Sheldon

Pre-Filed Testimony of Dyanne Sheldon
Submitted on behalf of Appellant
Airport Communities Coalition

PCHB No. 01-160
ACC & CASE v. Dept. of Ecology & Port of Seattle

February 22, 2002

1. Dyanne Sheldon declares as follows:

2. I am an environmental scientist, with over 20 years of specializing in wetland ecology and wetland management related issues. I have a Bachelor's of Science in Botany, and a Master's of Education and Curriculum Development. I have worked as a wetland ecologist and land-use planner in the Pacific Northwest for over 20 years, and as a naturalist and educator for over 25 years (see Vitae, Attachment A).

3. In my pre-trial testimony I focus on the following issues: discrepancies in how Ecology has taken regulatory authority on wetlands, determination of restoration/creation credits, assessment of functions proposed to be provided, whether or not the detailed plans and performance specifications of the 401 permit will result in the suite of benefits described in the NRMP, whether the relocated stream and floodplain system will function as described in the NRMP text, how the conditions of the 401 do not effectively apply current state of the science on effective mitigation design and finally whether or not the 401 conditions assure long-term protection of water quality of state aquatic resources.

4. As I noted previously in my Declaration in Support for Motion for Stay, (Attachment O this document, Para. 7; Oct. 2001) hydrology is the key driver for all wetland functions. The recently published National Academy of

Sciences[1] (NAS) work on mitigation effectiveness has this to say about hydrology: "The long-term success of any wetland restoration or creation project is, to a very large extent, dependent upon restoring, establishing, or developing and managing the appropriate hydrology."[2] Research on the influence of how water gets into a wetland, how long it is present, and how deep it is inundated has identified water as the critical parameter in determining functions[3],[4] a wetland provides. As one of only two consultants hired by Ecology to assist in the two-year process of developing a method for assessing the functions of Puget Sound lowland wetlands, I'm well aware of the complexities in ascertaining what 'drives' wetland functions. It is discussed further in paragraph XXX, below.

5. As Marble[5] states, "By definition, all wetlands are created and maintained by water. The frequency, depth, and duration of water's influence determine, to a significant extent, the vegetation present and the functions that the wetlands provide." When you change the "frequency, depth, or duration of water's influence" on a wetland, you change how the wetland functions. Decreasing the volume of water getting to a wetland can reduce the wetland

---

[1] National Academy of Sciences, Compensating for Wetland Losses Under the Clean Water Act. National Academy Press. 2001.
[2] Hammer, D.A. Creating Freshwater Wetlands. Lewis Publishers. 1992.
[3] Brinson, M. M. (1993). "A hydrogeomorphic classification for wetlands," Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A270 053.
[4] Methods for Assessing Wetland Functions. Volume 1: Riverine and Depressional Wetlands in the Lowlands of Western Washington. 1998. T. Hrubry, T. Granger, K. Brunner, S. Cooke, K. Dublanica, R. Gersib, L. Reinelt, L. Richter, D. Sheldon, A. Wald, F. Weinmann. Washington State Department of Ecology Publication #98-106.
http://www.ecy.wa.gov/programs/sea/wfap/westernWFAPmethods.html
[5] Marble. A.D.; A Guide to Wetland Functional Design. 1992. Lewis Publishers.

size, maintaining the same volume but changing the pattern in which the water gets to the wetland over the course of a year can drastically change biologic, chemical, and physical properties of a wetland. Increasing the rate of flow to towards a wetland can result in erosion and sedimentation, a change in the nutrient budget, and deposition of fines and sediment into the wetland eventually altering the pattern of surface water entering or moving through the wetland.[6]

6. Ecology modified the 401 Certification in September, 2001 to change a critical hydrology performance standard for one type of wetlands in the project area from a non-enforceable standard, to a standard that poses some potential real harm to maintaining existing wetland functions on the site (Table 5.2-12 of the NRMP). The August 401 Certification Performance Standard in Table 5.2-12 of the NRMP provided that the Port needed to show that there was *"saturation in the upper part"* (emphasis added) of the soil horizon for either mineral and organic soils. This is not a performance standard because it is not measurable. It is meaningless and Ecology attempted to fix it by rephrasing the condition (in the Sept. 2001 revisions to the 401) to state that groundwater within wetlands with organic soils had to be "within 10 inches of the surface" between March and mid-June (wetlands with predominantly mineral soils are still burdened by the meaningless "performance standard" of "...soils saturated in the upper part to mid-April...". What Ecology has consistently failed to require of the Port is

[6] Mitsch, W. and J. Gosslink. WETLANDS, Edition 3. 2000 Van Nostrand Reinhold.

to meet a performance standard that would require the Port to match the pre-filling hydrologic patterns in the wetlands downslope of the proposed project, after the project is constructed. By allowing the performance standard of "groundwater within 10 inches of the surface during the growing season" Ecology assumes that the State has met the intention of the RCW to assure maintaining the water quality of the state. Ecology assumes that even with that 'standard' that there will be some wetland feature on the landscape downslope of the runway, post-construction. What Ecology has failed to do is to require the Port to *maintain* the downslope wetlands without further degradation, post-construction.

7. For example, wetland 39 is a large forested wetland with mineral based soils, that is typical of many forested slope wetlands: it was shallowly inundated with slowly flowing water at the time of my field visit on January 31, 2001. Requiring this wetland to have only saturation to within 10 inches of the surface in the future will significantly diminish the functions of primary productivity, nutrient export, and stream flow attenuation to Miller Creek, down slope. It might still be a wetland, but it won't be providing the same functions as it does now. Note that the performance standard does not require the Port to match the hydroperiods of the wetlands pre- and post-project, which would have been the most logical standard to impose to assure long-term perpetuation of wetland resources and maintenance of wetland functions. That would have required Ecology to force the Port to collect adequate, credible

groundwater data on all the wetlands that are slated to remain, *prior* to the Port initiating a massive filling operation in the upland watershed above the groundwater fed wetlands. Although it was discussed, it was never fully carried out.

8. I noted in my declaration of Support for Stay for ACC (October, 2001, paragraphs 9-14, Attachment B) the acreage calculations of compensatory mitigation for the STIA do not meet the requirements of Ecology's own standards[7] for compensatory mitigation. Since preparing that declaration, I've examined the revised November 2001 Natural Resources Mitigation Plan for STIA (NRMP, Parametrix, November, 2001) in light of newly provided documents from Ecology staff, and I have identified some critical inconsistencies between what Ecology[8] has identified as their regulatory responsibility, what the Port has provided and Ecology has conditioned in the issued 401 Certification. Clearly Ecology is not taking regulatory responsibility for waters of the state, and the proposed 401 conditions do not adequately acknowledge nor protect State resources.

9. First, Ecology has not required the Port to properly identify the extent of wetlands within the project area per the standards of State law, but rather has allowed the Port to represent the wetlands per the standards of the federal requirements, which are less restrictive. Mr. Erik Stockdale, Senior Wetland

[7] Mc Milan, Andy. How Ecology Regulates Wetlands. April 1998. Ecology publication: 97-112, available at: http://www.ecy.wa.gov/pubs/97112.pdf .

Ecologist of Ecology[9], has stated in his deposition for this case, that Washington State regulates agricultural areas that meet the Natural Resources Conservation Service (NRCS) definition of prior converted cropland (PCC) as wetlands. Ecology's 401 Certification for the Third Runway fails to do so. The NRMP fails to accurately identify 7.8 acres of Vacca farm as wetland, instead those acres are identified as Prior Converted Cropland (PCC), and thereby become in essence, invisible in a regulatory context, until it serves the Port's purposes to point to those PCC acres as a place to obtain 'restoration' credit.

10. The Corps of Engineers does not have regulatory authority over PCC areas because of the provisions of the Food Security Act. The Army Corps of Engineers[10] in their December, 2000 public notice for the STIA 404 permit application noted, "...the State Department of Ecology will take jurisdiction over 7.88 acres of lands that the Corps has determined are prior converted cropland...".

11. In a letter (Attachment C) from Ecology[11] to Mr. Don Scarberry, Erik Stockdale clearly states, "The Department of Ecology regulates areas designated as "prior converted croplands" if they meet the technical criteria of wetlands in the 1996 Washington State Wetland Delineation Manual." He goes on to explain, "Thus

---

[8] E. Stockdale, Deposition upon Oral Examination. Airport Communities Coalition vs. Department of Ecology and Port of Seattle. January 23, 20002.
[9] E. Stockdale, Deposition upon Oral Examination. Airport Communities Coalition vs. Department of Ecology and Port of Seattle. January 23, 20002.
[10] U.S. Army Corps of Engineers Public Notice of Application for Permit. Second Revised Public Notice. December 27, 2000
[11] Stockdale, E., Sr. Wetland Specialist of Ecology to Mr. Don Scarberry of Novadyne Engineering. Clarifying Ecology's regulatory authority on prior converted cropland. March 28, 2001.

there are cases where wetlands meeting the state wetland delineation manual criteria (and the Corps of Engineers delineation manual criteria) are excluded from federal regulation, but not state regulation."

12. In Mr. Stockdale's[12] deposition of January 23, 2002 he refers to an email (Feb. 17, 2000) where he states that Ecology has found that the wetlands on Vacca Farm are wetlands per the Ecology manual and Ecology will regulate them as such under RCW 90.48 Water Pollution Control (90.48.260). Mr. Stockdale goes on to clarify (in his email and reiterated in his January, 20002 deposition), that Ecology won't give compensatory [sic] 'restoration' credit for the wetlands on Vacca Farm, but will require 'enhancement' ratios.

13. Mr. Jim Kelley, in his trial testimony on the case of Port of Seattle v. RST Enterprises, Inc (Attachment 4), regarding the condemnation of Parcel 92 for the Port[13], testified that he knew Ecology had the legal authority to regulate Vacca Farm as wetland (Parcel 92 at least), and that based on the City of SeaTac code, he confirmed that it is a Class I wetland. He testified the wetland that he mapped as "prior converted cropland" on parcel 92, is a portion of a much larger wetland (16.8 acres) that includes Lora Lake, forested and emergent communities. Both Ecology staff and the Port's consultant knew the wetland complex that included Vacca Farm was regulated wetland per the RCW, yet the 401 was issued disregarding that information.

---

[12] E. Stockdale, Deposition upon Oral Examination. Airport Communities Coalition vs. Department of Ecology and Port of Seattle. January 23, 20002.

[13] Kelley, J. Supreme Court Cause No. 71562-9. Port of Seattle v. RST Enterprise, Inc. June 5, 2001.

14. The consequences of not calling the majority of Vacca Farm wetland are complex. First it means that there are 7.8 fewer acres of wetland documented as being associated with the Port's project. Secondly, placement of the relocated Miller Creek channel does not get calculated as 1.16 acres of permanent wetland impact in Table 3.1-2 (NRMP). Interestingly, none of the wetland impact summarized on Table 3.1-2 is noted as Class 1 wetland, though based on James Kelley testimony for the Parcel 92 case, the nearly 17 acre wetland complex associated with Lora Lake is classified as Class 1. And lastly, if the area of PCC is not identified as wetland, then the Port can assert that the area has no wetland functions in its existing condition, and therefore justify restoration credits at a 1:1 ratio when they grade it to create well-drained floodplain and plant shrubs.

15. Ecology has an obligation to require the applicant to accurately identify all state regulated resources on the site, and to maintain an accurate accounting of preservation, loss, or alteration.

16. In addition to not accurately identifying regulated wetlands, the NRMP also takes credit for "restoring" nearly 7 acres of PCC lands, as if these lands are not currently providing any of the functions attributed to future conditions. Section 4.2.1 (pg.4-20, NRMP) outlines some of the functions expected in the Vacca Farm "restoration", it does not accurately reflect how many of the 'restored' functions are already being provided in existing conditions, to compare/contrast net gain or loss for particular functions. For example,

anticipated increases in small mammal habitat and passerine birds fails to recognize the structural complexity and abundant food sources present in existing conditions from a high diversity of vegetation types related to agriculture, 'weedy' margins, and high plant species diversity related to typical mature residential landscaping. The proposed shrub dominated future conditions are specifically designed, "*not* to provide direct food sources (fruits, nuts, seeds, berries, etc.)..."[14] for use by birds or mammals. The NRMP also describes how there will be a net increase in accumulation of on-site organic soil and a decrease in the loss of organic soil through oxidation (pg. 4-22). The 'loss' of peat from oxidation cannot be compared with a straight face with the project's proposed removal of 9,600 cubic yards of soil from the proposed 'restoration' area, most of it organic soils that have taken thousands of years of landscape processes to accumulate. The point is not to argue whether the landscape used for agricultural practices and characterized by high species diversity comprised of many non-native species is better or worse than a non-structurally diverse shrub community with 'interspersed' trees: the point is that the NRMP takes full credit for 'restoring' functions to an area that is not accurately represented for what functions it currently provides. The NRMP does recognize that although it is proposed to remove that 9,600 cubic yards of soil to replace lost flood storage, the net increase in flood storage from the overall project will be minor.

[14] NRMP, pg. 4-23. Parametrix. November, 2001

17. As I've noted in my previous declarations (Attachments B & O), how the Port calculated acreages of compensation credit is not consistent with the Guidance established by Ecology (attached to Attachment B). A further evaluation of the November, 2001 NRMP has identified previous Port 'calculations' that over-estimate the compensatory mitigation to be provided at Vacca Farm by nearly 50 percent. The NRMP (Table 4.1-3 and Table 5.1-1) calculate 6.60 acres of restoration mitigation credit for the PCC wetlands. However, Ecology has identified that these areas are regulated wetlands, therefore mitigation credit should be calculated as 'enhancement' at a ratio of 1 acre of credit for every 2 acres of enhancement; hence 3.3 acres of compensatory mitigation credit, not 6.6.

18. In addition, Table 5.1-1 identifies 3.06 acres of 'mitigation' in Lora Lake (distinct from the shoreline area of Lora Lake). Lora Lake is not identified as a wetland in the delineation reports or the NRMP, nor do the NRMP or Appendix A-F plan sheets identify 'enhancement' actions that are proposed in the lake. Ecology should not grant over 3 acres of compensatory credit for the whole lake simply because there are some proposed habitat along the shoreline.

19. Adjusting the acreage from Table 5.1-1 to accurately reflect the values provided, there would be a total of 6.9 acres of compensatory mitigation from the proposed Vacca Farm actions, only 52% of what the 401 Certification grants as credit in that area. See Attachment E for a table that summarizes these calculations. As noted in my previous declaration, although Ecology does not

have any clear guidance in providing compensatory mitigation credit for documented wetland losses by enhancing upland buffers. The 401 conditions grant 48% of the estimated *total* on-site compensatory mitigation credit for upland buffers. Using corrected values for the Vacca Farm area, Ecology would grant the Port nearly identical acreage of mitigation credit for wetland areas as they would for upland buffers.

20. Compensatory mitigation can be discussed in terms of aerial extent or in terms of functions lost, gained, or replaced. Successful replication of wetland functions through compensatory mitigation has been consistently poor, as documented by recent studies by the National Academy of Sciences[15] (NAS) (Attachment F), and two reports out of Ecology[16],[17] (Attachments G_1 & G_2). Conclusion 3 of the NAS report notes that, "Performance expectations in Sect. 404 permits have often been unclear, and compliance has often not been assured nor attained." This is precisely the point that I was making in my declaration of October 2001, the permit conditions, including the performance standards, of the revised 401 are remain vague, inconsistent, and in some instances, unenforceable.

21. For starters, it is challenging to comprehend what exact conditions and parameters Ecology will be attempting to enforce through the 401 Certification.

---

[15] National Research Council. Compensating for Wetland Losses Under the Clean Water Act. 2001. National Academy of Sciences. http://www.nap.edu/books/0309074320/html/

[16]Washington State Wetland Mitigation Effectiveness Evaluation Study. Phase 1: Compliance. P. Johnson, D. Mock. June, 2000. http://www.ecy.wa.gov/biblio/0006016.html

For example, Condition D.1: Required Mitigation[18] of the approved Sept. 2001 401 Certification states: (emphasis added in *italics*), "Mitigation for this project shall be completed as described in the following documents with the following additions and clarifications:

- The Final NRMP Master Plan Update Improvements, STIA, dated *December 2000* (Parametrix, Inc.)
- Appendixes A-E, Design Drawings, NRMP, dated *December 2000* (Parametrix, Inc.)...
- The revised NRMP performance standards found in Tables... received *July 31, 2001* (Parametrix, inc.)..."

None of those referenced standards are appended to the permit. Since re-issuance of the permit in September, revisions to the NRMP have continued, including a completely re-issued version dated November, 2001. Does that now supercede the July provisions cited in the 401? Piecemeal revisions, and clarifications and amendments to the NRMP continue to be prepared and submitted by the Port. Yet, the conditions of Ecology's 401 Certification specifically hold the Port (and Ecology) to the standards and parameters established in the July, 2001 memos from Parametrix to Ecology, not subsequent revisions of the NRMP.

---

[17] Washington State Wetland Mitigation Effectiveness Evaluation Study. Executive Summary: Phase 2: Ecological Success. P. Johnson, D. Mock. January, 2002. http://www.ecy.wa.gov/programs/sea/mit-study/mitigexecsum.pdf

[18] Water Quality Certification #1996-4-02325 (Amended-1). Sept. 21, 2001

22. One consistent issue raised in the current studies of the effectiveness of compensatory mitigation is the issue of functions. How they are assessed, what constitutes replacement, and whether it is ecologically sound to trade one suite of functions from one ecosystem type to another. For example, using upland forest buffers to compensate for the loss of wetland habitats. There are reams of reputable literature citations about the values and functions provided by mature upland forest habitat adjacent to streams, however there is little scientific documentation as to the value of exchanging one set of ecosystem functions for another.

23. Using their own numbers for enhancement and restoration (not adjusting for the discrepancies identified above), the Port proposes to provide 34.27 acres of wetland habitat restoration and/or creation on-site. They propose 54.9 acres of upland buffer enhancement. Over 60% of their active compensation acres are upland. Even if one uses their adjusted 'credit' numbers, and one includes the adjustments we've identified above, they provide 40% of their mitigation credits in the form of upland buffers.

24. The NRMP attempts to be convincing through repetition that those proposed upland buffers will be established as *forests* on the Port managed properties. Refer first to Table 5.1-9 of the NRMP (pg.5-5) that summarizes the mitigation goals of the project and note the design criteria in Goal 2: "To plant native shrub species in the floodplain and intersperse native trees in this area". It does not state create a *forest*. From Appendix A, Sheet L5 (NRMP) note that

shrubs will be planted at a density of greater than 2,100/acre (approximately 1 shrub every 20 sq. feet), where-as the trees will be planted at a density of 280 per acre (1 tree every 155 sq. ft.). Figure 5.1-7 from the Port's NRMP is attached to this document as an Appendix to illustrate the Port's own rendering of "...native shrubs interspersed with trees...". From the NRMP, Figure 5.1-7 (Attachment M) illustrates the "typical planting plan for the Miller Creek floodplain".

25. This is not a forest: it won't function as a forest because it is specifically designed not to do so, and Ecology's performance standards have no means to make the Port create a forest in the Miller Creek floodplain and riparian area. For substantiation of that previous statement, see Table 5.1-7 see Appendix H, sent from Parametrix to Ann Kenny of Ecology, and labeled, Final performance standards, evaluation approaches, and contingency measures for mitigating projects at Vacca Farm. Carefully note the Design Criteria for Wetland Enhancement and Restoration (II.5): "Plant native *shrub* species in these areas at densities of greater than 2,100 per acre. *Intersperse* native *trees* in this area", (emphasis added). The Performance Standard for II.5 states, "...shrub and tree survival will be 80%...At that time at least 2,100 shrubs /acre shall remain." That technically would be a requirement of 100% survival of all shrubs, so which standard will the enforcement staff utilize?

26. The Performance Standards for II.5 continue with measurable parameters for percent survival of installed plants, percent canopy coverage of *native species*

(emphasis added). There is absolutely **no** quantification of a number of trees to install, **no** percent coverage by trees, nor a required survival of number of trees per acre. Yet this is the area that the Port consistently refers to as a forested floodplain. Grave significance is given to the measurable increases in function that the stream will experience due to the restoration of floodplain and riparian *forest.*

27. Design Criteria II.6 is precisely the same, except it lowers the standards even further, by introducing the specter of "tall grasses", along with shrubs and trees. The quantifiable Performance Standard then calls for a canopy coverage of 80% by native species by year 15: not specifying what composition of tall grasses, shrubs or trees have to comprise that canopy coverage.

28. If one were to argue that the term 'canopy' implicitly infers trees, then perhaps that specificity should be made a permit clarification by Ecology, and they would have to more overtly address how it would be in direct conflict with the FAA wildlife management guidelines for areas near airports (see item #28, below).

29. The FAA has clear guidelines[19] for the management of habitat areas near airports to minimize the danger of bird strike. In email correspondence with Mr. Ed Cleary, FAA Wildlife Biologist (Feb. 12, 2002) and by reviewing the management guidelines, we've learned the FAA guidelines recommend a

[19] Cleary, Edward C. and Richard A. Dolbeer. 1999. Wildlife Hazard Management at Airports: A Manual for Airport Personnel. Federal Aviation Administration, Office of Airport Safety and Standards and U.S. Department

distance of at least 10,000 feet from any ground airplane movement area for a habitat that may attract wildlife. They recommend a distance of 5 statute miles from approach and departure airspace, specifically where there are turbine-powered aircraft. Mr. Cleary also noted that because European starlings are known to nest in very dense stands of trees, both coniferous and deciduous, that specific management guidelines have been developed to manage treed areas near airports. In particular is the removal of 1/3 of the forest canopy, and maintaining a mixed age class tree stand, rather than a mature forest canopy to not encourage starlings and raptors.[20]

30. The 401 Certification has been conditioned to allow the Port to utilize their wildlife management measures in zones where bird strikes may be an issue: such actions, post-construction, would effectively remove any semblance of *forest* from the riparian zone of Miller Creek within 10,000 feet of the Third Runway. The consequence of engaging in a discussion on the relative value of riparian forests to replace wetland functions is rendered mute when the Port and the FAA have the ultimate authority on how the Port property is managed, once the permits are issued. They are not planning on installing *forest* in any ecological sense of the term. They are, to quote the NRMP, going "to intersperse trees" amongst the shrubs within the broad floodplains of Miller Creek.

---

of Agriculture, Animal and Plant Health Inspection Service, National Wildlife Research Center. Washington, D.C. http://wildlife-mitigation.tc.faa.gov/public_html/EnglishManual/EngStart.pdf.

[20] Ron Johnson. 2001. Dispersal of Blackbirds, Crows, and Starlings from Urban Roosts. University of Nebraska Cooperative Extension. http://lancaster.unl.edu/enviro/pest/factsheets/076-99.htm

31. The recent National Academy of Sciences[21] report on compensatory mitigation clearly identified the value of *riparian wetland* habitats in their Conclusion #2 (pg. 5), "Riparian wetlands should receive special attention and protection, because their value for stream water quality and overall stream health cannot be duplicated in any other landscape position". They are clearly identifying the value of *riparian wetland* over other riparian upland habitats.

32. Creation of the floodplain area to the west of the relocated Miller Creek will involve grading and removing over 9,000 cubic yards of material, 2-6 feet of the existing peat, organic mineral soil, and some fill material from the existing area (pg. 5-36, NRMP). The limited groundwater data presented in the 2001 NRMP (Table 5.1-10) shows four groundwater wells, three of them in the general vicinity of the proposed relocated channel of Miller Creek, and one located west, on the fill plain adjacent to Des Moines Parkway. Although none of the wells were monitored between November and May of 1997/98 (the portion of the water year that most strongly influences ones ability to make a wetland hydrology call) all the wells (except #4) show groundwater fluctuating with the season, reaching within a few inches of the soils surface in late spring and early winter, and dropping to below 2 feet below the surface in the dead of summer. Data from P4 shows that the water table was regularly within 2.5 feet of the surface (elevation 273.1), meaning the groundwater on the west side of the site is roughly no lower than 270.6 feet.

[21] National Research Council. Compensating for Wetland Losses Under the Clean Water Act. 2001.

33. In creating the new floodplain area it is proposed to excavated the north-northwestern most portion of the floodplain area down to an elevation of approximately 264-266 feet: over three feet below the groundwater elevation at well 4.

34. A ditch will be constructed to constantly drain the "floodplain" area to preclude standing water that might attract waterfowl. Thus the floodplain is designed to constantly expose groundwater coming into the peat soils, and direct it to the south-east, through the drainage ditch, into Miller Creek at the bottom of the floodplain/creek restoration zone. The drainage ditch (shown clearly on sheet C1 of Appendix O of the NRMP (attached here as Attachment J), and also on sheets MC2 & MC3 of the December, 2001 construction bid documents) is designed to constantly dewater the 'wetland' floodplain.

35. The NRMP describes how relocation of Miller Creek into a closer association with a created floodplain will improve the hydrologic connectivity of the stream to the floodplain. The stream channel will be lined with fabric, as discussed in my declaration of October, 2001. As noted there, the manufacturer of the fabric that Parametrix supplied as an example of the type proposed to be used stated during phone conversations that neither he nor his technical field representatives could confirm that the fabric would remain pervious buried in the conditions described within the NRMP. The

---

National Academy of Sciences.

manufacturer could not provide any known examples of the fabric being used in such a setting and guaranteeing that it would remain pervious.

36. The floodplain is designed to be constantly drained via the ditch that bifurcates it. During larger flood events, the floodplain interacts with the stream, at the bottom of the system when flood water backwater into the floodplain from Miller Creek. When peak flows subside, the surface waters are designed to freely flow back out of the floodplain. The peat and mineral soils left in the floodplain will have little opportunity to provide recharge to the stream, as the floodplain is designed to drain to the SE, not towards the stream.

21.

37. The drainage ditch excavated into the floodplain appears to provide two functions. First, as described above, is to assure that the floodplain does not retain any standing surface water after peak flows subside. The other function appears to be to convey untreated stormwater across the newly created floodplain habitat into Miller Creek. At each of the northern terminus points of the "Y" of the ditch is a day-lighted 12" storm drain. These existing storm drains are currently buried under the soils of Vacca Farm. The NRMP does not clearly disclose their presence nor the source or condition of the surface water emanating from them into the floodplain. The grading plan for the 'floodplain' has been designed to daylight those two pipes (of unidentified origin, carrying flows from unidentified sources) and drain them through the floodplain, out to Miller Creek. What are the water quality parameters contained in this

discharge and how it might influence the ecological processes of the floodplain wetland and Miller Creek. In addition to the water quality questions is the question of how much flow emanates from those pipes and whether their contribution was factored into the backwater effect of the floodplain function.

38. The dewatering ditch is not indicated on Figure 5.1-6 (Attachment K), which purports to show a "Typical Cross Section of Miller Creek Floodplain Enhancement".

39. A reoccurring theme of the benefit of moving Miller Creek is that a riparian forest and buffer forest will shade the stream channel, keeping water temperatures cooler, and allowing organic debris to be dropped into the channel. See a proposed channel cross-section from the NRMP in Attachment L. In the summer months, when the channel needs shading the most, flows will be present in the low-flow channel in the center of the stream channel, approximately 15 feet from the 'bank'. The NRMP states (pg. 5-20) that channel banks will be stabilized with native willows, and that a native forest will be installed in riparian buffer. Figure 5.1-3 shows that the "riparian buffer" is 10 feet wide: enough for one tree width, not a forest. (Refer to the 'forest' discussion above).

40. Fig. 5.1-6 from the NRMP (Attachment L) does not show any vegetation within the actual stream channel. In the summer, in the Seattle area, maximum height of the sun above the horizon is approximately 55-60 degrees above the horizon. A willow shrub 15 feet away from the stream channel would have to be nearly

30 feet tall to cast effective cooling shade over the water of the stream in the height of summer. It is also unclear how the benefit of 'overhanging' riparian vegetation will be offered to the stream channel when it is such a distance from the bank and riparian area.

41. The NRMP discusses at length the benefit to fish from the relocation of Miller Creek into a new channel, replete with large woody debris, spawning gravels, and minimum low-flow depths of approximately 3 inches of water. Pg. 5-15 of the NRMP identifies that there is 2.5 feet of vertical drop over 1,118 linear feet of channel: a channel gradient of **0.22%**. For all intent and purposes, the channel is flat, with barely perceptible gradient. Biofiltration swales, designed to provide prolonged contact between shallow water and vegetation to clean up stormwater discharge, are generally designed with a 0.5% gradient: that is to provide minimum flow rates and maximum contact. This 'stream' is designed with a gradient of half that amount: in essence, it will be flat.

42. Attachment M provides a copy of a memo from Mr. Paul Tappel, civil engineer who designs stream restoration projects for fish habitat, to Mr. Jim Kelley in 1998, that provided the following feedback when Mr. Tappel reviewed initial site plans for the relocation of Miller Creek; "The very low stream channel gradient means there won't be any pools really, and silt and sand deposition are inevitable...The generic text implies that the stream will be converted into substantially higher quality trout habitat; I don't know how you can do that (given site constraints)...". The concept of creating well washed,

well aerated spawning habitat in a 1,000 foot+ channel with a 0.22% gradient is improbable, in spite of attempts to control the input of fines (silt, clay and other sediment) by use of fabric to line the channel bottom and sides.

43. Peat soils are not conducive to stream channels for two reasons: first peat accumulates in landscape settings with little to no surface flows present aiding in the accumulation of undecomposed organic material over thousands of years[22]. The landscape setting is flat geologic and hydrogeomorphic parameters dictate it for the accumulation of peat. This is confirmed at the Miller Creek peat deposits where the NRMP identifies barely 2 feet of fall over 1,000 feet linear distance.

44. Secondly, peat or organic soils have little structural integrity (see all the various Hart Crowser studies on the need to remove unsuitable organic soils from under the MSE wall). If one wants to create a stream with spawning gravels, large woody debris, and maintain flows on the surface, then one needs to hold those things up at the surface, or they will simply sink into the saturated peat. Hence the necessity of placing the relocated Miller Creek into a fabric liner.

45. In my declaration of October, 2001 I noted a failed attempt to construct stream in an old peat deposit the Koll Business Park in Bothell. Since that time staff from the Port, their consultants, and agency staff have conducted a field trip

[22] Rygg, G. Peat Resources of Washington State. 1953

out to the site to determine if North Creek and its designed floodplain are working. I re-visited this site on February 21, 2002, after many years absence.

46. As a professional peer, I had many opportunities to visit the site and discuss the design and its performance with one of the designers, Mr. Rex Van Woermer, after its installation. According to Mr. Van Woermer, the floodplain ended up approximately 18 inches higher than it was engineered. He and his engineer attributed this to the weight of the 'stream' (on fabric with rocks, sand, gravel, logs, and water) causing the peat to rebound. The floodplain was left high and dry.

47. Looking at the system recently the site looked quite different in some very important respects than it had a decade ago. First off, the site is still overwhelming dominated by reed canary grass (*Phalaris arundinaceae*) as practically the only herbaceous species present on the entire site. Woody vegetation is still predominantly focused along the stream corridor, where it was originally installed. What first surprised me was to note the extent of water dispersal into the 'floodplain' portion of the site, far greater than any other previous time I had seen this site. As I walked the perimeter, and then into the interior of the site, the source of the change of the site's hydrology became quickly evident.

48. The stream and the hydraulic gradients on the site are now controlled by beavers: there are at least three active dams or partial dams on North Creek through the site. That they are responsible for having manifested a change in

the hydraulic gradients on site is easily evidenced by observing the standing dead snags along the margins of the site and the stream channel: mature trees drowned by the increase in flooding because the beaver dams caused the water to be impounded. Although the increased depths of impoundments don't seemed to have diminished the presence and extent of reed canary grass, they have vastly increased the complexity of habitat types and niches across the site.

49. I also noted that portions of the site are densely shrubbed and covered with a near complete canopy of deciduous trees. In the ponded water, under the canopy of trees and shrubs, I also noted a substantial number of waterfowl roosting on every available 'high' spot. There were raptors, and great blue heron using the site.

50. The site was providing complex physical habitat because the beavers are allowed to manage the hydrology of the place. In portions of the site where the dams do not influence the hydrology, the floodplain is still out of contact with the stream do to the response of the peats to the stream channel.

51. The complex habitat types, including ponded slow moving water, dense wooded and shrubbed canopy are some of the specific habitat features that are of concern in the FAA wildlife hazard management guidelines. Would the Port ever allow this extent of habitat diversity to establish in the Miller Creek system, given its proximity to the Third Runway? Creating attractive habitat

for a wide range of wildlife species is clearly stated[23] as **not** one of the objective of the NRMP or the Port in its operation of the Third Runway.

52. Through the 401 Certification process Ecology has a mandate to assure that water quality parameters of the state are not put at risk by the permitted project. The basis of permitting the 401 is premised on the analysis presented in the NRMP, with special focus on wetlands and replacing lost functions. One of the most significant oversights in the NRMP is the lack of a peer reviewed functional assessment method to assess the functions of existing resources on the site to compare and contrast with proposed conditions. The NRMP outlines a list of functions that they assessed, they've outlined some assumptions, but they have provided no methodology that any other biologist or ecologist can evaluate or replicate. The NAS study identifies that lack of use of consistent functional assessment methods results on individuals use of their 'best professional judgement', an unreliable and unverifiable that is subject to debate and disagreements. What is striking about the NRMP functional assessment is that it refuses to use the unarguably most peer reviewed method designed specifically for western Washington lowland wetlands. Although the NRMP was originally drafted perhaps when Ecology's Functional Assessment Method was only out in draft form, the state method has been published and readily available since 1998. Forty-one percent of the wetlands present on the STIA project area are, according to the NRMP data, the type of wetlands that are

[23] STIA Natural Resource Mitigation Plan. November, 2001. Parametrix. pgs. 4-20 – 4-23.

appropriate for this peer reviewed and accepted method. The only explanation for why it was not utilized was that "it was not available". Why Ecology did not require its use on those wetlands where it was appropriate is not explained.

53. The lack of a reputable functional assessment method means that assessing function loss or gain is reduced to expert opinion, and 'best professional judgement'. No one is able to make an effective and replicable objective analysis as to whether the project will result in net gain or net loss of wetland function. That stands in sharp contrast with Ecology's published guidance managing public resources.

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

DATED this ___22___day of February, 2002, at Seattle, Washington.

Dyanne Sheldon

Pre-Filed Testimony
of
Dyanne Sheldon

INDEX TO EXHIBITS

K. Figure 5.1-6 from Natural Resource Mitigation Plan

L. Figure 5.1-3 from Natural Resource Mitigation Plan

M. Memorandum dated 04/06/98 from Paul Tappel to Jim Kelley, Re: Minor Edits & Questions, SeaTac JARPA

N. Figure 5.1-7 from Natural Resource Mitigation Plan

O. Declaration of Dyanne Sheldon in Support of ACC's Sur-Reply on Motion for Stay, dated October 10, 2001

A

Sheldon & Associates, Inc.

Dyanne Sheldon

Ms. Sheldon is a wetland ecologist and state certified science teacher, with over 20 years of field experience in both fresh and tidal wetlands of the Pacific Northwest. She was King County's first Wetland Planner and she has run her own consulting firm for over 11 years. Her professional experiences include conducting wetland delineations, inventories, and impact assessments; designing habitat restoration; providing construction oversight for wetland compensation projects; regulatory coordination and permit applications; expert witness testimony; crafting wetland and other sensitive area code language for local jurisdictions per the requirements of the Growth Management Act; review and critique of submitted wetland analysis studies; conducting public workshops and participating in public meetings and hearings regarding the consequences of proposed actions on wetland resources; providing "on-call" technical assistance for local jurisdictions including verifying wetland impact assessments and analysis and conditioning of wetland compensation designs. She is certified to teach 8-12 grade science and has taught courses for middle and high-school students, and adult courses at the University of Washington on environmental law and policy, and wetland biology. She has also worked with school districts designing site plans to incorporate outdoor education opportunities.

Areas of Expertise

Wetlands Ecology: delineation, functional assessment, impact analysis, inventory, relationship to management

Education: examples of adult courses:

Environmental Law and Policy, for Wetland Science and Manag. Cert., UW Extension.
Wetland Ecology, for the Wetland Science and Management Certificate, UW Extension.
Wetland Ecology, for University of Washington, Bothell.
Sustainable Communities and Environment, Masters of Environment. Antioch University.
Wetland Mitigation Design: for Professional Engineering Program, UW
Wetland Ecology and Management: guest lecturer: Wetland Restoration Network, UW

Environmental Planning: development of policy and regulations relating to aquatic lands including streams and wetlands, assessment of effectiveness of code language

Environmental Restoration: preparation of wetland compensation designs, establishment of monitoring parameters, construction oversight, monitoring post construction

Environmental Law and Policy: assist in permit application and coordinating between various regulatory jurisdictions; craft wetland code language, interpret regulatory standards,

Wildlife: assessment of impacts, assessment of habitat suitability, conduct surveys, preparation of Biological Assessments per the requirements of the Endangered Species Act.

Work Experience

Principal 1990-Present Sheldon & Associates, Inc., Seattle, WA

Manage seven professional staff that provide technical ecological expertise to public and private clients. Staff include wetland ecologists, water quality expert, landscape restoration designer, wildlife biologist, and fisheries biologist. In addition to managing a business and providing oversight to other technical staff, Ms. Sheldon continues to conduct a significant amount of technical wetland scientific and analysis work for public and private clients.

Wetland Ecologist 1988-1989 Jones & Stokes Associates, Seattle, WA

Created the first 'Wetland Section' for the Bellevue office of Jones & Stokes, hiring wetland ecologist staff and landscape architects to provide wetland analysis and restoration expertise. Conducted two years of sequential studies for the U.S. EPA, Seattle Office, on the restoration potential of diked lands in Washington and Oregon. Also conducted a then precedent setting analysis of the effectiveness of wetland regulations by local jurisdictions, also for EPA. Coordinated the field confirmation by 7 field staff of wetland delineations conducted on 2,000 acres of land proposed for development in eastern King County.

Wetland Planner 1984-1988 King County, Building and Land Development, Seattle, WA

As the first wetland planner for King County, Washington, Ms. Sheldon created the wetland regulatory program for the County, the first of its kind for a local jurisdiction in the United States. She reviewed all development permits submitted to the County that related to streams, wetlands, shorelines or habitat issues. She crafted the first draft of the County's Critical Areas Ordinance, and participated for years in the public process of revising and redrafting the code language to reflect staff and public input.

Director Naturalist 1975-1979 Westwood Hills Environmental Education Center
St. Louis Park, MN

Created a 150 acre environmental education Center for a first-ring suburb of Minneapolis. Conducted the site analysis, trail design, trail construction (hands-on supervising 100 juvenile youth for several summers), and input on interpretive structure design. Conducted all interpretive programming for K-12, as well as pre-schoolers and senior citizens, year-round (including snow-shoe tours in the winter). Developed an integrated curriculum for K-6 teachers in the local school district, and conducted in-school classes and on-site classes for students in cross-discipline programs.

Education

Master's Education: Arizona State University, Phoenix. Masters in Curriculum and Instruction, 2000
Bachelor Science: University of Minnesota, St. Paul, Minnesota : Botany, 1975

Special Training

Corps of Engineers Course, Federal Wetland Delineation Methodology (1987)
Special training offered only to Federal employees and Ms. Sheldon, based on King County position.
Corps of Engineers Course, Wetland Evaluation Technique Assessment Methodology (1989)
Special training offered only to Federal employees and Ms. Sheldon, based on King County position.
Federal Wetland Delineation Methodology (1989)
Society of Professional Soil Scientists Hydric Soils Workshop (1993)

Memberships

Society of Wetland Scientists

Ms. Sheldon is a charter member of the Pacific Northwest Chapter of the Society of Wetland Scientists. She served two terms as President of the Pacific Northwest Chapter (1991-1993) at the very beginning of this chapters existence, hosting the National Society of Wetland Scientists meeting in Seattle in 1993, the most successful National Meeting ever held.

