which are much more resistant to decay than the algae or other plants expected in open water habitats, will accumulate on the soil surface. In addition, the root system of these plants will contribute organic matter to the deeper soil layers. In an anaerobic soil environment, this organic matter would contribute to accumulation in soils and anaeropbic nutrient cycling processes such as denitrification, methanogneisis, etc. The fact that the Port's mitigation sites at Vacca Farm and the Tyee Golf course currently have organic soils, yet lack the critical plant production component because the sites are now lawn or golf course further assures that more natural ecological systems can be readily established.

77. In the Vacca Farm and Miller Creek relocation area, the new creek channel is designed to have overbank flow during the 1-year and higher storm events. Smaller storms will flood portions of the floodplain through backwater flooding. As floodwaters recede, export of dissolved and particulate organic matter from the floodplain to the stream will occur at higher levels than would currently be expected because greater amounts and types of organic matter (leaves, twigs, branches, etc.) will be on site and available for export. Replacing of grass-dominated riparian plants adjacent to the stream and Lora Lake with native woody riparian vegetation will increase the amount and diversity of organic matter (i.e., readily decomposable leaves and woody debris that is slower to decompose) available to the stream and aquatic habitat of Lora Lake.

78. The high productivity expected in forest and shrub wetlands will result in accumulations of organic matter in the saturated soil of the restored wetland. Groundwater movement through the site and flooding will transport dissolved organic matter to Miller Creek. Placement of logs in Miller Creek and development of a natural riparian zone will help trap organic

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debris in the stream channel, where it will be available for processing by aquatic invertebrates, thus benefiting the food chain. Suggestions by the ACC[26] that shrub wetlands are of low productivity and thus less valuable than emergent wetlands are wrong. The project mitigation, in basin and out of basin, replaces low quality turf grass, plowed fields, and abandoned lands dominated by introduced pasture grasses and reed canary grass. The plant productivity of these systems is nearly irrelevant, as the lack the vegetation structure and process that provide habitat and allow the sites fully support riparian systems are missing. For example, the mowed golf course and the plowed fields of Vacca Farm are unable to export organic matter to adjacent streams because they are mowed, plowed, and or harvested each year. There are few or no trees or shrubs present on these sites, and riparian contributions to instream processes are unsupported. Leaf and woody debris does not accumulate as peat, and as a result, it is very likely that an annual loss of peat from these systems, due to the oxidation of the existing soils occurs. As ecological benefits of the mitigation are explained in the documents Ms. Azous claims to have reviewed, her statements that the "*Vacca Farm purposefully lacks habitat for biological processes*" demonstrates her fundamental misunderstanding of the Port's proposals and the ecological conditions in the project area.

79. Further, in contrast to ACCs claim, the Vacca farm mitigation site will, following grading, have adequate hydrology to support wetland vegetation and biological functions. This is demonstrated by the hydrologic monitoring data presented in the *Natural Resource Mitigation Plan* (Table 5.1-10, page 5-32), other on-site observations, and that the development of peat soils at this site is the result of groundwater discharge (which is still present) and not surface flooding. The wetland is graded such that overbank and backwater flooding will occur during the mean annual flow, not the 100-year flow as reported by ACC[27]. Following flood events, floodwaters will gradually recede as the water elevation in the creek recedes without long-term ponding.

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[26] See paragraphs 5 and 21 of the Declaration of Amanda Azous, September 11, 2001.

[27] See Response #19 to comment letter by Sheldon & Associates, February 15, 2001 in March 2001 Response to Comments.

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80. Removal of plowing and soil drainage systems will reduce the potential loss of peat soils through oxidation, which occurs in better drained soils. Restoring natural hydrology and natural plant communities will provide a carbon cycle where greater amounts of organic matter decomposes anaerobically with subsequent export from the site as dissolved organic carbon, and accumulation on-site as organic soil.

