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**BEFORE THE POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON**

AIRPORT COMMUNITIES
COALITION,

Appellant,

CITIZENS AGAINST SEA-TAC
EXPANSION,

Intervenor/Appellant,

v.

STATE OF WASHINGTON,
DEPARTMENT OF ECOLOGY; and
PORT OF SEATTLE,

Respondents.

PCHB No. 01-160

DIRECT TESTIMONY OF ERIK
STOCKDALE SUBMITTED ON
BEHALF OF THE DEPARTMENT OF
ECOLOGY

AR 002950

ORIGINAL

1 Erik Stockdale declares as follows:

2 **I. Introduction**

3 1. I am a Senior Wetlands Specialist with the Washington State Department of
4 Ecology (Ecology) in the Shorelands and Environmental Assistance Program. I am a certified
5 Professional Wetlands Scientist with the Society of Wetland Scientists (SWS). I served on the
6 board of the Pacific Northwest chapter of SWS for three years. A copy of my resume detailing
7 my education and experience is attached hereto as Attachment A.

8 2. Construction of the Port of Seattle's (Port) Master Plan Update improvement
9 projects at Seattle-Tacoma International Airport (STIA) will necessitate the filling of 18.37
10 acres of palustrine freshwater wetlands in the Miller, Walker and Des Moines Creek basins,
11 three highly urbanized basins. At the Vacca Farm, an additional 0.92 acres of "prior converted
12 croplands" will be filled by the embankment, bringing the total permanent impact to 19.29
13 acres.¹ The wetlands slated for development have all been modified and degraded to varying
14 degrees. Many of the wetlands have been maintained as lawn and landscaping over several
15 decades "in the back yards" of homes recently condemned and purchased by the Port. Other
16 wetlands formed on the embankment of the fill placed for the existing second runway.
17 Wetlands are also located in the Vacca Farm area, and within several of the fairways at the
18 Tyee Golf course on Des Moines Creek. In addition, the project will temporarily affect 2.05
19 acres of wetlands for several years with temporary stormwater control ponds.²

20 3. In Ecology's review of the Port's application for a Clean Water Act § 401
21 Certification (401 Certification), I was responsible for evaluating impacts to wetlands and
22 aquatic resources and determining if there was reasonable assurance that the project would
23 comply with water quality standards with regard to those resources. Since 1996, I have
24

25 ¹ The Corps Public Notice does not include impacts to prior converted croplands because these wetlands
are exempt from federal regulation under the Clean Water Act. Ecology regulates the filling of prior converted
croplands and requires mitigation under ch. 90.48. RCW.

26 ² Ecology decided to address these impacts as a separate impact in terms of calculating compensatory
mitigation because the stormwater ponds will be in place for a couple of years, after which time the area will be
restored to natural wetland conditions.

1 worked with a team of Ecology staff on the Port's applications for a 401 Certification. In that
2 capacity, I reviewed the Port's Natural Resource Mitigation Plan (NRMP) for compliance with
3 state laws and regulations. In 2001, my day to day involvement in the project was transferred
4 to Katie Walter, a Certified Professional Wetlands Scientist at Shannon & Wilson. Ms. Walter
5 and I worked closely, thus allowing me to remain informed of any changes to the NRMP.

6 4. Wetlands are waters of the state and are regulated under the state's water quality
7 laws, ch. 90.48 RCW, and applicable regulations in Title 173 WAC. Ecology has developed
8 several policy and guidance documents that outline Ecology's regulatory authority and
9 mitigation approach regarding wetlands. They include: How Ecology Regulates Wetlands,³
10 Water Quality Guidelines for Wetlands,⁴ and the Alternative Mitigation Policy Guidance for
11 Aquatic Permitting Requirements from the Departments of Ecology and Fish and Wildlife.⁵ In
12 addition, ch. 90.74 RCW addresses out-of-basin mitigation.

13 **II. The NRMP Will Result In A Net Environmental Benefit**

14 5. The 401 Certification requires that the Port implement the mitigation detailed in
15 the NRMP. Table 4.1-3 of the NRMP provides a "bean count" of the mitigation actions. To
16 compensate for the 19.29 acres of wetland fill, the in-basin mitigation includes:

- 17 (a) 11.95 acres of wetland restoration;
18 (b) 22.32 acres of wetland enhancement;
19 (c) 54.93 acres of wetland buffer enhancement and riparian corridor restoration; and
20 (d) 23.55 acres of wetland and buffer preservation.

21 The out-of-basin mitigation includes:

- 22 (a) 29.98 acres of wetland creation;
23 (b) 19.5 acres of wetland enhancement; and
24 (c) 15.9 acres of wetland buffer enhancement.

25 **AR 002952**

26 ³ Washington State Department of Ecology, Publication No. 97-112 (March 1998)

⁴ Washington State Department of Ecology, Publication No. 96-06 (April 1996)

⁵ Washington State Departments of Ecology, Fish & Wildlife, and Transportation. 2000.

The Port's compensatory mitigation plan will restore and enhance ecological and hydrological functions to 176 acres of land. Of that, approximately 112 acres of the mitigation occurs on-site.

6. One tool Ecology employed in its evaluation of the adequacy of the Port's NRMP was its wetlands guidance document setting forth general mitigation ratios.⁶ Mitigation ratios are a generally accepted method, based primarily on a scientific understanding of wetland functions, the risks of various mitigation actions, and the time required for their establishment of wetland processes and functions. Ratios help determine equivalency between the wetland functions lost and proposed mitigation. The general ratios should be adjusted based on numerous site-specific factors including:

- a. What type(s) of wetlands are being filled;
- b. The likelihood that the mitigation action will be successful;
- c. How long it will take the mitigation action to be fully successful;
- d. How much gain in aquatic resource function will result from the mitigation action;
- e. The location of the mitigation actions; and
- f. How well the mitigation wetlands will persist on the landscape.

Relative to the general ratios, applying these factors results in a more accurate ratio based on scientifically-based assessment of impacts. The ACC's witnesses state that Ecology was inconsistent with its own guidance because Ecology did not apply the correct mitigation ratios to the proposed wetland impacts as outlined in Ecology's guidance documents. As explained below, this conclusion is erroneous.⁷

⁶ McMillan, A. 1998. How Ecology Regulates Wetlands. Ecology publication 97-112, available at <http://www.ecy.wa.gov/biblio/97112.html>

⁷ One criticism regarding Ecology's mitigation guidance that can fairly be leveled is that the guidance documents are out of date with the agency's current mitigation practice. The documents do not discuss changes made to agency policy and practice by the following: the Washington Alternative Mitigation Policy Guidance for Aquatic Permitting Requirements; changes made to RCW 90.48 and RCW 90.74 by Engrossed Substitute Senate Bill 5273; and the mitigation banking rule. The guidance documents are also silent on Ecology's current practice of granting mitigation credit for upland buffers, as well as Ecology's recognition of the FAA's legitimate concern over wetland mitigation in and around airports. Ecology staff, including Andy McMillan and I, are presently

1 7. The NRMP is the culmination of several years of intensive project impact
2 assessment and negotiations between the Port, Ecology and the Army Corps of Engineers
3 (Corps). Early in the process the Port argued that Federal Aviation Administration (FAA)
4 requirements prevented in-basin mitigation. Instead, the Port proposed the out of basin
5 mitigation in Auburn as the primary mitigation strategy. The Port argued that the hydrologic
6 and water quality functions provided by the wetlands being filled could be replicated in-basin
7 by the project's stormwater management plan. Ecology did not accept either argument. At a
8 meeting with the Port in November 1998, Ecology laid out a set of minimum "environmental
9 objectives" for the project. One of the minimum objectives was that wetlands needed to be
10 replaced in-basin on a one-to-one basis (1:1)—one acre of mitigation credit is provided for one
11 acre of impact.