Society of Ecological Restoration
National Association of Science Educators
National Association for Environmental Education

Relevant Projects

King County Department of Development and Environmental Services: Redmond Ridge and Trilogy UPD On-Call Technical Services. 1990-present. Ms. Sheldon has provided on-call services for two 1,000 acre Planned Unit Developments in King County's Novelty Hill area for over 10 years. She has conducted field verification of resource lands, conditioned permits, provided expert testimony at public hearings, worked closely with design and review engineers on multiple complex stormwater management and resource protection issues. She has reviewed and conditioned hundreds of individual site development applications for the projects, including wetland mitigation designs.Contact: Ms. Lisa Lee: 206-205-1441.

Washington State Department of Ecology: Best Available Science Research Program. 2001-present. Ms. Sheldon was selected by the staff of Ecology and Washington Department of Fish and Wildlife to conduct the technical review of scientific literature related to current scientific findings on wetland functions and development impacts for the entire state. The purpose of the research project is to create recommended revisions to local jurisdictions critical areas ordinances, as required by the Growth Management Act, to reflect the current state of scientific knowledge in local codes. Contact: Mr. Andy McMillian, 306-407-7272.

Publications

(Partial list, as author, contributor, or major reviewer, as noted)

Cumulative Effects of Development on Wetlands: Harbour Pointe Case Study, Snohomish County, Washington. July, 1990. **Dyanne Sheldon** for the U.S. Environmental Protection Agency, Region 10.

Deepwater Slough Restoration Feasibility Analysis. July, 1996. **D. Sheldon** (Primary Author), D. Swanson, K. Ewing, T. Deming. Skagit System Cooperative, Skagit County, Washington.

Diked Wetalnds Restoration Potential in Washington and Oregon. Phase I: Literature Review. October, 1988. **Dyanne Sheldon** for the U.S. Environmental Protection Agency, Region 10.

Guidance On Developing Local Wetlands Projects: A Case Study of Three Counties and Guidelines for Others. November, 1991. C. Deming Cowles, **Dyanne Sheldon,** Suzanne Dietz. Office of Wetlands Protection United States Environmental Protection Agency.

Methods for Assessing Wetland Functions. Volume 1: Riverine and Depressional Wetlands in the Lowlands of Western Washington. 1998. T. Hrubry, T. Granger, K. Brunner, S. Cooke, K. Dublanica, R. Gersib, L. Reinelt, L. Richter, **D. Sheldon**, A. Wald, F. Weinmann. Washington State Department of Ecology Publication #98-106.

Restoration Potential of Diked Estuarine Wetlands in Washington and Oregon. Phase II: Identification of Candidate Sites in Puget Sound. July, 1990. **Dyanne Sheldon** for the U.S. Environmental Protection Agency, Region 10.

Restoring Wetlands in Washington: A Guidebook for Wetland Restoration, Planning and Implementation. 1993. M. Stevens and R. Van Bianchi, Principal Authors. W. Eliot, D. Gordon, and **D. Sheldon**, Editors. Washington State Department of Ecology Publication #93-17

Sand Point Magnuson Park Vegetation Management Plan. 2001. M. Fischer and **D. Sheldon**. Seattle Department of Parks and Recreation.

Sea-Tac Airport Wetland Inventory. 1991. **D. Sheldon** and K. Kunz. Environmental Management Section, Port of Seattle.

Sea-Tac Airport Wetland Management Plan. 1991. R. Butler and **D. Sheldon**. Environmental Management Section, Port of Seattle.

Washington State Wetlands Rating System: Western Washington. 1991 and 1993. S. Tosach, A. McMillan, S. Maurman (Authors). **D. Sheldon**, Major Reviewer. Washington State Department of Ecology Publication #93-74

Washington State Wetlands Rating System: Eastern Washington. 1991. S. Tosach, A. McMillan, S. Maurman (Authors). **D. Sheldon**, Major Reviewer. Washington State Department of Ecology Publication #91-58

Wetland Mitigation Replacement Ratios: Defining Equivalency. 1992. A.J. Castelle, C. Conolly, M. Emers, E. Metz, S. Meyer, M. Witter, S. Maurman, M. Bentley, **D. Sheldon**, and D. Dole. Washington State Department of Ecology Publication #92-8.

Wetland Buffer: Use and Effectiveness. 1992. A.J. Castelle, C. Conolly, M. Emers, E. Metz, S. Meyer, M. Witter, S. Maurman, M. Bentley, S. Cooke, **D. Sheldon**, and D. Dole. Washington State Department of Ecology Publication #92-10

Wetland Plants of King County and Puget Sound Lowlands. 1981. V. Crawford, **D. Sheldon**, P. Arcese, M. Schwartz. King County Resource Planning.

Wetland Plants of Western Washington & Northwestern Oregon. 1997. S.S. Cooke, Editor. Contributors: N. Pascoe, T. Duebendorfer, S. Clay-Poole, F. Weinmann, R. Pratt; J. and P. Titus, S. Moore, R. Vanbianchi, M. Fries, S. Sundberg, **D. Sheldon**, R. Robohm, B. Colebrook, C. Aniteau, C. Conolly, M. Chaney, K. Brunner, L. Potash, J. Hartley.

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and THE PORT OF SEATTLE, Respondents.	No. 01-133 No. 01-160 DECLARATION OF DYANNE SHELDON IN SUPPORT OF ACC'S MOTION FOR STAY (Section 401 Certification No. 1996-4-02325 and CZMA concurrency statement, Issued August 10, 2001, Reissued September 21, 2001, under No. 1996-4-02325 (Amended-1))

Dyanne Sheldon declares as follows:

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

2. I am an environmental scientist, with over 20 years of specializing in wetland ecology and management related issues. I have a Bachelor's of Science in Botany, and a Master's of Education and Curriculum Development. I have worked as a wetland ecologist and land-use planner in the Pacific Northwest for over 20 years, and as a naturalist and educator for over 25 years. In 1981 I was one of three biologist hired by King County to assist in conducting King County's wetland inventory: the first such effort ever undertaken in the Pacific Northwest by a local jurisdiction. From that position I was hired as the Wetland Planner at

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

King County, Washington, the first such 'local wetland planner' position in the country. I created the precedent setting wetland management program at King County: it established the first wetland rating system, the first requirements for buffers and setbacks on wetlands from development activities and the first requirements for compensatory mitigation ever demanded by a local or state government in this region. In my capacity as the only wetland planner for King County, I reviewed and conditioned or denied, every single development permit application that related to streams and/or wetlands submitted to the County between 1983 and 1988. In the intervening 17 years I have watched the consequences of some of the actions I allowed to be permitted at that time. As the first person to attempt to regulate wetlands for a local jurisdiction, through the process of placing conditions on individual permit applications, I did not have the benefit of any precedence, scientific 'research', or the results of long-term studies to inform my decision making process. The wetland rating system I helped develop in 1981 had never been used previously, no one in King County had ever required a buffer before, and certainly no one had ever required or attempted to create wetland mitigation in King County prior to the mid-1980's. The entire *science* of wetland management in the Pacific Northwest was barely in its conceptual stage: the Army Corps of

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

Engineers 404 permitting requirements allowed up to 10 acres of wetland fill at that time. The wetland scientific and management community of the Pacific Northwest has watched and learned the lessons from those early attempts to 'protect' wetlands: the lessons learned and the mistakes made have informed and influenced wetland regulations and policies in this region for nearly the last two decades.

3. Based on my years of experience regulating wetlands and my knowledge of wetland ecology I have often been solicited by State and Federal agencies to actively participated in regulatory, policy and planning activities related to wetland and habitat issues throughout the region. In the mid-1980's I was asked frequently by the Washington State Department of Ecology Wetlands Section staff to participate formally and informally in processes to formulate State wetland management policy and regulatory framework and guidance. At the Department of Ecology's request I provided input on the original proposed State Wetland Management Program, the Wetland Rating System for Western Washington, the State Wetlands Integration Strategy, the State Model Wetland Ordinance (modeled directly on the King County Critical Area's Ordinance that I originally drafted in 1982 as King County's Wetland Management Guidelines). The State Model Wetland Ordinance contains requirements for buffers and building setbacks, rating systems, and

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

replacement ratio's for compensatory mitigation: all issues for which Ecology actively contacted me and sought my input based on my professional experiences. As a consultant I've been hired by Ecology numerous times to provide technical expertise in wetland management related issues. In 1992 I was hired to conduct the field assessment element, to provide technical review and oversight, and to write key portions of the precedent setting study: Wetland Replacement Ratio's: Defining Equivalency (available at: http://www.ecy.wa.gov/pubs/92008.pdf). This was the first study prepared by Ecology that identified some of the key re-occurring design, implementation, maintenance and monitoring problems that resulted in compensatory mitigation failures in the region.

4. I have worked as an environmental consultant since 1988, and for more than 11 years as the Principal of Sheldon & Associates, Inc. At Sheldon & Associates I have continued to provide technical assistance and guidance to many local jurisdictions, functioning in an 'on-call' capacity as their technical critical areas staff. I have reviewed and conditioned many hundreds of permit applications and mitigation documents for numerous local city and county governments from simple applications to two of the largest single-owner development projects ever approved in King County: Redmond Ridge and Trilogy, both more than 1000 acres in

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

size. These two Urban Planned Developments (UPD's) have many parallel issues to the STIA Third Runway project: they are large and complex, they are very controversial, and there have been years of permit submittals, negotiations, and conflicting expert testimony and acrimonious public hearings. The two UPD projects were in planning stages, permit application review and conditioning phases for over 10 years, and have now been in the construction phases for more than 3 years. The level of scrutiny and analysis of the applications, the complexity and perceived 'bomb-proof' nature of the permit conditions, and the subsequent reality of implementation, permit condition 'interpretation', and enforcement on these projects has strongly influenced my opinions on the methods, means, and implications of well-crafted and non-ambiguous conditions language. The harsh lessons learned from attempting to implement what were then precedent-setting permit conditions has been sobering, even with a relative willing applicant. That ongoing experience has informed my professional opinions on the need to grant ACC's request for a stay of the 401 Certification for STIA.

5. I have designed successful wetland compensation projects for open water, emergent, shrub and forested freshwater systems, as well as several estuarine restoration projects. I have done the technical design,

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

coordinating with civil and hydraulic engineers, as well as our on-staff landscape designers. I have provided construction oversight and long-term monitoring of our own designs and of compensation projects designed by others. Observing the construction and installation of our own work, and that of others, I have learned many crucial elements that are often overlooked or not accounted for in compensation design. This knowledge, along with 20 years of watching the impacts caused to natural ecosystems despite the efforts of the best-intended permit conditions, is reflected in my professional opinions of the effectiveness of the 401 permit conditions crafted from Ecology for the STIA Third Runway project.

6. I was asked by the Airport Communities Coalition (ACC) to review the documentation provided by the Port of Seattle describing proposed development at Sea-Tac Airport (STIA) for possible impacts to wetlands. My review has included the Port's Wetlands Delineation and Wetland Functional Assessment documents, the Natural Resources Mitigation Plans (NRMP), the JARPA permit application and other documents and engineering plans related to activities affecting wetlands. My comments from previous reviews were sent to the U.S. Army Corps of Engineers on February 20th, 2001. I have also reviewed Ecology's recent CWA Section

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

401 certification decision dated August 10, 2001, and amended September 21, 2001.

7. I have reviewed declarations and briefs relating to the ACC request for stay made by various Ecology staff persons, their consultants, consultants for the STIA Third Runway project, and others providing consultation to the ACC.

8. I understand that the ACC has filed an appeal with the Pollution Control Hearing Board challenging the Section 401 Certification (No. 1996-4-02325) and the CZMA concurrency statement, issued August 10, 2001, and amended September 21, 2001 to the Port of Seattle, and that ACC has requested a stay until the questions it has raised concerning compliance with the Clean Water Act have been resolved by the Pollution Control Hearings Board (PCHB). I am submitting this declaration in support of ACC's appeal and motion for stay because I am convinced that the Natural Resource Mitigation Plan (NRMP) and related measures proposed by the Port of Seattle fail to accurately describe all potential impacts to wetland resources associated with the STIA Third Runway and that the conditions imposed by Ecology through the 401 Certification are inadequate to assure adequate compensation for the identified losses in wetlands and wetland functions. Granting of a stay, while the merits of ACC's appeal are considered by the Board, will

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

prevent the Port from permanently eliminating aquatic resources within the Miller, Walker and Des Moines Creek watersheds. Dismissal of the stay will result in irreparable harm to public resources: the documented permanent loss of wetland and stream resources, without adequate compensation that meets Ecology's own standards. It will also establish conditions that will likely have undocumented secondary adverse effects on wetlands and downstream resources.

9. One key issue of contention is the adequacy and efficacy of the proposed compensatory mitigation for the documented impacts to wetlands from the project. Speaking solely to the issue of quantifying compensation (not at this point, to the ecological adequacy of what has been proposed) I rely upon published guidance from Ecology[1,2]. The Port has identified 18.37 acres of permanent impacts, and Ecology has identified an additional 2.05 acres of 'long-term' impacts, resulting in 20.42 acres of wetland requiring compensation.

10. Using information provided in the NRMP, Table 3.1-1, the following acres of impacts to wetland vegetation types are anticipated:

---

[1] Mc. Millan, Andy. How Ecology Regulates Wetlands. April 1998. Ecology publication: 97-112, available at: http://www.ecy.wa.gov/pubs/97112.pdf; copy attached.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

8.17 acres forested wetland
2.98 acres shrub wetland
7.22 acres emergent wetland

Using the replacement ratio's from "How Ecology Regulates Wetlands", Category 2 and 3 wetlands require a variable ratio dependent upon the type of wetland vegetation community to be impacted and the type of compensation (creation or restoration) proposed. The total wetland compensation required (if all the compensation was done by using creation or restoration, not enhancement) using Ecology standards would be:

forested class: 3:1 ratio X 8.17 acres of impact = 24.51 acres
shrub class: 2:1 ratio X 2.98 acres of impact = 5.96 acres
emergent class: 2:1 ratio X 5.22 acres of impact = 10.44 acres
Type 4 wetlands: 1.25:1 X 2.01 acres of impact = 2.51 acres
TOTAL for 18. 37 acres of impact = **43.42 acres**

(Of the 18.37 acres of wetland impacts identified in Table 3.1-2 of the NRMP, 90% of them are Category 2 and Category 3 wetlands. A lower replacement ratio of 1.25:1 would be required for 2.01 acres of the Category 4 wetlands which were assumed to be emergent for these estimations). If one assumes that the additional 2.05 acres of additional wetland that Ecology has identified in the 401 Certification as required compensation are either shrub or emergent wetland, it would require an

---

[2] Castelle, A., et. al. Wetland Mitigation Replacement Ratios: Defining Equivalency. 1992. Ecology

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

additional 4.1 acres of compensation. That means that the total required acreage, per Ecology standards, would be:

TOTAL Compensatory Mitigation: 47.52 acres

For reasons that are not fully explained, Ecology in their 401 Certification has chosen a 1:1 replacement ratio for both wetland creation and restoration (the Port would get 1 acre of credit for every acre of wetland that they create or restore). From Ecology's own "How Ecology Regulates Wetlands" (pg. 15): "...historically a replacement ratio of 1:1 was common...In recent years the ratio has increased and seldom is a 1:1 ratio acceptable to any regulatory agency. This increase is due primarily to two factors: 1) the likelihood of success of the compensatory mitigation, and 2) the length of time it takes to successfully create or restore a wetland." Although the Ecology publication identifies that the ratios are guidelines, subject to some variability, it is unclear as to why the 401 Certification as issued by Ecology gives the Port one acre of wetland 'credit' for every single acre of wetland creation or restoration.

11. In addition, Ecology's "How Ecology Regulates Wetlands" (pg. 16), states, "For wetland *enhancement* (emphasis added) the (replacement) ratios

---

publication 92-08. available at: http://www.ecy.wa.gov/pubs/92008.pdf.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

are doubled. Enhancement as compensation for wetland losses results in a net loss of wetland area and a net gain in wetland function from enhancement is usually less than from creation or restoration." That means that for every acre of forested wetlands that the Port proposes to fill and compensate by enhancing existing wetlands, they should be providing 6 acres of enhanced wetlands . For just the 8.17 acres of forested wetlands identified to be filled, that would require 49.02 acres of enhancement compensation. Yet the 401 Certification allows the Port to receive 1 acre of 'credit' for every 2 acres of wetland they enhance, regardless of whether they are impacting forest, shrub or emergent wetlands, with no clear scientific justification provided.

12. The Port is proposing 6.6 acres of in-basin restoration, and 29.98 acres of out-of-basin wetland creation. Using an average ratio of a 2.5:1 ratio for restoration/creation (averaging 3:1 and 2:1 for forest vs. shrub or emergent) those numbers would only compensate for 14.63 acres impacts. The 40.96 acres of total wetland enhancement would only compensate for just over 9 acres of impacts. The total compensation credit, as estimated, then would be roughly 23 acres, not 167 acres as stated in the 401 Certification, to compensate for the identified impacts of over 20 acres. Thus the 401 Certification would allow the Port to just meet the acreage standards for compensatory mitigation for the *known*

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

impacts by using in-basin and out-of-basin compensation. There are no 'extra mitigation credits' provided in the NRMP, there is no compensation provided for the anticipated secondary impacts to wetlands.

13. The 401 Certification identifies a whopping total of 167 acres of compensatory mitigation for the project as "unprecedented". What also appears to be unprecedented is Ecology granting mitigation "credit" for simply *preserving* existing wetlands in the project area, and for enhancing *upland* buffer habitats. The premise of all wetland regulations (including Ecology's own Model Wetland Ordinance) is that wetlands are to be preserved and only altered when reasonable use of a property would be denied. I've never seen a written or implied public or scientific policy that one should get *compensation credit* for not filling wetlands: that implies that all wetlands are expected to be filled and an applicant should get compensation credit for simply *not* filling them.

14. The 401 Certification identifies *preservation* as one aspect of 'mitigation', and gives the applicant compensatory credit for it. However, the term 'mitigation', as defined in RCW 43.21C.110.84-05-020 for SEPA, is a sequence of actions: avoidance of impacts, minimizing impacts, rectifying impacts, reducing impacts, compensating for impacts, and monitoring impacts. It in no manner implies that 'mitigation credit'

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

should be given for an applicant who preserves sensitive areas on their properties. The law directs that an applicant (or an agency reviewing an application) must proceed through the sequential steps of avoidance, minimization, and rectifying impacts BEFORE getting to the option of compensating for impacts. This jump to 'compensation' without going through the preceding sequential steps is one of the most common misinterpretations of 'mitigation'. Ecology mistakenly identifies astoundingly high mitigation ratios as having been provided, and implies substantial over-compensation on the part of the Port.

15. In a similar vein, providing compensation credit for wetland losses through improvements to *upland* forest habitats on a calculated acreage basis is not justified ecologically nor in Ecology's own guidance documents. That is not to argue that upland habitats are not critical for various life stages of some aquatic species, however, calculating over 50 acres of *wetland* mitigation acreage for improvement to *uplands* is not justified. If Ecology feels that it is ecologically sound to provide wetland credit for upland habitats, perhaps they should have required the Port to first identify the total acreage of upland habitat proposed to be eliminated by the project, and then compare relative functional loss to functional gain. That might begin to provide a more accurate ecological snapshot of the project impacts.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

16. The 401 Certification should be stayed because Ecology has been unable to make the Port clearly identify all permanent wetland impacts or for the Port to provide adequate compensation for those identified losses. Attachment B of the 401 Certificate contains five **pages** of corrections, additional data needs, clarifications of Port submitted plans, and revisions still required by Ecology of the applicant to the *approved* plans. When there remains so many requests for revisions, requests for additional data, and requests for explanation of plan sheets and drawings, Ecology should not have deemed the analysis as complete. As an example, on pg.3 of Appendix B of the 401 Certification, under the item labeled Appendix D Sheet C3, Ecology is asking the applicant to clarify how hydrologic support will be provided to two wetlands after construction. If Ecology cannot determine how those wetlands will have hydrologic support after construction, then Ecology cannot determine that the wetlands won't be adversely affected by the project, and they have not been able to accurately determine extent of likely impacts to wetlands and therefore to downstream water quality. There are multiple requests for clarifications in the 401 conditions from Ecology to the Port. The Port has failed to adequately address wetland issues, and Ecology acknowledges that in a *de facto* manner by requesting clarification and

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

additional analysis specifically related to long-term wetland sustainability which influences water quality.

17. One of the gravest concerns I have regarding the issuance of the 401 Certification is the ability of the Department of Ecology to implement and enforce the conditions of the 401. Many conditions are ambiguous and unclear, leaving the way for broad interpretation and misrepresentation once the Port receives all their permits in hand. The Port has not been a willing participant in this permitting review and conditioning process, as is evidenced by the fact that there remain significant issues that the Port refuses to willingly modify through the *years* of Ecology's review. For example, the 401 Certification Condition # 4, states that the Port has misidentified 2.05 acres of wetland impacts as 'temporary' while Ecology has determined those losses as permanent. This issue was raised by several reviewers of previous Port documents, yet the Port retains the position that the impacts are temporal. Ecology has not held the Port fully accountable, but only lists several options of where the Port might consider developing additional in-basin compensation. In reviewing and conditioning permits designed to protect public resources, it is inappropriate for Ecology to accept flawed analysis and to suggest to the applicant how the Port might provide a more acceptable project. This kind of condition implies to me the state

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

of this review and conditioning of this permit process: it appears that Ecology staff has become weary of fighting with the Port and their consultants, so conditions of the 401 are proffered as a means to resolution, rather than assuring adequate analysis and resolution of all potential adverse effects prior to issuance of the permit.

18. The scale of this project shifts into sharp focus when one realizes that this seemingly minor contested issue of 2.05 acres of wetland fill would require any other applicant to conduct a full Alternatives Analysis and apply for a Section 401 Water Quality Certification and an Individual Permit through Section 404 of the Corps. In the context of what the Port is proposing with their proposal, that 'small issue' seems only a minor detail. What would generate the need for a complete 401 Certification and Individual Permit and Alternative Analysis process has been regulated to a minor "housekeeping issue" through Ecology's 401 conditions.

19. In addition to the identified 20+ acres of wetland loss from the STIA project, there remains the issue of how much additional acreage of wetland will be adversely affected by the construction and permanent conditions resulting from the construction of the project and its on-site compensation. Although the 401 conditions and monitoring are supposed to assure that unforeseen adverse impacts are rectified and/or

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

some contingency action is implemented, the reality is, for some consequences, there is no appropriate contingency action, and the damage will be irrevocable. As an example: I previously raised in written comments the issue of placing the relocated Miller Creek through Vacca farms peat bog by placing it on an impervious fabric 'substrate', thus hydrologically isolating the stream from the groundwater in the wetlands (a source of late-season stream flow). In their response comments, the Port's consultants identified the type of geotextile fabric they were proposing to use as a liner, stating the degree of permeability of the fabric. We subsequently did some research on the fabric samples provided by the applicant to the Army Corps of Engineers staff, and found first off that the product manufacturer that the Port identified as a source no longer made the material. Further research identified a new source for similar fabric. We described the proposed use of the fabric (to line a stream channel on top of a peat substrate, then back-filled with gravel, sands, and silts (sediment)) and asked the National Sales and Technical Manager of the John Manville Corporation (Mr. Dean Norman, July, 2001) how he thought the fabric would function to allow the free exchange of water in perpetuity in such a setting. Mr. Norman did not have any data, nor did his two technical field experts at John Manville or Fluid Systems (suppliers of the fabric),

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

that the fabric, put to such use, would continue to remain pervious over-time. He did state, that, "logically, the fabric would act as a filter and over time might become less and less pervious". The point of this description is not to argue whether or not fabric, placed under a created stream channel will remain pervious or it won't, (neither the Port's consultants nor I, nor the fabric's manufacturer can testify that it will or that it won't: there is no data). The point is this: what will be Ecology staff's response if the stream channel/wetland interflow function fails? One of the functional gains the NRMP identifies is relocation and restoration of Miller Creek into a floodplain setting: yet key elements of that future condition are pure speculation (the fabric remaining permeable). Although a monitoring plan and contingency actions have been identified, how exactly will Ecology implement them? The Port will have its permits, the runway will be built and operational, and there will be no 'hammer' to encourage the Port to design and implement a 'fix' (that begs the question of how one would propose to 'fix' a broken stream channel bottom...). NRMP Table 5.2-12 does not identify a design criteria or performance standard linked to creating and maintaining that interflow. Although it is implied as a key element in increasing stream/floodplain functions over existing conditions, there is no performance standard, evaluation method or contingency plan if it fails.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

20. Another key element of the Port's proposed enhancement and replication of wetland functions in the project area is based on sophisticated models of infiltration of groundwater through the fill, to discharge into downslope wetlands. The infiltration models are as accurate as the assumptions on which they are built: if the assumptions are found to be in error, how would anyone begin to 'fix' the downslope wetlands?

21. To assure the protection of the State's water quality, Ecology, through the conditions of the 401 Certification has to assure the ability to enforce the permit conditions, measure the outcomes, and require contingency actions if they should become necessary. The manner in which many of the 401 conditions are written will preclude Ecology's ability to enforce them. I do not offer that observation lightly. I base that concern on my professional experience for the last 10 years of attempting to help craft and then enforce the most comprehensive and restrictive development conditions ever imposed by King County on two land-use applications (each project over 1,000 acres in size). Condition language that the applicant agreed to at the time of permitting, and which seemed so clear and unambiguous has been transformed over the years. Intention and specificity has given way to interpretation and literal construction: even with a *willing* applicant team at the time of permitting, the harsh reality of attempting to enforce sparsely crafted conditions is daunting.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

Ecology's conditions are too often vague and assume a cooperative collaborative environment in future conditions as the Port proceeds with its project. Protection of public resources is at stake, from degradation of water quality, changes in wetland hydroperiod, to discovering unexpected realities from predicted modeling conditions bad assumptions. Once the wetlands are filled and once the runway is operational, the technical ability of Ecology staff, no matter how qualified and how motivated, will not be sufficient to assure the protection of public resources and preservation of water quality standards in Miller, Des Moines, and Walker Creek once the Port has their permits in hand. Without granting this stay and assuring that adequate analysis has been completed, the Port will begin filling wetlands in an unalterable path towards completion of their project.

22. Granting of the stay is critical at this juncture, even if the Port states that they only intend to fill 2.8 acres of wetland initially. The rationale for the fill is logistics: to gain access to the surrounding non-wetland landscape to continue the on-going filling operations. To justify denying the stay because "only 2.8 acres of wetland would be immediately filled" ignores the consequences of the ongoing filling operation within the upstream contributing area to the existing wetlands on site. As long as the Port continues to fill uplands upslope of the wetlands, they continue

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

to cause likely changes to the contributing basins and shallow ground-water interflow to those wetlands: filling the uplands *will* affect the wetlands downslope by changing the size and configuration of their contributing basins. In addition, pre-construction monitoring of wetland hydroperiods has been requested by Ecology and the Corps in wetlands identified to remain, post-project. The rationale for that hydrologic data is to use pre-project data to establish pre-existing conditions as a means to confirm "no adverse effects" in post-project conditions. If no "pre-project" data exists (i.e., the Port has only collected hydrologic data since the filling in the uplands has commenced), then it will be impossible for Ecology or the Corps to determine if the STIA project has had an effect. This may be a moot point: the 401 Certification conditions unbelievably do not require the Port to match or even compare pre and post project hydrologic conditions in the wetlands proposed to remain below the project area. The Performance standard is related to the relative wetness of the vegetation (the WIS rating per species) present in the wetlands, plus a re-delineation of the wetland edge to confirm it has not shrunken. This type of performance criteria fails to recognize that wetland soils, perhaps the most important defining parameter of wetland delineation, will not change as quickly as the vegetation and/or water: therefore wetland soils will persist to the historic pre-project extent even if

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

the Port fails to get adequate water to the wetland. A stay of the 401 Certification is justified in my opinion to allow/encourage Ecology to re-visit their proposed performance standards to establish parameters that have sufficient substance to assure the long-term protection of aquatic resources, including water quality.

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

DATED this 5 day of October, 2001, at Seattle, Washington.

Dyanne Sheldon

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

How Ecology Regulates Wetlands

An introduction to:

Regulatory authority
Wetland definitions and delineation
Wetland characterization and function assessment
Wetland mitigation
Buffers
and more

April 1998
Publication No. 97-112
printed on recycled paper

For additional copies of this document, contact:

Department of Ecology
Publications Distribution Center
PO Box 47600
Olympia, WA 98504-7600
Telephone: (360) 407-7472

This document is available on the World Wide Web at http://www.wa.gov/ecology/ under the "Shorelands and Wetlands" section.

We welcome any comments on how we can improve this guide. Please send written comments to Department of Ecology, Publications Office, PO Box 47600, Olympia WA 98504-7600. *The Department of Ecology is an equal opportunity agency and does not discriminate on the basis of race, creed, color, disability, age, religion, national origin, sex, marital status, disabled veteran's status, Vietnam Era veteran's status or sexual orientation.*

For more information or if you have special accommodation needs, please contact Shorelands & Environmental Assistance Program at (360) 407-7256, or (360) 407-6206 (TDD).

How Ecology Regulates Wetlands

An introduction to:

Regulatory authority
Wetland definitions and delineation
Wetland characterization and function assessment
Wetland mitigation
Buffers
and more

Prepared by:

Andy McMillan
Washington State Department of Ecology
Shorelands & Environmental Assistance Program

April 1998
Publication No. 97-112
printed on recycled paper

Table of Contents

1. Introduction

This document provides an overview of the role that the Department of Ecology plays in regulating wetlands and the factors that go into the agency's wetland permitting decisions. This document does not provide new qualifications or requirements for the regulation of wetlands. It provides a reference to wetland regulations but in no manner supercedes or adds to existing legal authority.

The field of wetland science and the wetland regulatory framework are constantly changing. In addition, wetlands are dynamic and highly variable ecosystems. Because of this variability, Ecology has developed general wetland regulation guidelines that allow the agency to incorporate current wetland science, tailor the level of regulation to the type of wetland being affected, and respond to site-specific situations.

The guidelines help provide predictability while allowing the flexibility that is needed to achieve ecologically and economically sound solutions on individual sites.

Ecology views regulations as only one tool to protect wetlands. Along with regulations, there are many non-regulatory opportunities to conserve wetland resources. Ecology's view of comprehensive wetlands protection includes voluntary stewardship actions, taken by landowners and local communities, to actively preserve, restore and enhance existing wetlands. Ecology's wetlands protection efforts focus on educating and informing wetland owners about all their options and opportunities - both regulatory and non-regulatory (see Chapter 10).

Given the constantly changing nature of wetland science and regulation be aware that this guidance document is subject to periodic revision. **Make sure you have the most recent version of this document before relying upon this information.**

In addition, be aware that other wetland regulatory agencies may have different policies, requirements or approaches. Ecology strives to achieve consistency among federal, state, and local agencies in wetlands regulation but we cannot speak for other agencies.

2. Wetland Regulatory Authority

The following descriptions of some key laws and regulations explain the basis for Ecology's involvement in wetland regulation. For a more detailed description of specific laws and regulations see Ecology's *Wetland Regulations Guidebook*, Ecology Pub. No. 88-5 (see Appendix B for ordering information).

State laws and regulations

Two state laws, the State Water Pollution Control Act and the Shoreline Management Act, give Ecology authority to regulate wetlands. These are outlined below.

Ecology provides technical assistance to other agencies that regulate wetlands under separate statutes, such as the Hydraulic Code (Department of Fish and Wildlife) and the Forest Practices Act (Department of Natural Resources).

In addition, Ecology provides assistance to local governments under the Growth Management Act. This includes assistance in developing comprehensive plan policies and development regulations, and in implementing local wetland regulations.

Finally, Ecology uses the State Environmental Policy Act (SEPA) process as a mechanism to identify potential wetland-related concerns early in the permitting process. While substantive authority under SEPA can be used to require additional wetland protection, it is used primarily as a means of identifying impacts that are regulated under other statutes. For more information on these other statutes consult the *Wetland Regulations Guidebook*.

State Water Pollution Control Act (Chapter 90.48 RCW)

This statute was originally passed in 1945 and has been modified several times since. The Act was created to protect the quality of all waters of the state for public health and enjoyment. It is written broadly and mandates the protection of all uses and benefits of water including water supply, commerce and navigation, recreation, fish and wildlife habitat and aesthetics.

The Act gives Ecology "jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters,

water courses, and other surface and underground waters of the state of Washington."

Although wetlands are not specifically mentioned in the statute, all wetlands are either surface or underground water, or both. In addition, a Thurston County Superior Court decision in 1993 ruled that all wetlands "bigger than puddles" are waters of the state (No. 91-2-02895-5, *Building Industries Association of Washington, et al vs. City of Lacey, et al.).* Amendments to state water quality standards adopted in 1997 included wetlands in the definition of surface waters to clarify that they are waters of the state.

The Act's definitions of "pollution" (90.48.020) and "discharges" (90.48.080) are broad and include all of the impacts that typically degrade wetland functions, including placing fill and discharging stormwater runoff. The Act gives Ecology wide latitude in protecting waters of the state and designates Ecology as lead state agency for implementing provisions of the federal Clean Water Act including Section 401 (see "Federal Laws" section, below, for more detail on Section 401).

The implementing regulations for the statute include **Surface Water Quality Standards** (Chapter 173-201A WAC) - the primary regulations that cover wetlands and other waters of the state. Because wetlands are so variable there are no specific numerical standards for wetlands. A single standard for pH or dissolved oxygen for wetlands is not feasible because physical and chemical characteristics vary widely from wetland to wetland.

The **antidegradation policy** (Chapter 173-201A-070 WAC) provides the basis for protecting wetlands. The federal government requires that state water quality standards include an anti-degradation policy.

Washington's antidegradation policy states that "existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed." Strict adherence to this policy would mean that Ecology could not permit any alteration of a wetland which impairs the functions of the wetland as they relate to any of the defined beneficial uses such as water supply, recreation, fish and wildlife habitat, aesthetics, commerce, etc. However, the regulations allow for short-term impacts to waters of the state as long as the degradation does not "interfere(s) with or become

injurious to existing water uses or causes long-term harm to the environment [WAC 173-201A-110 (2)]."

Ecology is able to permit alterations of wetlands, including filling of a wetland, only if the net result of the action does not result in long-term harm to the environment. Generally, this allows the agency to permit projects with minimal or short-term impacts to wetlands. In addition, with adequate mitigation that effectively offsets the impacts, Ecology can permit projects that would otherwise not comply with the regulations. In these cases, we apply the guidelines in this document to help evaluate the project.

The primary mechanism for implementing the provisions of this statute is the state **water quality certification** issued pursuant to Section 401 of the federal Clean Water Act. Because most wetland impacts are regulated under Section 404 of the federal Clean Water Act, we have used this process to address the state's concerns with wetland impacts. However, for those activities that degrade wetlands and fall outside the purview of the 404 program, we may use other state water quality permitting processes such as wastewater discharge permits, short-term water quality modifications, and administrative orders.

Shoreline Management Act (Chapter 90.58 RCW)

The Shoreline Management Act (SMA) was enacted in 1971 and regulates only a portion of the wetlands in the state. The SMA regulates only wetlands within 200 feet of shoreline water bodies and wetlands "associated" with these water bodies. (Approximately 30% of the state's freshwater wetlands and all of the tidal wetlands are under SMA jurisdiction.)

Ecology's role in regulating wetlands under the SMA is threefold:
1) determining which wetlands are within the jurisdiction of the law;
2) reviewing and approving local regulations which guide permit decisions; and
3) reviewing and either approving or appealing local government permit decisions (depending on the type of permit).

Determining jurisdiction: The Shoreline Act directs Ecology to determine which wetlands are regulated under the SMA. The regulations governing which wetlands are in SMA jurisdiction are

found in WAC 173-22. There are many factors to consider in making a wetland jurisdictional determination (see Appendix F).

Reviewing local plans: Ecology is also involved in the development and approval of local Shoreline Master Programs (SMPs) which contain the goals, policies and regulations used by cities and counties to guide their shoreline permit decisions. We encourage local governments to include the provisions of our various wetland guidelines in their Master Programs. Many local SMPs have not been updated in the past 10 years and thus, do not contain appropriate wetland protection language. However, with the passage of the Growth Management Act, most local governments are, or will be, revising their SMPs to be consistent with the GMA.

Reviewing local permits: The third role that Ecology plays in regulating wetlands under the SMA is in our review of local government permitting decisions. We must review and either approve, condition, or deny all Shoreline *Variance* permits and Shoreline *Conditional Use* permits. However, if we believe that a Shoreline *Substantial Development* permit issued by a local government does not adequately address wetland impacts we have the right to appeal that permit. In our review of these permits we consider the language in the local SMP, the policies of the SMA and our understanding of the project impacts to the wetland. Our wetland guidelines are useful in assessing the impacts and the adequacy of any proposed mitigation.

Federal Laws

Clean Water Act

Section 404 of the federal Clean Water Act regulates the placement of fill in waters of the United States including wetlands. The US Army Corps of Engineers administers the permitting program for this law. (For more detailed information on this law see the *Wetlands Regulations Guidebook*, Ecology Pub. #88-5.)

Section 401 of the federal Clean Water Act requires that proposed dredge and fill activities permitted under Section 404 be reviewed and certified by the designated state agency that the proposed project will meet state water quality standards. The federal permit is deemed to be invalid unless it has been certified by the state. This

certification is required on all Corps of Engineers General Permits as well as all Individual Permits.

The Department of Ecology is designated by statute as the state agency responsible for issuing this water quality certification. For Section 404 Individual Permits and some General Permits, applicants must contact Ecology and receive an approved water quality certification. For some General Permits a blanket certification has been issued. Our role in this process is outlined in the above section of the state clean water act and below in the section on permit processes.

Coastal Zone Management Act

Ecology is also responsible for implementing provisions of the federal Coastal Zone Management Act. This statute requires that all federal licenses and permits be reviewed by the state for consistency with the state's coastal zone management plan. This is only applicable to projects within the 15 coastal counties of Washington. For those projects within SMA jurisdiction, compliance with Shoreline Management Act provisions is sufficient to meet CZMA consistency requirements. When a project is outside of SMA jurisdiction but still within the coastal zone, Ecology must issue a separate notice of consistency.

State Wetlands Goals

The only formally adopted state goals on wetlands are contained in two Executive Orders signed by Governor Booth Gardner.

Executive Order 89-10, signed in December 1989, adopted the interim goal of "no overall net loss in acreage and function of Washington's remaining wetlands base" and the long term goal "to increase the quantity and quality of Washington's wetlands resource base." These goals originated in the work of the National Wetlands Policy Forum during the late 1980s.

It is important to understand that the goal of "no net loss" does not mean that no further wetlands will be lost; rather, that mitigation and non-regulatory restoration will offset wetland losses. It is expected that loss of wetland acreage and function will be minimized through regulation and that no net loss and a long-term

gain in wetland resources will only occur through a combination of regulation and non-regulatory restoration of wetlands in the state. Hence, the state's regulatory programs are designed to address all significant impacts to wetlands and, where losses are permitted, to require that equivalent wetland resources are provided through wetland creation, restoration, and enhancement.

Executive Order 90-04, signed in April 1990, directs state agencies to do a number of things to better protect wetlands. This Executive Order has been misinterpreted by some as providing new legal authority to state agencies to protect wetlands. In fact, the Order simply directs state agencies to use their existing authority to protect wetlands "to the extent legally permissible." The primary directive contained in 90-04 provides that state agencies apply the definition of mitigation found in SEPA in sequential order (see Chapter 5 on Mitigation). The remainder of 90-04 directed different agencies to conduct a variety of activities to improve their wetlands protection efforts.

3. Wetland Definitions and Delineation

Many people are confused about the difference between wetland definition and wetland delineation. The terms are often used interchangeably, thus contributing to the confusion. Simply put, a wetland *definition* tells what a wetland is, and a *delineation method* tells how to find a wetland on the ground.

Most **wetland definitions** include some reference to the presence of water, soil and vegetation. A **wetland delineation method** describes how a person determines if enough water, and the right types of soil and vegetation are present in a given site. There have been several different wetland definitions developed for different purposes throughout the country. There have also been several delineation manuals developed to implement the same wetland definition.