81. In the Miller Creek wetland and buffer mitigation area, replacing grass-dominated riparian areas with native woody riparian vegetation will increase the export of organic matter to the creek. In many places, lawn vegetation will be replaced with tree and shrub vegetation. The high productivity expected in the enhanced wetlands will increase the amount and diversity of organic matter (i.e., insects, leaves, branches, trees, etc.) reaching the stream. Accumulations of organic matter in the saturated soil and increased export to the stream as detritus and woody debris or as dissolved carbon are likely to occur. Where riparian vegetation consists of blackberry, its replacement with a multi-storied forest and shrub canopy will also increase the type and diversity of organic matter reaching the stream.

82. Placing LWD in the Miller Creek stream channel and removing residential land uses, as part of buffer mitigation will result in restoration of natural patterns of organic matter accumulation, storage and cycling in the stream channel. For example, under residential land use, many residents clear the riparian buffer of trees or shrubs, reducing delivery of organic matter to the stream channel. When trees or branches do fall into the creek, they are typically removed by the landowner. Removing these logs and branches prevents trapping of organic matter in the channel, and promotes its conveyance downstream. Placement of logs in the stream as mitigation will promote trapping and storage of organic matter in the mitigation site, where its ultimate decomposition will benefit aquatic organisms.

83. Groundwater movement through the riparian wetlands will transport dissolved organic matter to Miller Creek. Removing artificial bank armoring and placing in-channel woody

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debris will improve overbank flow in some sections. This overbank flow, coupled with overhanging riparian vegetation, will provide additional sources of organic matter export into the stream channel. Where riparian wetland vegetation is currently pasture or blackberry, planting tree and shrub communities will increase the amount and diversity of organic matter available to the stream and wetlands.

84. At the Tyee Valley Golf Course mitigation area, organic matter export functions will increase because currently organic matter is cut and removed from the floodplain as part of golf course activities. After enhancement is in place, organic matter could be exported from the wetland and riparian buffer during flooding and rainy periods. New woody vegetation in the riparian zone will contribute leaf fall and insects directly to Des Moines Creek at levels higher than the current herbaceous vegetation provides.

85. Wetland mitigation in Auburn will promote organic matter export functions because, the wetland will be in the floodplain and also have a seasonal hydrologic connection to the Green River. As the flood and other surface waters drain, fine particulate organic matter (FPOM) and dissolved organic matter will be exported to downstream systems via the ditch systems. During periods of groundwater discharge, particulate and dissolved organic matter would be discharged from the site.

86. *Ground Water Exchange.* The ground water exchange functions of the impacted wetlands has been evaluated in detail by the Port (see Appendices B, C, D, E, F, G of the *Wetland Functional Assessment and Impact Analysis Report,* **Attachment L**). The project's impacts to this function has been avoided by project design and mitigated through low flow mitigation. As a result, the mitigation sites are not designed to provide this function.

87. *Flood Storage.* The Vacca Farm and Miller Creek relocation/mitigation site is designed to replace floodplain filled by the project (8,500 cubic yards) and provide a small net

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increase (9,600 cubic yards). The overall significance of the wetlands and farmland in providing this function will not change.

88. No change to the flood storage functions at the Miller Creek wetland and buffer mitigation site, or at the Tyee Valley Golf Course mitigation site, will occur s a result of mitigation.

89. The Auburn mitigation site is hydrologically connected to the Green River floodplain via a series of ditches. The site is designed to store floodwater during 100-year flood events.

90. With regard to flood storage, the ACC[28] said "*slope and riparian wetlands lost have far superior water quality and water storage functions compared to the upland buffer the Port would restore as compensation*". It is generally recognized that wetlands on slopes provide little opportunity for water storage in a manner that moderates runoff rates and flood control. Wetlands on slopes lack the topographic conditions that allow significant water storage. For the wet season, when flood storage is important, the surface soils in these wetland soils remain saturated, and thus have little storage capacity compared to the non-saturated upland soils. With regard to water quality functions, upland soils are known to provide significant water quality functions, and in fact, infiltration of stormwater into upland soils is among the best BMP for water treatment of urban runoff. The statement the "*the 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*" is not supported by the cited reference which has no relevance to the mitigation planned by the Port. Further, the proposed buffer enhancements will add organic mulch to parts of the area. It will not remove or compact soils. There thus would be no reduction in infiltration rates, storage capacities, or sub-soil properties and thus the soil's ability to provide water quality functions would not be changed. Enhancement of other wetlands and the excavation of replacement floodplain replace the hydrologic functions of the small area of riparian wetlands affected (about 0.6 acres of Wetland R1 and A1).