12 8. There are at least two means to apply mitigation ratios. One way is to give
13 credit of 1:1 for every new acre of wetland created or restored, credit of 2:1 for wetland area
14 enhanced, credit of between 5:1 and 10:1 for riparian/buffer enhancement and preservation,
15 and require that the total mitigation credit equal at least double the area being filled. This was
16 the approach used on the Port's project and resulted in mitigation credit approximately four
17 times the amount of wetland area proposed for fill. Table 4.1-3 of the NRMP provides a
18 summary of the mitigation credits agreed to by Ecology and the Corps of Engineers for the
19 project.⁸

20 9. The other method is to follow the general ratios contained in Ecology's
21 guidance. To demonstrate that Ecology's acceptance of the mitigation in the NRMP meets
22 Ecology's mitigation guidance, Mr. Andy McMillan, Ecology's senior wetland policy
23 specialist (and author of Ecology's wetland guidance documents) and I prepared the following
24 three tables. Those tables apply ratios based on site-specific anticipated gains in wetland

25 _____
engaged in the process of updating several of Ecology's wetlands guidance documents to make them reflect
26 current practice.

⁸ Natural Resource Mitigation Plan, Master Plan Update Improvements Seattle-Tacoma International
Airport, Parametrix, Inc., November 2001, page 4-13.

1 function and based on the general ratios of 2:1 for creation/restoration, 4:1 for wetland
 2 enhancement, and 10:1 to 20:1 for riparian/buffer enhancement and preservation. Using this
 3 approach, one would require the mitigation credit to be roughly equivalent to the amount of
 4 wetland area being filled. In fact, under this approach the amount of credit attributable to the
 5 mitigation required of the Port is double the amount of impact. The application of mitigation
 6 ratios by either method demonstrates that the mitigation package for this project exceeds
 7 Ecology's recommended mitigation ratios.

8 **Table 1. In-Basin Mitigation**

Mitigation Action	Credit ratio	Mitigation Area (acres)	Mitigation credit
Creation/Restoration			
Remove fill at Lora Lake	1:1	1.0	1.0
Remove fill at Des Moines Way nursery site	1:1	2.0	2.0
Remove fill at wetland A17	1:1	0.3	0.3
Vacca Farm "restoration" ⁹	2:1	6.6	3.3
TOTAL		9.9	6.6
Wetland Enhancement			
Des Moines Way Nursery	4:1	0.86	0.21
Vacca Farm "enhancement"	4:1	5.7	1.42
Miller Creek wetland enhancement	4:1	10.25	2.56
Tyee Golf Course	4:1	4.5	1.12
Des Moines Creek wetlands	4:1	1.01	0.25
TOTAL		22.32	5.56
Wetland Buffer Enhancement and Riparian Corridor Restoration			
Miller Creek Buffer	10:1	40.86	4.08
Vacca Farm	10:1	4.58	0.46
Lora Lake	10:1	1.81	0.18
Tyee Mitigation Buffer	10:1	1.57	0.16
W. Des Moines Creek	10:1	3.38	0.38
Des Moines Way Nursery	10:1	2.73	0.27
TOTAL		54.93	5.53
Preservation			
Borrow Area 3 wetland complex	10:1	2.35	0.23
Borrow Area 3 buffer	20:1	21.20	1.06
TOTAL		23.55	1.29
TOTAL In-Basin		110.7	18.98
Mitigation ratio based on 19.29 acres of impact (18.37 acres from Public Notice plus 0.92 acres prior converted croplands)		5.74 to 1	0.98 to 1

9 Includes prior converted croplands and some fill removal from former wetland areas.

Mitigation Action	Credit ratio	Mitigation Area	Mitigation credit
Wetland Creation	2:1	29.98	14.99
Wetland Enhancement	4:1	19.5	4.87
Buffer Enhancement	10:1	15.9	1.59
TOTAL Out-of-Basin		65.38	21.45
Mitigation ratio based on 19.29 acres of impact (18.37 acres from Public Notice plus 0.92 acres prior converted croplands)		3.39 to 1	1.11 to 1

	Mitigation Area	Mitigation Area Ratio	Mitigation Credit	Mitigation Credit Ratio
In-basin mitigation	110.7	5.74 to 1	18.98	0.984 to 1
Out-of-basin	65.38	3.39 to 1	21.45	1.11 to 1
Total	176.08	9.12 to 1	40.43	2.1 to 1

10. The result of applying the mitigation ratios in this manner demonstrates that the mitigation actions for the project provide approximately equivalent mitigation in-basin to what is being lost. Additionally, out-of-basin mitigation actions provide mitigation that is more than equivalent to what is being lost. Taken together, these actions provide considerably more mitigation than would be required if the mitigation was based strictly on Ecology's general mitigation ratio guidance.

11. Though the overall mitigation will result in a net gain in acreage, a net loss of wetland area will occur within the basin where the impacts occur. Generally, out-of-basin mitigation is acceptable if it is not technically or scientifically feasible to provide a sustainable mitigation that replaces wetland functions lost in basin. The National Academy of Sciences wetland mitigation study and other studies have discouraged mitigation that simply attempts to "fit" new wetlands into locations where they have little chance to succeed in order to meet the objective of "no net loss" of wetland area in a particular location.^{10,11,12} Given the highly

¹⁰ National Research Council, 2001. Compensating for Wetland Losses under the Clean Water Act, National Academy Press, Washington, D.C. See <http://www.nap.edu/books/0309074320/html/>

¹¹ Johnson, P., and others. 2000. Washington State Wetland Mitigation Evaluation Study, Phase 1: Compliance. Ecology publication 00-06-016. Available at <http://www.ecy.wa.gov/biblio/0006016.html>; and Johnson, P. and others 2001. Washington State Wetland Evaluation Study, Phase 2: Evaluating Success. Ecology publication 02-06-009. Available at <http://www.ecy.wa.gov/biblio/0206009.html>

1 developed condition of the Miller, Walker and Des Moines Creek basins, it is a reality that few
2 opportunities for wetland creation or restoration remain. Furthermore, FAA regulations
3 strongly circumscribe habitat mitigation activities in and around airports in the United States.¹³
4 The NRMP will provide sustainable aquatic resource mitigation in-basin by restoring the
5 riparian processes, habitat structures and functions of a severely degraded urban reach of
6 Miller Creek. Additionally, a considerable amount of out-of-basin mitigation is being provided
7 on the Green River in Auburn, to ensure that wetland area is maintained in a larger geographic
8 area—the WRIA.