In understanding wetland regulation it is important to distinguish between "biological," "jurisdictional," and "regulated" wetlands.

Biological Wetland: A biological wetland is one that is determined to have the physical, biological and chemical characteristics to be called a wetland. There are several definitions that were developed over the years that attempted to describe a biological wetland. The most recent one, called *a reference definition* by the National Academy of Sciences, states: "A wetland is an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical and biological features reflective of recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic, or anthropogenic factors have removed them or prevented their development."

Jurisdictional Wetland: A jurisdictional wetland is one that a particular law has determined should be regulated by the provisions of the law. It may be the same as a biological wetland or it may

represent a subset of biological wetlands. For example, the Shoreline Management Act has defined wetlands under its jurisdiction as being all wetlands associated with tidal waters and certain lakes and streams. Most freshwater wetlands in the state are not within shoreline jurisdiction. The SMA definition further restricts jurisdictional wetlands by specifically excluding artificial wetlands intentionally created from non-wetland sites such as canals, farm ponds and landscape amenities. Thus, even though some of these areas may meet the above biological definition, the SMA would not regulate them.

Regulated Wetland: While most jurisdictional wetlands are going to be regulated to some extent, there are always certain activities that are exempt from a given law. This results in some jurisdictional wetlands not being regulated. For example, a wetland may fall under SMA jurisdiction because it meets the specific criteria contained in the SMA wetland definition. However, if the wetland occurred in an area that had been historically farmed, a landowner could plow the wetland to plant a crop without having to get a shoreline permit because this activity is exempt. Thus, some people have been confused by the notion that an area may meet the jurisdictional definition of a wetland, are delineated as such, and still be exempt from any regulation because of the particular activity proposed.

Recent changes to laws and regulations

Recent state legislative changes have helped the situation tremendously. At present, the wetland **definitions** contained in the Growth Management Act (GMA) and the Shoreline Management Act are virtually the same as the definition used by the federal agencies under Section 404 of the CWA. In addition, the state legislature passed a law in 1995 directing Ecology to adopt a **state wetland delineation manual** that is consistent with the federal delineation manual (1987 Corps of Engineers manual). Ecology has adopted a **Washington State Wetland Identification and Delineation Manual** under the SMA regulations (WAC 173-22). *(See Appendix B for ordering information.)*

This state manual is required for any delineation conducted under the SMA. Also, local governments must use it in implementing GMA regulations. Since this manual is consistent with the 1987 Corps Manual anyone needing approval from both federal and state/local agencies should simply designate that their delineation was conducted using both the state manual and the 1987 manual.

4. Wetland Characterization and Function Assessment

For many years most regulatory programs operated as if all wetlands should be treated the same. This "one regulation fits all wetlands" approach has historically resulted in inadequate protection of some wetlands and over-regulation of others. There is great variation in the types of wetlands found in the state of Washington and there is even greater variation in the functions they perform. Our approach is to base the level of protection on the importance of the wetland.

It is important to distinguish between wetland functions and wetland values. **Functions** are the things that wetlands do, such as trap sediments, recharge streamflows, provide habitat, etc. **Values** are how important we think these different functions are.

For example, a wetland may store a great amount of water during floods. This water storage capacity is a function the wetland performs. How much we may value this function depends on how important that flood storage is in the watershed. If there is no downstream development that would be threatened by flooding, then the function might be considered less important than it would be if structures were present. As another example, wetlands provide habitat for a wide variety of plant and animal species. If the species happens to be an endangered species, we will value that habitat more.

Functions can be assessed, and to some extent, measured. More often it is only feasible to estimate a relative level of performance. Actual measurement of functions (cubic feet of floodwater storage, # of waterfowl species, etc.) is usually too expensive to assess. Values, on the other hand, are generally "assessed" through the regulatory process. The policies and regulations of the different laws usually establish how much different functions are valued.

Our current understanding is that wetlands perform different types of functions and perform these functions to varying degrees. There are several different methods that are used to characterize the types of functions performed by wetlands and some of these methods generalize the extent to which these functions are performed.

However, we currently do not have a quantitative method for determining wetland function that is scientifically valid and applicable in a regulatory setting. What is needed is a rapid method of quantifying wetland functional performance that is scientifically supported.

The various functional assessment methods currently available all have drawbacks and cannot be heavily relied upon to base regulatory decisions. Some of these methods can provide useful information to assist in making a regulatory decision but we are still left with applying "best professional judgment" (BPJ) in determining performance of wetland functions.

Recent development of two new methods, the **hydrogeomorphic** approach and the **Indicator Value Assessment** method show great promise. With funds from an EPA grant, Ecology will be coordinating development of a quantitative function assessment method for certain types of wetlands in Washington State over the next few years. It is our hope that this tool will be useful in making regulatory decisions. *(For a brochure describing the **Wetland Function Assessment Project**, order Ecology Publication 96-103. To order, see Appendix B.)*

Until better methods are developed, Ecology relies upon the best professional judgment of its staff combined with the best available science in assessing wetland function for regulatory decisions. We have found that established methods such as the **Wetland Evaluation Technique** (WET) and **the Habitat Evaluation Procedure** (HEP) can provide useful information when applied correctly but cannot be relied upon to accurately measure wetland functions. However, Ecology may use this information in evaluating projects and making regulatory decisions.

Other methods, such as **Reppert** and the **Wetland Characterization Method** are not accepted by Ecology. The Wetland Characterization Method was developed by Ecology for use with inventory-level planning efforts and is not appropriate for assessing functions for regulatory decisions on a specific site. The original Reppert method contains flaws that make it ineffective - however, more recent, regionalized Reppert-based methods may provide useful information in estimating performance of wetland functions.

In addition to using one of the above methods, applicants are encouraged to provide **site-specific information** on wetland characteristics to assist in making an individual assessment of wetland functions. Important characteristics include:

- location in the watershed,
- inlet/outlet character,
- basin storage capacity,
- vegetation type,
- species abundance and distribution,
- interspersion, and
- structural diversity.

We also encourage the use of **the Washington State Wetland Rating System** (either Eastern or Western Washington version) to assist with a decision about the management of a particular site. *The rating system does not assess wetland functions.* It places wetlands into four different categories based on a combination of functions and values. The four basic criteria that determine a wetland's placement in a category are:

- rarity,
- irreplaceability,
- sensitivity to disturbance, and
- habitat functions.

The rating system was designed to be used with local development regulations to ascertain appropriate protective measures. Thus, while the rating system is not sufficient to evaluate the adequacy of a particular mitigation plan, it is helpful in determining the appropriate buffers for a site and in establishing mitigation parameters such as sequencing and replacement ratios (see Chapter 5 on Mitigation).

5. Wetland Mitigation

Wetland mitigation is a concept that is frequently misunderstood. The term mitigate means literally "to make less severe or painful; to moderate" (Webster's). In the wetland regulatory context it essentially means *to reduce the total adverse impacts of a project to an acceptable level.* This can be accomplished through a variety of methods. Wetland mitigation is usually defined in terms of a series of steps that should be taken in sequential order. They are:

1) **Avoiding** adverse impacts (either by finding another site or changing the location on-site);
2) **Minimizing** adverse impacts by limiting the degree or location of a project on-site;
3) Rectifying adverse impacts by **restoring** the affected environment;
4) **Reducing** the adverse impacts by preservation and maintenance operations over the life of the project;
5) **Compensating** for adverse impacts by replacing or providing substitute resources or environments; and
6) **Monitoring** the impacts and taking appropriate corrective measures.

Following this process is referred to as **sequencing**. Most people equate wetland mitigation with step 5, and this has led to the use of the term "compensatory mitigation" to distinguish this type of mitigation from the broader definition.

In most cases, Ecology requires that an applicant demonstrate that they have followed this sequence in developing their project before permit approval is granted. However, Ecology has taken the position that lower quality wetlands *(Category 4 wetlands in our rating system)* usually do not warrant the first step of avoiding the impact altogether. This is based on our assumption that these types of wetlands can be successfully replaced. With other wetlands, particularly higher quality wetlands, we are usually stringent in requiring that project proponents demonstrate that they have followed the sequence.

We work with project proponents to design their project so that they can accomplish their objectives while avoiding and minimizing

impacts to wetland resources. The earlier we are involved in the process the more successful we usually are in finding a win-win solution.

Compensatory mitigation

When adverse wetland impacts are truly "unavoidable," an applicant is required to develop a **compensatory mitigation plan**. This can include creation of a new wetland, restoration of a former wetland, enhancement of a degraded wetland or some combination of the three. In some instances, preservation of high quality wetlands and/or adjacent high quality uplands may be acceptable as part of an overall mitigation "package."

Historically, creation of new wetlands in upland sites has been problematic, primarily due to the difficulty in establishing an adequate water regime to sustain wetland conditions. Thus, Ecology emphasizes restoration of former wetlands or enhancement of significantly degraded wetlands as the preferred methods of compensation. With these methods, establishing an adequate water regime is usually more certain.

The primary questions we ask in determining the adequacy of a compensatory mitigation method, location or plan are:

1) What are the type and extent of functions being impacted by the project?
2) How will the proposed mitigation replace these functions?
3) Will the proposed mitigation be successful and sustainable?

Thus, the appropriate type of compensatory mitigation will depend on the individual circumstances of the project. It will also depend on the opportunities for mitigation in the area of the project since we usually require that the replacement wetland be located in the same drainage basin. It is difficult to replace hydrologic and fish habitat functions in a different drainage basin and impossible to replace them in a different watershed. However, the old notion that compensatory mitigation must be "on-site" is now seldom required since adequate opportunities are rarely available on a given project site.

Also, in the past we typically required "in-kind" compensatory mitigation, usually meaning that the replacement wetland must be the same type of wetland as the one being impacted (e.g., a cattail

marsh for a cattail marsh). This is still often a requirement since it is difficult to replace lost functions with a different type of wetland. However, Ecology makes an individual assessment in each case and has occasionally decided to accept, or even encourage, out-of-kind replacement. This is usually due to one or more of several factors. Sometimes the wetland being impacted is of low value such as a depression dominated by exotic invasive plants such as reed-canarygrass.

In some cases there may not be adequate opportunities to recreate or restore the same type of wetland in the area and there may be an excellent opportunity to create a different, usually higher-value wetland in the area. In other cases we have judged that a different type of resource restoration makes more ecological sense in a particular situation. For example, we have allowed the restoration of stream and riparian corridors in exchange for a minimal loss of wetlands in areas where stream resources have been significantly degraded, particularly in eastern Washington.

Another mitigation concept is the use of **replacement ratios**. A replacement ratio is the amount of wetland area created, restored or enhanced in relation to the amount of wetland area impacted. For example, historically a replacement ratio of 1:1 was common. This means for every acre of wetland impacted an acre of wetland would be created. In recent years the ratio has increased and seldom is a 1:1 ratio acceptable to any regulatory agency. This increase is due primarily to two factors: 1) the likelihood of success of the compensatory mitigation and 2) the length of time it takes to successfully create or restore a wetland.

Since compensatory wetland mitigation has historically been less than 100% successful (different studies have determined that roughly half of the attempts to create wetlands have failed) and it takes anywhere from several years to several decades to create a fully-functioning wetland, replacement ratios greater than 1:1 are used as a means of equalizing the tradeoff. While the goal is always to replace the lost functions at a 1:1 ratio, it is almost always necessary to increase the replacement acreage in order to accomplish this.

At present Ecology recommends replacement ratios based on the rating of the wetland and/or the type of wetland.

The recommended ratios are as follows:

Wetland category	Creation and Restoration	Enhancement*
Category 1 (all types)	6:1	12:1
Category 2 or 3		
• **Forested**	3:1	6:1
• **Scrub/shrub**	2:1	4:1
• **Emergent**	2:1	4:1
Category 4	1.25:1	2.5:1

** For wetland enhancement the ratios are doubled. Enhancement as compensation for wetland losses results in a net loss of wetland area and the net gain in wetland function from enhancement is usually less than from creation or restoration.*

These ratios are general guidelines that are adjusted up or down based on the likelihood of success of the proposed mitigation and the expected length of time it will take to reach maturity. Good hydrologic information on the proposed mitigation site is necessary to establish a likelihood of success. In addition, the track record of the type of proposed compensatory mitigation is an important factor.

If the person responsible for designing and constructing the compensatory mitigation can demonstrate that they or anyone else have successfully conducted a similar project, the likelihood of success is increased and replacement ratios may be lowered. Likewise, a lack of documentation that the type of mitigation proposed has been successful elsewhere may lead to even higher ratios.

For more information on replacement ratios and their scientific rationale, see *Wetland Mitigation Replacement Ratios: Defining Equivalency,* Ecology Pub. No. 92-08.

Early consultation with agencies

There are many details that must be considered in the development of an acceptable mitigation plan. Ecology likes to work with the applicant in developing a conceptual plan prior to extensive work being done on a detailed plan. This can prevent unnecessary expenditures of time and money for all parties. State and federal

agencies have developed extensive guidance on how to develop conceptual and detailed mitigation plans (see *Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals*, Ecology Pub. #94-29).

Monitoring plans

Given the poor track record of compensatory mitigation it is critical to have an adequate monitoring plan for a mitigation site. The standard length of time for monitoring a mitigation site has increased over the years as projects have demonstrated how slowly wetlands evolve. At present, five years is the minimum requirement and in many cases, especially where forested wetlands are being created or restored, a much longer time is required. Increasingly, invasion of a created or restored wetland by aggressive, non-native plant species is a major concern. It is essential that the mitigation plan takes into account the potential for invasion and includes monitoring and maintenance provisions to ensure success.

Mitigation banking

Mitigation banking is a concept that is receiving increasing attention and support. The general idea is to create or restore a large wetland area and use the "credit" to compensate for wetland impacts that occur elsewhere. If conducted appropriately this approach can be beneficial to applicants and the environment.

Project proponents benefit by not having to take on a risky, open-ended mitigation project and the environment benefits by having a functioning replacement wetland in place before the impact occurs. At present, federal and state agencies are working to develop consistent guidelines on mitigation banking to facilitate the development and use of private banks. The Department of Transportation has a signed agreement with federal and state regulatory agencies on how to establish and operate a bank for its own use but has yet to initiate development of a banking site. The 1998 Legislature directed Ecology to develop rules for mitigation banking.

There are still some obstacles remaining that continue to make banking problematic. There is need for a method of quantifying wetland functions to establish wetland credits and debits to be used in banking "transactions." There is also a need to establish how banking will mesh with the existing regulatory processes.

6. Buffers

Wetland buffers have been a subject of considerable debate and discussion in recent years. While increased attention is being directed at the scientific basis for establishing buffers around wetlands, it remains a highly charged issue. While some people still challenge the need for any buffers, most of the debate centers on "how much is enough?"

The case for buffers

Wetland buffers are important to protect the functions provided by wetlands. They do this in two basic ways:

1) Buffers reduce the adverse impacts of adjacent land uses by
   - stabilizing soil and preventing erosion;
   - filtering suspended solids, nutrients, and toxic substances;
   - moderating impacts of stormwater runoff; and
   - reducing noise, light, intrusion and other disturbances.

2) Buffers provide important habitat for wildlife which utilize the wetland and the buffer area for essential feeding, nesting, breeding, rearing and resting. For example, some waterfowl feed in the wetlands and nest in adjacent uplands while many amphibians spend the majority of their lives in forested areas and breed in wetlands. Without protecting adjacent upland areas, wetlands would not be able to support these wetland dependent species.

Ecology funded several private consulting firms to work together to document the scientific basis for buffers. Their report is titled *Wetland Buffers: Use and Effectiveness* and is available from Ecology as Publication #92-10.

How much is enough?

This is the question most often asked and debated about buffers. Unfortunately, there is no single definitive answer for all wetlands. Appropriate buffer widths should be determined case by case and are dependent on the four major variables described below: (1) wetland function and sensitivity to disturbance; (2) buffer

characteristics; (3) land use impacts; and (4) desired buffer functions.

(1) **Wetland function** and sensitivity to disturbance are attributes that will influence the necessary level of protection for a wetland. Wetlands systems that are extremely sensitive or have important functions will require larger buffers to protect them from disturbances (e.g., high quality estuarine wetlands and bogs need larger buffer widths to ensure a lower risk of disturbance.)

(2) **Buffer characteristics** such as vegetative composition, plant density, soils and slope are all important factors in determining effective buffer widths.

(3) **Land use impacts** play a significant role in determining buffer widths. Construction impacts include erosion and sedimentation, debris disposal, vegetation removal and noise. Post-construction impacts are variable depending on the land use, but residential land use, in particular, can have significant impacts.

(4) **Desired buffer function(s)** are pertinent in determining appropriate buffer widths. Temperature moderation, for example, will require smaller buffer widths than some wildlife habitat or water quality functions. Buffer widths for wildlife may be generalized, but specific habitat needs of wildlife species depends on individual habitat requirements.

Despite the need for site-specific analysis to determine appropriate buffer widths there are instances where generalized widths or ranges are useful. Most local ordinances provide specific buffer widths or ranges as a starting point to provide some consistency and predictability. Most of these ordinances also contain provisions for adjusting buffer widths up or down based on site-specific factors.

Ecology has proposed buffer ranges to be used in conjunction with our 4-tiered rating system. They are:

Category 1 200 - 300 feet
Category 2 100 - 200 feet
Category 3 50 - 100 feet
Category 4 25 - 50 feet

In addition to these suggested buffer widths we utilize the following guidelines:

- Buffer effectiveness increases with buffer width.
- Buffers of less than 50 feet in width are generally ineffective in protecting wetlands.
- Buffer widths effective in preventing significant water quality impacts to wetlands are generally 100 feet or greater.
- Buffers from 50 to 150 feet are necessary to protect a wetland from direct human disturbance in the form of human encroachment (e.g., trampling, debris).
- In western Washington, wetlands with important wildlife functions should have 200 to 300 foot buffers based on land use. In eastern Washington, wetlands with important wildlife functions should have 100 to 200 foot buffers based on land use.

7. Stormwater Issues

One of the more complex wetland-related issues that we deal with is stormwater management. It has become virtually impossible to separate wetland and stormwater issues when dealing with projects in urban areas. In many cases wetlands receive all or part of their water from stormwater. There are two primary components of this issue that are important to understand. They are framed below as questions we are often asked. (For more information on wetlands and stormwater see *Stormwater and Wetlands*, Ecology Pub. 97-91)

1. **Can wetlands be used for stormwater treatment?** In many cases it would be detrimental to a wetland to discharge stormwater into it. In all cases it is necessary to "clean" the stormwater prior to discharge into a wetland. Stormwater should meet state water quality standards for Class A waters before being discharged into a wetland. Typically, we require the pretreatment of stormwater using the methods outlined in Ecology's Stormwater Manual. For discharge of stormwater into wetlands, we must evaluate the potential impacts to the wetland including changes in the wetlands water regime and the introduction of pollutants. In some cases, stormwater must be directed into a wetland in order to maintain the water regime of the wetland.

2. **Can stormwater treatment facilities count as wetland mitigation?** Generally, the answer is no. Most stormwater treatment ponds or swales are too degraded and too intensively managed to provide the range of wetland functions desirable in a mitigation project. However, stormwater treatment facilities may help offset the loss of certain water quality improvement functions associated with a wetland that is being impacted. To the extent that they do that, stormwater facilities may be included as part of an overall wetland mitigation "package."

8. Wetland Permitting Processes

Ecology issues many different permits or approvals that may involve wetland concerns. These could include such permits as water rights, wells, hazardous waste cleanup, etc. However, the two primary approvals that typically involve wetlands are shoreline permits and water quality certifications (described in Chapter 2). In each case, there is a distinctly different process involved. In most cases, however, there will be a wetlands specialist who is primarily responsible for determining whether the wetland-related issues are adequately addressed.

Whenever a wetland issue is involved, the applicant is advised to contact the wetland specialist for their area and work with them to address the agency's wetland-related concerns. These staff work in one of the agency's four regional offices (see Appendix A). For more information on the permitting requirements and procedures consult the *Wetland Regulations Guidebook* (Ecology Pub. #88-5.)

9. Technical Assistance

In addition to their regulatory activities, wetlands specialists with Ecology provide a range of technical assistance to local governments, other state and federal agencies, and the public. Because of their specific wetlands expertise, local government staff often call on these staff to assist in reviewing development proposals requiring local approval. In these instances, Ecology staff are not acting under any direct regulatory authority but are providing assistance as directed in the State Environmental Policy Act and the Growth Management Act.

There are times when Ecology's wetland specialists are involved in a project where they are providing technical assistance to a local government or other state agency as well as performing their regulatory duties under state statute. This dual role requires that Ecology staff communicate clearly what constitutes requirements and what is simply a recommendation. However, whether acting in

a regulatory or advisory capacity, Ecology wetland staff will generally base their decisions or recommendations on this guidance.

Ecology is frequently asked to assist local landowners, especially in conducting wetland delineations. In general, we do not have an adequate number of staff to conduct delineations for landowners. We have, and as time allows, will continue to assist landowners in determining if they have a wetland on their property and what laws, if any, might apply. In some instances, we have assisted in determining approximate wetland boundaries, especially if no direct wetland impacts are anticipated and no detailed delineation will be required.

In addition to providing assistance on projects, wetlands specialists are frequently involved in providing training on wetland issues to local government or state agency staff. As time allows, Ecology is also involved in conducting training or educational presentations for public organizations.

For more information on wetlands, contact one of the individuals listed in Appendix A. If you are calling about a site-specific issue contact the appropriate regional staff.

10. Wetlands Stewardship

Voluntarily protecting wetlands benefits landowners and their neighbors. Wetlands provide functions which benefit communities and the environment - rearing habitat for salmon, the holding of flood waters, and water quality filtration, to name a few. When wetlands are lost, communities have to pay for engineered replacements of these services.

Voluntary approaches to wetlands protection include permanently preserving lands, restoring and enhancing functions, and conserving wetland features by applying best management practices.

Stewardship does not have to mean an economic loss to the landowner. A growing number of land stewards are realizing that they can benefit economically by protecting and enhancing wetlands. Some of the financial benefits include direct income from wetland amenities, estate tax reductions, and in some cases income and property tax reductions. An outstanding program that is available to Washington landowners is the local 'current use' property valuation tax which offers long-term property tax reductions for maintaining wetlands in an undeveloped state.

Ecology provides information and assistance on stewardship approaches, programs, and opportunities. Refer to Appendix A for stewardship and restoration contacts. Refer to the Ecology publications *At Home with Wetlands* (Pub. # 90-31) and *Exploring Wetlands Stewardship* (Pub. # 96-120) for more general information about stewardship.

Appendix A - Ecology Wetlands Contacts

HEADQUARTERS PO Box 47600 Olympia, WA 98504-7600 FAX (360) 407-7162	**Policy & Regulation**	Andy McMillan (360) 407-7272	**Function Assessment**	Teri Granger (360) 407-6547
	Senior Ecologist	Tom Hruby (360) 407-7274	**Restoration**	Richard Gersib (360) 407-7259
	Stewardship	Jane Rubey (360) 407-7258		

EASTERN REGION N. 4601 Monroe Spokane, WA 99205-1295 Fax: (509) 456-6175	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman**	Dennis Beich (509) 625-5192

CENTRAL REGION 15 West Yakima Avenue, Suite 200 Yakima, WA 98902-3401 FAX: (509) 575-2809	**Benton, Kittitas, Klickitat, Yakima,**	Cathy Reed (509) 575-2616
	Chelan, Douglas, Okanogan	Mark Schuppe (509) 575-2384

SOUTHWEST REGION PO Box 47775 Olympia, WA 98504-7775 FAX: (360) 407-6305	**Pacific, Wahkiakum, Skamania, Clark**	Bill Leonard (360) 407-7273
	Clallam, Jefferson, Pierce, Kitsap	Ann Boeholt (360) 407-6221
	Grays Harbor, Cowlitz, Thurston, Lewis, Mason	Perry Lund (360) 407-7260

NORTHWEST REGION Mail Stop NB-81 3190 - 160th Avenue SE Bellevue, WA 98008-5452 FAX: (425) 649-7098	**Snohomish, King, San Juan**	Erik Stockdale (425) 649-7061
	Skagit, King, Island	Susan Meyer (425) 649-7000
	Whatcom	Barry Wenger (360) 738-4633

Current as of 4/98

Appendix B - Publications

Ecology has a variety of wetland publications that cover a range of topics. Some are listed below and are available through Ecology's Publications Office at 360/407-7472. Most of these documents are available on Ecology's World Wide Web home page at www.wa.gov/ecology/ under the "Shorelands and Wetlands" section.

- **Wetland Regulations Guidebook** (88-5) A guide to federal, state and local wetlands regulations. 40 pages.
- **Exploring Wetlands Stewardship - A Reference Guide for Assisting Washington Landowners** (96-120) Technical assistance on options for preservation, conservation, and recovery of wetlands and riparian areas. 260 pages.
- **At Home With Wetlands: A Landowners Guide** (90-31) How to protect or enhance wetlands on your property. 42 pages.
- **Washington State Hydric Soils Guidebook** (#90-20) 33 pages.
- **Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals** (94-29). A guide for permit applicants, consultants, and landscape architects. 40 pages.
- **Wetland Mitigation Replacement Ratios: Defining Equivalency** (92-08) 110 pages.
- **Wetland Buffers: Use and Effectiveness** (92-10) 180 pages.
- **Washington State Wetland Rating System - Western WA** (93-74) 61 pages.
- **Washington State Wetland Rating System - Eastern WA** (91-58) 58 pages.
- **Wetland Function Assessment Project** brochure (96-103).
- **Stormwater and Wetlands** - A brief introduction to the issue. 4 pages.
- **Washington State Wetlands Identification and Delineation Manual** (96-94)

Appendix C - Preparing wetland reports

Background

Wetland reports are advised, and sometimes required, for development projects where wetlands may be affected. Thorough wetlands reports reduce project delays by providing local governments and regulatory agencies with the information needed to make informed and timely decisions. A typical report includes a wetland assessment, an impact assessment, and a mitigation proposal. This is only a recommended format. More or less detail may be necessary depending on the complexity of the project.

Wetland assessment

The wetland assessment provides detailed information about wetlands on the site. The information required for a complete wetland assessment falls into three categories: wetland community description, delineation report, and an assessment of the functions and values provided by the wetland.

Wetland community description

Each wetland community on the site should be described by including:

- composition of dominant plant species
- a map showing the distribution of dominant plants
- U.S. Fish and Wildlife (Cowardin) classification
- connection and proximity to nearby water bodies
- known or suspected wildlife use
- evidence of recent or historic disturbances
- habitat features; (color photographs are useful in portraying these features)
- a brief description of adjacent upland plant communities
- its rating, based on Ecology's Washington State Wetlands Rating System

Delineation report

Delineation reports should explain both how and when the delineation was conducted. All delineations conducted for state or local government approval should be done using the Washington State Wetland Identification and Delineation Manual (1997). This

manual is consistent with the 1987 Corps Manual, so the same report can be submitted to the Corps. A good delineation report includes:

- complete set of the field data forms that were filled out during the wetland determination and delineation
- site map showing wetland boundaries and the locations of all data points
- topographic map of the area
- site designation on a National Wetlands Inventory map
- site designation on local wetland inventories (when available)
- site designation on a Soils Survey Report soils map
- any previous site documentation and/or analysis (e.g. environmental checklist, Environmental Impact Statement, or geotechnical report)
- Washington Natural Heritage Program data on rare plants, or high quality wetlands
- WA Department of Wildlife Nongame and Priority Habitat information
- Federal Emergency Management Agency (FEMA) Flood Insurance Rates maps

For large and/or complex projects, a large scale (1":400' to 1":100') air photo with overlays displaying site property and wetland boundaries is helpful.

Values and functions assessment

Wetland functions and values assessments should be conducted by individuals with training or expertise in plant ecology, wildlife biology, and hydrology. Functions and values that should be evaluated include, but are not limited to: water quality improvement, fisheries and wildlife habitat, flood and stream flow attenuation, and recreation and aesthetics.

The report should explain what methods were used to assess the wetland functions, and the strengths and limitations of the methods applied. Another acceptable method for assessing wetland functions and values is for qualified staff to use "best professional judgement". If best professional judgement is used, it is particularly important to explain what factors or criteria were used to reach any conclusions on functions and values. When detailed habitat information is needed sites may be evaluated using the Habitat Evaluation Procedure (HEP).

Impact assessment and brief project description

The wetland report should provide detailed information on how wetland functions and values will be adversely affected by the proposed project. The report should discuss the effects of both direct impacts (e.g. filling, dredging, clearing, and alterations to wetland hydrology) as well as indirect impacts (increased intrusion, increased noise, light, and glare, etc.) on each wetland. In addition, specific water quality impacts (e.g. sedimentation, nutrients, hydrocarbons, and toxics) should be discussed. The report should estimate the area (in square feet) of each wetland plant community that will be directly affected by the project. A site plan should be included which clearly identifies all areas of direct and indirect impact.

Mitigation proposal

The mitigation section of the report should include a discussion on how the project has been designed to avoid and minimize adverse impacts to wetlands. This section should also discuss how wetland buffers and stormwater treatment facilities will be provided. Each of the anticipated impacts noted under the previous section should be addressed here, relative to the effectiveness of the mitigation at replacing lost functions.

If any wetland creation, restoration, or enhancement is proposed as compensation, a plan should be provided. The plan should follow the outline presented in the Guidelines for Developing Freshwater Mitigation Plans and Proposals prepared by the Department of Ecology (see Appendix B for ordering information).

For more information

For more information on wetland reports, contact Ecology's regional wetlands staff at any of the agency's regional offices (see Appendix A.

Appendix D - Hiring a wetlands consultant

Who needs wetlands consultants?

Wetlands consultants are usually hired to identify and delineate wetlands, assess the values of a particular wetland, and provide guidance with wetland regulations and permits. They are generally hired by landowners who want to do something on their property that may affect a wetland. Some consultants are self-employed; others work for larger environmental consulting firms.

How to find a wetlands consultant

There are a number of ways to find the names of wetlands consultants. One approach is to look in the Yellow Pages of your phone directory (or the directories of the closest cities) under "Environmental and Ecological Services". You can also contact your local government planning office and ask if they know of any local wetlands consultants. Finally, you can contact state and federal resource agencies and ask for referrals. Be aware, however, that many agencies might not be able to provide recommendations because of questions of fairness.

Selecting a wetlands consultant

There are a number of factors you should consider before hiring a wetlands consultant. Be sure to ask the following questions before making your selection.

Training - Does the consultant have training or experience in the use of the 1987 federal or 1997 state wetlands delineation manuals? Has the consultant had additional training or expertise in related fields such as botany, soils, hydrology or wildlife?

Experience - How long has the consultant been doing wetlands work? How much experience do they have delineating wetlands in the field, assessing wetlands values, or working with wetland regulations? Has the consultant worked in the part of the state where you propose to develop?

References - Who were some of the consultant's past clients? Were they satisfied customers? Call them and find out who they worked

with from the consulting firm and how they liked working with them. Ask whether there were any problems that occurred during or after the project, how the consultant handled those problems, and what they charged for their work. You may also want to ask local governments about their experiences working with a particular consultant.

Staff - Who will be working on your project? Will it be the principal consultant with the years of experience or someone with less experience who works for them? Know who you're hiring!

Cost - How much will the consultant cost? Compare rates, but don't let cost be your sole criteria. Be sure to consider training, experience, and the other factors as well. A good consultant who charges you more may end up saving you money by reducing permit-processing delays.

Appendix E - Suggested Definitions for Wetlands Studies

Background

In the course of reviewing wetlands ordinances at the request of local governments, Ecology staff have noted a variety of ways that different types of wetland studies have been defined. While there are no official or "correct" definitions for these studies, the following are definitions used in Ecology offices.

Definitions

Special Studies — These studies are referenced in many critical areas ordinances. They can include a variety of environmental reports such as seismic hazard geotechnical reports, habitat management plans, drainage and erosion control plans, or specific wetland studies such as wetland reports or wetland mitigation plans.

Wetland Boundary Survey — This is the same procedure as a wetland delineation.

Wetland Delineation — A process of marking a line on the ground (and ultimately on a map), delineating the boundary between the wetland and upland for regulatory purposes. This delineation is aimed at determining a precise location for the wetland/upland boundary based on field indicators (such as vegetation, soils, and hydrology), and is best accomplished by an experienced wetland specialist. For federal, state and most local jurisdictional purposes, delineations are carried out using 1987 Army Corps Manual or the 1997 Washington State Wetland Identification and Delineation Manual.

Wetland Determination — A formal determination of whether a wetland or its buffer exists on a site. A determination may include a formal wetland delineation.

Wetland Evaluation — The process of determining the values of a wetland based on an assessment of the potential and /or actual functions performed by the wetland. Some evaluations include characterizing and analyzing potential impacts to the wetland.

Functions often assessed include groundwater recharge and discharge; sediment stabilization; nutrient removal and/or transformation; food web support; flood-flow alteration; retention of toxics; habitat for wildlife (often done using the U.S. Fish and Wildlife Service "Habitat Evaluation Procedure"); and transition habitat between aquatic and terrestrial systems.

Wetland Functional Assessment — Often synonymous with a wetland evaluation. A method of evaluating wetland functions, such as water quality, hydrology, wildlife habitat, and food chain support. The most commonly used assessment method is Wetland Evaluation Technique (WET).

Wetland Inventory — An effort to collect data about wetlands. Inventories are designed to provide information about the location, extent, and often, the characteristics of wetlands within a geographic area. In some cases, inventories include data about wetland functions and values or adjacent upland areas.

Wetland Mitigation Plan — A two-phase plan describing how impacts to wetlands will be addressed. The first phase is a preliminary plan, which includes an outline of the impacts that have necessitated the mitigation, and the steps taken in implementing mitigation including avoidance, minimization, rectification and compensation. The second phase is the final mitigation plan. Here, changes are made to the preliminary plan based on comments from agencies, and a final detailed plan is presented. Both plans include background information, an ecological assessment of the affected wetland and the proposed mitigation site, goals and objectives for the mitigation site, detailed site plans, the schedule and method for implementation, and a contingency plan.

Wetland Rating Evaluation — An evaluation of a wetland's importance according to specific characteristics or functional attributes. Ordinance standards for buffers, mitigation acreage and replacement ratios, and permitted uses can vary according to the rating a wetland receives. Some jurisdictions refer to this process as "wetland ranking."

Wetland Reconnaissance — This process is similar to a wetland determination. It is a preliminary site visit to determine whether a wetland or its buffer exists on site.

Wetland Report — A report required for development projects where wetlands may be affected. A report should generally provide the following types of information: a wetland delineation, a community description, a functional assessment, an impact assessment, and a mitigation proposal. Definitions of wetland reports in some ordinances have also included a wetland determination, a wetland rating evaluation, and a wetland evaluation.

For more information

If you have suggestions or comments about this list, please contact Tom Hruby at (360) 407-7274. You may also send ideas to:

Tom Hruby
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Appendix F - Associated Wetlands Designation Criteria (or, How to Identify Wetlands subject to SMA jurisdiction)

This appendix, excerpted from Ecology's *Shoreline Management Guidebook*, is intended to assist local governments determine wetland areas subject to shoreline jurisdiction.

In administering the SMA, it is important to be able to identify wetlands that are "associated" with Shoreline waters (marine waters, lakes $\geq$ 20 acres and streams > 20cfs). Associated wetlands are those described in RCW 90.58.030(2)(f) and defined in RCW 90.58.030(2)(h). The definition of wetlands in the original Act was confusing because it included all lands within 200 feet of the Ordinary High Water Mark (OHWM) of the shoreline water body. This definition has been changed so that wetlands are now defined consistent with other state and federal definitions and includes those areas previously defined in the Act as "marshes, swamps and bogs." (The area within 200 feet of the OHWM is now called "shoreland areas.")

Much confusion in shoreline administration results from difficulty or uncertainty in identifying the wetlands that are "associated" with the streams, lakes and tidal waters of the state. These guidelines are intended to assist in the designation of wetlands that fall under the jurisdiction of the SMA.

I. General Guidelines

A. A wetland is associated if it falls within 200 feet as measured on a horizontal plane from the OHWM or the floodway, whichever is more inclusive, of a water body under shoreline jurisdiction. See WAC 173-22-030(1).

B. The entire wetland is associated if any part of it is within the area described in A., above.

C. The entire wetland is associated if any part of it lies within the 100-year floodplain of a shoreline.

D. The entire wetland is associated when it is in proximity to and either influences or is influenced by the water body. See WAC 173-220-40(3)(c).

NOTE: When a road, dike, or other built barrier is between the wetland and shoreline, the wetland is still associated if it meets the general designation guidelines and the tests of influence and proximity. Don't assume that SMA jurisdiction ends just because a wetland is separated from the shoreline by a road or other structure.

"In proximity" means that the wetland is close enough to the shoreline to affect or be affected by that shoreline. Proximity is not limited to horizontal distance but can also include consideration of vertical distance. Proximate shorelines can include such situations as:

> A hundred-acre wetland in the floodplain that is two miles away from a water body but that intercepts flood runoff and dampens the flood surge that eventually enters that water body; or,
>
> a wetland in an overflow channel adjacent to a stream that acts as a flood storage area.

Factors to use in deciding if "influence" exists include:

1. **Hydraulic continuity**

Hydraulic continuity includes surface and ground water, can be perennial or intermittent and can be a ditch, culvert, or pipe. Intermittent streams flow at some time during a normal year. Indicators of hydraulic continuity include direct surface or subsurface water connection, continuous undrained hydric surface or subsurface water connection, continuous undrained hydric soil (particularly organic soils), or continuous hydrophytic vegetation.

These indicators are evidenced by:

a. Periodic inundation occurring in a normal year.

i. Inundation (standing water) or fully saturated soils observed during a normal or drier year.
ii. Hydrologic gauging data from period record that indicates periodic overbank flows.
iii. Drift lines, sediment or other materials deposited on vegetation by water.

b. Tidally influenced geohydraulic features such as:

i. Dunal systems.
ii. Spits and jetties.
iii. Beaches.

c. Tidal inundation as indicated by:

i. Presence of salt-tolerant vegetation.
ii. Interstitial soil salinity of greater than 0.5 parts per thousands.
iii. Tidally formed dendritic channels, particularly with tidal waters in them (fresh or salt).
iv. Drift lines or piles.

d. Connection by a tide gate or a culvert (determines whether the tide gate is functioning).

2. **Groundwater recharge and discharge.**

a. Spring systems discharging into shoreline.

b. Continuous organic soils with shoreline.

c. Augmentation of low flows in shoreline.

d. Wetlands recharging into sole source aquifer.

3. **Stormwater and floodwater detention**, such as:

a. Wetland located close to mouth of system.

b. Wetland is significant percentage of detention capacity of watershed.

4. **Water quality improvement**, filtration and assimilation of sediment, nutrients, and pollutants.

a. Wetland discharges directly into shoreline.

b. Ambient water quality of the shoreline susceptible to degradation, and wetland buffers potential adverse impacts.

c. Specific pollutant source in watershed (point or non-point source) which the wetland is effectively buffering.

d. Is there an unstable sediment source that the wetland is effectively buffering?

5. **Erosion control and buffering**, such as stability of banks (presence of headcutting or bank erosion), sediment accretion, evidence including:

a. System in hydrologic equilibrium (watershed currently functioning at capacity, without bank cutting or deposition occurring from altered watershed characteristics).

b. Urbanization in watershed, altering flowing patterns.

c. Agricultural or forestry development in watershed (particularly with related road systems) altering flow patterns.

6. **Food chain support**, important to a particular species or habitat within the affected shoreline area, which may include:

a. Plant species diversity.

b. Invertebrate diversity.

c. Faunal diversity.

d. Fish spawning, overwintering, and rearing habitat (anadromous, wild strain).

e. Structural diversity-terrestrial: presence of stratified horizontal and vertical canopy layers, including snags and downed wood.

f. Structural diversity-aquatic: large organic debris, pool: rifle: run ratio, bank overhang.