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[28] See paragraph 19 of the Declaration of Amanda Azous, September 11, 2001.

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91. *Nutrient/Sediment Trapping.* Although the water quality functions of the existing wetlands will be lost when these wetlands are filled, the overall project, including the planned mitigation, will fully replace these water quality functions and is likely to result in improved water quality in Miller, Walker, and Des Moines Creeks. This is true for several reasons.

92. First, a number of the existing wetlands that will be eliminated or impacted by Master Plan Update improvements do not provide optimal water quality treatment functions. The treatment function in some of these wetlands is sub-optimal due to a short residence time (as inferred by wetlands on slopes, small size, topography that limits ponding and storage of water, and channelized flow) and a lack of dense emergent vegetation. The above-mentioned factors are typically associated with wetlands with high function for water quality improvement.

93. Second, the proposed stormwater management facilities will include water quality treatment. This will primarily consist of biofiltration swales and filter strips, as well as wet vaults where biofiltration is not feasible. These water quality treatment facilities will be constructed to meet Ecology and NPDES requirements. These facilities will be at least partially effective in replacing the water quality functions of the wetlands to be filled.

94. It is noteworthy that existing wetlands (to be filled) receive untreated stormwater runoff from non-STIA areas. For example, existing wetlands downslope of 12th Avenue South receive untreated stormwater runoff from 12th Avenue South and provide treatment (at less than optimal rates) prior to discharge to Miller Creek. Treating stormwater likely degrades some of the biological functions also provided by the wetlands. Following construction of the embankment, runoff will be treated by water quality treatment BMPs, which should enhance the biological functions of the remaining wetlands.

95. Third, and perhaps most important, construction of Master Plan Update improvements and mitigation measures will improve the quality of water draining to the streams and

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wetlands because existing land uses that contribute pollutants to the wetlands and Miller Creek will be replaced by natural vegetation.[29]

- For areas within development footprints, existing pollution-generating areas within the acquisition area (e.g., lawns, streets and driveways) that currently lack water quality treatment facilities will be removed. These areas will be replaced with embankment and other facilities with stormwater management BMPs.

- For areas to remain undeveloped, but not specified as mitigation, the removal of residential and commercial land-uses will eliminate pollutant sources, including failing septic tanks, fertilizer, runoff, and other potential pollutants (pesticides, pesticide residues). If redevelopment of these areas occurs, then stormwater management standards for water quality treatment and runoff rates must be met at the time of development. These standards would exceed the baseline condition (lacking any stormwater BMPs), and maintain water quality benefits compared to the current condition.

- For areas in the Vacca Farm mitigation area, the restoration of farmed areas in the Miller Creek floodplain with native wetland vegetation will reducing erosion, pollutant sources, and increase the area's water quality treatment capacity to remove nutrients and pollutants from Miller Creek and stormwater runoff from adjacent areas.

- For Miller Creek and Wetland A17 mitigation areas, the enhancement of wetlands and buffers will eliminate pollutant sources, including failing septic tanks, fertilizer, runoff, and other potential pollutants (pesticides, pesticide residues). Planting of these areas native upland and wetland vegetation will reduce erosion, pollutant sources, and increase the area's water quality treatment capacity to remove nutrients and pollutants from Miller Creek and stormwater runoff from adjacent areas.

- For mitigation along on the Tyee Valley Golf Course and along Des Moines Creek, removal of golf course uses would remove fertilizer and pesticide runoff to the creek. Planting of these areas native upland and wetland vegetation will reduce pollutant sources and increase the area's capacity to remove nutrients and pollutants from Des Moines Creek and stormwater runoff from adjacent areas.