9 12. The ACC asserts that the mitigation activities at the Vacca Farm are more in the
10 nature of enhancement than restoration and should, therefore, be given less credit. The ACC's
11 position, however, ignores the fact that the differences between enhancement and restoration
12 are more a matter of degree than a matter of kind. Ecology recognizes that wetland restoration
13 and enhancement exist on a continuum rather than on an either/or dichotomous key. Ecology
14 often reviews projects with wetlands that are highly altered by human activity, like those at the
15 site of the Port's project. Many of these wetlands are highly altered in terms of their structure
16 and function, and provide limited and highly depressed functions. For example, the Vacca
17 Farm wetlands are being actively farmed, where ditching, disking, cropping and drainage
18 continues to remove most habitat structure and wetland functions and severely degrade
19 hydrological functions. In their wetlands textbook, Mitsch & Gosselink (2000)¹⁴ recognize the
20 value of this type of restoration in their discussion of "agricultural land restoration." The
21 authors state that "the [Conservation Reserve Program] guidelines announced in 1997 give
22 increased emphasis to the enrollment and restoration of cropped wetlands, that is, wetlands that
23

24
25 ¹² Gwin, Stephanie, Mary Kentula, and Paul Shaffer. 1999. Evaluating the Effects of Wetland Regulation
Through Hydrogeomorphic Classification and Landscape Profiles. WETLANDS 19 (3):477-489.

26 ¹³ FAA Advisory Circular 150/5200-33 "Hazardous Wildlife Attractants on or Near Airports." See also
Natural Resource Mitigation Plan, Master Plan Update Improvements Seattle-Tacoma International Airport,
Parametrix, Inc., November 2001, Section 7, p. 7-9.

¹⁴ Mitsch, W.J., and J.G. Gosselink. 2000. Wetlands. John Wiley & Sons, Inc. Third edition.

1 produce crops but serve wetland functions.” (Emphasis added.) The authors do not refer to
2 “enhancement” of cropped wetlands.

3 13. For the Vacca Farm, Ecology seeks to achieve a mitigation design that results in
4 a restoration of the significantly degraded functions present at the site. Furthermore, the
5 National Academy of Sciences report on wetland mitigation weighs in on the matter of
6 improving wetland function at the expense of acreage by stating:¹⁵

7 A watershed perspective provides the context for considering wetland
8 enhancement as mitigation. If the proposed mitigation is to enhance an
9 existing degraded jurisdictional wetland, the result could be a net loss of
10 wetland area in exchange for an increase in wetland functioning. Here,
11 changing the condition of the degraded wetland to some other ecosystem
12 state (enhanced to become a better example of the current type or remodeled
13 to become a more functional / valuable wetland type) at the expense of lost
14 area might be judged a desirable exchange.

15 14. The Society of Wetland Scientists issued a position paper on the definition of
16 wetland restoration in August 2000.¹⁶ The Society defines restoration as:

17 Actions taken in a converted or degraded natural wetland that result in the
18 reestablishment of ecological processes, and biotic/abiotic linkages and lead to a
19 persistent, resilient system integrated within its landscape.

20 The position paper goes on to list five key elements of restoration:

- 21 a. Restoration is the reinstatement of driving ecological processes.
22 b. Restoration must be integrated with the surrounding landscape.
23 c. The goal of wetland restoration is a persistent, resilient system.
24 d. Wetland restoration should result in the historic type of wetland but may
25 not always result in the historic biological community and structure.
26 e. Restoration planning should include the development of structural and
functional objectives and performance standards for measuring
achievement of the objectives.

27 This definition of restoration is mirrored in the seminal textbook Wetlands which defines
28 restoration as “to return a site to an approximation of its condition before alteration.”¹⁷

29 ¹⁵ National Research Council, 2001. Compensating for Wetland Losses under the Clean Water Act,
30 National Academy Press, Washington, D.C., p. 142. Available at <http://www.nap.edu/books/0309051347/html/>

31 ¹⁶ Society of Wetland Scientists. 2000. Position Paper on the Definition of Wetland Restoration..
32 Available on-line at <http://www.sws.org/wetlandconcerns/restoration.html>

1 15. The NRMP is a plan that clearly meets the five key restoration elements
2 articulated by the Society. The ACC fails to acknowledge the very meaningful actions being
3 required in the 401 Certification and NRMP to offset the impacts that will result from the
4 Port's project.

5 **III. Credit Properly Given for Miller Creek Riparian Buffer**

6 16. In its analysis of the NRMP, the ACC dismisses the value of the landscape-scale
7 restoration and enhancement plan of the Miller Creek riparian zone. The ACC must do so in
8 order to maintain its assertion that the NRMP does not provide sufficient in-basin mitigation.

9 17. The NRMP contains very detailed plans on how a 200-foot wide, 1.7 mile-long
10 reach of Miller Creek will become "un-urbanized". When one considers that Miller Creek is
11 5.3 miles long, the 1.7 mile long restoration constitutes 32 percent of the length of the creek.
12 There are 75 homes within the 1.7 mile long, 200-foot wide zone that are being removed.
13 Removal of the homes, driveways, patios, etc. will reduce 4.3 acres of impervious area which
14 currently drain untreated and un-detained to the creek. Removal of impervious surface area in
15 an urban watershed is one of the most beneficial actions that can be taken to restore the
16 physical, chemical and biological systems in a watershed. The "net impervious" area in the
17 basin will further decrease when the Port retrofits its stormwater system. Removal of human
18 habitation from the riparian zone will reduce the watershed-scale effects of fertilizer and
19 pesticide runoff.¹⁸ It will also remove chronic effects caused by tree clearing, lawn care, soil
20 compaction, pet waste and predation, among others. Over 380 homes are being removed from
21 the basin as part of the Port's buyout plan. The scale of this effort has never been done before
22 in the State of Washington.

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24
25 ¹⁷ Mitsch, W.J., and J.G. Gosselink. 2000. Wetlands. John Wiley & Sons, Inc. Third edition.

26 ¹⁸ U.S. Geological Survey (USGS). 1999. Pesticides detected in urban streams during rainstorms and relations to retail sales of pesticides in King County, WA. USGS Fact Sheet 097-99. Available on-line at <http://wa.water.usgs.gov/pugt/fs.097-99/fs.097-99.pdf>. Miller and Des Moines creek basins were included in this study.

1 18. Though ACC's witnesses both acknowledge the value of riparian habitat, they
2 stop short in their analysis and fail to give any credit for the important riparian functions being
3 restored and enhanced along Miller Creek by the Port.¹⁹ As described below, the restoration
4 and enhancement of riparian corridors provide important functions to riparian areas and,
5 particularly in this instance, improve the overall health of the basins and/or watershed.

6 19. For regulatory purposes, society classifies natural systems into "boxes" so that
7 we can grapple with variability that exists in nature. Arbitrary boundaries are placed on a
8 landscape and it is stated that functions and environmental processes change at that boundary.
9 The box (*e.g.*, wetland) on one side of the boundary is said to have a certain suite of functions
10 that are uniform across that box, and the box on the other side (*e.g.*, riparian upland, stream,
11 etc.) has another set of functions that are considered to be uniform as well. These boxes,
12 however, are a simplification imposed on nature; natural systems do not have the sharp
13 boundary associated with the boundaries of the boxes.