7. **Wildlife habitat** important to a particular species or group that use the affected shoreline area.

a. Habitat available for individual species.

b. Breeding/spawning habitat.

c. Overwintering habitat.

8. Wildlife corridors.

a. Connectivity and conductivity of shoreline watershed.

b. Fractionalization of habitat in watershed.

c. Availability of habitat and water in adjacent landscape.

d. Disturbance (noise, presence of people, development in watershed).

II. Special Situations

A. When a wetland is adjacent to or potentially impacted by both a shoreline and a non-shoreline, the rules for determining association with the shorelines apply *(see I. General Guidelines, above)*. If the hydraulic gradient of the wetland is clearly away form the shoreline, then other indications of association must be strongly present.

B. When a non-SMA water body enters the floodplain of an SMA shoreline, the associated wetland extends above the floodplain to the outer limit of continuous hydric soils, hydrophytic vegetation, and/or surface or subsurface hydrology.

C

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

March 28, 2001 - via fax 425-883-7977 and U.S. Mail

Mr. Don Scarberry
Novadyne Engineering
16600 NE 80th St, Suite 205
Redmond, WA 98052

Post-it® Fax Note 7671	Date 3/29/01	# of pages ▶ 1
To SUSAN JONES	From DON SCARBERRY	
Co./Dept.	Co.	
Phone # 206 467 7654	Phone # 425 883 [illegible]	
Fax # 206 623 7022	Fax #	

Dear Mr. Scarberry:

Mr. Kevin Fetherston has asked me to clarify the Department of Ecology's policy regarding the regulatory status of lands classified as "prior converted croplands" by the US Army Corps of Engineers.

The Department of Ecology regulates areas designated as "prior converted croplands" if they meet the technical criteria of wetlands in the 1996 Washington State Wetland Delineation and Identification Manual. The 1995 Washington State Legislature passed Engrossed Senate Bill 5776, which directed the Department of Ecology to "adopt a manual for the delineation of wetlands..." that was consistent with the 1987 federal delineation manual. This state manual is required to be used by all state agencies in the application of any state laws and regulations as well as by any city or county in the implementation of any regulations under the Growth Management Act. You can find the manual at http://www.ecy.wa.gov/programs/sea/pubs/96-94.html

"Prior converted croplands" are historic wetlands that have been put into agricultural use. The Food Security Act (FSA) excludes wetland areas from Section 404 of the Clean Water Act if they meet certain cropping history and modified wetland hydrology criteria. The Food Security Act does not apply to state law. Thus there are cases where wetlands meeting the state wetland delineation manual criteria (and the Corps of Engineers delineation manual criteria) are excluded from federal regulation but not state regulation.

I hope this answers the question you asked Mr. Fetherston to investigate. If you have any further questions please feel free to call me at 425-649-7061.

Sincerely,

Erik Stockdale

Erik C. Stockdale
Senior Wetlands Specialist
Shorelands & Environmental Assistance Program

ES:SA
cc: Mr. Kevin Fetherston
Ann Kenny
Andy McMillan

D

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR THE COUNTY OF KING

PORT OF SEATTLE, a municipal corporation, Petitioner, v. RST ENTERPRISES, INC., a Washington corporation; and KING COUNTY, Respondent.	Supreme Court Cause No. 71562-9 King County Cause No. 99-2-26788-5 KNT

VERBATIM REPORT OF PROCEEDINGS

The above-entitled matter came on regularly for hearing before the Honorable DEAN S. LUM, Superior Court Judge for the State of Washington, County of King, JUNE 5, 2001.

APPEARANCES

SUSAN DELANTY JONES
ROBERT W. FERGUSON
Attorneys at Law
On Behalf of the Petitioner

J. RICHARD ARAMBURU
Attorney at Law
On Behalf of the Respondent

EXAMINATION INDEX

EXHIBIT INDEX

NO	FOR	ADMITTED
2	Petitioner	159
6	Petitioner	34
13	Petitioner	131
14	Petitioner	96
19	Petitioner	12
20	Petitioner	26
21	Petitioner	12
24	Respondent	15
26	Respondent	43
53-A	Respondent	97
59	Respondent	139
63	Petitioner	163

JUNE 5, 2001

MORNING SESSION

10:29 A.M.

* * * * *

THE COURT: I understand that it's been unbearable. Well, it was very hot, and then it was very hot this morning. So we're going to try to do -- keep this open. And it's not that bad right now.

MS. JONES: No. Thank you, your Honor. It helped a lot.

THE COURT: So maybe we're going to go post a sign.

THE BAILIFF: I did.

THE COURT: All right. And we're at the end of the hall, so it shouldn't be too bad with the door open.

Anyway, again, I apologize for being a little bit late, Counsel. My dentist found something and so he had to do something, and so it's bad news for me, but not bad -- not as bad news for you, all right? Thank you.

Counsel, we're ready for our next witness, then.

MS. JONES: Thank you, your Honor. The Port calls James Kelley.

THE COURT: Okay. Mr. Kelley, could you step forward, please, and stand right in front of the court reporter and raise your right hand?

JAMES C. KELLEY, PH.D., called as a witness on behalf of the Petitioner, after being first duly sworn, was examined and testified as follows:

THE COURT: Thank you. Please be seated in that first chair there. And watch your step as you're stepping up.

DIRECT EXAMINATION

MS. JONES:

Q. Mr. Kelley, please state your name.

A. James C. Kelley.

Q. And what is your job title?

A. I'm a senior wetland ecologist at Parametrix, Incorporated.

Q. Okay. What is your job description, other than your title?

A. I'm a wetland biologist.

Q. And what does that involve?

A. That involves evaluating property for -- to identify wetland conditions, areas that meet the Federal and state criteria for wetlands, and to advise property owners and state and government agencies on how the presence of wetlands might affect the development

potential or the ability for them to implement a project.

Q. Mr. Kelley, you said that you worked for Parametrix. Can you explain a little bit about what Parametrix is or what its business is?

A. Yes. We're an environmental consulting and engineering design firm. And we assist property owners, public agencies, and others in the design and permitting of environmental and engineering projects.

Q. Okay. Can you talk a bit about who -- you said you advise public and other clients. Who are some of the public clients that you have had that you kind of advise work for?

A. We're currently working on permitting projects with the Port of Seattle. We work with the Washington State Department of Transportation on transportation roadway projects, interchange improvement projects, and work with Sound Transit, local communities, public works departments that need to change or replace bridges, culverts, add lanes to roads, et cetera.

Q. You also said you worked for other clients, as well. Do you work for private -- does Parametrix still do work for private clients?

A. Yes, we do work for private clients. I have

specifically been involved in conducting -- we had land evaluations on property that's under consideration as private development. I've worked on projects such as the South Hill Village Mall in Puyallup. I've worked on numerous housing developments, short plat type developments, in King County, Snohomish County, and in Pierce County; worked for industries such as the Simpson Tacoma Craftmill in Tacoma, and Alcoa Aluminum.

Q. Thank you.

Have you been retained to reach an expert opinion with regard to wetlands being taken on property being taken by the Port of Seattle for the third runway?

A. Yes, I have.

Q. Okay. And does that work include delineation of wetlands on Parcel 92?

A. Yes, it has.

Q. And do you understand that Parcel 92 is one piece of property that is owned by a corporation called RST?

A. Yes.

Q. Okay. Have you reached an opinion as to the existence of wetlands on Parcel 92?

A. Yes, I have.

Q. Okay. And have you reached an opinion as to the

existence of agricultural wetlands on Parcel 92 as those are defined in the SeaTac City Code?

A. Yes.

Q. Okay. We'll talk about your opinions in a moment, and the basis for them, but first I'd like to talk briefly about your qualifications, please. Can you describe briefly your education?

A. Yes. I have a Bachelor's of Science degree from the University of Vermont, which I obtained in 1978. And at that time, I studied plant ecology and botany. Then I went to graduate school at Michigan State University, where I obtained a master's degree in plant biology, specifically ecology and botany. And I received a doctoral degree from Michigan State University, where I studied wetland ecology and wetland ecosystems near Lake Michigan.

Q. Was your dissertation on wetland ecosystems near Lake Michigan?

A. Yes, that's correct.

Q. Have you done any postdoctoral research?

A. I was employed at the University of Minnesota in Duluth for two years, where I worked on some postdoctoral research project investigating wetlands in Voyageurs National Park.

Q. Okay. And could you just talk briefly about your

work history since you left your postdoctoral work at Minnesota?

A. Yes. I've been in the Seattle area since 1987. And at that time, upon moving here, I started working in the consulting industry and have been essentially conducting the job description that I provided a few moments ago since 1987.

Q. Okay. You said a few moments ago that you have -- are doing work for the Port of Seattle on wetlands for the third runway project. Can you explain in a little more detail the kind of work that you've been retained to do on the Third Runway Project?

A. Yes. This work has involved identifying where the Port's third runway and other master plan projects may impact wetlands or may require the filling of wetlands, identifying the regulatory criteria or the development criteria that apply to those wetlands, and assisting the Port in designing a strategy and plan to mitigate those environmental impacts to wetlands so that they can obtain the required permits and proceed with the master plan projects.

Q. Have you reached an opinion as to the existence of wetlands on the property that is being -- all the property that is being taken for the third runway?

A. Yes, we have.

Q. And does that opinion include wetlands on Parcel 92?
A. Wetlands on Parcel 92 are not being filled by the Third Runway Project. Wetlands on Parcel 92 are incorporated into part of the mitigation that's proposed for the Third Runway Project.
Q. Okay. Let's talk about that. You have in front of you, Mr. Kelley, three books of exhibits. And I'm going to draw your attention to Exhibit No. 19. Do you recognize that Exhibit No. 19?
A. Yes, I do.
Q. And what is that, please?
A. This is a map of wetlands and prior converted cropland at the -- what we call the Vacca Farm area, which includes Parcel 92 and several other land parcels in the same general area.
Q. Okay. And is this map that is represented by Exhibit No. 19 a part of a larger wetland delineation report that you have --
A. Yes, that's correct.
Q. Can you show the Court on the -- well, let's look -- actually, let's also look at Exhibit No. 21, please, just a couple tabs. I think, actually, that Exhibit 21 looks closer to the blow-up; is that right? I'm sorry.
A. That's correct.

Q. Can you tell -- could you explain the difference between Exhibit No. 19 and Exhibit No. 21?
A. Exhibit No. 19 is indicating wetlands that the Corps of Engineers takes jurisdiction over in the case of the permit application that is under consideration for the Port of Seattle.
Q. Okay.
A. And Exhibit 21 was prepared in assisting the Corps in determining what is jurisdictional wetland, and identifies a category of wetland called prior converted cropland, which the Corps does not take jurisdiction over. However, the prior converted cropland does still have wet soils and hydric soil conditions.

MS. JONES: Okay. We'll talk about that for a moment. But before we do that, your Honor, I move to admit Exhibit Nos. 19 and 21.

THE COURT: Any objection?

MR. ARAMBURU: Voir dire, your Honor.

THE COURT: Sure.

VOIR DIRE EXAMINATION

BY MR. ARAMBURU:

Q. I notice that, some of the data plots are missing on Exhibit 21 that are found on Exhibit 19, could you tell me why that is?

A. I think that the explanation of that would be that figure 19 was prepared at a later date, compared to 21, and some additional data have been collected in the field and mapped on that figure at that time.

Q. Actually, Exhibit 21 appears to be several days later by the date at the bottom?

A. That would -- that would be the print date and not necessarily the date that the figure was actually prepared.

Q. Okay. So the data show on Exhibit 21 was more preliminary information than shown on 19?

A. I don't know that I would characterize it as preliminary.

Q. But the additional data plots that are shown on 19 were taken after the data plots shown on 21?

A. Yes, that's what I -- yes.

MR. ARAMBURU: No objection to 19 and 21.

THE COURT: Exhbit Nos. 19 and 21 are admitted.

CONTINUED DIRECT EXAMINATION

BY MS. JONES:

AR 014868

Q. Mr. Kelley, looking at Exhibit No. 19, just to carry on Mr. Aramburu's comments for a moment, are those data plots on number 19 all placed in areas -- or primarily placed in areas where you appear to have

delineated wetland boundaries?

A. Yes, that's -- that's correct. When we conduct wetland delineations and prepare wetland reports, we need to collect -- collect data sheets and include those in our reports that characterize the general or typical conditions of the wetland. And typically, we identify a data sheet within a wetland boundary and outside the wetland boundary to kind of contrast the -- those two conditions. That helps the Corps of Engineers, in their evaluation of the record, review the information on the wetland and come to their jurisdictional decision.

Q. Okay. And --

THE COURT: Counsel, hold on just a minute. I take it, when you're talking about data plots, those are the red marks?

MS. JONES: That's right. I'll ask the witness.

A. That is correct.

MS. JONES: Thank you, your Honor.

Q. (By Ms. Jones:) What are data plots, Mr. Kelley?

A. Well, those are specific locations where we dig a hole generally 18 inches deep. We examine soil conditions for hydric soil. The criteria -- there's specific criteria that the Corps uses to identify

whether a soil is wetland or non-wetland. The wetland soils are termed hydric soils. Also, in the -- in those locations, we examine and identify very specifically what kind of plants are growing at that location and whether they're classified as wetland plants by the Army Corps of Engineers. And we also examine the hydrology of the site and determine whether site conditions are wet or not, and whether they meet the criteria for wetland hydrology.

Q. Mr. Kelley, could you turn to Exhibit No. 24 in your exhibit book there?

A. Yes.

Q. Can you identify this document?

A. Yes. This is a Wetland Delineation Report for Master Plan Update Improvements at Seattle-Tacoma International Airport.

Q. And was this prepared by you?

A. Yes, it was.

Q. Okay. And does it anywhere in that document show the worksheets that coincide with the data plots that you indicated on the maps that are Exhibit 19 and 21?

A. Yes. There's an appendix to this report that provides the data sheets. And there's a methodology section that explains the process of collecting data required for the wetland delineation.

Q. Now, this is entitled Revised Draft. Is this the final wetland delineation report that was submitted to the -- prepared for the Port of Seattle?

A. No. This is a -- a final draft was prepared in December of 2000. And there were some minor changes to that draft and other areas -- for other areas of the Port's projects, but there were no changes to condition -- wetland conditions on Parcel 92.

Q. Thank you.

MS. JONES: The Port moves for the admission of Exhibit 24.

THE COURT: Any objection?

MR. ARAMBURU: No objection, your Honor.

THE COURT: Exhibit No. 24 is admitted.

Q. (By Ms. Jones:) On Exhibit No. 21, the one that you call -- that's called figure C1 at the top, Mr. Kelley. Can you -- I know, actually I want to back up and ask a question. You said that the Port does not take -- or that the Corps of Engineers does not take jurisdiction over what are called prior converted croplands, which you've outlined on Exhibit 21. Can you explain a little more detail what it means for the Corps of Engineers to take jurisdiction of a wetland?

A. Yes. Taking jurisdiction would be meaning that the

Corps -- environmental staff have evaluated conditions on a site, determined conditions to be wetland, and determined that that wetland is under -- is under regulation of the Clean Water Act, section 404.

Q. And what does it mean, just to make it real clear, if the Corps does not take jurisdiction?

A. If the Corps does not take jurisdiction, then they reach a conclusion that the area is neither wetland or for some other reason is exempt from -- from regulation by the Corps under section 404 of the Clean Water Act.

Q. Okay. Why do the Corps -- why does the Corps of Engineers for permitting purposes want to know about wetlands so that people like you get hired to delineate them? What's the point?

A. Well, the larger point is for environmental protection, that wetlands are important ecological areas that help maintain stream, wildlife habitat, and other ecosystem functions or conditions that society values.

Q. And so having found the information that the Corps of Engineers want -- the Corps of Engineers wants for issuing a permit, is there something that the Port of Seattle must do once that information is made clear?

A. Yes. Once we identify what is a wetland and provide the Corps with that information and they concur with that, then we evaluate project impacts to wetlands. And if there are impacts to important natural resources as a result of filling or altering wetlands, then mitigation is planned to compensate or replace those environmental impacts.

Q. Have you and Parametrix worked on a mitigation plan for the wetlands that you have delineated for the Port of Seattle for the Third Runway Project?

A. Yes, we have.

Q. Okay. And can you explain a little bit about what wetland mitigation means?

A. Well, mitigation is our actions that are taken to compensate or replace for other environmental impacts of a project. So in the case of wetlands, most typically the projects may require filling wetland to accommodate some development. And a mitigation plan is proposed to either create new wetlands, to replace those that have been filled, or to enhance or restore some existing wetlands that may have been -- maybe not totally eliminated, but partially destroyed by some other previous land use activity.

Q. Will the construction of the third runway actually result in the filling in of some wetlands in the area

where the runway's to be built?

A. Yes. The third runway construction would fill 18.37 acres of wetland.

Q. Okay. And what happens -- what is the Port required to do as far as the Corps of Engineers is concerned to mitigate the impact of the loss of those 18.37 acres of wetland?

A. Well, we're currently working on a mitigation plan with the Corps of Engineers and Department of Ecology that includes a variety of on-site mitigation near the airport and off-site mitigation down near the City of Auburn. The total area of this mitigation is somewhat in excess of a hundred acres and includes restoration of several wetlands and stream buffers near the airport, as well as creating new wetlands down at the City of Auburn.

Q. What's the process for creating wetlands at the City of Auburn when you have wetlands that you're covering up in SeaTac?

MR. ARAMBURU: I'm going to object, your Honor. I'm not sure that that's a relevant question.

THE COURT: Counsel, what's the relevance of that?

MS. JONES: Just -- it was actually sort of background about mitigation, but I don't mind

withdrawing the question, your Honor, that's fine.

THE COURT: Okay.

Q. (By Ms. Jones:) Mr. Kelley, do you know -- actually, what I want to do is to talk about the wetlands that you've delineated here in the vicinity of Parcel 92. And again, this would be looking at Exhibit No. 21 in the blow-up here. There are particular numbers, aren't there, on the wetlands that you've delineated?

A. Yes, that's correct.

Q. Now, for example, the one up in the top right-hand corner is called Wetland A1. What is the purpose for -- or can you explain what the extent of Wetland A1 is? And you can come down here and actually show the Court, if you'd like.

A. Well, Wetland A1 is a wetland area that occurs south of this small lake called Lora Lake, extends actually off this map to the east of the lake, and then borders some agricultural drainage ditches through the center of the property and connects into Miller Creek down at the south portion of this Vacca Farm area. Wetland A1 also extends around on the east side and borders the periphery of Miller Creek, which is this dash or dotted line down here.

Q. Why does -- why do you have Wetland A1 -- why is that a single wetland all the way down to pretty much the

lower part of the map?

A. When you identify wetlands, you identify them independent of any parcel boundaries, and you identify them in this case as a continuous area with meeting certain -- meeting the three parameters for wetland, the hydric soil, the wetland, vegetation, and the wetland hydrology. There's areas adjacent to Wetland A1 that are called out separately as wetland, and that's because those were identified as areas that have wet soil, but they're farmland, and the Corps evaluated those areas to make a determination if they're wetland based on other criteria, then vegetation, soils, and hydrology.

Q. Can you point out on this map the blow-up of Exhibit 21 where Parcel 92 is? It's not as clear as it should be on the blow-up here.

A. Yeah. Parcel 92 would be located in this area, roughly, down by what I'm outlining here.

Q. And I notice that at the southern part of Parcel 92, there's a Wetland FW11?

A. Yes, that's correct.

Q. Can you point that out here?

A. That would be this area right here.

Q. And why is that separately designated from Wetland A1, since it looks like it's right next to A1?

A. Well, it's actually designated separately, because we in the Corps of Engineers reached a determination that this was wetland based on different criteria than for Wetland A1.

Q. And what were the different criteria?

A. And the differing criteria for these farmed wetlands are that in areas that are farmed, wetlands are designated as farmed wetland when the soils are saturated to the surface, or there's standing water -- actually standing water on the soil surface for 14 days during the growing season, whereas -- and there don't need to be wetland plants present in farmed wetlands because they're farmed, and farmed areas are typically plowed on an annual basis. From the Wetland A1, we would be required to demonstrate that there are wetland plants present, that there's wetland soils present, and that there's wetland hydrology present, whereas in the farmed wetland, we have hydrology that is ponding, and we have wetland soils present.

Q. Thank you.

Can you describe for the Court what these lines that are called Water V1 and Water V2 are on the map?

A. These are drainage ditches that have been excavated across the site to collect high groundwater and

convey that towards the creek and other drainage ditches to -- presumably to facilitate a faster drying out of the site and enhance farming.

Q. Now, this exhibit doesn't show those -- those Water V1 and Water V2 going all the way to Miller Creek, which you've previously shown the location of, do they?

A. I think that we've portrayed them here as separated until -- they're under Corps jurisdiction as a water that was determined to be non-wetland. And then when they reach the edge of the wetland where there's remaining ditch, they're under Corps jurisdiction as a wetland and as a stream or ditch.

Q. In other words, if they didn't go anywhere or go to a wetland or go to a stream, they wouldn't come under Corps jurisdiction?

A. The Corps specifically took jurisdiction of these ditches because -- because historically this area was a wetland, and the water that these ditches carry flows down slope to adjacent wetlands and is apparent in sustaining those wetlands.

Q. Could you look at -- or show the Court where Wetland A1a is?

A. A1a is located on the western portion of the site.

Q. Is that right next to the road?

A. Yes. And most of this wetland is actually in the right-of-way for Des Moines Memorial Drive and is actually not on Parcel 92.

Q. Okay. Oh, why do you do a separate delineation of that A1a?

A. Well, again, this was evaluating wetlands on the project site. A1a is a vegetated wetland. It was in an area that was non-farmed. And it's on the road embankment at the very edge of the farmland where natural vegetation occurs, but there's a high water table there, and it's a place where groundwater surfaces and then gradually flows near surface across the site to the more extensive wetlands.

Q. Thanks. Mr. Kelley, you can have a chair for a moment.

Did Parametrix also do an aerial photo of what you'd call the Vacca Farmlands and superimpose the wetlands that you delineated on that photo?

A. Yes, we did.

Q. Would you look at Exhibit No. 20, please?

A. (Witness complying.)

Q. Is this that photo, Exhibit 20, or one of the photos that you took?

A. Yes, that's correct.

Q. Showing you the blow-up that I just put up here, it's

labeled Image #4. Is that the same label that's on Exhibit 20?

A. Yes, that's correct.

Q. Keeping in mind that this looks more blurry than the one that is in your book, is this an accurate blow-up of Exhibit No. 21?

A. Yes.

Q. Or Exhibit 20? Excuse me.

A. Yes, it is.

Q. Is Exhibit 20 one of the exhibits that you placed in the Wetland Delineation Report, Exhibit No. 24?

A. Yes.

MS. JONES: Your Honor, we move to admit Exhibit No. 20.

MR. ARAMBURU: Voir dire, your Honor?

THE COURT: Sure.

VOIR DIRE EXAMINATION

BY MR. ARAMBURU:

Q. What is the date of the base map for this photograph?

A. The date of the photograph?

Q. Yes.

A. The date of the photograph is, I believe, 1995.

Q. And do I understand correctly that this is illustrative of the material that you've done in Exhibit 19 and 21?

A. Yes.
Q. It doesn't have an independent purpose? I'm trying to understand the purpose of doing these drawings on the aerial photograph.
A. Oh, the purpose of doing them on the aerial photograph is primarily as an aid to the Corps of Engineers, Department of Ecology, and other regulatory staff. It helps them walk out to a project site and understand -- on the ground they can look at the aerial photograph and understand where a house is in relation to a wetland or where a particular ditch system might be in relation to a wetland. The photograph helps them orient themselves to a site. And in a large project area like this, these were very useful to the regulators.
Q. Okay. But as I understand it, the -- how am I going to describe this? The central blue line here that we see on the photograph, that runs into a farm wetland, does it not?
A. That's correct.
Q. And the other area down here is also a farmed wetland, correct?
A. That's correct.
Q. And you don't make that distinction here on your drawing; is that right?

A. No, we don't, so this is somewhat of a simplification of the map for -- which accompanies this image on the very next page in our wetland delineation report.
Q. And can you show us where the lot 92 is on here?
A. (Witness complying.) Yes. The lot 92 would be approximated by what I'm outlining here. Excuse me, it would come up to about here on its easterly point along Des Moines Memorial Drive, approximately across here on the south, and on the north approximately across like this.
Q. So the boundary between lot 92 and 93 goes -- goes through the wetland that's FW11 on your other drawings; is that correct?
A. I believe it does, yes.

MR. ARAMBURU: No objection, your Honor.

THE COURT: All right. Let's see, Exhibit No. 20 is admitted.

CONTINUED DIRECT EXAMINATION

BY MS. JONES:

Q. You talked a moment ago and actually mentioned prior -- the term prior converted cropland, Mr. Kelley, and that shows as the lines on Exhibit No. 21 with vertical lines, is that correct, the prior converted cropland?
A. With --

Q. I'm sorry, horizontal lines.
A. The horizontal lines.
Q. Excuse me.
A. Yes, that's correct.
Q. Thank you.

How did you reach the opinion that the property indicated by the horizontal lines was prior converted cropland?

A. Well, the criteria for prior converted cropland is that an area has been in farm production since 1982 or later. And that -- actually, prior to 1982, the area was put into farm production and has remained in farm production since then, and that there is -- the area lacks standing water for 14 consecutive days. And under those conditions, for section 404, Clean Water Act purposes, the Corps identifies wetlands as prior converted.
Q. Okay. And I think you said before that for purposes of -- when it's prior converted, that the Corps does not take jurisdiction?

A. That's correct.
Q. Do you know why the Corps does not regard prior converted wetlands as jurisdictional for purposes of the 404 permit?

MR. ARAMBURU: Objection, speculative; lack

of foundation.

Q. (By Ms. Jones:) Well, you've worked on 404 permits for how many years now, Mr. Kelley?

A. 13, 14 years, I guess.

Q. Okay. And are you responsible for knowing the regulations that govern the granting of the 404 permit?

A. Yes, that's correct.

Q. And does that inform the work that you do when you are delineating wetlands for purposes of assisting a client in getting a 404 permit?

A. Yes.

Q. And I'm just -- I'll repeat my question, how do you -- since you know that the Corps of Engineers does not take jurisdiction over prior converted croplands, you previously testified to, my question is, do you know why the Corps does not?

MR. ARAMBURU: Same objection, your Honor, lack of foundation. The witness is apparently being asked to provide some legislative history here, and he's not qualified to do that.

THE COURT: Objection's overruled.

Q. (By Ms. Jones:) You may answer.

A. Well, these areas are regulated under the Food Security Act.

Q. What is the Food Security Act?
A. It's a department of agriculture regulation that effects -- effects funding for farmers and farmland and certain cropping procedures, whether they're in wetlands or not, may or may not be eligible for funding. So there's -- the Food Security Act sets up a structure with regards to wetlands of providing crop subsidies under various circumstances for farmers, among other things.
Q. So does the fact -- just the simple fact that a property may be described as prior converted cropland mean that it is not a wetland under the definitions that you work under in delineating the lands?
A. No, it does not mean that. And if an area was non-wetland -- if an area that was under -- was being farmed was non-wetland, if it didn't have the wetland hydrology criteria, if it didn't have the wetland soil criteria, we would just simply map it as upland. And on a -- on our wetland map, it would remain white, like the remaining areas. In this particular case, there's hydric soils on the site, and there's wetland hydrology on the site, so we had to bring this to the Corps -- Corps's attention. And they had to make a special determination to determine whether this prior converted cropland criteria was applicable

to this particular piece of farmland.

Q. And in this case, they did conclude --

A. In this case, they did, because the Corps and ourselves utilized the extensive history of aerial photographs that are available to demonstrate conclusively that since 1939, this site has been farmed.

Q. Okay. Thank you.

Let me ask you this: In your work delineating wetlands, you've testified already to your work with the Corps of Engineers, do you also work with the state -- Washington State Department of Ecology when you're doing wetland work?

A. Yes, we do.

Q. And why is that?

A. Because under the -- under the Clean Water Act, section 404, there's also another section of the code, section 401, which relates to water. Section 404 relates to wetland themselves. And to obtain a permit to fill wetlands, you also need to meet the criteria of section 401, which is to protect water quality. And in Washington State, the Department of Ecology is responsible for implementing that program.

Q. So you have worked actually with the State Department of Ecology on this particular Port of Seattle Third

Runway Project?

A. Yes, we have.

Q. Okay. Does the state -- or does the Port need to get a permit from the state in order to carry on the Third Runway Project with respect to wetlands?

A. Yes. We need to obtain the section 401 Water Quality Certificate, and then we have to obtain hydrologic project approvals from the state for modification of wetlands and drainage networks, streams.

Q. Would you please turn to page -- or Exhibit 6, rather, in your notebook there?

A. (Witness complying.)

Q. Have you seen this document before?

A. Yes, I have.

Q. What is this, please?

A. This is the Public Notice for the Port's permit application for the third runway and other master plan projects.

Q. And what's the function of the Public Notice, do you know?

A. The Public Notice is to alert the interested public that the Corps of Engineers and the Department of Ecology are considering the Port's permit request to fill and develop these wetlands.

Q. Would you look at the last page of that Exhibit No.

6, please? The seventh paragraph, sort of the first large-ish paragraph there, contains a reference to the State of Washington and the Vacca Farm site. And it basically says that -- well, could you tell us what it says, please?

A. Would you like me to read it or --

Q. Well --

A. Okay.

Q. You can read it or give me --

A. It states that the State of Washington is reviewing the project to comply with the water quality standards. This would be section 401. And that the State has determined that they will extend jurisdiction as a waters of the State over 7.88 acres of land that's considered prior converted by the Corps of Engineers.

Q. Do you know how this paragraph got into the Public Notice that was issued by the Corps of Engineers?

A. Yes. In a general sense, we reviewed this area with the Department of Ecology, and they evaluated the soils and the hydrology on the site, the land use, and they evaluated the determination that the Corps had made, and the Department of Ecology determined that this area was wetland and met the criteria of being a wetland and should be considered a waters of

the State.

MS. JONES: Move to admit Exhibit No. 6.

THE COURT: Counsel?

VOIR DIRE EXAMINATION

BY MR. ARAMBURU:

Q. Is this the current notice?

THE COURT: I'm sorry, are you requesting voir dire, Counsel?

MR. ARAMBURU: Yes, please, your Honor.

THE COURT: Go ahead.

MR. KELLEY: There -- should I answer that question or --

THE COURT: If you can.

A. Okay. There was a public notice issued in December of 2000 for the project, as well.

Q. (By Mr. Aramburu:) So this isn't the current public notice for the 404 permit, is it?

A. I don't know that this notice or any information in it would have been withdrawn. I guess I don't -- legally, I don't know the answer to that question.

Q. But this is --

A. There was a new notice that was done in December of 2000, and that new notice identified some additional mitigation steps that had been taken and some changes to the project had changed slightly, some of the

amounts of wetland impact, but there was no change in the state's determination of what was jurisdictional and what was not jurisdictional. And I would anticipate that this exact same paragraph -- is this the 2000 public notice?

Q. But you have looked at that notice recently?

A. I have not verified that this statement is in that notice.

MR. ARAMBURU: I have no objection to this document being the 1999 notice.

THE COURT: All right. Thank you.

Well, the document is admitted. As to what it is, that's not the real question here, Counsel, that's for your cross-examination, but the document is admitted in terms of admissibility.

MS. JONES: Thank you, your Honor.

CONTINUED DIRECT EXAMINATION

BY MS. JONES:

Q. Mr. Kelley, turning now from the Corps of Engineers and the state to the City of SeaTac, do you know how the City of SeaTac Code treats formerly farmed wetlands that may exhibit some wetland characteristics?

A. Yes. The City of SeaTac Code identifies that if vegetation of a site has been altered such as would

happen through normal farming practices, that a wetland determination would be made on the basis of evaluating soils for certain hydric soil conditions, and evaluating water conditions on the site to determine that the wetland hydrology parameters are met.

Q. Have you reviewed the definition of wetlands in the City's code?

A. Yes, I have.

Q. Would you turn, please, to Exhibit No. 26?

A. (Witness complying.)

MS. JONES: Exhibit No. 26 is, just for everyone's information, a portion of the land use code or the City's code relating to land use.

Q. (By Ms. Jones:) And what I'm interested in, Mr. Kelley, is if you'll turn to page 15-46.

A. (Witness complying.)

Q. Mr. Kelley, do you have a page 15-47 in your --

A. No, I do not. Oh, yes, I do, it follows 15-50.

MS. JONES: Your Honor, I apologize, we apparently -- it should go 15-46, 15-47, 15-48, 15-49, 15-50, et cetera. I believe I covered yesterday that we had placed it in the wrong order.

Thank you, Counsel.

THE COURT: And he's going to fix that in

the original?

Q. (By Ms. Jones:) Can you do that?

A. It's corrected.

Q. Actually, before we look at that exhibit -- or that provision of the code, Mr. Kelley, are you familiar with the term "altered wetland"?

A. With respect to City of SeaTac Code or --

Q. Yes, uh-huh.

A. I'm not really. I mean, in general parlance, we would say a wetland has been altered or changed, and I -- I don't recall specifically how that might be defined in the City's code.

Q. Okay. And when you talk -- when you say generally you understand what an altered wetland is, what would be some examples of an altered wetland?

A. It could be farming of a wetland area; it could be ditching or attempting to drain a wetland; it could be partial filling of a wetland area that might occur either legally or illegally as part of some construction. So some kind of human cause, usually human cause, construction activity, or clearing -- land clearing in a wetland.

Q. Do you have any knowledge of what farming would do to a wetland that would alter the wetland?

A. Well, typically, farming would remove wetland

vegetation and eliminate wetland vegetation, depending on frequency and type of plowing. Other times, farming involves attempting to drain wetlands, either through excavation of surface ditches or installation of underground drainage pipes and tile to keep groundwater from saturating the soil and effecting the ability to plow the soil.

Q. A moment ago when you were describing the work on Exhibit No. 21, you referred to a wetland as -- or referred to Wetland FW11 as a farmed wetland. Is a farmed wetland the same thing as an altered wetland?

A. It would be a type of altered wetland. I would consider a farmed wetland an altered wetland.

Q. Is there any difference between a farmed wetland or is there a specific meaning to a farmed wetland that isn't -- that is more -- more narrow than the generic term "altered wetland"?

A. Yes, it is. It would be a narrow -- more narrow than altered wetland, and it would be area that was in agricultural production since at least 1982 and had had continuous farming, and that it had standing water present for at least 14 consecutive days during the growing season.

Q. And that might not necessarily be true of a wetland that was altered in a more general sense?

A. That's right; other wetland alterations might not result in a farmed wetland. Or if farming started in 1990, for example, the area would not be classified as a farmed wetland.

Q. Is a farmed wetland a Corps of Engineers' term?

A. Yes, it is. And part of the Food Security Act, as well, identifies that.

Q. Okay. Thank you.

Now, looking back at page 15-56, Exhibit 26, do you know what this -- what this provision is?

A. Yes. This is the City's definition of wetlands and City of SeaTac zoning definition of wetlands and their classification of wetlands into varying types, based upon ecological value.

Q. Okay. And can you describe generally what you understand a Class I Wetland to be under the City's code?

A. Yes. Class I Wetlands are the highest quality type wetlands that would be in the City of SeaTac. And there's six criteria that are listed here for them. They generally would include wetlands that might have endangered species, wetlands that might have a high diversity of plant and vegetation types in them, wetlands that have rare plants in them, some of the larger wetlands, especially if they're associated

with lakes or other water bodies, and also, wetlands that have formed on organic or peat-type soils. Also, finally, the larger forested wetland systems that provide habitat for more diverse array of birds would be classified as Class I.

Q. And you understand what a Class II Wetland is generally?

A. Yes.

Q. And what is that?

A. Those would be wetlands that the City would still consider quite valuable. They're somewhat less diverse and probably smaller in size than the Class I Wetlands. They must be greater than one acre in size, but they have less diversity -- or they have less wetland classes than a Class I Wetland might have.

Q. Were you asked by the Port to reach a conclusion as -- by the Port to reach a conclusion as to whether the prior converted cropland on Parcel 92 met the definition of wetlands for purposes of the City's code, section 15.10.675?

A. At the time we prepared our wetland delineation report and our mitigation plans, I was not asked to do that.

Q. Have you subsequently been asked to do that?

A. Yes, I have.
Q. Okay. And what did you conclude?
A. I concluded that this wetland area would be a Class I Wetland.
Q. Including Parcel 92?
A. Including wetlands on Parcel 92.
Q. Okay. And can you explain why it is that you conclude that Parcel 92 is a Class I Wetland under the City's code?
A. Yes. The Parcel 92 wetland is contiguous with wetlands on adjacent parcels, and that total area of wetlands, including Lora Lake, is 16.8 acres in size.
Q. And why is that important for your conclusion as to Class I?
A. Well, the criteria number three identifies wetlands that are equal to or greater than 10 acres in size. So in classifying the wetland, I wanted to know what the total size of the wetland is and whether this criteria might be met or might not be met.
Q. And -- but we're, of course, only talking about Parcel 92. Doesn't that constrain you in finding 10 acres?
A. Well, in classifying wetlands, and as indicated here in the code, there's no criteria to evaluate wetlands only on a single land parcel. In other words, you

classify wetlands irrespective of parcel boundaries.

Q. Okay. Is there any other reason besides the extent of the wetland being greater than 10 acres that you found that helped you reach your conclusion that Parcel 92 is part of a Class I Wetland?

A. Yes. It's -- as I said, it's greater than 10 acres in size, it's 16.8 acres, and it's also a rather diverse wetland. There are actually four wetland classes on the site -- or the wetland consists of four wetland classes. And those classes include open water, which is the Lora Lake area to the north. It includes forested wetlands, which are around the south side of Lora Lake. There are shrub dominated wetland classes that are present on the south side of Lora Lake, and also along the perimeter of some of the agricultural drainage ditches that extend down through the central portion of the wetland. And then there are emergent wetland classes which occur along some of the fringes of the wetland, particularly adjacent to the farmed areas.

Q. When you say, "emergent wetland classes," what does that mean?

A. Emergent wetlands are -- it's just simply a type of wetland that's dominated by herbaceous or non-woody plants, so grasses and cattails and sedges and rushes

are classified as emergent wetlands.

Q. Can you describe some of the kinds of vegetation that you observed on the Vacca Farm wetland?

A. Yes. From the northern portion of the site, south of Lora Lake, are forested wetlands that contain black cottonwood trees and, also, willow shrubs and blackberry. There are shrub wetlands that parallel some of the agricultural drainage ditches that are dominated by willow shrubs. In the center of some of the agricultural drainage ditches are cattail and rush. Along the margins of the wetland, particularly adjacent to farmland, there's horsetail, reed canarygrass, willow herb, and a variety of other wetland grasses. There's some common rush in that area.

Q. Are there any other criteria in the City's code, other than number three, which you've just been testifying to, that helped you to make your conclusion that Parcel 92 is included in a Class I Wetland?

A. The other criteria that would be relevant here would be that it is mapped as a peat soil type. And my observations on the site confirmed that the area is a peat soil and a peat wetland. And the mapping sources include a text, Peat Resources of Washington,

and also in 1953, I believe, a county soil survey identified this area as peat.

Q. Thank you very much, Mr. Kelley.

MS. JONES: Your Honor, before I forget, I'd like to move to admit Exhibit No. 24, which is the City of SeaTac's code revisions.

THE COURT: Counsel?

MR. ARAMBURU: You mean 26?

MS. JONES: I'm sorry, I do mean 26.

THE COURT: All right.

MR. ARAMBURU: No objection, your Honor, to Exhibit 26, the SeaTac Code Revision.

THE COURT: All right. Thank you. Exhibit No. 26 is admitted. Thank you.

Q. (By Ms. Jones:) Would you please turn to page -- or tab number 14, Mr. Kelley?

A. (Witness complying.)

Q. This is entitled King County Washington Soil Survey, and it's dated 1952. Do you see that?

A. Yes.

Q. Is that the source that you consulted in making your conclusion that there were peat soils on the property?

A. Yes, that's correct.

Q. Okay. And what does this soil survey from King

County in 1952 say about the soils on the property?