96. The ACC[30] asserts that a loss in the wetlands role in reducing nitrogen export will occur and that this will alter the food web and increase the supply of nitrogen at the mouth of the

[29] The influence of land use on the water quality conditions of runoff water is well documented, and include studies in Washington (see *Fundamentals of Urban Runoff Management* R. Horner, J. Skupien, E. Livingston, and H. Shaver. 1994. page 38; as well as other regions (*Los Angeles County 1994-2000 Integrated Receiving Water Impact Report.* Los Angeles County Department of Public Works. 2000; *Sources of Pollutants in Wisconsin Stormwater.* Bannerman et al. 1999. Natural Science and Technology, 28:241-259).

[30] See *Declaration of Amanda Azous*, paragraph 25, September 11, 2001.

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creeks This argument is not logical because, as described above, the project will remove sources of pollutants to wetlands near Miller, Des Moines and Walker Creeks by removing land uses that contribute nitrogen to them. The replacement of lawns, golf courses, farmland, streets and driveways, and home sites with natural vegetation would restore a natural pattern of nitrogen cycling to the landscape which would not be detrimental because naturally vegetated wetlands and buffers do not contribute ecologically damaging levels of nitrogen in runoff waters.

97. The ACC (paragraph 25, 26, and 27 of the Azous Declaration) claims that *"enormous consequences"* to water quality and ecological conditions will result from the filling of wetlands and providing over 100 acres of in-basin mitigation. The facts are that the MPU improvements and STIA occupy only about 9 percent of the entire Miller Creek basin. Of that area, only a small percentage of urban runoff waters are routed through the wetlands that will be filled. Most runoff (including that generated by portions of the existing airfield, 12th Avenue South, 154th Street, 160th Street, and 170th Street) drains directly to the creek, or in the case of Water W, to channels that quickly convey water through wetlands to the creek. Therefore, the filling of wetlands will not cause increased amounts of urban runoff to go untreated to Miller Creek. The fundamental point is the project removes the sources of pollutants or provides water quality treatment facilities.

98. At the Vacca Farm and Miller Creek relocation site the new stream channel is designed to have overbank flow during the 1-year and higher storm events. Smaller storms will flood portions of the floodplain through backwater flooding. In each case, floodwater flows into shrub and forested riparian areas will promote sediment trapping and retention of nutrients in the restored wetland. In the riparian wetlands, planting woody vegetation will allow this function to occur at higher levels than currently exists on the farmland or lawn areas (adjacent to Lora Lake). The replacement of herbaceous vegetation with woody plant communities would promote storage of nutrients in organic matter (wood) which decomposes slower than herbaceous vegetation. Removal of farming and residential land use activities will remove activities that degrade water quality.

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99. Water quality functions in the Miller Creek Wetland and buffer mitigation area will improve for several reasons. Many impacts to the riparian wetlands and the stream will be removed as a result of the project and mitigation. For example, several dozen houses and buildings, lawns, driveways, etc. will be removed from the mitigation area, thus removing features and land uses that contribute to the degradation of water quality. Several septic systems will be removed from the mitigation area, as will one or more horse pastures, which also contribute to degradation of water quality. Outside of the mitigation area, removing streets and residential land uses will reduce the amount of pollutant loading to the wetland and stream system. Restoration of these disturbed areas will increase their capacity to provide water quality functions by establishing natural nutrient cycling pathways.

100. At the Tyee Valley Golf Course mitigation area, the removal of turf grass and turf grass management actions from the wetland and buffer areas will remove sources of nutrients and pesticides. Planting shrub and forest vegetation will provide natural pathways for nutrient uptake and cycling.

101. Wetland mitigation in Auburn consists of creating and enhancing depressional wetlands with channelized discharge. The large size of the wetland basins and relatively small amount of discharge water expected during most conditions will result in high retention rates for sediment and nutrients. The site will have a surface water connection to the Green River flood during flow events that exceed 8,500 cubic ft per second. At these flow levels, the wetland area will flood as a result of backwater conditions from the Green River. During flood events the wetland is expected to remove nutrients and sediments from floodwaters.