14 20. In reviewing the NRMP, it is important to recognize that the environmental
15 conditions used to categorize wetlands and uplands occur along gradients of scale and
16 intensity. As a result, functions change gradually as the gradients change. Riparian corridors
17 are one area where gradients and functions change gradually. However, the classification and
18 regulation of wetlands requires defining sharp boundaries on these environmental gradients
19 and the assumption that the functions also change significantly at these boundaries. Because
20 wetlands occur at the interface of terrestrial and aquatic systems, their functions overlap and
21 ignore the boundaries we force on them. Our legal system requires that we draw sharp
22 boundaries where they simply do not exist. This has led to the common misperception that
23 somehow, almost magically, landscape functions suddenly become less valuable on the
24 landward side of a wetland boundary.

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¹⁹ Pre-filed Testimony of Amanda Azous, ¶ 12; Pre-filed Testimony of Dyanne Sheldon, ¶ 22.

1 21. The National Academy of Sciences presents one of the more compelling
2 summaries of the value of riparian areas.²⁰ In a study related to the problems with defining and
3 delineating wetlands, the National Academy states the following:

4 Riparian zones, which can be defined several ways, contain or adjoin riverine
5 wetlands and share with them a multitude of functions including surface and
6 subsurface water storage, sediment retention, nutrient and contaminant removal,
7 and maintenance of habitat for plants and animals. [page 152]

8 Riparian ecosystems are among the nations highly valued and threatened natural
9 resources. [page 153]

10 Because of their proximity to flowing water, riparian ecosystems are closely
11 associated with the maintenance of the physical, chemical and biological
12 processes of streams. **Although widely recognized as important to the goals
13 of the Clean Water Act, riparian zones are not fully protected by it.**
14 [Emphasis added; page 153]

15 At the conclusion of Chapter 6, the National Academy report lists the following
16 recommendation with respect to riparian zones:

17 **Riparian zones perform many of the same functions as do wetlands,
18 including maintenance of water quality, storage of floodwaters, and
19 enhancement of biodiversity,** especially in the western United States.
20 Although they typically contain wetlands, riparian zones cannot be defined
21 wholly as wetlands by any broad definition. If national policy extends to
22 protection of riparian zones pursuant to the goals of the Clean Water Act,
23 regulation must be achieved through legislation that recognizes the special
24 attributes of these landscape features, and not by attempting to define them as
25 wetlands. [Emphasis added; page 166]

26 22. Rivers, streams and wetlands are closely linked, ecologically, with their
surrounding terrestrial ecosystems. The transition zone between the aquatic ecosystem and
upland or terrestrial habitat is commonly referred to as the riparian ecotone.²¹ Riparian areas
are more than just buffers. They include the groundwater, the vegetative canopy, the
floodplain, and extend laterally into the terrestrial ecosystem. The term ecotone implies a zone
of transition from one ecosystem to another. It also implies that this zone is ecologically

²⁰ National Research Council. 1995. **Wetlands: Characteristics and Boundaries**. National Academy Press, Washington, D.C., Chapter 6, pp. 149-167. Available at <http://www.nap.edu/books/0309051347/html/>.

²¹ Naiman, R.J., and R.E. Bilby, eds. 1998. **River Ecology and Management: Lessons from the Pacific Coastal Ecoregion**. Springer-Verlag, New York, 705 pp.

1 important to both adjoining ecosystems. The literature clearly indicates this is the case for
2 stream-riparian ecosystems of our region.^{22,23}

3 23. The distance the riparian area extends into the terrestrial zone varies with each
4 function in question and is not a fixed distance from the creek or river.^{24,25} Riparian functions
5 decrease with an increase in distance from the water, though each at a different rate. For
6 example, bank stability functions are stronger immediately adjacent to the creek. The input of
7 organic matter extends approximately 130 feet from the creek. The value of the riparian zone
8 for habitat depends on the individual species in question. There are now over 700 publications
9 on the water quality functions of riparian buffers, not including the hundreds of scientific
10 papers reporting on other riparian buffer functions.²⁶

11 24. There are **six key functions provided by riparian zones** that influence aquatic
12 habitats. As in wetlands, many of these functions are interrelated. Where comparable, I
13 discuss similarities between riparian and wetland functions.

14 25. **Production and delivery of large and small woody debris:**²⁷ Well-
15 established riparian zones contribute to the structure and function of stream ecosystems by
16 contributing "woody debris" to the channel in the form of snapped limbs, broken tree tops, root

17 ²² Knutson, K. Lea and Virginia L. Naef. 1997. Washington State Department of Fish & Wildlife.
18 Management Recommendations for Washington's Priority Habitats: Riparian. Washington Dept. of Fish &
Wildlife, Olympia, WA 181 pp. <http://www.wa.gov/wdfw/hab/ripsum.htm>

19 ²³ Bilby, R.E. 1988. Interactions between aquatic and terrestrial systems. Pages 13-43 in K.J. Raedeke,
editor. Streamside Management: Riparian Wildlife and Forestry Interactions. Institute of Forest Resources,
Contribution no. 59. University of Washington, Seattle, WA.

20 ²⁴ Wenger, Seth. 1999. A Review of the Scientific Literature on Riparian Buffer Width, Extent and
Vegetation. Office of Public Service and Outreach, Institute of Ecology, University of Georgia. Available at
http://outreach.ecology.uga.edu/tools/buffers/lit_review.pdf

21 ²⁵ Gregory, S.V., F.J. Swanson, W.A. McKee, and K.W. Cummins. 1991. An Ecosystem Perspective on
Riparian Zones. *BioScience* 41:540-551.

22 ²⁶ Correll, D.S. 2001. Vegetated Stream Riparian Zones: Their Effects on Stream Nutrients, Sediments,
and Toxic Substances. An Annotated and Indexed Bibliography of the world literature including buffer strips, and
interactions with hyporheic zones and floodplains. Tenth Edition. Sustainable Florida Ecosystems, Inc., Crystal
23 River, FL. Available at <http://www.riparian.net/correll.htm>

24 ²⁷ The important role of woody debris in the formation of stream habitat structure and function is well
documented in the literature. See, for example, 1. Bolton, S. and J. Shellberg. 2001. Ecological Issues in
Floodplains and Riparian Corridors. Aquatic Habitat Guidelines white paper. See <http://www.wa.gov/wdfw/hab/ahg/floodrip.htm>; 2. Beechie, T., and S.M. Bolton. 1999. An approach to restoring salmonid habitat-
forming processes in Pacific Northwest watersheds. *Fisheries Habitat* 24:6-15; 3. Fetherston, K.L., R.J. Naiman,
25 R.E. Bilby. 1995. Large woody debris, physical processes, and riparian forest development in montane river
networks of the Pacific Northwest. *Geomorphology* 13:133-144; 4 Spence, B. et al. 1996. An Ecosystem
26 Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp.,
Corvallis, OR. See www.nwr.noaa.gov/1habcon/habweb/ManTech/front.htm

1 wads, and entire trees. The ability of a tree to contribute to this function is related to its height
2 and distance from the stream, regardless of whether the area is wetland or upland. The greatest
3 contribution comes from trees within one tree height of the channel. Large woody debris
4 influences the retention and flow of sediment and spawning gravel through a basin, affects
5 habitat complexity and diversity, and determines the retention of nutrients for aquatic
6 invertebrates, among other functions. Coniferous wood has a much higher longevity rate in
7 streams than deciduous wood. Restoration of forested riparian communities is a key element of
8 salmon restoration planning efforts around the state.