A. The soil survey includes a map of soil types in the county. And it indicates that the area of Parcel 92 and the Vacca Farm area more generally is mapped as a peat soil. There's two types of peat soil mapped in this area, one of them is Rifle peat, and I believe the other type is a Carbondale muck, which is also classified as a peat soil.

Q. Thank you.

Other than the City's definition, which you have just testified to with respect to Exhibit No. 26, do you have other sources which assist you in determining whether or not you have a wetland?

A. Yes. And the City code requires that you utilize those other sources to identify wetlands. The City code refers to the Federal manual -- the 1987 federal manual for identifying wetlands, and also the State Department of Ecology manual for identifying wetlands. And those manuals provide very specific criteria and procedures for evaluating site conditions and reaching a determination as to whether wetlands are present or not.

Q. Does the -- do the manuals that you're talking about discuss the issue of what appears to be a wetland, but there is no vegetation or little vegetation on

it?

A. Yes, they do. There's -- there's a term in the manual that refers to normal circumstances, and that's actually part of the wetland definition that under normal circumstances, a wetland must have hydric soil, it must have wetland hydrology, and it must have wetland vegetation. And then it provides guidance in what they mean by normal circumstances. And the intent of using that word is that if, for some reason, through some alteration, either natural or manmade, vegetation were removed by farming or plowing or land clearing, bull dozing, timber removal, that an area can still be classified as wetland without vegetation if soils and wetland hydrology still meet the criteria for being wetland.

Q. Let's talk about those terms for a moment. You said hydric soils, I believe. Could you describe what you understand the Corps and the state's manual to mean by "hydric soils"?

A. Yes. Hydric soils are soils that have formed over relatively long periods of time, in wetlands or in a condition of poor drainage, where at least for 14 days during the growing season they are saturated to near the surface, or there's a high water table.

Q. And have you concluded with respect to Parcel 92 that

there are hydric soils?

A. Yes, I have.

Q. And how have you done that?

A. I have gone out onto Parcel 92 and dug soil pits during the growing season and examined high water tables. When we identify -- when we prepared these maps for our reports, we walked the perimeter of the area that has high water table and identified very clearly the edge of the wetland based on hydric soil characteristics, but also by high water table. So, in essence --

Q. Please do.

A. In essence --

Q. The record should show that the witness is approaching the blow-up of Exhibit No. 21.

A. In essence, this mapping of this wetland edge here is -- represents a series of flags that were hung in the field. And at each location where that flag was hung, we examined the soils and came to a conclusion that soils in the interior portion of the wetland had wetland hydrology and soils exterior to the wetland lacked wetland hydrology.

Q. I was just going to ask you what hydrology was, as opposed to hydric soils. Can you explain what hydrology is for the Court, please?

A. So, yes, wetland hydrology is the presence of saturated soils or a high water table for at least 14 consecutive days during the growing season. And the Federal manual identifies very specific ways to determine whether this is present on a site or not. For our studies, this involved walking -- determining where the edge of the wetland is, walking that edge, and identifying whether soils were saturated or had a high water table.

Q. Did you submit those results to the Corps of Engineers?

A. Yes, we did. This map is essentially those results. It includes the data points that were checked in their specific locations that provide more detailed information for the entire Vacca Farm area. And then the flagged data points and the mapping of those data points delineate exactly where the edge of that wetland is.

Q. Other than all of the matters you've just testified to in support of your opinion that Parcel 92 is a wetland, are there any other things you haven't mentioned yet that would lead you to that conclusion?

A. I'm not aware of any.

Q. You think you've covered it?

A. I think I've covered it.

Q. All right. Great. Thank you.

I just want to talk briefly about a new topic, which is what you referred to earlier as the ditches or Water V1 and Water V2 on Exhibit 20 here. Are you familiar with the requirements in some jurisdictions that there must be a buffer between a wetland and any area that needs to be developed?

A. Yes, I am.

Q. Okay. And what's the basis of that familiarity?

A. Well, we -- I have evaluated local regulations and assisted clients in development issues near wetlands. And these wetland protection codes typically have protected buffers and criteria to modify or develop in or near wetlands.

Q. When you've assisted clients with that kind of effort, do you know if it's ever possible to move wetlands, such as Water V1 or Water V2 in, or to reduce the need for buffers and, therefore, enhance development on the property?

A. Yes, in some cases, that's feasible.

Q. Okay. Are there issues raised by an application to move wetland areas or ditches in a wetland to another area?

A. The issues that would be raised would be a more detailed review process by the City or county

government.

Q. Can you -- excuse me, go ahead.

A. That they would just simply -- they would have to review the proposal, understand site conditions, understand that the proposal was in compliance with their code, and that it would, overall, provide some kind of mitigation or benefit typically to the resources.

Q. Are you aware if there are any permits that are required when one seeks to move a wetland?

A. Well, locally, there might be -- depending on how the regulations were structured, there might be a variety of permits, such as a grading permit would be commonly where this proposal would be removed -- would be reviewed, at the state level. It could involve a hydrologic permit approval from the Washington Department of Fish and Wildlife.

Q. What's that?

A. That is a requirement to comply with state law, HPA review for any project that involves the -- the use or the diversion -- a change in flow of waters, waters of the State. So relocating a stream or relocating certain drainage ditches would require review with the state under HPA.

Q. And HPA, what did you say that was?

A. Hydrologic Project Approval.
Q. And what's the state department that approves that?
A. The Washington Department of Fish and Wildlife.
Q. Okay. Are there any other state agencies that might be interested in the removal -- or the moving of a wetland, if you know?
A. Especially if you -- certainly if moving of the wetland required the -- triggered section 404 of the Clean Water Act, which would involve the Corps of Engineers, then Washington Department of Ecology would have to review and issue a section 401 Water Quality Certificate for the project.
Q. If you worked -- just going back for a minute to the Hydrolic Project Approval from Fish and Wildlife, have you ever applied or assisted a client in applying for an HPA permit?
A. Yes, we have; I have.
Q. Okay. And can you tell me how long that process took to -- let me ask you this, did you acquire the permit, and how long did the process take?
A. I've assisted and obtained a number of these. And the length of time is somewhat unpredictable, and it's variable, depending upon the complexity of the projects and the types of issues involved. So a very simple project that might involve modification of a

drainage ditch that also has been determined to be a waters of the State might take several weeks to a month. And a more complex project that might involve concerns over fish habitat and protection of water quality and perhaps the loss of wetlands might take several months or longer, even.

Q. How about the Department of Ecology, if it got its nose in looking at that, the timing there?

A. Well, like-wise the timing is dependent on the complexity of the project and the significance of the environmental change or the potential impact to the environment. But in a 404, 401 permit review that the Corps and Ecology would do, that timing I would typically expect to be in the order of several months to perhaps several years.

Q. Have you had a recent experience with Ecology in trying to fill a parcel that Ecology is going to have to approve?

A. I have an ongoing experience.

Q. Well, why don't you describe one -- do you have one involving PCC farmland, what the Corps calls PCC farmland?

A. A number of years ago, I worked on a project in Eastern Washington at the City of Colville. The City was proposing to construct a new airport that was on

farmland, nearly 100 percent plowed farmland, and portions of this farmland had standing water on it and met the criteria for prior converted cropland. And I worked on this project probably for two and a half years before a Corps of Engineers' permit was obtained.

Q. Okay. Have you been out to Parcel 92 recently?

A. Yes, I have been.

Q. When was that?

A. I was out on Parcel 92 last Friday.

Q. Okay. Can you tell us any observations that would be useful for your analysis of Parcel 92 as a wetland?

A. On Friday, I observed that there was standing water -- excuse me, there was -- I did not observe standing water in the wetland areas. I dug holes and observed a high water table on the site. In one case, the water was within four to six inches of the soil surface, and the soil surface itself was wet and --

MR. ARAMBURU: Your Honor, I want to object. We asked specifically during the course of discovery that all information regarding evaluation by Mr. Kelley be turned over to us, so that we would have an opportunity to review it with our expert. This is new testimony and results that have not been

disclosed to us, and I would object to the testimony as being material that would be in violation of the discovery order.

THE COURT: Counsel, it is --

MS. JONES: I will withdraw that last question, your Honor, that's fine.

THE COURT: Thank you.

Q. (By Ms. Jones:) Let me just conclude, Mr. Kelley, have you concluded, in light of the testimony that you've given, that the area that is described as -- or that is mapped as prior converted cropland on Parcel 92 is a wetland for the purposes of the code for the City of SeaTac?

A. Yes, I have.

Q. And what is the class that you have concluded?

A. That it's a Class I Wetland.

MS. JONES: Thank you. I have no further questions.

THE COURT: Thank you.

Counsel?

CROSS-EXAMINATION

BY MR. ARAMBURU:

Q. Mr. Kelley, your description of this as a Class I Wetland, have you expressed that to the Corps of Engineers, the Department of Ecology, or anyone else

before today?

A. It's not -- it's a Class I Wetland under the City of SeaTac Code, and the Corps of Engineers and the Department of Ecology are not responsible for implementing the City of SeaTac Code.

Q. I understand that.

A. So I have not discussed it with them.

Q. So you've not told anyone else before today that this is a Class I Wetland?

MS. JONES: Objection, vague as to "anyone else," your Honor.

A. I discussed the matter --

THE COURT: The objection's -- well, the objection's overruled.

Answer the question, please.

A. I've told other people before today that this is a Class I Wetland.

Q. (By Mr. Aramburu:) Okay. And when did you reach that conclusion?

A. Probably in late March.

Q. Of 2001?

A. Of 2001.

Q. And how long have you been working on this project?

A. I've been working on this project since about 1995.

Q. So as a Class I Wetland, do we generally try to stay

away from alter ratings of Class I Wetlands?
A. Yes, we do.
Q. And is that the Port's plan, to leave this in its current condition?
A. Actually, no, it's not.
Q. So, of this area that you're showing us as Wetland A1, what's going to happen to that?
A. The Port's plan for Wetland A1 and nearly all the wetlands that are indicated on this map is to -- as part of their mitigation for filling other wetlands, to improve and enhance the wetland -- the wetland site. So, for example, in Wetland A1, there are areas that are dominated by blackberry, which is a relatively low quality invasive plant. And the Port would remove that blackberry and re-vegetate the area with native trees and shrubs. The areas of farmland on Parcel 92 and the rest of this area that are mapped as prior converted cropland would be taken out of annual crop production and would be replanted with native trees and shrubs to provide habitat, and particularly to help function as a floodplain ecosystem that would benefit Miller Creek.
Q. Well, there's going to be lot of grading in there, isn't there?
A. There will not be any grading on Parcel 92. There

would be some grading on some of the other sites to increase and provide flood storage, and there would be some grading to relocate Miller Creek and construct a natural stream channel for Miller Creek.

Q. So a lot of the area that's shown as Wetland A1 will be graded?

A. A portion, I don't recall the exact number.

Q. And when we're talking about grading, we're talking about digging down and removing of soil so there'll be additional areas for floodplain storage; is that right?

A. The floodplain storage is actually planned to occur on the west side of the site from the -- primarily in the prior converted cropland. And in the upland areas just west of the wetland edge that is higher up and elevated, that area would be excavated down to create new flood storage.

Q. And can you show us where that would be on exhibit -- what is this, 19?

A. Yeah. The area that would be graded for flood storage is primarily in this area here, and then this higher land to the west of the wetland.

MS. JONES: 21.

Q. (By Mr. Aramburu:) And what are the plans for Water V1 and V2?

A. The -- those would be -- those would simply be left as is with native vegetation planted around them and over that area, over the entire area of Parcel 92.

Q. So I conclude from this that these wetlands you're talking about aren't valuable enough to be saved in their current condition; is that correct?

MS. JONES: Objection. I don't know that it's germane what counsel concludes.

THE COURT: Objection sustained, vague.

Q. (By Mr. Aramburu:) Do I understand, notwithstanding your classification of Wetland A1 as a Class I Wetland, that there will still be substantial alteration to that area?

MS. JONES: Objection, vague as to the meaning of substantial.

THE COURT: Objection overruled.

You may answer if you can.

A. There are alterations planned for Wetland A1 that would involve alterations to improve its habitat or its value. And then there would also be some alterations to Wetland A1 to accommodate the Port's project proposal.

Q. (By Mr. Aramburu:) And that is some filling of A1?

A. That would be some filling of A1.

Q. And does -- what does the City of SeaTac say about

filling this Class I Wetland?
A. I have not asked them.
Q. Aren't you going to process this through -- this permit of yours through the City of SeaTac?
A. No.
Q. Why not?
A. It's not a requirement to do that.
Q. It's not -- why isn't it a requirement?
A. The Port has entered into an Interlocal Agreement with the City of SeaTac that exempts third runway and master plan projects from the City of SeaTac ordinance.
Q. So it's your testimony the Port doesn't have to comply with the SeaTac requirements, but the private property owner, RST, would; is that right?
A. I don't know what the private property owner is proposing or would need to do.
Q. Now, let me ask you about the work that's actually been done out on this property. You've shown us a number of your -- Exhibits 19 and 21 show a number of data plots; is that correct?
A. Yes, that's correct.
Q. And let's take a look at Exhibit 19, please. I think we have 21 on the board.

Now, the red marks that are shown here are the

data plots --

A. Yes.

Q. -- what's the purpose of taking those data plots?

A. The Corps requests that we collect from wetland and adjacent non-wetland areas information that characterizes the environmental conditions on the site.

Q. And how are those wetland plots -- how is it decided where to put those?

A. They are put in areas that generalize site conditions. And where site conditions are variable, we would take additional data plots. But where site conditions are uniform, we would tend to take less data plots. So the data plots are meant to generalize site conditions over a fairly broad area, and they're also meant to discriminate between upland conditions and wetland conditions.

Q. And would you look at Exhibit 24, please?

A. Yes.

Q. And at the back of Exhibit 24, these wetland determination -- are these wetland data plots identified?

A. Yes.

Q. And are all the records for each data plot shown on Exhibit 19 found in the appendix to Exhibit 24?

A. I'm not sure exactly what you're asking, could you --
Q. Are all the data sheets --
A. That are here?
Q. -- that correspond to the data points shown on Exhibit 19 found in Exhibit 24?
A. I believe they are.
Q. Now, the plots that were done, on how many days were those plots done?
A. I don't recall specifically what days the data was collected.
Q. And was the data collected for more than a single day on any of the plots?
A. On any single plot, the data would have been collected on one day.
Q. Okay. And can we tell which day that is by looking at the data sheets?
A. Yes. We do have a date on those data sheets.
Q. And can you tell us when that is?
A. These were on 4/19/1998.
Q. Now, I notice that there are no data plots found on Wetland FW3; is that correct?
A. Yes, that's correct.
Q. And are there any -- and that's a farmed wetland?
A. Yes, that's correct.
Q. And are there any data plots for Wetland A1 in the

vicinity of the Parcel 92?

A. No, there are not.

Q. And are there any wetland plots that would be adjacent or close by Wetland FW11?

A. No, there are not.

MR. ARAMBURU: It's Exhibit 19, your Honor, that we're looking at here.

THE COURT: Right.

Q. (By Mr. Aramburu:) Now, looking at Exhibit 19, does Exhibit 19 have the rough outline of the Parcel 92 property?

A. Yes, it does.

Q. Okay. Specified by 092?

A. That's correct.

Q. Now, in fact, I don't see any data plots at all on lot 92; is that right?

A. That's correct.

Q. So there's never been any data plots gathered for lot 92?

A. There's been data collected on lot 92. They haven't been recorded on these data plots and included in our report. The data collected when -- the wetland boundaries were identified when we had access to the site in 1999 and flagged the edges of the PC wetland -- was collected to identify where hydric

soil was present and where wetland hydrology was present. And those areas were flagged in the field and presented to the Army Corps of Engineers to make a determination on the presence of wetlands.

Q. Was that information turned over to the property owner in this case?

A. It's right here in front of you. The edge of the wetland on our map is my testimony as to where hydric soil and wetland hydrology occurs on the site.

Q. So there's not any other data, other than this map --

A. That's correct.

Q. -- for lot number two?

A. That's correct.

Q. And has there been an observation -- you were describing the necessity to observe wetland hydrology for a period of 14 days?

A. Yes, that's correct.

Q. And has that been done on lot 92?

A. Yes, it has. The area that is identified as farmed wetland on lot 92 has been observed repeatedly by myself and by the Corps of Engineers and by others in my office and the Port as an area that has long-standing flooding for actually several months or more.

Q. And have you made any written recordings of that?

A. I -- only in the designation of it as farmed wetland and recording that that area has greater than 14 days inundation.

Q. And how was Wetland FW11 actually delineated?

A. That was delineated from an aerial photograph that showed standing water present at -- during the early part of the growing season in March of the year.

Q. And how many aerial photographs did you use?

A. We examined probably a dozen or so aerial photographs of the area.

Q. Did you use one of those to make your determination?

A. Yes, that's correct.

Q. And what -- and which one was that?

A. I believe that it was a 1974 aerial photograph that showed standing water on the site.

Q. And would you look at Exhibit 39-C, please?

THE COURT: It's in a different notebook.

Q. (By Mr. Aramburu:) Now, Mr. Kelley, they're individually tabbed with the numbers on them. Do you have that?

A. Yes.

Q. And is that the aerial photograph you used?

A. No, it's not.

Q. It's not. Did you use a different photograph?

A. This is dated 1946.

Q. Excuse me. It would be under tab C, Mr. Kelley. There's four -- there's five photographs under Exhibit 39.

A. I'm sorry. I understand. This is a 1985 photograph.

Q. Well, perhaps our notebooks -- would you look on the back of the photographs? And I think we've tried to put the dates there.

THE COURT: It may be your -- our courtesy ones are different from the original ones, so you might want to just go up and check on that.

(Off the record.)

Q. (By Mr. Aramburu:) Okay. Now we're looking at 39-C. Is this the photograph you used?

A. Yes, it is.

Q. And tell us how we can tell where wetland -- where the precise boundaries of Wetland FW11 are on that photograph.

A. Well, the actual photograph that we used was of somewhat better quality than this, but there --

Q. Well, now, let me -- we've made copies of the photographs and you may have a copy.

A. I have a copy.

Q. You have a copy. Let's --

MR. ARAMBURU: I think your Honor may have a copy, as well.

Q. (By Mr. Aramburu:) We're going to lend you the Court's copy here. The notebook you have contains a copy of the photograph, and I think this is an original photograph. Does that look more like what you looked at?

A. Yes, it does. But I do believe that is still a Xerox copy, but we had it printed on graphic paper, you know, the same kind of paper that you would have a snapshot-type printed on. And this is a color Xerox medium.

Q. Okay. Did you have more than one of these --

A. No.

Q. -- made?

A. No. This is the right size. It had the Walker designation on it, but it was on graphic paper.

MR. ARAMBURU: We have an original of this photograph, your Honor, and that's what we're trying to find.

THE COURT: Well, why don't -- let's take our lunch recess at this time, we're fairly close, and then you could probably find that. Thank you very much, Counsel.

MR. ARAMBURU: Okay.

THE COURT: Let's make sure we don't mix up the original from my copy.

MR. ARAMBURU: Correct.

THE COURT: But go ahead and take a look at those.

MR. ARAMBURU: We'll take a look.

THE COURT: All right. Thank you. We'll be in recess.

12:00 P.M.

(Court at recess.)

* * * * *

JUNE 5, 2001

AFTERNOON SESSION

1:39 P.M.

* * * * *

THE COURT: Counsel, go ahead.

CONTINUED CROSS-EXAMINATION

BY MR. ARAMBURU:

Q. Mr. Kelley, before the noon recess, we were looking at Exhibit 39-C. We were as yet unable to find the original photograph, and we're going to keep looking for that, but help us out, if you would, as to how -- the process that you went through with Exhibit 39-C in delineating Wetland FW11. Now, I recall that the testimony up until now has been that that delineation was made by using this map; is that right?

A. Well, in part.

Q. Using this aerial photograph?

A. It was made, in part, by this map, using the aerial photograph. But prior to using the aerial photograph in -- in -- I believe it would have been December and January of -- and February of 1999, we were in the area with the Corps of Engineers. We were reviewing some of our other delineation work, and we were examining the Vacca Farm area and Parcel 92. And on several occasions at that time, we identified

standing water on Parcel 92 and standing water in the other farmed wetlands, such as Farmed Wetland 3 and Farmed Wetland 2. And the Corps identified a need to distinguish those farmed wetlands from the prior converted cropland, because there was standing water on these sites. And they indicated to us that because of the standing water, these areas will not meet the prior converted cropland criteria. And I believe --

Q. Okay.

A. I believe at that time that we did not have access -- the Port did not have access to the property. And we obtained access later on in the year, and at that time identified this aerial photograph as useful in showing where standing water on that -- this would be useful in helping us map standing water on that site, which we had previously observed.

Q. But this -- this map is now about 25 years old or more, isn't it? Or, excuse me, this aerial photograph?

A. Yes, it is.

Q. Why didn't you use a later aerial photograph?

A. Well, this was the aerial photograph that we found -- could find in the record that was taken in the early part of the growing season, the rainy part of the

growing season, when we would expect these farmed wetlands to actually contain inundation. And it also had patterns in the Farmed Wetland 11 that the Corps and myself felt would be useful in mapping the aerial extent of that area.

Q. Okay. But I notice that Wetland V1 and V2 don't seem to be in existence in 1974.

A. That's correct; they're not on this photograph.

Q. And so the typical method of determining wetland delineation is the flag, is that not correct?

A. That's correct.

Q. Did you ever flag Wetland 11?

A. No. I believe Wetland 11 was mapped based on this aerial photograph.

Q. I meant to say FW11.

A. FW11, yeah.

Q. In looking at the photograph here, this was taken on March 20, 1974, can you show us the areas that you used to make your determination? Can you point those out for us?

A. Yes. If you look at that photograph -- can I come up to this exhibit? This may be -- how am I going to show -- show you this? It's so tiny.

Q. Well, first of all, the photograph you used is the one you had -- the same size you have in your hand,

correct?
A. Yes, that's correct.
Q. And you didn't get a blow-up of it or anything?
A. No, we did not.
Q. Okay.
A. We examined it under magnification.
Q. Okay. But using that same size?
A. Yes.

MR. ARAMBURU: Perhaps the thing to do, your Honor, would be to have the witness come up here and help us out with where that is.

THE COURT: You want to present it, Counsel?

MR. ARAMBURU: Okay. Good.

MR. KELLEY: I would like to use the photograph that I believe is in the -- one of the other notebooks that's slightly higher quality than this one.

MR. ARAMBURU: Okay.

THE COURT: Here's the other notebook, Counsel.

MR. KELLEY: Or, actually, it's right here. There's a notebook right here with it in it too, so --

MR. ARAMBURU: Okay.

THE COURT: Ms. Jones, do you want to come up here?

MS. JONES: I do.

THE COURT: You want to do it?

MR. KELLEY: I'm not sure.

MS. JONES: I will just look over Mr. Aramburu's shoulder.

(Off the record.)

A. So it's this dark soil area in here that was examined under magnification and determined to coincide with the areas that we have observed as being flooded in the winter of 1999 with the Corps of Engineers. And oftentimes on farm sites, areas that are -- where the soil is wet, it shows up as being darker colored in aerial photographs, and where there's surface water on a soil, it shows up as being dark on aerial photographs. So in viewing this aerial photograph myself personally and with a Corps of Engineers, they determined that that was an acceptable method for mapping FW11.

Q. (By Mr. Aramburu:) Okay. And there seems to be a darker area just to the west of that, was that also mapped?

A. Could you point to which?

Q. Is that a dark area there, too?

A. No, that was not mapped.
Q. Does that look like that's wet?
A. It could have been inundated, but it's not where we observed water in the winter of 1999, in the early spring of 1999, so the Corps -- so the Corps did not call that farmed wetland. So they -- what actually happened is we observed water on the site, and the Corps determined there's farmed wetland present. And then we were asked to map it, and the available information to map it when we had access to the site was these aerial photographs. We had access to the site later on in the summer, and the surface water had drained by that time.
Q. So -- and did you make consecutive observations over 14 days?
A. Yes. I believe we would have observed over probably a several month period. And I observed water in the winter of 2001 over a several month period on this site, as well.
Q. But it's not the wintertime that counts, is it, Mr. Kelley?
A. No, it's the growing season.
Q. In the early growing season?
A. In the early growing season.
Q. Did you make consecutive recorded observations over

14 days of water in the area of FW11?
A. Yes.
Q. And those are recorded?
A. No, they're not recorded.
Q. And -- and that's just what you remember; is that right?
A. That's correct.
Q. And was the -- was the area of inundation the same each day?
A. I would say yes, for all practical purposes, it's the same each day, with the exception of several periods of time where it was very wet, it had rained a lot. And on those days, the area of inundation was visibly larger.
Q. And in the aerial photograph that you've looked at here, do you know what the wetland conditions were the next day after -- on March 21, 1974?
A. No, I do not.
Q. Now, there was some testimony about Wetland A1 or 1A, I guess it is?
A. Which one is it?
Q. You testified about A1?
A. A1?
Q. Yeah. And how big is A1?
A. A1, I believe, is approximately two acres in size. I

would have to look at a table in our report to answer that exactly. Actually, it's identified here on Exhibit 19. It's 4.59 acres.

Q. Okay. It's not 10 acres, correct?

A. No; it's 4.59 acres.

Q. So it doesn't meet the 10 acre criteria under the City of SeaTac Code; is that correct?

A. That's correct.

Q. Okay. Now, we're talking a little bit about the -- about the wetland situation here. And can you tell us whether or not there's any rare or endangered species found in this location?

A. We have not found any rare or endangered species at this location.

Q. So would you look back again at page 15-46 of Exhibit 26?

A. (Witness complying.)

Q. Now, your testimony is that this is a Class I Wetland. Have you consulted with the Department of Ecology as to what class of wetland they believe it is?

A. I have not consulted with them.

Q. Did you not tell us during the deposition that you thought the Department of Ecology had classified this as a Class II Wetland?

A. Yes. We classified it in our report as a Class II Wetland, and the Department of Ecology has not opined on that classification.
Q. So your original classification was a Class II Wetland?
A. That was under the Department of Ecology classification criteria, which may be different from the City of SeaTac criteria.
Q. So in terms of looking at the wetlands, and let's focus now, if we may, on those wetlands found on lot 92, those are -- those -- would it be fair to characterize those as degraded wetlands?
A. Yes, it would.
Q. And degraded because of the agricultural activities?
A. Yes.
Q. And you've concluded those agricultural activities have gone on for years; is that correct?
A. That's correct.
Q. And have you found any plant associations of infrequent occurrence?
A. No, I have not.
Q. And on lot 92, are there any forested wetlands greater than one acre in size?
A. No, there are not.
Q. Are there forested wetlands greater than one acre in

size for Wetland A1?

A. Yes, there is forested wetland in Wetland A1.

Q. Is it greater than an acre?

A. I'm not certain the actual acreage that's forested. I suspect it's greater than an acre.

Q. Now, would you look at Exhibit 24 and page 3-27, please?

A. (Witness complying.)

Q. That indicates, does it not, that the -- go back. Does -- is the information shown on page 3-27 done under your direction?

A. Yes, it was.

Q. Did you write it?

A. I wrote portions of it, and I reviewed the entire text.

Q. And indicates that the emergent communities in the Wetland A1 are predominantly reed canarygrass?

A. That's correct.

Q. Is that a wetland species?

A. Yes, it is.

Q. Is that a native species?

A. No, it's not.

Q. And was Wetland A1 delineated on-site?

A. Yes, it was.

Q. It was flagged in the environment of lot 92?

A. Yes, it was.
Q. Now, you've provided testimony about the Department of Ecology's involvement in the wetland delineation work. What was the question that was put to the Department of Ecology? What were they asked to do?
A. For the Port's permit application, the Department of Ecology needs to determine that the functions and values of impacts to wetlands are adequately mitigated.
Q. And in the area that we're talking about on lot 92 and in the vicinity of lot 92, there wasn't going to be filling for the third runway, was there?
A. That's correct.
Q. And so the question that was asked the Department of Ecology was whether they would agree that the areas in this vicinity could be used as mitigation; is that correct?
A. Well, in a general sense, we talked to the Department of Ecology about mitigation on this site and how that mitigation would be characterized, whether it would be characterized as wetland restoration or wetland enhancement. So we -- in addition to -- we wanted to discuss some of the specifics about how to -- how they would like to see mitigation accomplished on this site.

Q. So the Department of Ecology wasn't presented with a development project such as you have for your private clients, were they?
A. No, they were not.
Q. So the only question they were asked is whether or not this was going to be a suitable area for a wetland mitigation?
A. Yes, that's correct, for parcel --
Q. And then they asked you to give advice or opinions on the ratios of wetland enhancement that might be available on these properties?
A. That's correct. They were --
Q. And --
A. They were also concerned about wetland impacts to the prior converted cropland that's identified in this location, because the project would fill a portion of this prior converted cropland. So in -- that was an area where they had an interest that went beyond simply mitigation.
Q. But that's not near the lot 92 parcel?
A. It's a few thousand feet from lot 92.
Q. Is it your testimony that the wetlands on lot 92 cannot be moved or modified in any fashion?
A. No.
Q. And we've talked about Waters V1 and V2, the ditches?

A. Uh-huh.
Q. Could those be moved and relocated on the site?
A. Under certain circumstances.
Q. And what would that be?
A. It would be preparing a development plan -- a mitigation plan that met -- would meet HPA and local zoning code requirements.
Q. And would it not be the case that one might have to mitigate for the loss of area in those two ditches?
A. In those -- could you rephrase that question?
Q. If they were to be filled, would you expect that someone would ask for replacement -- wetlands enhancement?
A. Yes. I think you would need to replace the area of those ditches that was lost, as well as the functions that they provide, the ecological benefits that they provide.
Q. And what are those?
A. Primarily, in this case, the conveyance of water across the site of groundwater.
Q. That could be done with a pipe?
A. It could be -- an engineer would do it with a pipe, a biologist would do it differently.
Q. Is there anything unique or important about the vegetation that's found in those two ditches?

A. The vegetation helps stabilize the edges of the ditches and helps keep sediment from moving across the site and moving into Miller Creek.
Q. But is there any kind of desirable vegetation that we'd want to save out of those two ditches?
A. No.
Q. And so in terms of mitigating for the loss of the ditches, we'd have to replace that on a ratio of one-to-one, two-to-one, three-to-one, something like that?
A. Perhaps three-to-one would be a starting point.
Q. And how big are Wetlands V1 -- or ditches V1 and V2?
A. They're a few hundredths of an acre in size, probably.
Q. I recall, and correct me if I'm wrong, that each one of them is counted on your information as 1/100th of an acre. Take a moment if you'd like to consult your material. I think that's found on exhibit --
A. They're on Exhibit 19. And that's correct, they're each identified as 1/100th of an acre.
Q. And so that would be about 436 square feet, each --
A. Roughly.
Q. -- acre being 43,560 square feet.

So if we replace those, we might have to have an area on a three-to-one mitigation of, say, 3,000

square feet?
A. Yes.
Q. Now, is it your testimony that the point of -- again, let's look at Exhibit 19, because that's useful, I think, to help us here. Is it your testimony that the point of Wetland A1 that goes into lot 92, that that area could not be filled?
A. No, I did not testify to that.
Q. So that area could be filled?
A. Under certain circumstances.
Q. And that would be the same circumstances as the filling of Waters V1 and V2?
A. Yes, with the addition that that would require compliance with section 404, because that's not exempt from 404 jurisdiction.
Q. Okay. And what about the filling of FW11?
A. That would be -- that it would be part of 404 jurisdiction, and that would require section 404 permitting, in addition to local permitting.
Q. Any reason why that couldn't be filled if it complied with the other provisions?
A. No.
Q. Is there anything so unique or desirable on any of these wetlands that we wouldn't want to fill them under any circumstances?

A. Well, any condition for filling them under section 404 would require demonstration of no practicable alternatives for a project, and that would apply to Wetland FW11 and A1, so that -- whether those were filled or not would be very dependent on specifically what was proposed for the site and why the only -- why this was the only site where that particular project could occur on. If -- and then in the local regulation in reviewing permits and determining whether wetland fill should be approved or not, the quality and quantity of mitigation and whether that mitigation functionally replaced what was occurring on-site would be the critical review point. That would be what the agencies would decide on. So the functions of flood storage that Wetland FW11 provides, the water quality benefits that wetlands -- vegetative wetlands provide, the collection and conveyance of groundwater across the site would be one of the functions that the wetlands provide. And all of these would have to be incorporated into a mitigation plan and reviewed -- agreed to and reviewed and approved by a permitting authority.

Q. This is the kind of work you do all the time for your private clients, isn't it?

A. That's correct.

Q. And we haven't -- from our materials here, we don't have a total amount of wetlands on the Parcel 92 site. But from my sort of eyeballing it, it looks like less than half an acre, would you agree with that? And again, I'm not asking to be precise, but that looks to be about the number?

A. No. I would -- I would agree that nearly the entire site, if not the entire site, is wetland.

Q. Well, let's leave aside the issue of -- and I understand your testimony on prior converted croplands, but looking at Exhibit 19, would you agree with necessity that the wetlands that are mapped there would be less than half an acre?

A. The wetland that the Corps of Engineers has determined are jurisdictional under their 404 program may be less than half an acre.

Q. And are there any rules and regulations that relate to filling less than half an acre of wetland?

A. Under the Corps of Engineers?

Q. Correct.

A. These wetlands would -- well, I think it would depend on the development proposal. There are a variety of nationwide permits that might allow a more -- that might allow -- that may apply to this situation or may require an individual permit. And it would

depend on the specific development proposal, what the nature of the development was, and why you had to fill these wetlands.

Q. And it would also not be the case that the Court would take a close look at the functions that the wetlands serve on the site?

A. That's correct.

Q. And we agree that these are degraded wetlands; is that correct?

A. The habitat value of these wetlands has been degraded. The function that the wetlands provide in providing flood storage may not have been degraded, portions of the wetlands still in the floodplain. The functions that the wetlands provide in terms of groundwater discharge, the movement of groundwater to surface water, and the supplemental base flow to Miller Creek downstream may not have been degraded by farming. So some functions have been degraded and others may not have been.

Q. So there might have to be some arrangement to continue the drainage of water that's otherwise conveyed by Waters V1, V2, and A1 on lot 92?

A. That's correct. And the agencies, in reviewing a permit application, might require, instead of mitigation, instead of a square area that might be

3,000 feet square, they may require a long linear type mitigation wetland that would provide groundwater collection and conveyance functions similar to what these existing ditches do; however, they might allow you to move that function to a different location on the site.

Q. Is it unusual in Western Washington to deal with wetlands on a commercial or residential site that are less an half acre?

A. Yes. It's common to do -- excuse me, no, it's not unusual to deal with.

Q. Would you turn to page 3-19 of Exhibit 24, please?

A. (Witness complying.)

Q. I had a question about the last paragraph that's found on that page. There's a sentence that says certain areas meet the criteria for PC cropland, prior converted cropland, but it says these have hydric soils and saturation within 12 inches of soil surface for more than 15 consecutive days; is that right?

A. That's what it says.

Q. And have you gone out to the site and have records of observations of soil saturation for more than 15 consecutive days?

A. We've gone out to the site -- to all of these parcels

as a whole on numerous occasions during the spring and early summer months. And when a site that contains peat soils is observed to have saturation during the late spring and summer months, as we have -- early summer months, as we have observed on this site, that observation alone is sufficient to demonstrate long-term saturation, that if it hasn't rained and the drainage characteristics of peat soil is so slow that if -- when you observe water during the non-rainy season, you know that that water has been there for a substantial period of time, and it will be there for a substantial period of time in the future because it drains out of those soils so slowly.

Q. Well, my question to you, however, is do you have records that indicate observations in the prior converted croplands for more than 15 consecutive days?

A. No, I don't have those records.

Q. Then your next sentence says, however, these areas lack inundation for at least 15 consecutive days and therefore, the areas do not meet the criteria for farmed wetlands according to the Food Security Act. Do you see that sentence there?

A. Yes.

Q. So it indicates that they are not inundated for more than 15 consecutive days; is that correct?
A. That's correct.
Q. Okay. And is that different than the previous sentence?
A. The previous sentence, we're talking about saturation of soils, which is walking out on the site and observing that the soil water table is high, the soils are squishy, in layman's terms. But in -- in doing our testing, you dig a hole and you observe where the poor space in the soil is fully -- 100 percent saturated with water, and that's the criteria for wetlands. And that's what the first sentence is stating, that the soils are saturated. Inundation is the presence of water sitting on top of the soil two inches deep, three inches deep, maybe deeper.
Q. So if you're off-site, can you see the inundation because you can see surface water?
A. That's correct.
Q. However, for purposes of soil saturation for your previous sentence, you'd have to go out and dig a hole, wouldn't you?

A. That's correct.
Q. So isn't that the common way to do is to go dig a hole and observe the water levels in the hole for a

consecutive period of days?

A. Well, it's not necessary to do it for a consecutive period of time because of the drainage characteristics of soils in our area, and particularly peat soils that don't drain rapidly.

Q. Well, but did you go out to the site and set up a number of observations or holes that you looked into over a period of time and saw that there was saturation within 12 inches?

A. We went out to the site and we observed the soil characteristics and the hydrologic characteristics. And based on those observations, we delineated wetlands. We brought the Army Corps of Engineers out and the Department of Ecology out, showed them the work that we had done, the basis for our wetland determination, how our data plots that we took characterized the site conditions, and based on that information, I personally, and agency staff, concluded that the areas were wetland and met the Federal criteria for wetlands.

Q. But as I understand it, the issue that you were taking to the Corps was not a development proposal to fill wetlands, but a proposal to alter them for beneficial purposes; is that correct?

A. When we first started taking the Corps out to this

site, we had not been looking at this site as mitigation, so it was -- they were making a determination as to where wetlands occur on property that the Port of Seattle owns or was acquiring.

Q. But that these were prior converted croplands was fine with the Port for its purposes; isn't that correct?

A. Well, whatever it was is fine for our purposes.

Q. But there wasn't a contest over this issue as to whether they were or weren't?

A. Well, there was in the sense that we had to provide to the agencies enough documentation so that they would make that determination we requested. We identified to the Corps that we felt this area met the criteria for prior converted cropland. They asked us to provide that information to them. We have an appendix in our wetland delineation report that addresses our determination on prior converted cropland, and the Corps has accepted that. So we did ask them to make this determination.

Q. But did you ask them to conclude that it was all wetlands, the prior converted croplands were wetlands?

A. No, we did not.

Q. And that would not have been in the best interests of

the mitigation plan, would it?

A. I don't think it would have mattered to the mitigation plan. The agencies want a site that is -- that has a high probability of being able to reestablish wetland functions on it. It's in the best interests of the mitigation plan that this site does, indeed, have high water tables in the spring and doesn't need excavation or grading to create hydrology. The hydrology is already there. So it may have been in the best interests of the mitigation plan if the Corps determined it was jurisdictional wetland.

Q. But you get more benefit for restoring wetlands than you do for enhancing existing wetland; is that not correct?

A. The Corps is not -- or Ecology has not specifically identified to me how they're going to credit our mitigation proposal with benefit for this site.

Q. But there's different ratios for properties that are existing enhancement of wetlands and the restoration of other wetlands; is that correct?

A. Generally, mitigation ratios are accepted by the Corps on a site-by-site basis, on a case-by-case basis.

Q. And as I understand it, you don't have your Corps

permit yet for all this work?
A. That's correct.
Q. And how many times have you submitted material to the Corps?
MS. JONES: Objection, irrelevant.
THE COURT: Overruled.
A. We submit information to the Corps on a monthly basis.
Q. (By Mr. Aramburu:) Well, I notice that there were two notices of Corps applications, one in 1999 and one in 2000; is that right?
A. That's right.
Q. So there was a resubmission of material in 2000?
A. That's correct.
Q. Is that because the Corps told you, you needed to do more work?
A. A lot of that was procedural in terms of not obtaining a Corps' permit within -- and obtaining section approval from Department of Ecology on the Clean Water Act certification within a one year period. But there's ongoing -- but we have work ongoing.
Q. Would you turn to Exhibit 54, I guess it's 53-A, please?
A. (Witness complying.)