102. The requirement for increasing the size of the Miller Creek Wetland and Buffer enhancement area to include Wetland A17 and Water D (Condition D(4) of the 401 Certification) is a minor component of the overall mitigation planned for the project. This additional mitigation area is geographically adjacent to and hydrologically linked to the planned Miller Creek Wetland and

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Buffer Enhancement mitigation site, for which detailed mitigation designs are provided. The addition of the Wetland A17 area is merely a geographic expansion of the Miller Creek Wetland and Buffer Enhancement Area, and it will be subject to the same mitigation plan that has been developed and reviewed by Ecology in detail. The design and implementation of this mitigation involves the same types of activities that are already described in the existing mitigation areas. These are the removal of houses, garages, and other structures from wetlands and buffers, the removal of invasive vegetation, and the planting of these and other areas with native wetland or upland trees and shrubs. Where two driveways cross Water D, culverts and driveway fill will be removed from the wetland. In another location where Water D is buried across a portion of a yard, it will be removed from a culvert. These actions represent improvements to the watercourse and are similar to other in-water work described in the mitigation plan.

103. On behalf of the ACC, Amanda Azous stated that it is important to consider the cumulative impacts of all projects in the watershed, and she alleged that there has been no cumulative impact assessment completed by the Port. Azous Decl. at Para. 30 (ACC declarant Tom Luster made a similar allegation. Luster Decl. at p. 16.). These declarants are correct that a consideration of cumulative impacts is important, but they are wrong that the Port conducted no cumulative impact assessment. The Port, and the regulatory agencies responsible for reviewing permits for the airport projects, have extensively considered the cumulative impacts. In its response to public comments, the Port reviewed all the other projects proceeding in the Miller, Walker, and Des Moines Creek basins. This includes the SR 509 and Regional Detention Facility projects mentioned by Mr. Luster, along with airport terminal projects, wastewater system expansion, Part 150 noise compatibility planning, and other projects and activities in the area. See General Response GR-19, dated April, 2001, attached to the Declaration of Steven G. Jones. The Port concluded that these other projects would not result in significant adverse impacts to the aquatic ecosystem of the basins because their impacts will be mitigated. Also, the FAA, as lead agency for environmental

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review of the airport projects, fully considered the wetland and other environmental impacts of other projects in the basins. The FAA concluded that "none of these projects are expected to cause significant adverse impacts individually or in combination with the Master Plan Update projects." See, Federal Aviation Administration Record of Decision, *Environmental Reevaluation for Master Plan Update Development Actions, Sea-Tac International Airport*, August 8, 2001, p. A-1, attached to this declaration as **Attachment J.** Finally, the Port has also considered the historical changes to these stream basins, as documented in *Cumulative Impacts to Wetlands and Streams*, August 2001, attached to this declaration as **Attachment N.**

104. *Summary.* In my experience working as a professional wetland ecologist, I have had the opportunity to observe nearly all the wetland mitigation plans for major projects in the Puget Sound area that involve wetland impacts. In my opinion, the wetland mitigation required by this 401 Certification exceeds the mitigation requirements that have typically been imposed on other projects. The mitigation requirements of this 401 Certification are detailed and comprehensive, and they fully mitigate for the impacts of wetland filling. Substantial resources have been devoted to the planning, design, and regulatory review of the mitigation plan, to avoid and minimize direct and indirect impacts to wetlands and other aquatic resources. Avoidance of and mitigation for impacts has been exhaustively considered on a function by function basis, as explained in this declaration. The mitigation will result in one of the largest wetland mitigation sites in Puget Sound. I am unaware of any 1.4-mile reach of stream in Washington where adjacent residential land uses were removed and its riparian wetlands and buffers restored to natural conditions. The large ecological lift that will occur at the in-basin mitigation sites and at the site in Auburn will be protected in perpetuity by restrictive covenants. The temporal impacts of the mitigation will be positive and substantial in the long run. The benefits can be thought of as similar to compounding interest, where the ecological benefits gained by over 167 acres of functioning habitat will increase over time, far outweighing short-term risks that are mitigated by an extensive 15-year monitoring program. Since the planned

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mitigation replaces all functions provided by the impacted wetlands and will result in water quality and other ecological benefits to the remaining wetlands and streams, beneficial uses will be protected, water quality will not be degraded, and state water quality standards will be met.

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

Executed at Kirkland, Washington, this 29th day of September 2001.

James C. Kelley

James C. Kelley, Ph.D.

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*** Slip Sheet ***

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