9 **26. Food-chain support.** Wetlands are commonly referred to as “supermarkets of
10 the landscape” due to the high primary productivity of certain wetlands, such as sedge
11 meadows and other emergent wetlands. This metaphor does not necessarily carry to forested
12 wetlands, where tree growth is slower than trees in adjacent uplands or riparian zones.²⁸ Trees
13 growing on the drier areas of riparian areas tend to grow faster than in wetter areas as their
14 growth is not limited by the stress of anaerobic soils. The leaf and litter fall from trees
15 contributes a tremendous amount of energy to the riparian and stream food web.²⁹ In addition,
16 the insect fall from riparian zones during the summer is a critical source of food for fish, at a
17 time when aquatic insect production is generally at its lowest.^{30,31} Though leaf fall forms the
18 basis of the detrital-based food web in streams, the input of terrestrial insects to streams from
19 riparian vegetation provides food for fish that are directly available, forming “a potentially
20 more energy-efficient linkage of food webs at the interface between terrestrial and aquatic
21 ecosystems.”³² In addition to leaf and insect fall, riparian vegetation contributes small organic
22 matter to the stream in terms of twigs and branches.

23 _____
24 ²⁸ The “Site Potential Tree Height” or SPT is the average height of the dominant trees native to a site,
upon maturity.

25 ²⁹ Nakano, S. 1999. Terrestrial-aquatic linkages: riparian arthropod inputs alter trophic cascades in a
stream food web. *Ecology*, Oct 1999.

26 ³⁰ Nakano, S. 1999.

³¹ Wallace, J. B., S. L. Eggert, J. L. Meyer, and J. R. Webster. 1997. Multiple trophic levels of a forest
stream linked to terrestrial litter inputs. *Science* 277:102-104.

³² Nakano, S. 1999.

1 27. **Regulation of nutrient, sediment and pollutant inputs to streams:** Riparian
2 zones control the input of sediments, nutrients and pollutants to streams. Several variables
3 affect the ability of riparian buffers to regulate these inputs, including slope, soil type,
4 vegetation community, and drainage characteristics. Riparian vegetation takes up nutrients that
5 flow across the riparian zone in surface or subsurface waters.

6 28. **Moderation of water temperature, creation of thermal microclimate:** The
7 presence of trees in the riparian zone not only influences the amount of solar radiation that
8 reaches a stream but it also influences soil moisture, soil temperature, air temperature, and
9 relative humidity within the riparian zone. The thermal buffering function provided by trees in
10 riparian areas is a function of stand age, density, and distance from the stream. Riparian
11 vegetation shades stream water during summer days, providing thermal control to running
12 waters. During the winter, riparian forest cover provides thermal insulation.³³ Due of the high
13 level of urbanization in the basins, these functions are depressed in Miller and Des Moines
14 Creek basins.

15 29. **Habitat for wildlife:** Riparian buffer zones are critical for maintaining the
16 species composition and ecological functions of both aquatic and terrestrial ecosystems.³⁴
17 Approximately 87% of wildlife species in western Oregon and Washington use wetlands or
18 riparian areas during some or all of their life cycle.³⁵ A Study in Oregon determined that eight
19 of eleven species of amphibians and five of six species of reptiles either reside or breed in
20 aquatic or riparian habitats.³⁶ An extensive review of the wildlife value of riparian areas in
21

22 33 Spence, B. et al. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057.
23 ManTech Environmental Research Services Corp., Corvallis, OR. See www.nwr.noaa.gov/1habcon/habweb/ManTech/front.htm

24 ³⁴ Naiman, R.J., K.L. Fetherston, S. McKay, and J. Chen. 1998. Riparian forests. Pages 289-323 (chapter
25 12), in R.J. Naiman and R.E. Bilby (eds). River Ecology and Management: Lessons from the Pacific Coastal
26 Ecoregion. Springer-Verlag, NY. See http://www.fish.washington.edu/people/naiman/CV/reprints/chapter_12.pdf

25 ³⁵ Brown, E. R. 1985. Management of wildlife and fish habitats in forests of western Oregon and
26 Washington. Publication R6-F&WL-192-1985. U.S. Department of Agriculture, Forest Service, Pacific Northwest
Region, Portland, Oregon.

26 ³⁶ Bury, R. B. 1988. Habitat relationships and ecological importance of amphibians and reptiles. Pages
61-76 in K. J. Raedeke, editor. Streamside management: riparian wildlife and forestry interactions. Contribution
No. 59. University of Washington, Institute of Forest Resources, Seattle.

1 Washington State is provided in O'Connell et al. (1993).³⁷ The Washington Department of Fish
2 and Wildlife has developed recommendations for minimum buffer widths to protect wildlife.
3 The widths depend on the habitat requirements of different species.³⁸

4 **30. Migration and dispersal corridors:** Furthermore, riparian areas serve as
5 migration and/or dispersal corridors for wildlife species. Restoration of the 1.7 mile-long reach
6 will re-connect habitat that has been fragmented by urbanization for decades.

7 **31.** The removal of riparian vegetation through urbanization, agriculture and
8 logging has significantly disrupted and diminished the functions of the riparian zone in the
9 affected basins. Landowners have simplified the structural complexity of the riparian zone on
10 Miller Creek by removing native understory vegetation, limbing/topping and clearing trees,
11 and installing lawns. Residential lawn care typically requires the use of pesticides and
12 fertilizers and results in discharges of pesticides and fertilizers that end up in the creek.³⁹
13 Human activity within the riparian zone has also compacted the soil, decreasing the soils
14 ability to infiltrate water. When limbs and/or whole trees fall in creeks on single family lots,
15 landowners typically remove the trees, denying the creek this critical habitat forming structure.
16 The restoration and maintenance of natural vegetation communities within the Miller and Des
17 Moines Creek basins is designed to restore and enhance these functions. The NRMP will
18 essentially turn the clock back to a time prior to urbanization, and remove the chronic human
19 disturbance from the area.

20 **32.** Ms. Azous claims the riparian buffers proposed for enhancement and restoration
21 are "already protected by stream buffer regulations" and that "a minimum 100-foot buffer
22

23 ³⁷ O'Connell, M.A., J.G. Hallett, and S.D. West. 1993. Wildlife Use of Riparian Habitats: A Literature
24 Review. Timber Fish and Wildlife Program, Washington Department of Natural Resources, Olympia, WA. TFW-
25 WL1-93-001. 162 pp.