Q. Does your firm work on the natural resource mitigation plan for the third runway?
A. Yes, that's correct.
Q. And can you identify the materials that are found under tab 53-A?
A. There is chapter two -- actually, there's various -- various pieces of a report, the Natural Resource Mitigation Plan for Seattle-Tacoma International Airport, Master Plan Update, prepared and finalized in December of 2000.
Q. And did your office have a hand in preparing that?
A. Yes, that's correct.
Q. And were you substantially responsible for preparing it?
A. Yes.
Q. Okay. Now, in that material, and this is the mitigation plan that you've submitted to the Corps to tell them that you should be permitted to fill the wetlands for the third runway, this would be the mitigation for that?
A. That's right.
Q. And in this material, do you make a distinction between wetland restoration and wetland enhancement?
A. We do.
Q. And looking over, I think, on page 5-2, table 5.1-1,

does that summarize the mitigation areas?
A. Yes, it does.
Q. And wetland restoration, 6.60 acres, is that primary to the prior converted cropland?
A. Yes, it is.
Q. Now, does -- this report also describes monitoring wells that were put in; is that correct? Look over at page 5-31 and 32?
A. Yes. We did place monitoring wells.
Q. And what was the purpose of that?
A. They were placed in -- near the location of relocating a stream channel, and to evaluate the hydrologic conditions and the feasibility constructability of relocating the Miller Creek stream channel.
Q. And those would give you groundwater levels?
A. Yes, that's correct.
Q. Any of those on lot 92, Parcel 92?
A. No, they aren't.
Q. Did you consider at all in your evaluations of the wetlands on lot 92 the ability to transfer development rights from that property to other properties?
A. No, I did not.
Q. Do you know if that is permitted by local SeaTac

regulations?

A. I do not know.

Q. Is it -- is the concept of development or of transfer of development rights in connection with wetland preservation a common element found in wetland regulation?

A. I've never used it on a project that I've worked on.

Q. Would you turn to Exhibit 6, please?

A. (Witness complying.)

Q. I have some testimony from you concerning a portion of this Corps -- this Public Notice of the Corps' application. And you didn't write this, I take it?

A. No; the Army Corps of Engineers wrote this.

Q. And you brought our attention to some language in the notice on page 9; is that correct?

A. Yes.

Q. This says that -- it talks about the Vacca Farm, and then it says, accordingly, impacts being considered under water quality standards include certain property to be filled at the Vacca Farm site, and an additional 6.92 acres of waters of the State temporarily impacted during construction of mitigation. Do you know what's going to be filled at the Vacca Farm site?

A. Yes, I do.

Q. What is that?
A. There's a portion of this prior converted cropland that would be filled. Miller Creek, which flows across this portion of this site, would be moved over into a portion of Wetland A1, and that would accommodate the runway embankment and the 154th Street relocation.
Q. Okay. And then it says that there are waters of the State that will be temporarily impacted during construction of mitigation. Do you know what that means?
A. That's referring to areas within Wetland A1, all these farmed wetlands and other small wetlands, and the prior converted cropland that would be restored during the mitigation process. So taking trucks out into the wetland, digging holes to plant wetland vegetation, in some cases excavation for floodplain, is what is referred to as those temporary impacts.
Q. And do I understand from this that the principal concern of DOE has to do with the water quality standards?
A. Their concern is with water quality standards and wetland function, and how wetland function may pertain to water quality, but habitat, as well, aquatic habitat functions.

Q. So when it says water quality standards, then, would the Department of Ecology be concerned that working in the wetlands might cause downstream siltation to harm fish and that kind of thing?

A. Yes, that's one of their concerns.

Q. That seems to be the one expressed here.

A. It's the one expressed here in this notice.

MR. ARAMBURU: Those are all the questions I have for cross-examination. Thank you very much, Mr. Kelley.

THE COURT: Counsel, redirect?

MS. JONES: Yes, I have a little redirect. Thank you.

First, your Honor, I would like to move to admit Exhibit No. 14, which I neglected to do on direct. That's the soil survey of King County, Washington, dated September 1952, Exhibit 14.

THE COURT: Thank you. Any objection?

MR. ARAMBURU: No objection to 14, your Honor.

THE COURT: All right. Thank you. Exhibit No. 14 is admitted.

MR. ARAMBURU: Your Honor, I'd like, also, to ask for the admission of Exhibit 54-A, which the witness discussed during his testimony.

THE COURT: Hold on just a minute.

MS. JONES: No objection.

THE COURT: 54-A or 53-A?

MR. ARAMBURU: Excuse me, 53-A, your Honor. Excuse me.

THE COURT: So that is the Natural Resource Mitigation Plan for the third runway; is that correct?

MR. ARAMBURU: That's correct.

MS. JONES: No objection, your Honor.

THE COURT: Okay. All right. Thank you. Exhibit No. 53-A is admitted.

Thank you. All right. Counsel, go ahead.

MS. JONES: Thank you.

REDIRECT EXAMINATION

BY MS. JONES:

Q. Mr. Kelley, Mr. Aramburu asked you early in your cross-examination whether the Port was going to mitigate Wetland A1. Do you recall that?

A. Yes.

Q. Okay. And the question I have is, is the Port doing any mitigation activities on Parcel 92?

A. Yes, we are.

Q. And what are they, please?

A. The mitigation activities are primarily planting that

area with native trees and shrubs that are adapted to wetland conditions.

Q. Are you planting or does the Port's mitigation plan include planting not only on what's been delineated as wetland, but what you have testified is wetland and what's been shown on your exhibits as prior converted cropland?

A. Yes, that's correct.

Q. You also testified that the Port will be filling part of exhibit -- of Wetland A1, and also restoring part of it by relocating the creek and replanting some native trees and shrubs there; is that right?

A. Yes.

Q. Is there -- is there a cost to doing that; that is, does the Port have to expend money to do those mitigation activities?

A. Yes, they do.

Q. I believe Mr. Aramburu asked you how many days that you -- how many days the data plots were done as you were delineating the wetlands. Do you recall that?

A. Yes.

Q. Would you normally go out and do data plots for more than one day before you made your conclusion on a particular data plot?

A. It's usually only in -- in -- it's unusual

circumstances where wetland consultants and wetland regulatory agencies have to observe sites for 14 consecutive days. On a site like this, where it's obviously wet during much of the year, we can very readily examine the soils and examine the hydrologic conditions of the site and determine that the site meets the criteria for wetland.

Q. When you were doing data points, does the Army Corps of Engineers' Wetland Delineation Manual require you to mark data points for more than one day before you have a conclusion based on those data points?

A. No, it does not require that.

Q. What about the State of Washington, Department of Ecology Wetland Delineation Manual?

A. No, for general determinations, it does not.

Q. Now, there was some question about the lack of data points on Parcel 92, even though there are some data points in prior converted cropland to the north. Do you recall that?

A. Yes.

Q. Why do data points -- or do data points -- why don't you explain that, why did you not do them on 92 when you had done them prior to the north in the area that you've described as wetland, but also has been delineated as prior converted cropland?

A. Well, generally, what the Corps wants to see in a delineation report are data plots that are representative of the variety of conditions that might be on a site, and so that they don't require a data point at every wetland delineation flag which might be hung around the perimeter of a wetland. They don't require a data point on every square foot of the delineation site. They require a -- enough data plots in the wetland and around the perimeter of the wetland to sufficiently characterize the larger or the broader changes that may be present on a site.

And so in this particular case, where we identified wetlands and prior converted cropland, it was determined that the data plots that we have to the north of Parcel 92 in prior converted cropland adequately characterize the presence of hydric soil, the presence of peat soil. And the hydrology of the site, when we obtained access to Parcel 92 and examined those conditions, we found them substantially the same as areas to the north.

Q. What were the conditions that you examined on Parcel 92 when you did get access that made you think they were the same as the ones you had done data points on farther north?

A. We dug holes and determined that the soils were peat

soils, and we determined that there was the same type of peat that occurs to the north on other parcels. We observed water flowing into those holes and water flowing almost to the soil surface and determined that the wetland hydrology criteria was met. In the case of the prior converted cropland, the plowing was the same as the plowing further north. In the case of Wetland A1, the vegetation along the perimeter of the wetland was the same as -- as vegetation in other portions of that area.

Q. Thank you.

Now, in response to a question from Mr. Aramburu, you indicated that Wetland A1 is less than 10 acres in size; is that right?

A. That's what I said, yes.

Q. Okay. In your correct testimony, you had indicated that you were -- had concluded that there was a Class I Wetland here because there was in excess of 10 acres for a wetland?

A. Yes.

Q. Can you explain why -- or explain if there is a discrepancy, what that -- how you reconcile that?

A. Yeah. I think that this figure that we have here in the 4.59 acreage, I think that we -- that I stated for Wetland A1, consider that particular unit of

wetland, which is Wetland A1, where a wetland determination was based on the presence of three parameters, according to the routine delineation approach identified in the Federal manual and in the State manual.

So in this area, we found undisturbed wetland vegetation, we found hydric soil, we found a high water table, so all three parameters were met. Then on other portions of this site -- and so that area was called out as Wetland A1, 4.59 acres. Then as we continued to study the site, we found places where there was ponding and places with hydric soil and water, but no vegetation, and so we started identifying out some of the little nuances of the site that we need to bring to the attention to the Corps so they can make a determination on wetlands, and so these other areas were identified and called out. Then -- and that's why our map is a little mosaic of different things, because it represents the different criteria that were used in the field to identify these different areas. We had the vegetated wetlands with these perimeters, we had prior converted croplands soils, but no inundation present. And then we had the farmed wetlands that had hydric soil, no plants, 'cause they're plowed, and they had

inundation. That's independent of how this wetland is classified according to the City of SeaTac zoning code. If you're classifying this wetland according to the City of SeaTac zoning code, all the little detail, the boundaries that separate out this area are just simply dissolved, and it becomes one big wetland, which is 16.8 acres in size.

Q. Thank you.

Mr. Aramburu asked you to -- asked you whether or not Parcel 92 is degraded wetland. Do you recall that?

A. Yes.

Q. Is there a difference between degraded wetland and altered wetland, do you know?

A. No, it's just -- there's no technical difference, it's just a matter of common usage. They both would refer and imply -- well, degraded to me implies that the wetland functions may be impaired, altered just means maybe something is changed, things have changed, it may or may not imply that functions have been degraded. But it's just a nuance, and there's no technical definition that I'm aware of.

Q. All right. Is there -- do you know if the SeaTac City Code includes the term or uses the term degraded wetland?

A. I'm not aware that they do.
Q. Okay. Mr. Aramburu asked you if the wetland point -- on Parcel 92, that point that we've talked about on A1, Wetland A1, and also FW11, can be moved. Do you recall that?
A. Yes.
Q. Okay. And I believe your answer was that there would -- yes, but there would have to be compliance with section 404; is that right?
A. Yes, that's right.
Q. Okay. What kinds of things would be required to comply with section 404 if you wanted to move those wetlands?
A. Well, you would need to delineate the wetland, prepare a wetland delineation report, have that delineation approved by the Corps. You would need to prepare -- presumably with an engineer or a real estate developer, you would need to prepare a development plan and determine the acreage of impact to that wetland, the acreage of direct impact. You would have to review with the Corps whether there are any indirect impacts to that wetland, whether developing the -- developing the non -- the PC portion of that site near the wetland might intercept hydrology and cause indirect impacts to a greater

area of wetland than was just being filled by the project. So impact issues would need to be reviewed and approved by the Corps.

The Corps would be requesting information on what the ecological functions and values of that wetland were, so an evaluation of wildlife habitat, aquatic habitat, groundwater functions, storm water functions, flood storage functions, would need to be prepared and summarized in a report. And I think key on this site in getting a key permit would be evaluation of purpose and need, and demonstrating that you did not have alternatives to developing a project that avoided wetlands, and that can be a very difficult -- a very difficult hurdle, or it takes extensive information to demonstrate to the Corps that this is the only project site in -- available to you to accomplish this particular development. And for private development, it's very difficult to make that demonstration to the Corps.

Q. Do you have any estimate of the time it would take if you were to provide such a request to the Corps to move the wetlands we just talked about, getting a determination from the Corps about whether you could do it or not?

A. Well, I would think it would be in excess of 12

months to get all the information together and all the issues resolved and approved.

Q. Now, you talked about the moving of the ditches, as well, the ones -- the things we've referred to as Water V1 and Water V2. And I believe that your testimony was that these were a very small portion of the land, what did we say, .01?

A. .02, I believe.

Q. 436 square feet, each of them?

A. Yes, yes.

Q. Okay. And then I believe you testified that you might be able to -- in the moving of those particular ditches, you might -- that the nationwide permits might apply. Do you recall that?

A. Yes.

Q. What is a nationwide permit?

A. It's a -- there's a series of nationwide permits which are essentially permits that the Corps -- I believe that they're essentially permits that the Corps has issued to themselves to allow a more streamlined approval, compared to -- and so in requesting a nationwide permit, you are asking the Corps to review your development proposal and concur that you meet these pre-specified terms and conditions. And an individual permit is a more

lengthy process, where there's much more focus on individual project review.

Q. If a developer were to come along and, again, just based on your work with private individuals or smaller projects and didn't want to move FW -- or do anything to FW11 or A1, but did want to move those ditches, and therefore sought to do it through a nationwide permit, can you estimate the length of time that that process could take?

A. Well, it is an estimate. I would think it would be probably several months. I think that the Corps would ask you to provide information on endangered species, being Chinook salmon and bull trout, which don't occur on this site, but these streams connect to waterways that connect to Puget Sound where there's water quality concerns for these species, and that's -- these kinds of issues have -- are not clear cut. And it can take -- they're unpredictable. And so I hate to -- I'm hesitant to say three months, because it could take longer, but it would be -- I would be pleased if I could get it resolved in three months for a client.

Q. Would there be any other permits required that you know of in this particular site to move these ditches?

A. It would.
Q. If the developer wanted to do that?
A. It would require, as we discussed earlier, hydrolic project approval from the Department of Fish and Wildlife, the state Department of Fish and Wildlife. And these are protected under the City of SeaTac ordinances, I believe, as a stream.
Q. Thank you.

Mr. Aramburu asked you about the fact that you have assisted the Port in resubmitting -- in submitting new information to the Corps of Engineers at its request as it considers the 404 permit. Did any of the new information that you or Parametrix provided to the Corps apply to Parcel 92?

A. It applied -- what we submitted in December applied to Parcel 92.
Q. And was it changed?
A. It was not changed information.
Q. Thank you.

You said that the Port was doing some filling in the area northeast of Parcel 92, and I believe that you talked about this prior converted cropland area here that's designated as having .92 acres. Is that the area?

A. That's the area.

Q. Okay. What kind of -- did the Port have to receive a permit to do that work, filling of that prior converted cropland area?

A. Well, they haven't done it yet.

Q. They haven't done it yet, excuse me, of course they haven't. What do they have to do to do that?

A. It is included in our permit application. And Ecology has told myself and the Port that that area is a water of the State and that our mitigation has to include area to compensate for that impact. Our mitigation plan has specific -- it's larger because we have .98 acres of impact to that prior converted cropland.

MS. JONES: Okay. Thanks. I don't have any more.

THE COURT: All right. Thank you.

MR. ARAMBURU: May I have --

THE COURT: Sure, just brief rebuttal.

RECROSS-EXAMINATION

BY MR. ARAMBURU:

Q. Mr. Kelley, you talked about the mitigation plan for the facility. And would you look at Exhibit 54-A? And that would be, I guess, following page 3-10 of that document.

(Off the record.)

THE COURT: 54-A, Counsel?

MR. ARAMBURU: 53, your Honor. I've got a hang-up here with 53 and 54. Excuse me.

Q. (By Mr. Aramburu:) 53-A, looking at figure 3.2-1, do you see that? We've excerpted your report, which is much longer than this. In my copy, it stops page 3-10.

A. Yes, I have it.

MR. ARAMBURU: Okay. About ten pages in, your Honor.

THE COURT: All right. So you're looking at the --

MR. ARAMBURU: 3.2-1.

THE COURT: Got it.

Q. (By Mr. Aramburu:) Now, does this indicate in general the -- what's going to happen at the Vacca Farm site?

A. Well, it doesn't show the vegetation replant -- there's a lot of detail it doesn't show.

Q. Okay. But this shows that essentially pretty much the entire area to the east of the drainage ditch is going to be excavated for floodplain purposes; is that right?

A. Yes, it does.

Q. Okay. And as I see here on the drawing, 9,589 cubic

yards of material is going to be removed from that area. So that's digging down, what, two or three or four feet?

A. That's digging down more than that at the northwest portion of the site that's currently upland, and digging down one to two feet, in general, or less over the broader central portion of the site. And then on Parcel 92, we aren't doing any excavation.

Q. Well, I noticed that there appears to be some work outlined here on lot 92.

A. Yeah. That work would be temporary berm to control runoff and to assure that, if there was a heavy rain that would generate erosion or mobilize soil particles, that it would not run off-site onto the lot 94, which is south of Parcel 92, and that the water would be directed into the sedimentation ponds that would be present on the site during construction.

Q. And that -- and would that be removed after destruction?

A. Yes, most likely it would be removed.

Q. And would that -- would that area -- that would be an area of fill -- fill material brought in?

A. I suspect it would be fill material brought in.

Q. And that goes right through FW11, doesn't it?

A. Yes, it does.
Q. And it goes into exhibit -- or into A1?
A. Yes, it would.
Q. You discussed concern about Chinook salmon that are found downstream in Miller Creek; is that correct?
A. Yes.
Q. Are there any Chinook salmon located in the vicinity of lot 92?
A. No, there are not.
Q. And have any -- have any salmonids of any kind been identified in this area?
A. No.
Q. And would the first salmonids be found downstream of 160th Street?
A. Yes, that's correct --
Q. Okay. And that's --
A. -- as far as we are aware.
Q. Okay. And that's pretty much off of our Exhibit 19 that we have here?
A. That's correct.
Q. And is the conclusion of your work that the entire development of the third runway and all of the filling and work that's necessary there is not going to have an adverse impact on Chinook salmon?
A. That's the conclusion of our work. And that

conclusion is also based on very extensive water quality mitigation that occurs during construction, very extensive water quality and storm water controls during operation. And it also includes retrofitting portions of the airport right now that do not have standard or acceptable storm water management facilities up to current standards. So there was an extensive amount of mitigation that was required for us to come to that conclusion and to get concurrence from the Federal agencies on that determination.

Q. So the excavation that's shown on Exhibit 53-A at figure 3.2-1, excavation of almost 10,000 cubic yards of material, isn't going to hurt the fish?

A. That's correct; if it's done with identified mitigation to control sedimentation and storm water runoff during construction.

Q. One last question: Are you familiar with the King County Sensitive Areas mapping?

A. Yes, I am.

Q. Does any of what's shown on Exhibit 19 show up on that map?

A. I have not looked.

MR. ARAMBURU: No further questions.

THE COURT: Anything else, Counsel?

MS. JONES: Just one, your Honor.

REDIRECT EXAMINATION

BY MS. JONES:

Q. You just testified that you understand that there are no salmonids having been identified in Miller Creek north of 160th Street; is that right?

A. Yes.

Q. Do you know how far 160th Street is from Parcel 92?

A. I think it's about half a mile.

MS. JONES: No further questions.

THE COURT: All right. You may step down, sir.

MR. KELLEY: Thank you.

THE COURT: I think you pulled one of the maps out of there.

MR. KELLEY: I'm afraid to figure which one it came out of.

MS. JONES: It's 39.

THE COURT: 39, all right. Go ahead and put it back in the notebook by 39 if you could.

All right. Thank you, Counsel. We're going to take our afternoon recess at this time. We'll see you in 15 minutes. Thank you.

MS. JONES: Thank you, your Honor.

(Court at recess.)

THE COURT: Counsel, I should tell you just

E

Attachment E

Wetland Mitigation Calculations: Vacca Farm[1],[2]

Compensation Action	Location	Action Acres	Credit Acres	Explanation of Adjustment	Adjusted Acreages
Wetland Restoration Ratio: 1:1	Remove fill at Lora Lake	1.0	1.0		1.0
	Prior Converted Croplands	6.60	6.60	Ecology has documented that these areas are wetlands as regulated by the State. Therefore these areas should be assessed at enhancement ratios	3.30
Sub-total			***7.60***		***4.30***
Wetland Enhancement Ratio 1:2	Wetlands A1, A1a, A2, A3, A4	1.59	0.79		0.79
	FW 1,2,3,9, 10,11	0.73	0.36		0.36
	Lora Lake Shoreline	0.32	0.16		0.16
	Lora Lake aquatic habitat	3.06	1.53	Lora Lake is not identified in any Port documents as wetland. There is no NRMP text or landscape plans to identify the enhancement proposed in the lake.	0.0
Sub-total			***2.84***		***1.31***
Total Vacca Farm			***10.48***		***5.61***

[1] Data from Table 5.1-1, NRMP. Parametrix, 2001.
[2] Data from Table 4.1-3. NRMP, Parametrix, 2001

F

COMPENSATING FOR WETLAND LOSSES UNDER THE CLEAN WATER ACT

Committee on Mitigating Wetland Losses

Board on Environmental Studies and Toxicology

Water Science and Technology Board

Division on Earth and Life Studies

National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C.

COMMITTEE ON MITIGATING WETLAND LOSSES

JOY ZEDLER *(Chair)*, University of Wisconsin, Madison, Wisconsin
LEONARD SHABMAN *(Vice Chair)*, Virginia Polytechnic Institute and State University, Blacksburg, Virginia
VICTORIA ALVAREZ, California Department of Transportation, Sacramento, California
ROBERT O. EVANS, North Carolina State University, Raleigh, North Carolina
ROYAL C. GARDNER, Stetson University College of Law, St. Petersburg, Florida
J. WHITFIELD GIBBONS, Savannah River Ecology Laboratory, Aiken, South Carolina
JAMES WENDELL GILLIAM, North Carolina State University, Raleigh, North Carolina
CAROL A. JOHNSTON, University of Minnesota, Duluth, Minnesota
WILLIAM J. MITSCH, Ohio State University, Columbus, Ohio
KAREN PRESTEGAARD, University of Maryland, College Park, Maryland
ANN M. REDMOND, WilsonMiller, Inc., Tallahassee, Florida
CHARLES SIMENSTAD, University of Washington, Seattle, Washington
R. EUGENE TURNER, Louisiana State University, Baton Rouge, Louisiana

FEDERAL LIAISONS

JOHN GOODIN, U.S. Environmental Protection Agency
LISA T. MORALES, U.S. Environmental Protection Agency
JOHN F. STUDT, U.S. Army Corps of Engineers
ROBERT BRUMBAUGH, U.S. Army Corps of Engineers, Institute for Water Resources
BENJAMIN N. TUGGLE, U.S. Department of the Interior, Fish and Wildlife Service
THOMAS BIGFORD, U.S. Department of Commerce, National Marine Fisheries Service
KATHRYN CONANT, U.S. Department of Commerce, National Marine Fisheries Service
SUSAN MARIE STEDMAN, U.S. Department of Commerce, National Marine Fisheries Service

Executive Summary

Wetlands are complex ecosystems that, depending on their type and on circumstances within a watershed, can improve water quality, provide natural flood control, diminish droughts, recharge groundwater aquifers, and stabilize shorelines. They often support a wide variety of plants and animals, including rare and endangered species, migratory birds, and the young of commercially valuable fishes. Their beauty and diversity contribute recreational value.

The current high regard for wetlands, however, contrasts with earlier practices of draining and filling prior to the mid-1970s. Some past federal policies encouraged wetland conversion to promote agricultural, commercial, and residential development; mosquito control; and other activities that benefited society. By the 1980s the wetland area in the contiguous United States had decreased to approximately 53% of what it had been in the 1780s.

In recent years, concern about the loss of wetlands in the United States has led to federal efforts to protect wetlands on both public and private lands. Provisions in the Clean Water Act especially, the Food Security Act, several court rulings, and government policies, regulations, and directives regulate discharge of pollutants to wetlands and the filling of wetlands.

A principal objective of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency define the "waters of the United States" to include

most wetlands. This interpretation recognizes that some wetlands improve water quality through nutrient cycling and sediment trapping and retention; it is based on the judgment that some goals of the Clean Water Act cannot be achieved if wetlands are not protected. Indeed, in 1989, President Bush stated that "no net loss" of wetlands was a goal of his administration, and that was reflected in interagency agreements soon afterward.

The Clean Water Act prohibits the discharge of materials, such as soil or sand, into waters of the United States, unless authorized by a permit issued under Section 404 of that act. The Corps of Engineers, or a state program approved by the Environmental Protection Agency, has authority to issue such permits and to decide whether to attach conditions to them. To achieve no net loss of wetlands within the Section 404 program, a permittee is first expected to avoid deliberate discharge of materials into wetlands and then to minimize discharge that cannot be avoided. When damages are unavoidable, the Corps of Engineers can require the permittee to provide "compensatory mitigation" as a condition of issuing a permit.

Compensatory mitigation specifically refers to restoration, creation, enhancement, and in exceptional cases, preservation of other wetlands as compensation for impacts to natural wetlands. The permit recipient, either on a permit-by-permit basis or within a single-user mitigation bank, carries out "permittee-responsible" mitigation. In third-party mitigation (i.e., commercial mitigation bank, in-lieu fee program, cash donation, or revolving fund program), another party accepts a payment from the permittee and assumes the permittee's mitigation obligation. Most compensatory mitigation has been done by permit recipients, rather than by third parties.

The Committee on Mitigating Wetland Losses, which prepared this report, was established by the National Research Council to evaluate how well and under what conditions compensatory mitigation required under Section 404 is contributing toward satisfying the overall objective of restoring and maintaining the quality of the nation's waters. The committee reviewed examples of wetland restoration and creation projects in Florida, Illinois, and southern California that were required as a condition of Section 404 permits; received briefings from outside experts; and conducted an extensive review of the scientific literature on wetlands, government data and reports, and information provided by a wide variety of experts and organizations.

THE COMMITTEE'S PRINCIPAL FINDINGS

Conclusion 1: The goal of no net loss of wetlands is not being met for wetland functions by the mitigation program, despite progress in the last 20 years.

A recent study by the U.S. Fish and Wildlife Service suggests that the rate of loss of wetland area has slowed over the past decade. From 1986 to 1997, the estimated annual rate of wetland loss (58,545 acres per year) was about 23% that of the previous decade. Wetland losses due to agriculture declined precipitously, and there were significant reductions in losses due to urban and rural development. The decrease in wetland loss due to development may be attributable to the 404 permit process; however, the available data are not sufficient for drawing a firm conclusion.

The Corps of Engineers keeps data on the areas of permitted fill and areas of compensatory mitigation required as a condition for permits. From 1993 to 2000, approximately 24,000 acres of wetlands were permitted to be filled, and 42,000 acres were required as compensatory mitigation on an annual basis. Thus, 1.8 acres were supposed to be mitigated (i.e., gained) for every 1 acre permitted (i.e., lost). If the mitigation conditions specified in permits were actually being met, this ratio suggests that the 404 permit program could be described as resulting in a net gain in jurisdictional wetland area and function in the United States. The committee, however, found that the data available from the Corps were not adequate for determining the status of the required compensation wetlands. In addition, the data do not report the wetland functions that were lost due to the permitted fill. Further, the literature on compensatory mitigation suggests that required mitigation projects often are not undertaken or fail to meet permit conditions. Therefore, the committee is not convinced that the goal of no net loss for permitted wetlands is being met for wetland functions. The magnitude of the shortfall is not precisely known and cannot be determined from current data.

Recommendations

- The wetland area and functions lost and regained over time should be tracked in a national database. This database could include the Corps of Engineers' Regulatory Analysis and Management System database.
- The Corps of Engineers should expand and improve quality assurance measures for data entry in the Regulatory Analysis and Management System database.
- The Corps of Engineers, in cooperation with states, should encourage the establishment of watershed organizations responsible for tracking, monitoring, and managing wetlands in public ownership or under easement.

Conclusion 2: A watershed approach would improve permit decision making.

Wetland functions must be understood within a watershed framework in order to secure the purposes of the Clean Water Act. The federal

guidelines for permit decision making express a strong preference for compensation as near the permitted impact site as possible and for the same wetland type and functions. The committee concluded that such a preference for on-site and in-kind mitigation should not be automatic, but should follow from an analytically based assessment of the wetland needs in the watershed and the potential for the compensatory wetland to persist over time.

On-site compensation is typically constrained by hydrological conditions that are likely to have been or are being modified by the developments requiring mitigation. Hydrological conditions, including variability in water levels and water flow rates, are the primary driving force influencing wetland development, structure, functioning, and persistence. Proper placement within the landscape of compensatory wetlands to establish hydrological equivalence is necessary for wetland sustainability. The ability to achieve desired outcomes within a specific location is also a function of the degree of degradation of the hydrological conditions, soils, vegetation, and fauna at the site. The more degraded the local site and the more degraded the watershed, the less likely it will support a high-quality project. Thus, opportunities for in-kind compensation need to be sought within a larger landscape context.

Even with a suitable position in the landscape, the ability to establish desired wetland functions will depend on the particular function, the restoration or creation approach used, and the degree of degradation at the compensation site. Landscape position, hydrological variability, species richness, biological dynamics, and hydrological regime all are important factors that affect wetland restoration and mitigation of loss. Some wetland types—in particular, fens and bogs—cannot be effectively restored with present knowledge. Mitigation efforts that do not include a proper assessment of such factors are unlikely to contribute to the goals of the Clean Water Act.

Recommendations

- Avoidance is strongly recommended for wetlands that are difficult or impossible to restore, such as fens or bogs.
- Site selection for wetland conservation and mitigation should be conducted on a watershed scale in order to maintain wetland diversity, connectivity, and appropriate proportions of upland and wetland systems needed to enhance the long-term stability of the wetland and riparian systems. Regional watershed evaluation would greatly enhance the protection of wetlands and/or the creation of wetland corridors that mimic natural distributions of wetlands in the landscape.
- All mitigation wetlands should become self-sustaining. Proper

placement in the landscape to establish hydrogeological equivalence is inherent to wetland sustainability.

- The biological dynamics should be evaluated in terms of the populations present in reference models for the region and the ecological requirements of those species.
- The science and technology of wetland restoration and creation need to be based on a broader range of studies involving sites that differ in degree of degradation, restoration efforts, and regional variations. Predictability and effectiveness of outcomes should then improve.
- Hydrological variability should be incorporated into wetland mitigation design and evaluation. Except for some open-water wetlands, static water levels are not normal. Because of climatic variability, it should be recognized that many wetland types do not satisfy jurisdictional criteria every year. Hydrological functionality should be based on comparisons to reference sites during the same time period.
- Riparian wetlands should receive special attention and protection, because their value for stream water quality and overall stream health cannot be duplicated in any other landscape position.

A mitigation site needs to have the ability to become self-sustaining. This means that the hydrological processes that define a wetland in the ecosystem need to be present and expected to persist in perpetuity. To aid regulators and mitigators in designing projects that will become ecologically self-sustaining, the committee offers 10 operational guidelines.

Operational Guidelines for Creating or Restoring Self-Sustaining Wetlands

1. Consider the hydrogeomorphic and ecological landscape and climate.
2. Adopt a dynamic landscape perspective.
3. Restore or develop naturally variable hydrological conditions.
4. Whenever possible, choose wetland restoration over creation.
5. Avoid over-engineered structures in the wetland's design.
6. Pay particular attention to appropriate planting elevation, depth, soil type, and seasonal timing.
7. Provide appropriately heterogeneous topography.
8. Pay attention to subsurface conditions, including soil and sediment geochemistry and physics, groundwater quantity and quality, and infaunal communities.
9. Consider complications associated with wetland creation or restoration in seriously degraded or disturbed sites.
10. Conduct early monitoring as part of adaptive management.

Conclusion 3: Performance expectations in Section 404 permits have often been unclear, and compliance has often not been assured nor attained.

The attainment of no net loss of wetlands through both permittee and third-party mitigation requires that performance requirements for individual compensation sites be clearly stated and that the stated requirements will be met by the parties responsible for the mitigation. Some mitigation sites studied by the committee have met the criteria for permit compliance and are, or show promise of, developing into functional wetlands. However, in many cases, even though permit conditions may have been satisfied, required compensation actions were poorly designed or carelessly implemented. In other cases, the location of the mitigation site within the watershed could not provide the necessary hydrological conditions and hence the desired plant and animal communities, including buffers and uplands, necessary to achieve the desired wetland functions.

At some sites, compliance criteria were being met, but the hydrological variability that is a defining feature of a wetland had not been established. Concern that sites might not meet hydrological criteria used to define wetlands in the permitting process often encouraged construction of permanently flooded open-water wetlands. In some situations, seasonally and intermittently flooded or saturated wetlands would have better served the needs of the watershed. Compliance criteria sometimes specified plant species that the site conditions could not support or required plantings that were unnecessary or inappropriate. Monitoring is seldom required for more than 5 years, and the description of ecosystem functions in many monitoring reports is superficial. Legal and financial mechanisms for assuring long-term protection of sites are often absent, especially for permittee-responsible mitigation.

Long-term management is especially important, because wetland restoration and creation sites seldom achieve functional equivalency with reference sites or comply with permit requirements within 5 years. Up to 20 years may be needed for some wetland restoration or creation sites to achieve functional goals. The amount of time needed to become fully functional depends on the type of wetland, its degree of degradation, conditions in the surrounding watershed, and uncertainties in the application of scientific understanding. Once wetlands become fully functional, long-term stewardship, including monitoring or periodic assessment, is critical to achieving the goals of the Clean Water Act. "Long-term stewardship" implies a time frame typically accorded to other publicly valued natural assets, such as parks. This time frame emphasizes the importance of developing mitigation wetlands that are self-sustaining, so that the long-term costs are not unmanageable. The committee recommends three general goals to ensure compliance of sites that contribute to the water-

shed. The committee made nine specific recommendations to achieve these goals.

General Goals

- Individual compensatory mitigation sites should be designed and constructed to maximize the likelihood that they will make an ongoing ecological contribution to the watershed; this contribution should be specified in advance.
- Compensatory mitigation should be in place concurrent with, and preferably before, permitted activity.
- To ensure the replacement of lost wetland functions, there should be effective legal and financial assurances for long-term site sustainability and monitoring of all compensatory wetland projects.

Specific Recommendations

- Impact sites should be evaluated using the same functional assessment tools as used for the mitigation site.
- Mitigation projects should be planned with and measured by a broader set of wetland functions than are currently employed.
- Mitigation goals must be clear, and those goals carefully specified in terms of measurable performance standards, in order to improve mitigation effectiveness. Performance standards in permits should reflect mitigation goals and be written in such a way that ecological viability can be measured and the impacted functions replaced.
- Because a particular floristic assemblage might not provide all the functions lost, both restoration of community structure (e.g., plant cover and composition) and restoration of wetland functions should be considered in setting goals and assessing outcomes. Relationships between structure and function should be better known.
- The Corps of Engineers and other responsible regulatory authorities should use a functional assessment protocol that recognizes the watershed perspective to establish permittee compensation requirements.
- Dependence on subjective, best professional judgment in assessing wetland function should be replaced by science-based, rapid assessment procedures that incorporate at least the following characteristics: effectively assess goals of wetland mitigation projects; assess all recognized functions; incorporate effects of position in landscape; reliably indicate important wetland processes, or at least scientifically established structural surrogates of those processes; scale assessment results to results from reference sites; are sensitive to changes in performance over a dynamic range; are integrative over space and time; and generate parametric and dimensioned units, rather than nonparametric rank.

- The Corps of Engineers and other responsible regulatory authorities should take actions to improve the effectiveness of compliance monitoring before and after project construction.
- Compensatory mitigation sites should receive long-term stewardship, i.e., a time frame expected for other publicly valued assets, such as parks.
- The Corps of Engineers and other responsible regulatory authorities should establish and enforce clear compliance requirements for permittee-responsible compensation to assure that (1) projects are initiated no later than concurrent with permitted activity, (2) projects are implemented and constructed according to established design criteria and use an adaptive management approached specified in the permit, (3) the performance standards are specified in the permit and attained before permit compliance is achieved, and (4) the permittee provides a stewardship organization with an easement on, or title to, the compensatory wetland site and a cash contribution appropriate for the long-term monitoring, management and maintenance of the site.

Conclusion 4: Support for regulatory decision making is inadequate.

In addition to using a watershed framework, the federal regulatory authorities can work to improve functional wetland assessment, permit compliance monitoring, staff training, research, and collaboration with state agencies. The committee recommends that the Corps of Engineers, Environmental Protection Agency, and other responsible regulatory authorities take several specific actions.

Recommendations

- To assist permit writers and others in making compensatory mitigation decisions, a reference manual should be developed to help design projects that will be most likely to achieve permit requirements. The manual should be organized around the themes developed in this report. The Corps of Engineers should develop such a manual for each region, based in part on the careful enumeration of wetland functions in the 404(b)(1) guidelines and in part on local and national expertise regarding the difficulty of restoring different wetland types, hydrological conditions, and functions in alternative restoration or creation contexts.
- The Corps of Engineers and other responsible authorities should commit funds to allow staff participation in professional activities and in technical training programs that include the opportunity to share experiences across districts.

- The Corps of Engineers and other responsible regulatory authorities should establish a research program to study mitigation sites to determine what practices achieve long-term performance for creation, enhancement, and restoration of wetlands.
- States, with the participation of appropriate federal agencies, are encouraged to prepare technical plans or initiate interagency consensus processes for setting wetland protection, acquisition, restoration, enhancement, and creation project priorities on an ecoregional (watershed) basis.

Conclusion 5: Third-party compensation approaches (mitigation banks, in-lieu fee programs) offer some advantages over permittee-responsible mitigation.

The committee evaluated several compensatory mitigation mechanisms and developed a taxonomy to evaluate their potential strengths and weaknesses. Mechanisms were characterized by the following five attributes: (1) on-site or off-site compensatory mitigation action; (2) responsible party; (3) timing of the mitigation actions; (4) whether the Mitigation Banking Review Team process is used; and (5) stewardship requirements. The committee does not favor any particular mechanism but has offered recommendations that will, if adopted, assure that permittee-responsible as well as third-party mitigation will secure no net loss of wetlands. In addition, the committee believes that no net loss of wetlands will require a strengthened partnership with the states.

Recommendations

- The taxonomy developed by the committee is recommended as a reference point for discussions about compensatory mitigation. In practice, however, a compensatory mitigation mechanism may not fit neatly into one of the listed categories (e.g., mitigation bank versus in-lieu fee versus cash donation). Accordingly, the committee recommends that when an agency reviews mitigation options, it is most important to focus on their characteristics or attributes (e.g., who is legally responsible, the timing of the mitigation actions, whether the Mitigation Banking Review Team process is used, and whether stewardship requirements are in place).
- Institutional systems should be modified to provide third-party compensatory mitigation with all of the following attributes: timely and assured compensation for all permitted activities; watershed integration; and assurances of long-term sustainability and stewardship for restored, created, enhanced, or preserved wetlands.
- The Corps of Engineers and the Environmental Protection Agency should work with the states to expand their permitting and watershed planning programs to fill gaps in the federal wetland program.

CONCLUSION

The Clean Water Act Section 404 program should be improved to achieve the goal of no net loss of wetlands for both area and functions. The above recommendations will help to achieve this goal. It is of paramount importance that the regulatory agencies consider each permitting decision over broader geographic areas and longer time periods, i.e., by modifying the boundaries of permit decision making in time and space.

G

Washington State Wetland Mitigation Evaluation Study
Phase 1: Compliance

Patricia A. Johnson[1], Dana L. Mock[2], Emily J. Teachout[3], and Andy McMillan[1].

[1]Washington State Department of Ecology
Shorelands & Environmental Assistance Program, Lacey, WA.
[2]Americorps/Washington Conservation Corps, Lacey, WA.
[3]US Fish and Wildlife Service, Lacey, WA.