26 ³⁸ Knutson, K. Lea and Virginia L. Naef. 1997. Washington State Department of Fish & Wildlife.
Management Recommendations for Washington's Priority Habitats: Riparian. Washington Dept. of Fish &
Wildlife, Olympia, WA 181 pp. See <http://www.wa.gov/wdfw/hab/ripsum.htm>

³⁹ U.S. Geological Survey (USGS). 1999. Pesticides detected in urban streams during rainstorms and
relations to retail sales of pesticides in King County, WA. USGS Fact Sheet 097-99. Available on-line at
<http://wa.water.usgs.gov/pugt/fs.097-99/fs.097-99.pdf>. Miller and Des Moines creek basins were included in this
study.

1 would be required for any new development adjacent to Miller Creek.”⁴⁰ However, in order to
2 make that statement Ms. Azous assumes that functional, protective buffers are currently in
3 place on the Vacca Farm and on Miller Creek, which of course they are not. Until the Port
4 condemned the buyout area, the creek ran through the back yards of approximately 75 homes,
5 and through a vegetable farm. These areas were platted and converted long before local
6 governments developed buffer standards in their local ordinances. The current degraded
7 condition of the riparian zone on Miller Creek speaks for itself. The riparian zone restoration
8 required by the NRMP will substantially improve upon existing conditions, and will achieve a
9 level of landscape-scale benefits the City’s existing regulations cannot require.

10 33. Despite statements to the contrary, current buffers along the creeks and
11 wetlands do not protect and maintain aquatic functions. Absent a development proposal,
12 regulatory authorities have no ability to improve the buffers through existing regulations and
13 have no mechanism to make a landowner improve the buffers. Moreover, the Port is doing
14 more than merely setting aside land adjacent to the creek as a buffer; it is significantly
15 enhancing the buffer to provide needed riparian functions.

16 **IV. Ecology Properly Credited Preservation/Avoidance**

17 34. The ACC criticizes Ecology’s granting of wetland mitigation credit for the
18 preservation of high quality wetlands and their buffers. Given the important functions
19 provided by those wetlands and attendant buffers, the criticism is unwarranted. The only way
20 to truly protect a forested wetland is to remove the threat of logging. Most forested wetlands,
21 and certainly areas that function as buffers, can be legally cleared under federal and state laws,
22 thus eliminating most of the functions that the buffers would provide and altering the nature of
23 the former forested wetland.

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⁴⁰ Pre-filed Testimony of Amanda Azous, ¶¶ 3, 14.

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1 35. In particular, Ecology agreed to recognize the value of the Port's avoidance of
2 the 2.35 acre Wetland 30 complex in borrow area 3.⁴¹ The wetland complex is the only closed
3 depression wetland in the project area with extended period of inundation. As such, it is unlike
4 other wetlands owned by the Port. Because of its hydrologic isolation and persistence, it
5 provides ideal habitat for the pacific treefrog and other native amphibians. The wetland
6 complex is surrounded by a maturing second growth forest. The buffer provided around the
7 wetlands totals 21.20 acres. Because Wetland 30 dries out in the fall it is not subject to
8 invasion by bullfrogs, an introduced species highly predatory on native amphibians. The
9 preservation area is adjacent to Des Moines Creek Park, providing an important habitat linkage
10 to the creek. An abandoned road separates the preservation area from the park.

11 36. Ecology granted credit of the preservation at a ratio 10:1 in the NRMP.
12 Ecology granted mitigation credit because the Port is setting aside a valuable wetland that is
13 not otherwise protected from logging, along with a very significant buffer. Without the ability
14 to give credit for the preservation of forested wetlands and forested buffers, Ecology would not
15 be able to protect these important resources from further degradation due to logging.

16 **V. Vacca Farm Is Not Currently A Highly Functioning Wetland System.**

17 37. The ACC claims that the Vacca Farm is a high quality wetland. According to
18 Ecology's wetland rating system,⁴² Vacca Farm is a Category II wetland, not a Category I
19 wetland as asserted by the ACC. ACC's witnesses imply that the wetland is a high quality
20 wetland because it meets the City of SeaTac's Class 1 wetland criteria. Ecology and the Corps
21 do not use the City of SeaTac's rating system because it is technically flawed. The top rating
22 in any wetland classification system is reserved for high quality "cream of the crop" wetlands.
23 The City's rating system is not based on "best available science." It is a simplistic rating

24 _____
25 41 The "wetland photographs and maps" report by Parametrix dated May 2001 depicts the wetland
26 complex and its forested buffer on map #23 and image #23. The complex includes wetland 29 (0.74 acres),
wetland B9 (0.05 acres), wetland B10 (0.02 acres), wetland B7 (0.03 acres), wetland B6 (0.55 acres) and wetland
B5 (0.08 acres).

⁴² Washington State Wetland Rating System for Western Washington. Department of Ecology
publication 93-74.

1 system written by King County close to twenty years ago.⁴³ Understanding of wetland ecology
2 has grown significantly since that rating system was written. Review of the photographs in
3 Attachment B of my testimony supports Ecology's conclusion that the Vacca Farm wetland is
4 highly degraded. In fact, it could be argued that the Vacca Farm wetland should not even be
5 rated as Category II because of its severely degraded condition. The only reason it does rate
6 this highly is because it is part of a larger wetland complex that includes higher quality wetland
7 conditions.

8 38. Prior to human modification the wetland complex was undoubtedly a Category I
9 wetland. Sixty years of peat extraction, filling, drainage, ditching, clearing, agricultural
10 production, residential development, road construction and other disturbances have
11 significantly depressed the level of wetland functions performing at the wetland. Implying that
12 Vacca Farm is a high quality wetland is simply misleading. And while the ACC overstates the
13 present level of wetland functions at the Vacca Farm, it also underrates the significant
14 opportunity that exists at this location for meaningful in-basin restoration.

15 39. Ms. Sheldon contributes to the mischaracterization of the farm by stating in her
16 testimony at paragraph 16:

17 For example, anticipated increases in small mammal habitat and passerine birds
18 fails to recognize the structural complexity and abundant food sources present
19 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.

20 This statement seems to indicate that Ms. Sheldon believes that residential landscaping with
21 non-native species and agricultural areas with non-native weedy species provides good wildlife
22 habitat. Ms. Sheldon ignores the fact that most scientists who deal with assessment of wetland
23 functions base performance of habitat function on structural complexity and presence of native
24 plant species. The farm is neither structurally complex nor vegetated with native species.

25
26 ⁴³ King County staff recognize their rating system is not based on "best available science" and are in the
process of amending the county code to replace it with Ecology's four-tier wetland rating system.

1 40. Species richness is directly related to structural complexity.⁴⁴ Agricultural
2 ecosystems are noted for being homogenous in structural complexity and have low species
3 richness. Rather, they are noted for supporting a high abundance of a limited number of
4 species. Research in the Puget Sound lowlands establishes the fact that as areas urbanize, they
5 lose many of the deep forest species that rely on structural complexity and in turn shift in
6 populations to a limited number of bird species that are characteristic of disturbed
7 environments.⁴⁵ These include crows, seagulls, starlings, song sparrows, robins and other
8 urban-tolerant songbirds. A number of these species (particularly crows and magpies) are
9 highly predatory and eliminate native bird species through predation of eggs and young. On
10 the other hand, structural complexity in native systems consists of multiple layers of
11 vegetation, different types of vegetation communities (forested, scrub shrub, emergent, aquatic
12 bed) and the interspersions of these structural features with one another that together create a
13 higher number of habitat niches than a one-dimensional agricultural monoculture. Agricultural
14 activities tend to encourage the spread of aggressive, non-native species such as reed
15 canarygrass, which in turn reduce native habitat and structural complexity. They also
16 contribute to non-point source pollution problems.