June 2000
Publication No. 00-06-016

Printed on recycled paper

Washington State Wetland Mitigation Effectiveness Evaluation Study. Phase 1: Compliance. P. Johnson, D. Mock. June, 2000. http://www.ecy.wa.gov/biblio/0006016.html

Executive Summary

The Washington State Wetland Mitigation Evaluation Study assessed the effectiveness of compensatory wetland mitigation statewide. This study was initiated in response to a 1998 King County study (Mockler et al. 1998) which found that over three-quarters of the wetland mitigation sites evaluated in King County were unsuccessful according to their performance standards. The Wetland Mitigation Evaluation Study is a two-phase study to investigate the level of permit compliance and ecological functioning of a representative random sample of compensatory wetland mitigation projects in Washington.

The Phase 1 report describes the results from the first phase of the Wetland Mitigation Evaluation Study, which focused on the degree of compliance with permit requirements for compensatory wetland mitigation projects. Forty-five compensatory wetland mitigation sites were randomly selected from the US Army Corps of Engineer's Section 404 database and the Department of Ecology's Section 401 database. Background information was collected from the Corps' files, Ecology's files, and from project applicants or their consultants. Site conditions were evaluated against what was specified in Section 404 permits, Water Quality Certifications, Wetland Mitigation Plans, and/or Monitoring Reports.

Permit compliance for each of the 45 compensatory wetland mitigation projects was evaluated in three parts:

- Was the compensatory mitigation project implemented?
- Was it implemented to plan? and
- Was it meeting its performance standards (those assessable by the methods of this study)?

Overall, 13 projects (29%) were in full compliance with all three questions. Forty-two projects (93%) were implemented, and of those, 23 projects (55%) were implemented to plan. Thirty-four projects had performance standards that could be evaluated, and of those, 12 projects (35%) were meeting all performance standards assessable by this study.

A number of problems were encountered while conducting this study. Primarily, Ecology's 401 database contained numerous incomplete or inaccurate entries and project files were often either missing or lacking critical information. In addition, the methods and timing of site visits (fall of 1999) for Phase 1 did not allow assessment of all performance standards.

Recommendations for improving permit compliance are directed at applicants and permitting agencies. If followed, the recommendations should promote greater compliance. The recommendations for permitting agencies, specifically Ecology, are:

- Make permit follow-up and enforcement a higher priority;
- Consistently require project applicants to submit as-built and monitoring reports;
- Develop an effective permit/compensatory mitigation tracking system; and
- Create and maintain a comprehensive project filing system.

Wetland Mitigation Evaluation Study: Phase 2

Executive Summary

The "Washington State Wetland Mitigation Evaluation Study" was conducted in two phases to evaluate the success of projects intended to compensate (mitigate) for wetlands lost to development activities in the state of Washington. Phase 1 of the study, conducted in the fall of 1999, examined the compliance of 45 randomly selected projects with their permit requirements. Phase 2 examined the ecological success of a subset of the projects from Phase 1. The study did not include any Washington State Department of Transportation mitigation projects.

Over all, 24 compensatory wetland-mitigation projects (at 31 sites) were evaluated in Phase 2. Eighteen projects were located west of the Cascade Mountains, and six projects were located east of the Cascade crest.

The goal of Phase 2 of the Wetland Mitigation Evaluation Study was to determine the success of wetland mitigation projects from an ecological perspective. The overall success of mitigation projects in Phase 2 was evaluated based on two factors, each with its own criteria.

- **Achievement of ecologically relevant measures:**
  - Establishing the required acreage of mitigation.
  - Attaining ecologically significant performance standards.
  - Fulfilling appropriate goals and/or objectives.
- **Adequate compensation for the loss of wetlands:**
  - Contribution of the mitigation activity to the potential performance of functions.
  - Comparison of the type and scale of functions provided by the mitigation project with the type and scale of lost wetland functions.

In addition to evaluating the success of mitigation projects, the Phase 2 study also examined:

- Wetland resource trade-offs (e.g., in-kind/out-of-kind, on-site/off-site, etc.).
- Ecological condition (e.g., surrounding land uses, buffer condition, extent of invasive species, etc.).
- Factors that were associated with project success (or lack of success).

Over all, three projects (13 percent) were found to be fully successful; eight projects (33 percent) were moderately successful; eight (33 percent) were minimally successful; and five (21 percent) were not successful.

The results of the Phase 2 study indicate that "created wetlands" are more successful than previous studies have shown, since 60 percent of them were at least moderately successful, and only one project (10 percent) was not successful. However, only 65

percent of the total acreage of wetlands lost was replaced by creating or restoring new wetland area, thereby resulting in a net loss of 24.18 acres of wetland area.

No enhancement projects were fully successful, while eight out of nine (89 percent) enhancement projects were minimally or not successful. Nearly two-thirds of the total acreage of mitigation that was established resulted from enhancement activities.

In addition, mitigation projects designed and implemented by public entities[1] fared worse than projects done by private entities: 71 percent of private mitigation projects were judged to be fully or moderately successful, while 35 percent of public mitigation projects were judged to be fully or moderately successful. However, the difference in level of success between public and private projects is not statistically significant, because the sample size was too small.

Seventy-nine percent of mitigation projects were at least somewhat achieving their ecologically relevant measures, while 63 percent of projects at least partially compensated for the permitted wetland losses. This implies that, although projects may be doing a reasonable job of achieving ecologically relevant permit requirements, these requirements are not always sufficient indicators of whether mitigation projects adequately compensate for the permitted loss of wetlands.

Phase 2 findings suggest that follow-up by regulatory agencies results in more-successful mitigation projects. Responses to a consultant questionnaire indicated that 75 percent of the fully and moderately successful projects experienced some degree of agency follow-up, while only 27 percent of the minimally and not-successful projects had some follow-up.

It was interesting to note that being out of compliance with permit requirements did not necessarily mean a mitigation project ultimately would be unsuccessful. In fact, 66 percent of the projects that ultimately were fully successful were not in compliance in Phase 1. However, all of the projects that ultimately did not succeed also were not in compliance with their permits. The primary key to success appears to be follow-up monitoring and maintenance to make sure the mitigation actions have a chance to work.

Based on these results, the authors recommend that Department of Ecology improve the follow-up on wetland mitigation projects by developing and implementing a compliance tracking system. Additionally, Ecology should work collaboratively with other regulatory agencies, applicants, and their consultants to come up with new guidance to improve mitigation at every step in the process, from choosing an appropriate site to monitoring and performing site maintenance. By working together, those involved in wetland mitigation can develop solutions and approaches that improve wetland mitigation, and thereby help to protect the state's valuable wetland resources.

---

[1] Washington State Department of Transportation (WSDOT) projects were not included in this study.

H

Parametrix, Inc. *Consultants in Engineering and Environmental Sciences*

5808 Lake Washington Blvd. NE, Suite 200, Kirkland, WA 98033-7350
425-822-8880 • Fax: 425-889-8808

TRANSMITTAL FORM

To: **Ann Kenny**
Department of Ecology
NW Regional Office
3190 160th Ave. S.E.
Bellevue, WA 98008

Date: **July 12, 2001**
Project Number: **556-2912-001 (03)**
Project Name: **Master Plan Update Improvements Sea-Tac International Airport**

We are transmitting the following materials:

STIA - Wetland Photographs and Maps - Three copies of report.

STIA - Natural Resource Mitigation Plan - four tables:

Table 7.7-1	Final performance standards, evaluation approach, and contingency measures for the Auburn wetland mitigation project.
Table 5.1-7	Final performance standards, evaluation approaches, and contingency measures for mitigation projects at Vacca Farm
Table 5.2-12	Final performance standards, evaluation approach, and contingency measures for replacement drainage channels.
Table 5.3-6	Final performance standards, evaluation approach, and contingency measures for monitoring borrow area wetlands.

Comments:

These are:
- ☐ PER YOUR REQUEST
- ☐ FOR YOUR INFORMATION
- ☐ FOR YOUR REVIEW AND APPROVAL
- ☐ FOR YOUR FILES
- ☐ FOR YOUR ACTION

Sent Via:
- ☐ U.S. MAIL
- ☒ COURIER
- ☐ EXPRESS OVERNIGHT
- ☐ OTHER – INTEROFFICE
- ☐ HAND DELIVERY/PICK UP

Sincerely,

cc: Katie Walter, Shanon & Wilson

Jim Kelley

Table 5.2-12. Final performance standards, evaluation approach, and contingency measures for replacement drainage channels.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
1^. Construct the replacement channel to convey the 100-year, 24-hour design storm, and seepage water collected by the embankment drain layer and adjacent areas.	Replacement channels will meet or exceed design criteria for high flow. Channel depths will be a minimum of 2 ft deep with side slopes of 3:1 or flatter; or if slopes are steeper, log and rock weirs will protect channel banks.	Verify with record drawings.	Enlarge channel if conveyance is inadequate.
2. Direct water in drainage channels to discharge points in or adjacent to riparian wetlands along Miller Creek (Wetlands A13, 18, 37a, 39, 44a, R9).	Flowing water will be present in Segment B and Segment C from December to June in years of normal rainfall . Groundwater in wetlands with predominantly organic soils (Portions of Wetland 18, 37a, R14a, A14b, and 44a) will be within 10 inches of the soil surface at least between March and mid-June in years of normal rainfall. Other wetlands with predominantly mineral soils will have soils saturated in the upper part to mid-April in years of normal rainfall. Wetland indicator status of the dominant plant species will not differ from pre-project conditions at the end of the monitoring period. The wetland hydrology observed following project construction is sufficient to maintain the hydric soil conditions observed in the wetland and the types of wetland vegetation present prior to construction.	Measurements of channel baseflow by installing weirs that allow quantity of water flowing through channels to be determined. Map organic and inorganic soils. Monitor duration and depth to water table in wetlands to determine if wetland hydrology persists. The data will be related to the wetland indicator status of dominant wetland plants, the information on vegetation tolerance of various hydrologic regimes, and the intensity of reducing soil conditions (i.e. iron reduction (creating mottled and gleyed soil colors) or organic matter accumulation). This analysis will be used to determine whether the post-construction hydrology observed through monitoring can reasonably be expected to maintain the wetland soils and	Modify discharge points from channel to wetlands to meet performance standards. Divert treated stormwater from up slope stormwater ponds to drainage channels. Improve drainage paths to convey water to wetlands. Remove obstructions and/or enlarge channels as needed. Reconfigure drainage channels to maintain flows (i.e., longer drainage channels to collect more water for distribution to wetlands). Divert treated stormwater from up slope stormwater ponds to drainage channels (the source of this stormwater could be from biofiltration swales, filter strips, etc. treating runoff from the perimeter road). Reconfigure discharge (i.e., location, size and number of discharge points that distribute water to wetlands from drainage channels).

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
		vegetation currently present in the wetlands.	
3. Plant native shrubs at greater than 2,100 individuals per acre and native trees at greater than 280 trees per acre along channel banks.	Shrub density will be at least 2,100 individuals per acre. Tree density will be at least 280 stems per acre. Average tree and shrub survival will be at least 80% during the first 3 monitoring years. Average canopy cover of native species will be at least 80% by monitoring year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline. Canopy cover of non-native invasive species will be no more than 10% by monitoring year 15.	Vegetation sampling (plots, transects, or plotless techniques) to estimate cover, density, mortality, and invasive species.	If standards are not met: Select species that are better adapted to existing hydrologic conditions. Install additional plant material. Install protective collars to reduce herbivore damage. Control/reduce non-native invasive species.

^Indicates a key design standard to be determined from the as-built condition. These standards typically do not require ongoing monitoring.

Table 5.1-7. Final performance standards, evaluation approaches, and contingency measures for mitigation projects at Vacca Farm.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
I. Relocation of Miller Creek			
1.^ Construct low flow channel 8 feet wide with 1:1 slopes and 0.5 ft deep to convey summer base flows.	Maintain a a minimum water depth of 0.25 ft (with flows of 0.5 cfs).	Dry and wet season measurements of water depths and velocities.	Evaluate factors responsible for not meeting performance standards. Adjust channel depth or channel bottom width using habitat features such as logs, boulders, root wads, etc., or regrading channel if necessary.
2.^ Construct high flow channel 32 feet wide, with side slopes of 2:1 (typical) from depths of 0.5 to 1.0 ft to provide capacity for wet season base flow.	Wet season (October to April) average base flow depth is 1 ft (at 5 cfs).	See above.	See above.
3. The channel cross section will provide an average dry season base flow velocity that is greater than the silt transport velocity (0.7 ft/sec).	Flow velocities will exceed 0.7 cfs.	Measurements of stream velocity.	Alter velocities in low-flow channel using woody debris or boulders. Add increased amounts of LWD, boulders, or gravel bars to increase velocity.
4. Design a natural channel with stable gravel bottom in riffle sections suitable for spawning of cutthroat trout.	Substrates will contain less than 20% fine sediments (i.e., sand or smaller) in riffle sections.	Riffle areas will be delineated as part of the as built plans. A volumetric assessment of substrate (using McNeil cores or bulk samples) will be performed to document substrate conditions.	If fine sediments are present, evaluate sources and potential stabilization methods to control or eliminate fine sediments. Alter velocities in low-flow channel using woody debris or boulders.
5. Channel flow velocity is less than the gravel movement velocity (4 ft/sec) for the 100-year flow.	Scoured channel bottom sections, if present, shall not cumulatively exceed 10 linear feet. Bed material size will not increase significantly compared to as-built conditions.	A volumetric assessment of substrate (using McNeil cores or bulk samples) will be used to document substrate conditions. Channel surveys will be performed to evaluate the presence of scouring or erosion.	Adjust width of channel, replace spawning gravels, and/or repair any eroded channel banks with bioengineering or additional streambank plantings.
6. Flows greater than the annual peak flow will overtop the channel and inundate the adjacent floodplain restoration.	Flows greater than 40 cfs will overtop the stream banks and flow into the floodplain.	Measure water elevations in the stream channel and floodplain and relate to stream flow and as built topography (e.g., floodplain	Adjust bank height, channel morphology, or roughness to alter amounts of over bank flow. Regrade channel banks if necessary.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
		elevation and berm height).	
7. Provide instream habitat features such as deflectors and overhanging logs as needed to maximize available habitat.	A minimum of 20 in-stream habitat features (e.g., LWD, overhanging logs, deflector logs, or root wads) will be present. Numbers of habitat features remain stable or increase compared to as-built condition.	Measure abundance, sizes, and location of LWD in the new channel.	If losses of LWD occur, evaluate factors contributing to reduction in LWD (e.g., high flows) and address. Add LWD to channel as necessary.
8. Provide approximately 3.0 acres of vegetated buffer on the east side of the channel. Establish native vegetation along channel banks and the riparian zone of the new channel.	Establish 3.0 acres of native shrub/forested riparian zone and upland buffers with an average tree density of at least 280 stems/acre and shrub density of at least 2,100 individuals per acre. Average survival of planted trees and shrubs in the first 3 monitoring years shall be at least 80%; cover of native species will be 80% by year 15. Cover of non-native invasive species will be no greater than 10% by monitoring year 15.	Vegetation sampling (plots, transects, or plotless techniques) to measure stem density plant cover, count live and dead plants, and measure cover of non-native invasive species.	Install additional plants if necessary. Identify substitute native species that are adapted to site conditions. Eliminate or reduce the abundance of non-native invasive species. Install protective collars to reduce herbivore damage.
9. Densely plant woody vegetation along the new channel to cover open water and reduce use of the area by waterfowl.	Canopy cover extending over the low flow channel will be 80 percent by the end of the monitoring period.	Vegetation sampling to determine tree and shrub cover.	Add additional plants if areas of exposed stream channel are present.
II. Wetland Enhancement and Restoration			
1.[A] Provide for approximately 5.94 acre-ft of flood storage on Vacca Farm to compensate for approximately 5.24 acre-ft filled for the embankment. Excavate drainage swales to provide positive drainage from the floodplain and prevent standing water during non-flood periods.	Provide 5.9 acre-ft of flood storage to compensate for 5.2 acre-ft filled for the embankment. The floodplain area will slope towards drainage swales which connect to Miller Creek.	Record drawings and hydrologic monitoring to verify necessary flood storage is present	Regrade area if not excavated to specifications. Modify design of swales to improve drainage conditions if necessary.
2. Use excavated material from grading the floodplain to create topographic	Topographic features (mounds, ridges) will be constructed at a density of 4 per	Determine density from record survey.	Construct additional features if project has not been built to specifications.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
variation in the floodplain.	acre.		
3. Remove ditches and drains to reduce drainage rates and improve wetland hydrology. Grade floodplain to elevations that restore wetland hydrology.	Groundwater levels in the floodplain wetlands will be within 10 inches of the soil surface for at least the period between March and June during years of normal precipitation.	Hydrologic monitoring using shallow wells. Evaluate hydrologic conditions relative to recent precipitation.	Modify grading, drainage swales, or channel configuration to decrease or promote soil saturation.
4. Restore and enhance approximately 9.24 acres of farmed wetlands, wetland, and prior converted cropland in the floodplain and wetlands around Lora Lake with native vegetation. Enhance approximately 1.8 acres of floodplain and Lora Lake shoreline buffer with native vegetation (see Table 5.1.1).	The restoration area will be a minimum of 11 acres.	Determine area from record survey.	Modify construction if not built as specified.
5. Plant native shrub species in these areas at densities of greater than 2,100 per acre. Intersperse native trees in this area.	Shrub and tree survival will average at least 80% in the first 3 monitoring years. At that time, at least 2,100 shrubs/acre will remain. Percent canopy cover of native species will be at least 80% by year 15. Non-native invasive species cover will be no more than 10% by year 15 in newly planted areas. By the end of year 3, the number of species of trees and shrubs will not decrease by more than 10% from the number installed at baseline.	Vegetation sampling (plots, transects, or plotless techniques) measure vegetation cover and diversity.	If standards are not met: • Select species that are better adapted to existing hydrologic conditions. • Install additional plant material. • Install protective collars to reduce herbivore damage. • Control/reduce non-native invasive species.
6. Plant the floodplain with native trees, shrubs, and tall grasses (see Table 5.1-11 and 5.1-12) to deter waterfowl.	Percent canopy cover of native species will be at least 80% by year 15.	Vegetation sampling (plots, transects, or plotless techniques) to estimate canopy cover.	See above.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
7. Enhance existing forested wetland south of Lora Lake with native trees and shrubs. Total density of planted material will be greater than 250 stems/acres (trees) and 1,700 individuals per acre (shrubs).	Percent canopy cover of native species will be at least 80% by year 15.	Vegetation sampling (plots, transects, or plotless techniques) to estimate canopy cover.	See above.
III. Lora Lake Buffer Enhancement			
1. Plant a 25-ft buffer (0.60 acre) around Lora Lake with native trees and shrubs. Plant native tree species at densities of greater than 280 per acre. Plant native shrub species at densities of greater than 2,100 per acre.	Average survival of planted stock will be at least 80% in the first 3 monitoring years. Following year 3, at least 280 trees per acre and 2,100 shrubs per acre will be present. Percent canopy cover of native species will be at least 80% by year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline. Non-native invasive species cover will be no more than 10% by year 15 in newly planted areas.	Vegetation sampling (plots, transects, or plotless techniques), as described above.	Contingency measures for vegetation performance standards are described above.
2. Concrete bulkhead will be removed and shoreline graded to a stable slope configuration.	Record drawings and photo documentation verify that the concrete bulkhead has been removed. New shoreline of Lora Lake will have a slope of 3:1 or less.	Record drawings to verify removal and bulkheads and slope of shoreline.	Remove all structures and bulkhead areas to be consistent with design. Re-grade as necessary to be consistent with design.

[A]Compliance with this performance standard will be determined from the as-built drawing, and will generally not require ongoing monitoring.

Table 5.3-6. Final Performance Standards, Evaluation Approach, and Contingency Measures for Monitoring Borrow Area Wetlands.

Design Criteria	Performance Standard	Evaluation Approach	Contingency Measures
Maintain wetland hydrology by redirecting surface water runoff to the wetlands near Borrow Area 1.	Soils in wetlands near Borrow Area 1 (Wetlands 48 and B15) will be saturated to the surface from December to April in years of normal rainfall.	Shallow groundwater monitoring wells.	Minor regrading to direct surface water runoff to wetlands
Maintain wetland hydrology by directing groundwater seepage and surface water runoff via an interceptor swale to wetlands in and near Borrow Area 3.	Wetland 30 will have shallow standing water up to 24 inches deep during the breeding season for resident amphibians (i.e., December to April).	Shallow groundwater monitoring wells.	Adjust length and discharge points of interceptor swale system
	Wetland 29 will have soils saturated to the surface from December to April in years of normal rainfall.	Shallow groundwater monitoring wells.	Adjust length and discharge points of interceptor swale system

Table 7.7-1. Final performance standards, evaluation approach, and contingency measures for the Auburn wetland mitigation project.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
1. Use a perched water table to establish wetlands at the approximate final grades of: East Basin: 41 ft to 38 ft in emergent wetlands 42 ft to 41 ft in shrub wetlands 45 ft to 42 ft in forested wetlands Below 38 ft in open-water wetland West Basin: 42 ft to 44 ft in emergent wetlands 44 ft to 47 ft in shrub wetlands 47 ft to 49 ft in forested wetlands Below 42 ft in open-water wetland	Wetland areas will meet the following hydrology criteria: In forested areas, soils will be saturated within the upper 12 inches for a minimum of 2 weeks during the growing season. In shrub areas, soils will be saturated within the upper 6 inches for a minimum of 6 weeks during the growing season. In emergent zones, soils will be saturated to the soil surface for 6 months.	Measure hydrology using ground water monitoring wells, soil pits, and staff gages.	Modify surface drainage features or control elevations of drainage channels. Minor regrading if necessary
2. Plant five forested wetland plant associations that are similar in composition to naturally occurring plant associations. Use native deciduous and evergreen species such as black cottonwood, Oregon ash, red alder, western red cedar, and Sitka spruce. Forested communities will have a native shrub understory with species such as salmonberry, twinberry, red-osier dogwood, red elderberry, willows, and vine maple.	Forested wetlands will cover at least 36 acres of the mitigation site. Native upland forest habitat will be established on approximately 16 acres of the mitigation site.	Measured using record surveys, vegetation monitoring, and mapping. Verify areas available for vegetation zones on completion of grading and prior to planting.	Replant as necessary to achieve desired vegetation. Adjust planting areas to match as-built grades and planned vegetation zones.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
3. Plant native tree species at densities greater than 280 trees per acre. Plant native shrub species in forested communities at densities greater than 1,800 plants per acre.	Forested wetlands will have at least 80% cover of native species by monitoring year 15. Forested wetlands will have no more than 10% cover of non-native invasive species by monitoring year 15. Average survival of planted stock will be at least 80% in the first 3 monitoring years. At this time tree species density will be at least 280 trees per acre in forested wetland areas and shrub density will be at least 1,800 individual plants per acre in areas of the forested wetland that are planted with shrubs (i.e., over 25% to 50% of the area). By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	Verify using record surveys and vegetation monitoring. Vegetation sampling (plots, transects, or plotless techniques) to determine plant mortality, density, cover, and presence of invasive species. Vegetation analysis will employ statistically valid sampling and analysis procedures.	Replant as necessary to meet required density. If standards are not met: Select species that are better adapted to existing hydrologic conditions. Install additional plant material. Install protective collars to reduce herbivore damage. Control/reduce non-native invasive species. Implement integrated weed management plan, which may include test plots to evaluate potential control methods, mechanical removal, manual controls (i.e., chopping, digging) mowing, mulching, biological control, and/or herbicides.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
3. Plant an association of native shrub wetland species that is similar in composition to naturally occurring shrub wetlands, including species such as Pacific willow, Hooker's willow, Sitka willow, red-osier dogwood, and twinberry.	Shrub wetlands will cover at least 6.10 acres of the mitigation site. Species composition in the shrub wetland will include at least a 5% component of each native species planted. Average survival of planted stock will be at least 80% during the first 3 monitoring years. Following year 3, shrub density will be at least 2,100 plants per acre in shrub wetland areas. Canopy cover of native species will be at least 80% by monitoring year 15. Shrub areas will have no more than 10% cover of non-native invasive species by monitoring year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	See above.	See above.
4. Plant an association of native emergent	Emergent wetlands and open-water	See above.	See above.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
wetland species similar in composition to naturally occurring emergent wetlands. Use native species that are suited to seasonally and/or permanently flooded conditions, such as water parsley, hardstem bulrush, and common spike rush.	habitat will cover at least 6.8 acres of the mitigation site. Native emergent wetland species will contribute at least 90% of plant cover in areas planted with emergent species by monitoring year 15.		
5. Plant native emergent species in approximately 0.05-acre monotypic patches.	Species composition (stem density or percent composition) in the emergent wetland will include at least a 5% component of each native species planted. Emergent areas will have no more than 10% cover of non-native invasive species by monitoring year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	See above.	See above.
6. Establish an approximately 100-ft-wide forested buffer around the perimeter of the mitigation site. The buffer will be densely planted with native trees and shrubs to provide site protection and discourage access to the site by people or domestic animals.	Average survival of planted stock in the buffer will be at least 80% during the first 3 monitoring years. Canopy cover of native species in the buffer will be at least 80% by monitoring year 15. Canopy cover of non-native invasive species will be no more than 10% by monitoring year 15.	See above.	See above.
7. Provide year-round shallow water with patches of emergent vegetation as feeding	Permanently flooded emergent wetlands will have shallow-water habitat (<12	Hydrologic monitoring and vegetation surveys.	Replant or minor regrading as necessary.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
habitat for dabbling duck species.	inches deep) near the edges, with emergent vegetation and bottom detritus interspersed throughout.		
8. Provide ponded water areas for water resting habitat.	Ponded water at least 26 inches deep will occur in open areas of at least 1 acre from December through May.	Hydrologic monitoring.	Minor regrading as necessary.
9. Plant forested wetland adjacent to shrub, emergent, and open-water habitats.	Perch sites in the forested canopy will overhang emergent wetland areas.	Vegetation monitoring, site mapping.	Replant as necessary.
Plant portions of the forested wetland with shrub understory species to provide a multiple-layered canopy adjacent to the shrub portion of the wetland.	Forested wetlands will have a shrub understory of approximately 1,800 individual plants per acre over 25% to 50% of the area, depending on the planting zone.		
	Evidence of songbird nesting (nests, breeding territories, or observations of breeding behavior) will be present.	Seasonal surveys for wildlife.	
10. LWD (stumps and logs of native species) placed throughout the forested wetland to provide year-round cover for small mammals.	LWD placed at densities of 50 pieces per acre (approximately 25 ft on-center).	As-built surveys for wood placement and topography.	Supplement with more wood as necessary.
Low hummocks constructed in the shrub wetland areas to provide non-saturated soils for burrowing small mammals.	Shrub hummocks (with a minimum area of 150 ft^2 at elevation 43 ft) at least 4 per acre in the shrub zone.	As-built surveys to verify grades; vegetation surveys. Wildlife surveys.	
	Evidence of small mammal use (nests, feeding signs, observations) will be present.		
11. Provide attachment substrate for breeding amphibian species in areas of	At least 50% of live and dead stems in ponded emergent wetland areas will be species with stem diameters less than	Vegetation surveys.	Replant as necessary.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
ponded water.	0.25 inch.		
	Evidence of amphibian breeding (egg masses, larval stages) will be present.	Amphibian surveys during the breeding season.	
12. Screen the wetland from off-site areas.	Forest and shrub buffers (100-ft-wide) screen the site.	Vegetation surveys.	Replant as necessary.
13. Enhance habitat functions of existing wetland.	Plant sections of the existing wetland with native trees and shrubs at densities of at least 2,100 individual plants per acre for shrubs and at least 280 stems per acre for native trees.	Vegetation sampling (plots, transects, or plotless techniques) to determine plant mortality, density, cover, and presence of invasive species.	If standards are not met: Select species that are better adapted to existing hydrologic conditions. Install additional plant material. Install protective collars to reduce herbivore damage. Control/reduce non-native invasive species. Implement integrated weed management plan, which may include test plots to evaluate potential control methods, use of mechanical removal, manual controls (i.e., chopping, digging) mowing, mulching, biological control, and/or herbicides

[1] All hydrologic criteria (water depths, soil saturation, etc.) must be met during years of normal rainfall, which is considered to be years when rainfall amounts are statistically similar to the long term average ($p>0.10$).

Table 7.7-1. Final performance standards, evaluation approach, and contingency measures for the Auburn wetland mitigation project.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
1. Use a perched water table to establish wetlands at the approximate final grades of: East Basin: 41 ft to 38 ft in emergent wetlands 42 ft to 41 ft in shrub wetlands 45 ft to 42 ft in forested wetlands Below 38 ft in open-water wetland West Basin: 42 ft to 44 ft in emergent wetlands 44 ft to 45 ft in shrub wetlands 47 ft to 49 ft in forested wetlands Below 42 ft in open-water wetland	Wetland areas will meet the following hydrology criteria: In forested areas, soils will be saturated within the upper 12 inches for a minimum of 2 weeks during the growing season. In shrub areas, soils will be saturated within the upper 6 inches for a minimum of 6 weeks during the growing season. In emergent zones, soils will be saturated to the soil surface for 6 months.	Measure hydrology using ground water monitoring wells, soil pits, and staff gages.	Modify surface drainage features or control elevations of drainage channels. Minor regrading if necessary
2. Plant five forested wetland plant associations that are similar in composition to naturally occurring plant associations. Use native deciduous and evergreen species such as black cottonwood, Oregon ash, red alder, western red cedar, and Sitka spruce. Forested communities will have a native shrub understory with species such as salmonberry, twinberry, red-osier dogwood, red elderberry, willows, and vine maple.	Forested wetlands will cover at least 36 acres of the mitigation site. Native upland forest habitat will be established on approximately 16 acres of the mitigation site.	Measured using record surveys, vegetation monitoring, and mapping. Verify areas available for vegetation zones on completion of grading and prior to planting.	Replant as necessary to achieve desired vegetation. Adjust planting areas to match as-built grades and planned vegetation zones.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
3. Plant native tree species at densities greater than 280 trees per acre. Plant native shrub species in forested communities at densities greater than 1,800 plants per acre.	Forested wetlands will have at least 80% cover of native species by monitoring year 15. Forested wetlands will have no more than 10% cover of non-native invasive species by monitoring year 15. Average survival of planted stock will be at least 80% in the first 3 monitoring years. At this time tree species density will be at least 280 trees per acre in forested wetland areas and shrub density will be at least 1,800 individual plants per acre in areas of the forested wetland that are planted with shrubs (i.e., over 25% to 50% of the area). By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	Verify using record surveys and vegetation monitoring. Vegetation sampling (plots, transects, or plotless techniques) to determine plant mortality, density, cover, and presence of invasive species. Vegetation analysis will employ statistically valid sampling and analysis procedures.	Replant as necessary to meet required density. If standards are not met: Select species that are better adapted to existing hydrologic conditions. Install additional plant material. Install protective collars to reduce herbivore damage. Control/reduce non-native invasive species. Implement integrated weed management plan, which may include test plots to evaluate potential control methods, mechanical removal, manual controls (i.e., chopping, digging) mowing, mulching, biological control, and/or herbicides.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
3. Plant an association of native shrub wetland species that is similar in composition to naturally occurring shrub wetlands, including species such as Pacific willow, Hooker's willow, Sitka willow, red-osier dogwood, and twinberry.	Shrub wetlands will cover at [redacted] acres of the mitigation site. Species composition in the shrub wetland will include at least a 5% component of each native species planted. Average survival of planted stock will be at least 80% during the first 3 monitoring years. Following year 3, shrub density will be at least 2,100 plants per acre in shrub wetland areas. Canopy cover of native species will be at least 80% by monitoring year 15. Shrub areas will have no more than 10% cover of non-native invasive species by monitoring year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	See above.	See above.
4. Plant an association of native emergent	Emergent wetlands and open-water	See above.	See above.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
wetland species similar in composition to naturally occurring emergent wetlands. Use native species that are suited to seasonally and/or permanently flooded conditions, such as water parsley, hardstem bulrush, and common spike rush.	habitat will cover at least 6.8 acres of the mitigation site. Native emergent wetland species will contribute at least 90% of plant cover in areas planted with emergent species by monitoring year 15.		
5. Plant native emergent species in approximately 0.05-acre monotypic patches.	Species composition (stem density or percent composition) in the emergent wetland will include at least a 5% component of each native species planted. Emergent areas will have no more than 10% cover of non-native invasive species by monitoring year 15. By the end of year 3, plant diversity in each stratum will not decrease by more than 10% from the number and type of plants installed at baseline.	See above.	See above.
6. Establish an approximately 100-ft-wide forested buffer around the perimeter of the mitigation site. The buffer will be densely planted with native trees and shrubs to provide site protection and discourage access to the site by people or domestic animals.	Average survival of planted stock in the buffer will be at least 80% during the first 3 monitoring years. Canopy cover of native species in the buffer will be at least 80% by monitoring year 15. Canopy cover of non-native invasive species will be no more than 10% by monitoring year 15.	See above.	See above.
7. Provide year-round shallow water with patches of emergent vegetation as feeding	Permanently flooded emergent wetlands will have shallow-water habitat (<12	Hydrologic monitoring and vegetation surveys.	Replant or minor regrading as necessary.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
habitat for dabbling duck species.	inches deep) near the edges, with emergent vegetation and bottom detritus interspersed throughout.		
8. Provide ponded water areas for water resting habitat.	Ponded water at least 26 inches deep will occur in open areas of at least 1 acre from December through May.	Hydrologic monitoring.	Minor regrading as necessary.
9. Plant forested wetland adjacent to shrub, emergent, and open-water habitats.	Perch sites in the forested canopy will overhang emergent wetland areas.	Vegetation monitoring, site mapping.	Replant as necessary.
Plant portions of the forested wetland with shrub understory species to provide a multiple-layered canopy adjacent to the shrub portion of the wetland.	Forested wetlands will have a shrub understory of approximately 1,800 individual plants per acre over 25% to 50% of the area, depending on the planting zone.		
	Evidence of songbird nesting (nests, breeding territories, or observations of breeding behavior) will be present.	Seasonal surveys for wildlife.	
10. LWD (stumps and logs of native species) placed throughout the forested wetland to provide year-round cover for small mammals.	LWD placed at densities of 50 pieces per acre (approximately 25 ft on-center).	As-built surveys for wood placement and topography.	Supplement with more wood as necessary.
Low hummocks constructed in the shrub wetland areas to provide non-saturated soils for burrowing small mammals.	Shrub hummocks (with a minimum area of 150 ft^2 at elevation 43 ft) at least 4 per acre in the shrub zone.	As-built surveys to verify grades; vegetation surveys. Wildlife surveys.	
	Evidence of small mammal use (nests, feeding signs, observations) will be present.		
11. Provide attachment substrate for breeding amphibian species in areas of	At least 50% of live and dead stems in ponded emergent wetland areas will be species with stem diameters less than	Vegetation surveys.	Replant as necessary.

Design Criteria	Performance Standard[1]	Evaluation Approach	Contingency Measures
ponded water.	0.25 inch.		
	Evidence of amphibian breeding (egg masses, larval stages) will be present.	Amphibian surveys during the breeding season.	
12. Screen the wetland from off-site areas.	Forest and shrub buffers (100-ft-wide) screen the site.	Vegetation surveys.	Replant as necessary.
13. Enhance habitat functions of existing wetland.	Plant sections of the existing wetland with native trees and shrubs at densities of at least 2,100 individual plants per acre for shrubs and at least 280 stems per acre for native trees.	Vegetation sampling (plots, transects, or plotless techniques) to determine plant mortality, density, cover, and presence of invasive species.	If standards are not met: Select species that are better adapted to existing hydrologic conditions. Install additional plant material. Install protective collars to reduce herbivore damage. Control/reduce non-native invasive species. Implement integrated weed management plan, which may include test plots to evaluate potential control methods, use of mechanical removal, manual controls (i.e., chopping, digging) mowing, mulching, biological control, and/or herbicides

[1] All hydrologic criteria (water depths, soil saturation, etc.) must be met during years of normal rainfall, which is considered to be years when rainfall amounts are statistically similar to the long term average (p>0.10).

Federal Aviation Administration
Office of Airport Safety and Standards
Airport Safety and Compliance Branch

U. S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services
National Wildlife Research Center

Wildlife Hazard Management At Airports

A manual for airport personnel
prepared by

Edward C. Cleary
U. S. Department of Transportation
Federal Aviation Administration

Richard A. Dolbeer
U. S. Department of Agriculture
Wildlife Services

12/99

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

AUTHORS

Edward C. Cleary, Staff Wildlife Biologist, Office of Airport Safety and Standards, Federal Aviation Administration, 800 Independence Ave. SW, Washington, DC 20591

Richard A. Dolbeer, Project Leader, U.S. Department of Agriculture, Wildlife Services, National Wildlife Research Center, 6100 Columbus Ave., Sandusky, OH 44870

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

TABLE OF CONTENTS

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

LIST OF TABLES

LIST OF FIGURES

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

ACKNOWLEDGMENTS

We thank S. C. Barras, J. L. Seubert (retired) and S. E. Wright of the U.S. Department of Agriculture (USDA), National Wildlife Research Center (NWRC), for assistance in the compilation of this manual and helpful reviews of earlier drafts. E. A. LeBoeuf (presently with the U.S. Air Force BASH team) and J. L. Rapol of the Airports Division, Federal Aviation Administration (FAA), were instrumental in initiating the computerized bird strike database. B. D. Castellano, E. L. Melisky, J. R. Roman, (Airports Division, FAA), B. MacKinnon (Airports Group, Transport Canada), J. E. Ostrom (Minneapolis-St. Paul International Airport), P. Eschenfelder (Air Line Pilots Association), B. Wilson (Airports Council International – NA), and G. E. Larson (USDA, Wildlife Services) also provided helpful comments. Funding for the writing of this manual was provided to the NWRC through an interagency agreement with the FAA, William J. Hughes Technical Center. We thank S. Agrawal and M. Hoven of the Technical Center for their support.

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

9.2.a. Flight Schedule Modification

Although not generally practical for regularly scheduled commercial traffic on larger airports, there may be various situations when flight schedules of some aircraft can be adjusted to minimize the chance of a strike with a wildlife species that has a predictable pattern of movement. For example, pilots could be advised not to depart during a 30-minute period at sunrise or sunset during winter when large flocks of blackbirds cross an airport going to and from an off-airport roosting site. In situations such as at Midway Atoll where albatrosses and other seabirds are abundant during parts of the year, scheduling nighttime arrivals and departures, when birds are not flying, may be the only means of avoiding strikes. Finally, air traffic controllers on occasion may need to temporarily close a runway with unusually high bird activity or a large mammal (e.g., deer) incursion until wildlife control personnel can disperse the animals.

9.2.b. Habitat Modification and Exclusion

Habitat modification means changing the environment to make it less attractive or inaccessible to the problem wildlife. All wildlife need food, cover and water to survive. Any action that reduces, eliminates or excludes one or more of these elements will result in a proportional reduction in the wildlife population at the airport.

Initially, management actions to reduce food, cover, and water on an airport may be expensive. However, when costs are amortized over several years, these actions may be the least expensive approach to reduce wildlife populations on the airport. Once a habitat modification is done correctly, it is generally not necessary to go back and do it again. Also, these control methods are generally well accepted by the public and minimize the need to harass or kill wildlife on the airport.

Artificial feeding of waterfowl promotes unnaturally high bird concentrations. This can adversely effect aircraft safety. Feeding wildlife should be prohibited at airports and discouraged in areas near airports. (Photo by E. C. Cleary, FAA)

9.2.b.i. Food

Some of the more common urban food sources for birds on and near airports include handouts from people in taxi stands and parks, grain elevators, sewage treatment plants and improperly stored food waste around restaurants and catering services. Rural food sources attractive to birds include sanitary landfills, feedlots, certain agricultural crops (especially cereal grains and sunflower), and spilled grain along road and rail rights-of-way.