17 41. To say that the Vacca Farm is currently providing high levels of wetland
18 functions in its existing condition is not supported by the reality at the site, nor current
19 scientific principles. The restoration plan at Vacca Farm will result in a higher functioning
20 system than what currently exists at the site. In addition, restoration of the Vacca Farm, as well
21 as the Tyee Golf course fairways, will decrease the current level of "bird strike hazard" present
22 at the sites. The areas are hazards because they attract large number of waterfowl such as
23 ducks and geese, particularly during the winter when the fields are inundated.

24
25
26 ⁴⁴ Species richness is defined as the number of species in a study area.

⁴⁵ Azous, A.L., and R.R. Horner (eds). 2001. Wetlands and Urbanization. Implications for the Future. Chapter 6: Bird distribution, abundance, and habitat use. Lewis Publishers.

1 44. Ecology is not alone in recognizing the watershed benefits that can accrue from
2 “trading functions”. In a recent Regulatory Guidance Letter, the Corps Headquarters states the
3 following under a paragraph Watershed/Holistic Approach for Mitigation:

4 Increasingly, the Corps is taking a watershed approach in the regulatory
5 program. Mitigation projects are most successful if a holistic approach is taken
6 where a variety of aquatic resource types are protected in a mitigation project
7 (whether mitigation bank, in-lieu fee, or project-specific mitigation), including
8 open water, wetland and upland mixes. Where such mix of ecological factors is
9 included in the mitigation, all of those features (open water, wetland, and
10 upland resources which add to the aquatic functions) should be included in the
11 “credits” established.⁴⁶

12 The mitigation proposed in the NRMP will result in a net benefit to wetland and aquatic
13 resource functions in the affected basins.

14 VIII. In-Basin vs. Out-Of-Basin Mitigation and RCW 90.74

15 45. The Port proposed to provide a portion of its wetland mitigation out-of-basin
16 with a 65.38 acre wetland mitigation site in Auburn, consisting of a combination of wetland
17 creation (29.98 acres), wetland enhancement (19.5 acres) and buffer enhancement (15.9 acres).
18 While not located in the basins where the Port is constructing its project, the Auburn mitigation
19 site is within the same WRIA as the wetlands being impacted. Under Chapter 90.74 RCW, the
20 legislature directed the Departments of Fish and Wildlife and Ecology to consider out-of-basin,
21 in-WRIA mitigation when reviewing public infrastructure projects such as that proposed by the
22 Port. The statute sets forth criteria to consider when evaluating such mitigation proposals. See
23 RCW 90.74.020(1). The Port’s proposed mitigation in Auburn meets the statutory elements
24 and provides meaningful mitigation for the impacts created by the project.

25 46. Ms. Azous states that the “use of WRIA 9 as a planning unit for aquatic
26 resource protection in Miller and Des Moines Creek watersheds is inconsistent with best
available science and will result in degradation of beneficial uses within these watersheds.”⁴⁷

⁴⁶ Regulatory Guidance Letter No. 01-1 dated October 31, 2001, titled “Guidance for the Establishment and Maintenance of Compensatory Mitigation Projects under the Corps Regulatory Program Pursuant to Section 404(a) of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.” See <http://www.spk.usace.army.mil/pub/outgoing/co/reg/rgl/rgl01-01.pdf>

⁴⁷ Pre-filed Testimony of Amanda Azous, ¶ 3.

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1 Ecology respectfully disagrees. The approach taken on this project was to look first at in-basin
2 opportunities for replacing lost functions. There are very limited options within the Miller and
3 Des Moines Creek basins for wetland creation or restoration. Thus, Ecology pursued the
4 reasonable options of restoring wetlands at Vacca Farm and restoring the riparian corridor
5 along Miller Creek. These activities will replace most of the beneficial uses lost or degraded
6 by the development of the third runway.

7 47. Once reasonable in-basin opportunities are exhausted Ecology looked to other
8 options within the WRIA. Ecology determined that there were multiple options within the
9 Green River basin that would address functions that were identified as limiting in the Mill
10 Creek Special Area Management Plan.⁴⁸ The wetland mitigation in the Green River basin was
11 designed to address these limiting functions; primarily water quality improvement and
12 waterfowl habitat.

13 48. The important thing to consider is that making resource tradeoff decisions is not
14 simply a matter of applying scientific knowledge. Rather, it is essentially a policy decision
15 where a determination is made based on what is feasible and what provides the greatest
16 environmental benefit. The state has determined that out-of-kind and off-site tradeoffs are
17 justifiable and desirable in many situations. Chapter 90.74 RCW and the state's Alternative
18 Mitigation Policy Guidance for Aquatic Permitting Requirements from the Departments of
19 Ecology and Fish and Wildlife⁴⁹ provide the framework and guidance for making such
20 decisions. The alternative mitigation guidance spells out when off-site mitigation may be
21 acceptable and lays out specific circumstances under which wetland preservation can be
22 accepted as an element of compensatory mitigation. With respect to the basin boundaries for
23 off-site mitigation, the guidance clearly states that it can occur at the WRIA scale:

24 ///

25 ///

26 ⁴⁸ Mill Creek Special Area Management, <http://www.nws.usace.army.mil/reg/millcrk/main.htm>
⁴⁹ Washington State Departments of Ecology, Fish & Wildlife, and Transportation. 2000.

1 Acceptable off-site mitigation must occur in the same Water Resource
2 Inventory Area (WRIA), basin or sub-basin as the impacts, unless otherwise
3 approved by the permitting agencies.

4 49. It is not always possible or desirable to attempt to replace all functions in the
5 same place to the same degree. The bottom line in this case is that significant in-basin
6 mitigation is provided that will offset the impacts to critical functions in Miller and Des
7 Moines Creek basins while at the same time, additional mitigation is provided to address
8 critical functions in the adjoining Green River basin.

9 **IX. Conclusion**

10 50. After thorough analysis of the Port's submittals and consultation with Katie
11 Walter, I concluded that Ecology has reasonable assurance that the mitigation contained in the
12 NRMP, in combination with the conditions in the 401 Certification, that the Port's project will
13 meet applicable water quality standards with regards to impacts to wetlands and aquatic
14 resources. I subsequently communicated my recommendation that Ecology issue a 401
15 Certification to Ann Kenny and Gordon White. Ecology's amendment of the August 10, 2001
16 401 Certification did not alter my reasonable assurance determination.

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

19 DATED this 7th day of March, 2002 at Bellevue, Washington.

20 

21 ERIK STOCKDALE

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IX. Conclusion

50. After thorough analysis of the Port's submittals and consultation with Katie Walter, I concluded that Ecology has reasonable assurance that the mitigation contained in the NRMP, in combination with the conditions in the 401 Certification, that the Port's project will meet applicable water quality standards with regards to impacts to wetlands and aquatic resources. I subsequently communicated my recommendation that Ecology issue a 401 Certification to Ann Kenny and Gordon White. Ecology's amendment of the August 10, 2001 401 Certification did not alter my reasonable assurance determination.