Airport operators should be aware of these food attractants for birds that exist

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

on and in close proximity to the airport. On the airport, operators should require bird-proof storage of food waste, prohibit bird feeding, and promote good sanitation and litter control programs. Agricultural crops attractive to birds, such as cereal grains and sunflower, should be prohibited on airport lands leased for farming within the separation criteria identified in AC 150/5200-33 (see Chapter 5 and Appendix C). For nearby off-airport areas, airport operators should work closely with local governmental entities and landowners to discourage land-use practices and activities that provide food sources for problem bird species.

Trees and other landscaping plants selected for the street side of airports should not produce fruits or seeds attractive to birds. On airside areas, the large expanses of grass and forbs can sometimes provide ideal habitat for rodent and insect populations that attract raptors, gulls, other bird species, and mammalian predators such as coyotes. In addition, grasses allowed to produce seed heads can provide a desirable food source for doves, blackbirds and other species. The management of airside vegetation to minimize rodents, insects and seeds may be complex, requiring insecticide, herbicide and rodenticide applications, changes in vegetation cover, and adjustments in mowing schedules (e.g., mowing at night to minimize bird feeding on insects exposed by the mowing). Such management plans will need to be developed in conjunction with professional wildlife biologists and horticulturists knowledgeable with the local wildlife populations, vegetation and growing conditions (see below).

9.2.b.ii. Cover

All wildlife need cover for loafing, roosting, escape, and reproduction. Pigeons, house sparrows, and European starlings use building ledges, abandoned buildings, open girders and bridge work, and dense vegetation for cover. Blackbirds use marsh vegetation such as cattails for nesting and roosting. Many bird problems can be solved by eliminating availability of such areas either through removal or by exclusion.

Giant Canada geese, left undisturbed, will establish territories on urban lakes and ponds. In just a few years a pair of geese can easily increase to a flock of 100 or more. (Photo by E. C. Cleary, FAA)

Care should be taken when selecting and spacing plants for airport landscaping, not only to avoid production of fruits and seeds desired by birds as discussed above, but also to avoid the creation of areas of dense cover for roosting and nesting. Bird roosts that do form in trees on airports can generally be eliminated by thinning the canopy of trees and perhaps selectively removing trees to increase their spacing.

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

The management of airport airside vegetation to minimize bird activity is a controversial subject in North America. The general recommendation, based on studies in England in the 1960s and 1970s, has been to maintain a monoculture of grass at a height of 6-10 inches (Transport Canada) or 7-14 inches (U.S. Air Force). Tall grass, by interfering with visibility and ground movements, is thought to discourage many species of birds from loafing and feeding. However, the limited studies conducted in North America have not provided a consensus of opinion on the utility of tall-grass management for airports. For example, Canada geese do not appear to be discouraged by tall grass. In addition, maintenance of tall grass may result in increased rodent populations, a food source for raptors. Finally, maintenance of uniform stands of tall grass is difficult on many airports because of varying soil conditions. Arid regions in the western United States cannot maintain tall grass without irrigation.

Regardless of the grass height on the rest of the airport, the grass within the runway and taxiway safety areas should be maintained at a height of 3-4 inches. This will allow airport personnel and Airport Certification Safety Inspectors to visually inspect these areas for ruts, humps, depressions or other surface irregularities.

Until more research is completed, no general guidelines on grass height or vegetation type for airside areas of airports will be made. Airport operators should consult with professional wildlife biologists and horticulturists to develop a vegetation type and mowing schedule that is appropriate for the growing conditions and wildlife at the location. The main principles to follow are to use a vegetation cover and mowing regime that do not result in a build-up of rodent numbers or the production of seeds, forage or insects desired by birds.

Finally, dense stands of trees and undergrowth on airport property can provide excellent cover for deer, coyotes, geese, raptors, roosting blackbirds, rodents, and other wildlife. In general, these habitats should be cleared or at least sufficiently thinned to eliminate the desired cover and to allow easy visual and physical access by wildlife control personnel. All unnecessary posts, fences and other structures that can be used as perches by raptors and other birds should be removed from airside areas. Piles of construction debris and discarded equipment, unmowed fence rows, and other unmanaged areas often provide excellent cover for commensal rodents (rats and house mice). Such areas should be eliminated from airports.

All areas of standing water on the airport operating area should be drained to discourage bird use. (Photo courtesy USAF)

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

9.2.b.iii. Water

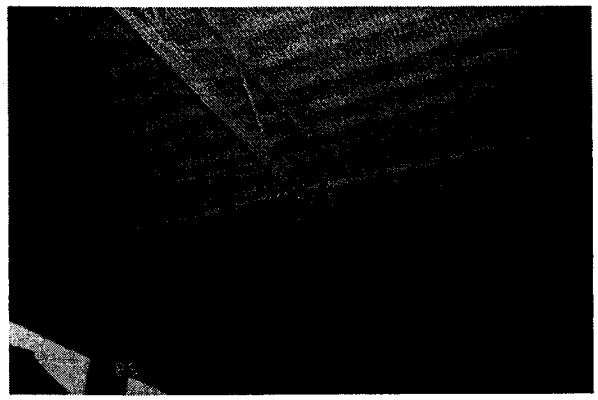
Water acts as a magnet for birds; therefore, all standing water on airports should be eliminated to the greatest extent possible. Depressions in paved and vegetated areas and disturbed areas at construction sites that accumulate standing water after rain should be filled or modified to allow rapid drainage. This is particularly important at coastal airports where fresh water is highly attractive to birds for drinking and bathing. Retention ponds, open drainage ditches, outdoor fountains and other wetland sites should not be established on or adjacent to airports.

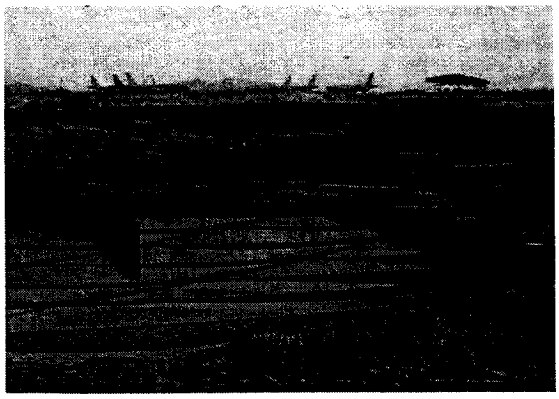
9.2.b.iv. Exclusion Techniques

If food, water, or cover can not be eliminated by habitat modification, then actions can sometimes be taken to exclude the wildlife from the desired resource. Exclusion involves the use of physical barriers to deny wildlife access to a particular area. As with habitat modification, exclusion techniques, such as installing a covered drainage ditch as opposed to an open ditch, can initially be costly. However, exclusion provides a permanent solution that is not only environmentally friendly, but when amortized over many years, may actually be the least expensive solution.

9.2.b.iv.a. Exclusion of Birds

Access to rafter and girded areas in hangars, warehouses, and under bridges can be





Birds can be prevented from roosting in hangars, warehouses, and under bridges by screening the rafters (left, photo by E. C. Cleary, FAA). Netting can also be installed over airport ponds to exclude birds (right, photo courtesy Wildlife Materials, Inc.).

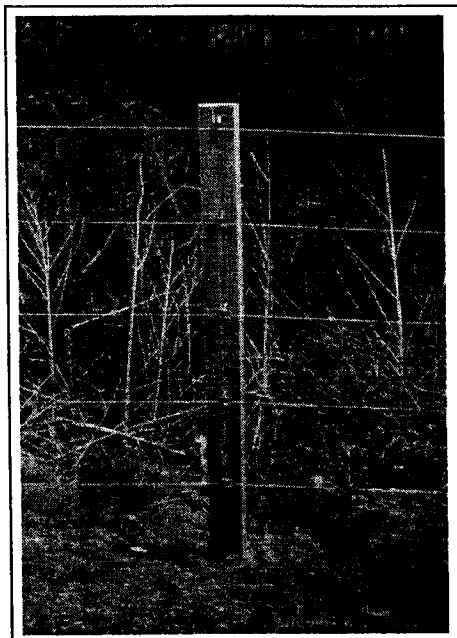
eliminated with netting. Curtains made of heavy-duty plastic sheeting, cut into 12-inch strips, and hung in warehouse or hangar doorways, can discourage birds from entering these openings. Porcupine wire can be installed on ledges, roof peaks, rafters, signs, posts, and other roosting and perching areas, to keep birds from using them. Changing the angle of building ledges to 45 degrees or more will deter birds from perching.

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

Gull and waterfowl use of retention ponds and drainage ditches can be reduced with over-head wire systems. A system of wires spaced 10 feet apart or in a 10- x 10-foot grid will discourage most gulls and waterfowl from landing. Similar wire systems have been successfully used to keep gulls off roofs and out of landfills, and to exclude crows from electrical substations. When it is desirable to eliminate all bird use, netting can be installed over small ponds and similar areas. However, birds are sometimes tangled in the netting, and maintenance problems arise with high winds and freezing weather. Complete coverage of ponds with plastic, 3-inch diameter "bird balls" will completely exclude birds and yet allow evaporation of water. Designing ponds with steep slopes will discourage wading birds such as herons. Use of culverts to totally cover water in drainage ditches is recommended whenever possible.

9.2.b.iv.b. Exclusion of Mammals

Airports should have a "zero tolerance" policy for deer, livestock and other large mammals in the aircraft operating area because of their severe threat to aviation safety (see Table 7-1). The best, albeit most costly, procedure for excluding these animals is a permanent, 10-foot high chain-link fence with barbed-wire outriggers that is inspected regularly to fix any holes, wash-out areas or other breaches. This fence also serves as an excellent security barrier for the airport. There are also numerous electric-fence designs for excluding deer, discussed in Hygnstrom et al. (1994), that are not as costly as permanent fencing but have drawbacks in safety and maintenance.



This 5-strand electric fence is one of many designs that can be used to discourage deer and other large mammals from entering selected areas. (Photo by E. C. Cleary, FAA)

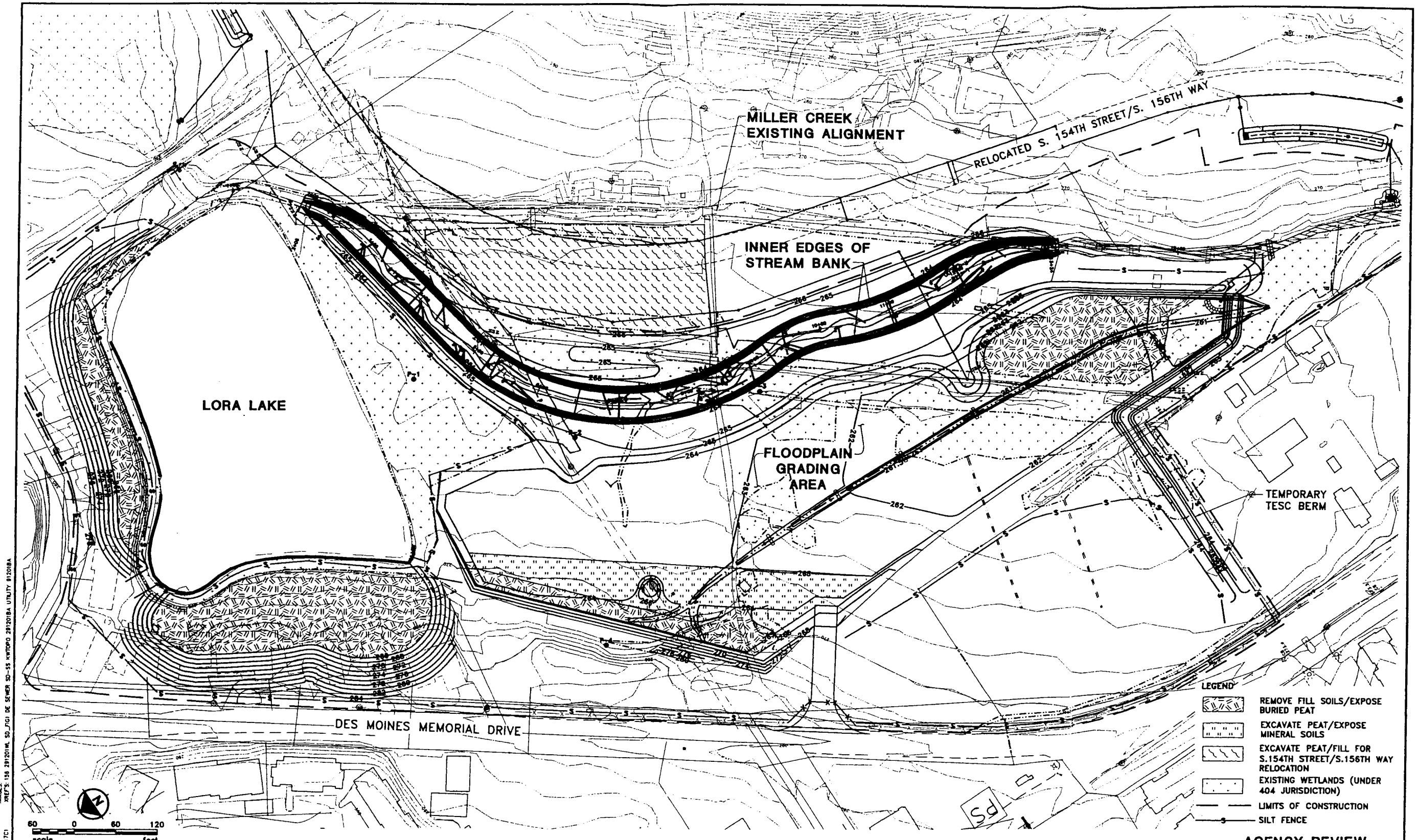
Cattle Guards are widely used to prevent hoofed livestock from traversing across fenced areas through permanent openings maintained for vehicular access. These devices, if at least 15 feet in length perpendicular to fence, will prevent deer from entering through gated areas on airports.

9.2.c. Repellent Techniques

Repellent and harassment techniques are designed to make the area or resource desired by wildlife unattractive, or to make the wildlife uncomfortable or fearful. Long term, the cost-effectiveness of repelling wildlife usually does not compare favorably with habitat modification or exclusion techniques. No matter how many times wildlife are driven from an area that attracts them, they or other individuals of their species will return as long as the attractant is accessible. However, habitat modifications and exclusion techniques will never completely rid an airport of problem wildlife; therefore, repellent techniques are a key component of any wildlife hazard management plan.

Cleary, E.C. and R. A. Dolbeer. 1999. Wildlife Hazard Management At Airports. Federal Aviation Administration and U.S. Department of Agriculture. http://wildlife-mitigation.tc.faa.gov/public_html/

J



AGENCY REVIEW
NOT FOR CONSTRUCTION

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Parametrix, Inc.
5808 Lk. Washington Blvd. NE
Kirkland, WA 98033
Ph: (425) 822-8880
"Quality Service Through Employee Ownership"

PROJECT ENGR./ARCH.: P. FENDT
DESIGNED: J. ULMAN
DRAWN: P.IT/SRM
SCALE: 1"=60'
DATE: NOVEMBER 2001
CHECKED BY:
APPROVED BY:

REVISIONS

NO.	DATE	BY	DESCRIPTION	APP'D
NO.	DATE	BY	DESCRIPTION	APP'D

App.O
NPMP

PROJECT ENGINEER:
DESIGNED BY:
DRAWN BY:
SCALE:
CHECKED BY:
APPROVED BY:

Port of Seattle
SEA-TAC INTERNATIONAL AIRPORT
PROJECT: MILLER CREEK RELOCATION
SHEET TITLE: CHANGES IN PEAT AND MUCK SOIL AT VACCA FARM

SHEET NUMBER: 100051
CONTRACT NO.: 291217C1
PORT OF SEATTLE NO.: STIA-9805-C1

IMAGES:
XREFS: 1S8 291201HL SD_FGI DE SEWER SD-SS KWTOPO 291201BA UNUTY 91201BA
DATE: 11/14/01 FILENAME: 291217C1

912101DE.DWG

APPENDIX O

AR 015029

K

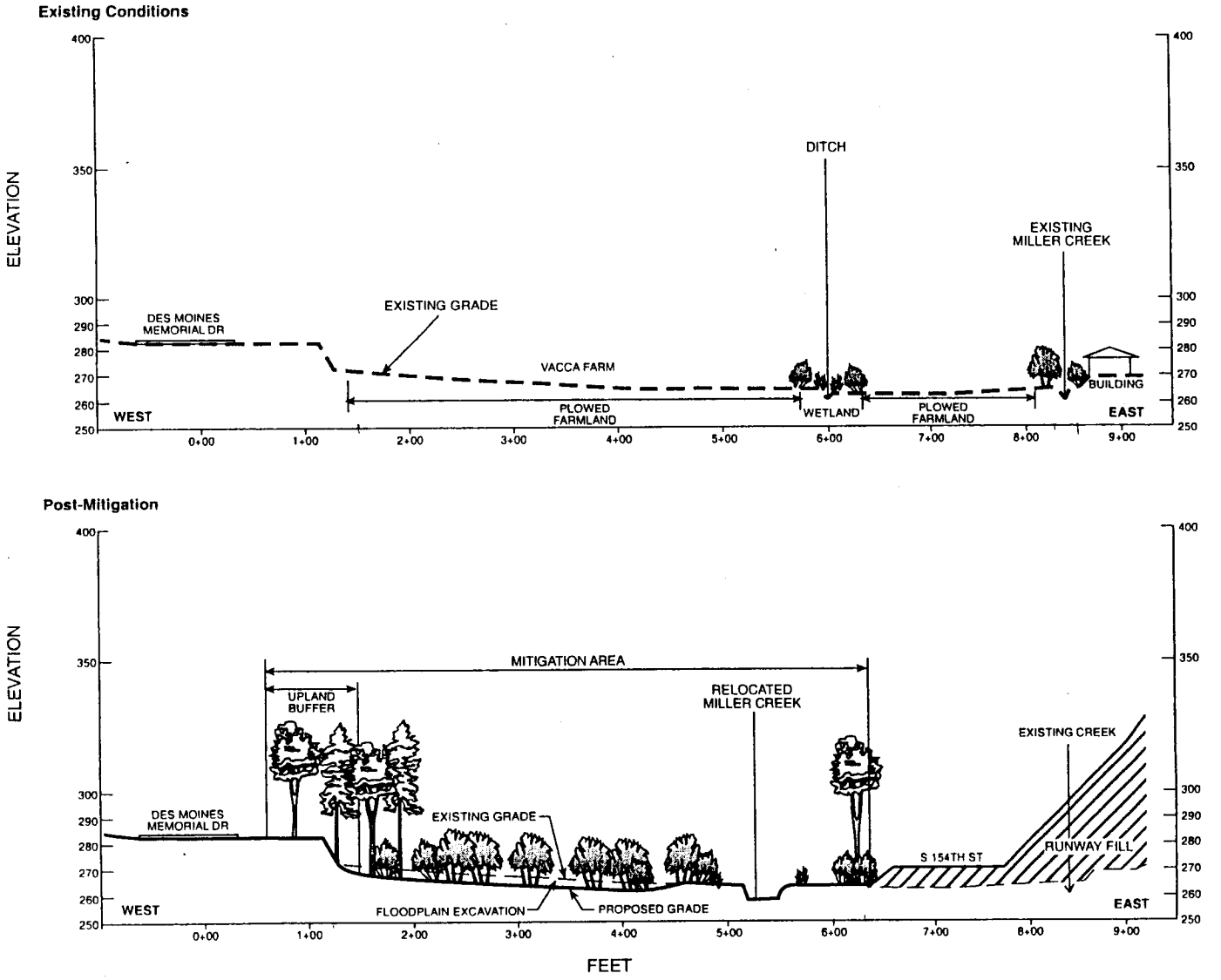
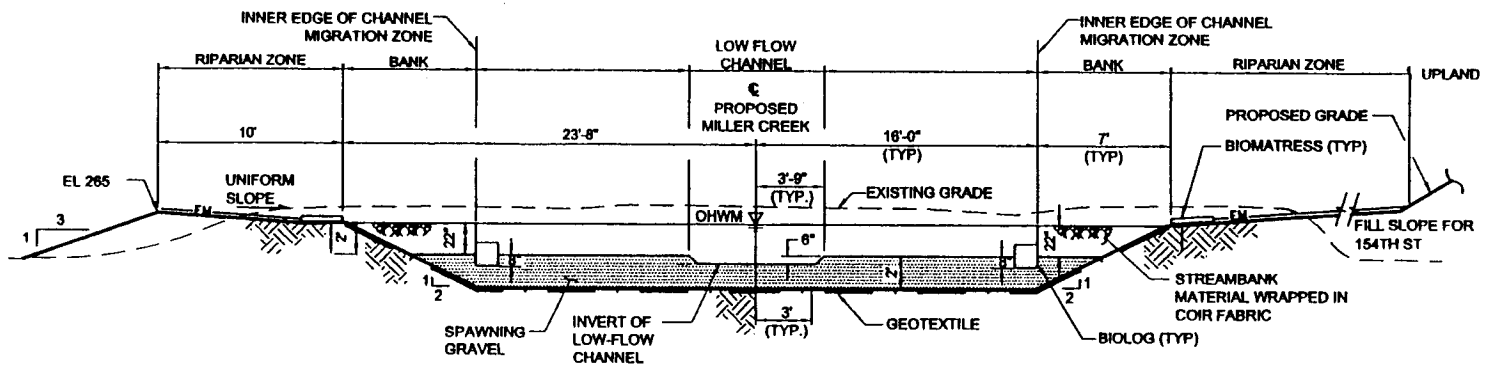


Figure 5.1-6
Typical Cross Section of Miller Creek Floodplain Enhancement

L



FILE: 291203_F5.1-1
DATE: 09/24/01

SCALE: HORIZONTAL 1"=10'
VERTICAL 1"=10'

Figure 5.1-3
Channel Cross Section
Miller Creek Location

M

Memorandum

Date: 04/06/98

To: Jim Kelley – 3 pg. fax

CC:

From: Paul Tappel

RE: Minor Edits & Questions, SeaTac JARPA

Here are some minor inconsistencies, etc. I picked up when reviewing the permit application. These did not affect the overall assessment except to make it a bit more time-consuming to figure out. Others may also catch these.

They are not in a particular order, mainly in order of my review.

Sheet 4 of 44 JARPA: Alignment of V-shaped bypass structure in plan view does not match sheet 16 North arrow, assumed sheet 6 was correct (this structure has been deleted anyway - Parametrix 4/6/98).

Sheet 4 of 44: Stream buffer shown 50' wide one side, 25' wide other which is assumed correct because it matches text somewhere for this reach. However, sheet 14 referenced here does not match these widths if scaled off.

Sheet 9 of 44: Where is the airport security road? Would this addition push the stream further to the left? Just a thought, no answer needed.

Sheets 10, 11, 12, & 18 of 44: Elevations don't all match up if you try to draw all the profiles together and match it with text. For instance, the channel cross-section sheet 18 is incorrectly drawn. I haven't figured this out but made my on-site estimates in the field.

Sheet 10 of 44: This shows the relocated Miller Creek channel in a 10'-deep cut. I don't think the "existing grade" in the top half of the drawing is correct. The steeply incised channel does not appear to match what would really be built (guess 5' deep cut). I know the scales are exaggerated H:V. This was one of my initial concerns with the plan, since a 10'-deep cut is substantial for a little creek.

Sheet 13 of 44: This drawing is odd. Based on rough measurement and guessing other drawings, I estimated "variable width" to be 5'-10'. This is approx. based on site visit also, but other readers wouldn't know. The drawing shows a winter storm

Memorandum

Date: 04/06/98

To: Jim Kelley – 3 pg. fax

CC:

From: Paul Tappel

RE: Minor Edits & Questions, SeaTac JARPA

Here are some minor inconsistencies, etc. I picked up when reviewing the permit application. These did not affect the overall assessment except to make it a bit more time-consuming to figure out. Others may also catch these.

They are not in a particular order, mainly in order of my review.

Sheet 4 of 44 JARPA: Alignment of V-shaped bypass structure in plan view does not match sheet 16 North arrow, assumed sheet 6 was correct (this structure has been deleted anyway - Parametrix 4/6/98).

Sheet 4 of 44: Stream buffer shown 50' wide one side, 25' wide other which is assumed correct because it matches text somewhere for this reach. However, sheet 14 referenced here does not match these widths if scaled off.

Sheet 9 of 44: Where is the airport security road? Would this addition push the stream further to the left? Just a thought, no answer needed.

Sheets 10, 11, 12, & 18 of 44: Elevations don't all match up if you try to draw all the profiles together and match it with text. For instance, the channel cross-section sheet 18 is incorrectly drawn. I haven't figured this out but made my on-site estimates in the field.

Sheet 10 of 44: This shows the relocated Miller Creek channel in a 10'-deep cut. I don't think the "existing grade" in the top half of the drawing is correct. The steeply incised channel does not appear to match what would really be built (guess 5' deep cut). I know the scales are exaggerated H:V. This was one of my initial concerns with the plan, since a 10'-deep cut is substantial for a little creek.

Sheet 13 of 44: This drawing is odd. Based on rough measurement and guessing other drawings, I estimated "variable width" to be 5'-10'. This is approx. based on site visit also, but other readers wouldn't know. The drawing shows a winter storm

flow depth of 1', very shallow. Then I used Manning's equation to estimate flows, using n=0.035 as stated in the text (this seems too low, should be 0.06+). In short, this drawing does not describe the real proposed cross-section although some precision is attempted with 3" measurements, etc. I concluded the basic hydraulic calculations for the re-located channel were questionable after trying to apply this drawing. This drawing was probably intended to be conceptual, but engineers look at these relationships to check with their experience.

Sheet 16 and 17 of 44: I had questions about how these structures would operate, but understand they have been deleted from the design. This is okay with me, I came to the same conclusion in the field.

Sheet 23 of 44: A series of log or rock weirs makes sense to control erosion, but root wads, angle logs, and deflector logs (see sheet 25) are inappropriate (they increase bank scour to create fish habitat). Actually, all the log structures should be replaced with rock weirs - easier to build and there's no fish habitat to think about here.

Sheet 23 of 44: The level spreader referenced to sheet 20 is on sheet 24.

Miller Creek Relocation Plan Section 3.3: says "more sinuous reconstructed channel with a variety of naturalized creek features". This is optimistic and somewhat misleading. The very low stream channel gradient means there won't be any pools really, and silt and sand deposition are inevitable. These are natural stream conditions and nothing to apologize for. The generic text implies the stream will be converted into substantially higher quality trout habitat; I don't know how you can do that (given site limitations) and the drawings don't show any substantial changes from the existing excavated creek channel to the new excavated creek channel.

Table 4.1-1: Average base flow = 5 cfs (1' depth). These data don't make sense considering the cross-section shown sheet 13 of 44.

Section 6.3.4: This approach to channel design does not reflect reality. There's a lot going on besides adjustments of channel parameters, and I question the results. This overlooks several basic facts of creeks, such as substantial changes with n-value with flow, almost all bedload/sediment transport occurs during peak floods (not baseflow), 0.3% slope is impossible to build in a natural/semi-natural channel with excavators and bulldozers, plus other issues if I kept listing them.

Section 6.5.1.3 and 6.5.1.4: These sound like they were pulled from somewhere else and pasted in the document. The stream cannot be elevated to the stated habitat criteria; these sections are not realistic.

General: There are several technical contradictions throughout the report. First, native riparian species such as willow, salmonberry, etc. will be planted by the hundreds, but somehow they won't attract wildlife (?). These are some of the same

species WDFW tells me to plant to maximize wildlife use of streamside areas, so what's going on? The report should be straight on the intent:: If bird strikes, etc. over-ride, then tell everyone the streamside area will be mowed down to minimize birds for human safety reasons. Otherwise, accept the fact riparian areas attract birds. Likewise, the plan includes several criteria, etc. to minimize watershed effects on baseflow, hydrology changes, etc. but repeatedly states that all ponded areas will be sloped downhill to drain. This eliminates all small-scale retention/detention storage in the area, which is important to stream base flow, wetlands, etc. Plus this stated criteria would eliminate open-water detention areas (61 acre-feet) possibly offsetting wetland filling - plus 61 acre-feet may be unrealistic for vault detention basins. I know these are sources of aggravation (conflicting Port/FAA/environmental objectives) but the text should at least be clear on mutually exclusive goals and criteria. These caught my eye, anyway.

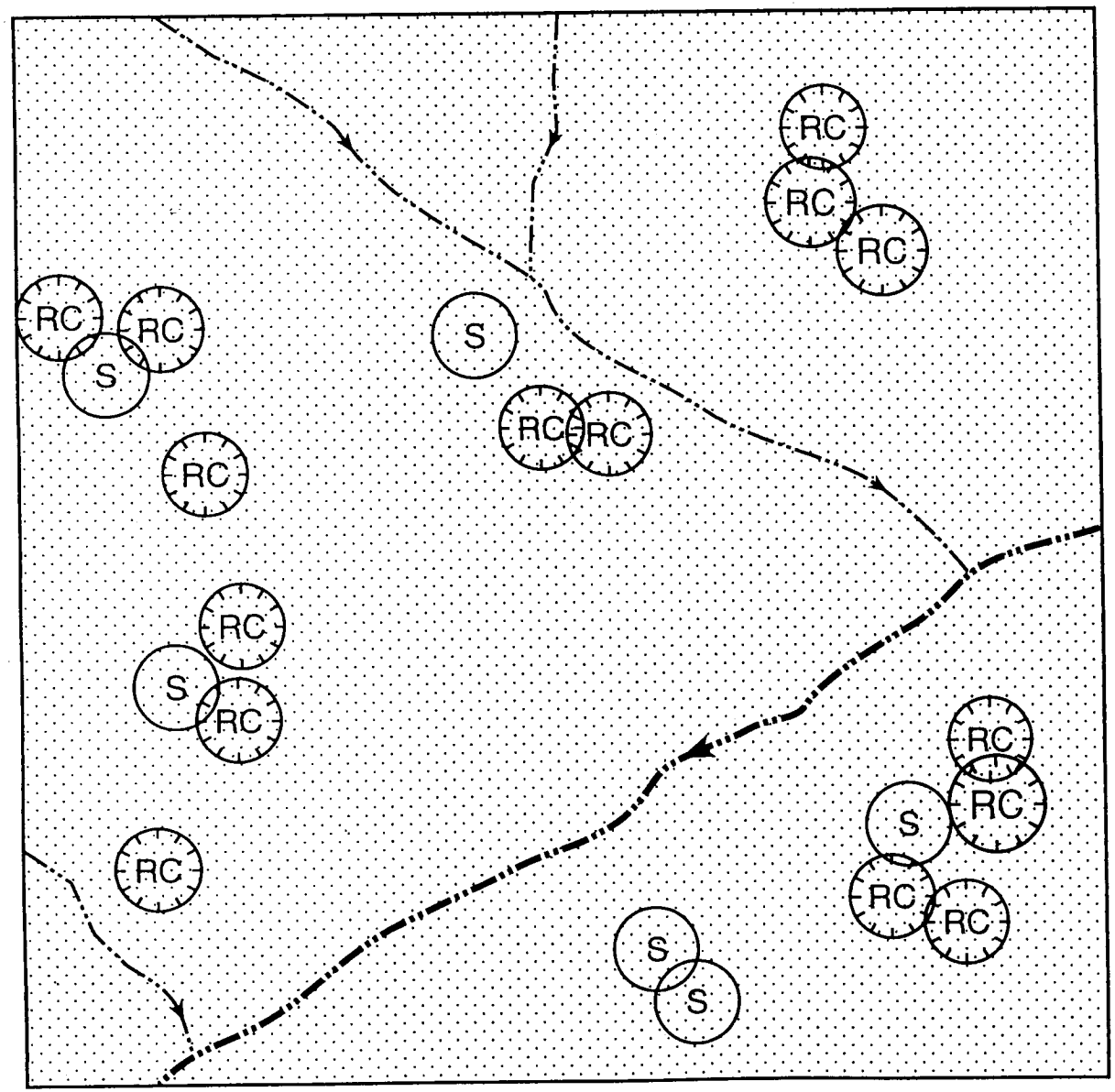
Let me know if you have any questions about these minor editorial comments.

Paul Taggart

P.S. - I don't think these need to be resolved this week or anything, they are just to keep in mind as the design goes ahead.

PT

N



Note: See Appendix A Sheets L1 and L2 for details

Port of Seattle/Natural Resource Mitigation Plan/556-2912-001/01(03) 12/00 (K)

Figure 5.1-7
Typical Planting Plan for the Miller Creek Floodplain, Zone 2

O

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and THE PORT OF SEATTLE, Respondents.	No. 01-133 DECLARATION OF DYANNE SHELDON IN SUPPORT OF ACC'S SUR-REPLY ON MOTION FOR STAY (Section 401 Certification No. 1996-4-02325 and CZMA concurrency statement, issued August 10, 2001, Reissued September 21, 2001, under No. 1996-4-02325 (Amended-1))

Dyanne Sheldon declares as follows:

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

2. Per the responses in the second declarations of Ecology staff (Stockdale) and Port consultants (Kelley), it is claimed that the need for pre-construction groundwater monitoring is being met and will provide sufficient detail to assure protection of water quality. Their conclusions are based on the Performance Standards contained within the NRMP and the conditions of the 401 Certification (Stockdale ¶ 3,4; Kelley ¶3,6,7,8). However, the Performance Standards of the NRMP,

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

ORIGINAL

as summarized by Kelley (¶10) provide virtually no quantifiable standard by which to measure whether groundwater parameters have been met. The Performance standard states, "Wetland areas with organic soils...*will have soils saturated in the upper part* (emphasis added) to mid-June in years of *normal* (emphasis added, see ¶ 3, below) rainfall." For the wetlands that have mineral soils, the Performance standard is stated as, "...soils saturated *in the upper part* to mid-April in years of *normal* rainfall." Who determines if the soil is *saturated in the upper part* five years, ten years, or fifteen years after this permit is granted? Certainly not the well-intentioned staff who created these "standards". This is a prime example of the impreciseness of the 401 conditions: they are written in such a manner that it will be impossible to determine if success or failure is an outcome in the future conditions.

3. As to 'normal' rainfall, Kelley (¶ 13, second declaration) claims that, "there is no normal rainfall year that would serve as a baseline...", yet the Port's proposed hydrologic Performance Standards rely upon determining groundwater presence in a year of 'normal rainfall'.

4. Relying upon a statistical analysis of the WIS (wetland indicator status) of the plants present in wetlands, as a means to determine impacts, imparts a mathematical certainty and validity to the WIS ratings that is not justified. The WIS rating of plants is a qualitative judgment of the relative percentage of time one would assume to find a particular species in a wetland or an upland habitat. The

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

WIS ratings for the wetland plants of the Pacific Northwest was based on the collective best guesses of small cadre of botanists and persons working on wetland related issues in the mid-1980's. I am consciously not using the label "wetland ecologists" here, as in the mid-1980's, there were no self-identified "wetland ecologists" in the Pacific Northwest. As one of the professionals who participated in that original exercise (to assign a wetland indicator status rating to plants) I can tell you that none of us, at that time, had ever 'rated' plants as to their expected presence in wetland or upland habitats. The point that I'm trying to illuminate is that one can have a dominance of plants that have a WIS rating of facultative in an area that would be classified as wetland (using the 1987 Corps of Engineers Delineation Manual). Facultative plants have an assumed range of 33-67% chance of being found in a wetland. If the Performance Standard for the success of wetland post-construction is based on a 'statistically valid analysis' of the WIS rating of the vegetation, one is relying upon a statistically (quantified) analysis of extremely simplistic *qualitative* parameter in order to determine success or failure. That is not good science.

5. In my professional career I have the experience, for the last three years, of reviewing and analyzing such a quantitative ('statistically valid') WIS-based performance standard conducted for a 500+ acre long-term monitoring program on a site with a range of wetland types in the Puget Sound lowlands. What such a

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

statistical analysis of WIS values results in is a vast simplification and homogenization of the results: in three years of such analysis not one shift in wetland vegetation composition has been determined to be *statistically significant.* Even in a bog community, where three obligate key-indicator wetland plants diminished in physical presence by a significant percentage, the statistically valid WIS indicator based analysis found nothing measurable: the consequences were masked in the statistics. No impact was identified. Note that the Performance Standard imposed by the 401 Certification does not propose what is an appropriate shift in WIS rating (if any): who will determine if a shift of any magnitude is success or failure? The Performance Standards also don't require the Port to identify and monitor a "control" wetland (one with similar physical characteristics and landscape setting, but out of any impact zone) to provide a reference for expected (or unexpected) natural successional changes and/or weather/climate induced changes in WIS ratings or hydroperiod. How will Ecology or the Port determine if future changes are related to the Port's project or to natural variations? Ecology will not be able to determine success/failure and convince the Port to employ contingency actions.

6. The Performance Standard of regular re-delineation of the wetlands, in future conditions, is not a failsafe to determine if wetland functions have been lost or adversely effected. Delineation is based on parameters dictated by the Corps 1987

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

Manual: soils, hydrology, and vegetation. Wetland soils will not loose their hydric 'signatures' in 10-15 years: organic soils will still be organic, mineral soil colors will not shift to non-wetland conditions in that time frame. Woody and many herbaceous species found in urban/suburban wetlands are generalists, they are adapted to a broad range of wet to dry conditions: it is unlikely that there will be a rapid shift (5-10+ years) in the extent and distribution of such species. Shifts that might be anticipated due to successional maturation of plant communities have not been identified within the Performance Standards as appropriate. The 401 Performance standards are not "strict", regardless of the intention of the authors of those standards: they are ambiguous and misleading in their cloak of 'valid science'. The Performance Standards are written in such as manner as to preclude Ecology staff, in the future, from accurately concluding adverse effect (failure to meet the Performance Standards), and therefore they are inadequate for the purpose of assuring permanent protection of water quality and public aquatic resources.

7. Lastly is the issue of adequate groundwater monitoring data and the use of such data to determine success or failure in future conditions. As noted above, the existing 401 conditions side-step the issue of quantified groundwater data even being an option for determining success/failure because no quantified standard for groundwater is included in the Performance Standards. Why this is of concern is quite simple: it is the presence and duration of water within a wetland that drives all

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

the physical, biological and chemical processes of a wetland: the wetland functions. Years of research and analysis have identified a wetland's hydroperiod as the 'driver' of wetland functions.[1,2,3] Constructing the Third Runway, placing fill on the slopes in the upper watersheds of three stream basins, and creating a huge engineered wall will affect how, when, and how much water will enter wetlands downslope of the project. Changes in the volume of water entering a wetland, the timing of the water into the wetland and the duration of the water in the wetland will all effect the functions that a wetland does and can provide. The analysis for this project has identified that water infiltrated through the proposed fill plain may reach the downslope wetlands 1 or more *months* later than existing condition. What no will be able to document is whether or not the same amount of water is present in the wetlands for the same length of time (extent of duration of saturation or inundation) post-construction, because, if this stay is not granted, insufficient 'pre-construction' data will be collected to confirm or deny the success of post-construction hydroperiods. The change in the 401 requirement to eliminate the need for collection of 'pre-construction' groundwater monitoring data is very significant, and will

---

[1] Brinson, M.M. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4 U.S. Army Engineers Waterways Experiment Station.

[2] Brinson, M.M. 1995. Assessing wetland functions using HGM. National Wetlands Newsletter. January-February, 1995.

[3] Hrubry, T., T.Granger, K. Brunner, S. Cooke, K. Dublanica, R.Gersib, L.Reinelt, K. Richter, D. Sheldon, A. Wald, F. Weinmann. Methods for Assessing Wetland Functions. 1998. Ecology publication: 98-106.

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201

effect Ecology's ability to determine accurately, success or failure in post-construction conditions. If no 'pre-construction' groundwater data exists, who can argue that post-construction hydrologic conditions are appropriate? Adverse effects on wetland function and potential adverse effects on water quality may result with no recourse available to assure implementation of contingency actions.

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

DATED this ___10___day of October, 2001, at Seattle, Washington.

Dyanne Sheldon

g:\lu\acc\pchb\drafts\sheldon-decl-sur-stayreply.doc

HELSELL FETTERMAN LLP
1500 Puget Sound Plaza
1325 Fourth Avenue
Seattle, WA 98101-2509

Rachael Paschal Osborn
Attorney at Law
2421 West Mission Avenue
Spokane, WA 99201