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

DATED this 7th day of March, 2002 at Bellevue, Washington.

Erik Stockdale
ERIK STOCKDALE

Erik C. Stockdale
Senior Wetlands Specialist, Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, WA 98008
Email: esto461@ecy.wa.gov

SUMMARY OF QUALIFICATIONS

- Nine years experience as a senior wetlands specialist with the Washington Department of Ecology, focusing on technical and policy aspects of wetland management: science, restoration, delineation, and regulation. Certified Professional Wetland Scientist.
- Over six and a half years experience as a natural resource planner with King County, focusing on both policy and technical aspects of land use impacts on wetlands and other aquatic resources.
- Demonstrated ability to work with federal, state, and local governments, tribes, citizen groups, and business interests.
- Recognized regional expert on wetlands and stormwater management issues, wetland restoration, and effects of urbanization.
- Effective public speaker and instructor; skilled presenter of technical and policy-related information to a variety of audiences.

EDUCATION

Master of Marine Affairs. School of Marine Affairs (formerly the Institute for Marine Studies), University of Washington, Seattle, WA. Concentration in Coastal Zone Management and Resource Policy. Minor degree in Business Administration. December 1987.

Bachelor of Arts. University of California at Santa Barbara. Double major in Aquatic Biology and Environmental Studies. Graduated with Honors. June 1983.

Languages: Oral and written fluency in Spanish.

PROFESSIONAL EXPERIENCE

Senior Wetlands Specialist, Washington Department of Ecology, Shorelands & Environmental Assistance Program, Bellevue, WA. October 1992 - Present. Provide scientific and technical expertise to local governments in wetland identification, delineation, inventory and restoration, evaluation of project impacts, functional assessment, and training. Assist local governments in the implementation of the Growth Management Act and Shoreline Management Act. Represent Ecology on a variety of inter-agency planning projects; in enforcement actions, hearings and other legal proceedings. Provide comprehensive habitat and planning related expertise to locally-based watershed planning initiatives to promote the integration of planning elements pursuant to the watershed management act. Assist in development of state wetland policy development, training and mentoring of junior staff; and project/permit dispute resolution. Provide technical support to Ecology's regulatory responsibilities under the Clean Water Act, Shoreline Management Act, and Water Pollution Control Act.

Resource Planner, Resource Planning Section, Environmental Division, King County Department of Parks Planning and Resources, Seattle, WA. February 1986 - October 1992. Project manager, critical areas mapping project; project manager, wetlands inventory update; project manager, environmental review program; lead staff, Wetlands Research Program; forest practice permit review; resource planner to Snoqualmie Valley Community Plan team; technical assistance to Sensitive Areas Ordinance; extensive involvement in all aspects of King County's wetland management program.

Instructor, National Wetlands Science Training Cooperative. Co-taught a four-day course on "Constructed Wetlands for Stormwater Management." Seattle, WA., Oct. 15-18, 1991.

Resource Analyst, California Coastal Conservancy, Resource Enhancement Staff. Development of wetland enhancement monitoring program. Summer 1985.

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Attachment A

PAPERS and PUBLICATIONS

- Stockdale, E.C. 1992. "The Science Behind Surface Water and Wetland Issues." Chapter 5, course materials, Continuing Legal Education Seminar, Washington State Bar Association, Environmental & Land Use Law Section, March 13, 1992.
- Stockdale, E.C. 1991. Freshwater Wetlands, Urban Stormwater, and Nonpoint Source Pollution: A Literature Review and Annotated Bibliography. King County and Washington State Department of Ecology, Olympia, WA. 274 pp. Second Edition.
- Stockdale, E.C., and R.R. Horner. 1988. "Using Freshwater Wetlands for Stormwater Management: A Progress Report." Presented to the Wetlands '88: Urban Wetlands and Riparian Habitat Symposium, June 26-29, 1988, Oakland, CA. Organized by the Association of State Wetland Managers, Inc.
- Stockdale, E.C., and R.R. Horner. 1987. "Prospects for Wetlands Use in Stormwater Management." Proceedings of the Coastal Zone '87 Symposium, Seattle, WA. pp. 3701-3714.
- Stockdale, E.C. 1987. "Should Freshwater Wetlands Be Used For Stormwater Management? A Discussion of Wetlands Management in King County, Washington." Master's Thesis, University of Washington, School of Marine Affairs, Seattle, WA. 148 pp.
- Stockdale, E.C. 1986. The Use of Wetlands for Stormwater Management and Nonpoint Pollution Control: A Review of the Literature. Washington State Department of Ecology, publication 87-7A. (revised in 1991).
- Stockdale, E.C. 1986. Viability of Freshwater Wetlands for Urban Surface Water Management and Nonpoint Pollution Control: An Annotated Bibliography. Washington State Department of Ecology, publication 87-7B. (revised in 1991).
- Stockdale, E.C. 1985. "Bibliography of Niño Effects in the Eastern Subarctic Pacific." In: W.S. Wooster and D.L. Fluharty (eds.), El Niño North: Niño Effects in the Eastern Subarctic Pacific Ocean. Washington Sea Grant Program, University of Washington, Seattle.
- Stockdale, E.C. 1985. On the Monitoring of Wetland Enhancement Projects. California State Coastal Conservancy, Oakland, CA.
- Stockdale, E.C. 1983. "Effects of Acid Rain on Aquatic and Terrestrial Ecosystems." Bachelor's Thesis, University of California at Santa Barbara, Environmental Studies Program.
- Stockdale, E.C. 1983. "Natural and Anthropogenic Impacts to Coral Reef Ecosystems." Senior paper, B.A. Aquatic Biology, University of California, Santa Barbara.

CERTIFICATIONS

Professional Wetland Scientist (number 0411), Society of Wetland Scientists Professional Certification Program.

HONORS

Graduated with honors, UC Santa Barbara, June 1983. Recipient, Edna Bailey Sussman Fund grant to support internship with California Coastal Conservancy.

PROFESSIONAL AFFILIATIONS

Society of Wetland Scientists, Pacific Northwest Chapter (Chapter Treasurer from 1992-1995)

REFERENCES, ADDITIONAL INFORMATION

References, chronology of training, and list of public presentations available upon request.

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PHOTO A: Discarded pumpkins at Vacca Farm, 11-16-98. Hundreds of crows, starlings and seagulls were feeding on the pumpkins before being scared away by my visit. Notice highly degraded condition of wetland, where wetland plant community is disrupted yearly by agricultural planting. Vegetable stand (on east side of Des Moines Memorial Drive) was located to right of blackberry bramble in center right of photo. The yearly disposal of pumpkins at site attracts a significant number of birds which in turn creates a significant bird strike hazard.



PHOTO B: Flock of geese at Vacca Farm 11-16-98. Photo is taken towards ESE. Miller Creek runs in ditch to east of (behind) single tree at center top of photo. Creek is not buffered. Homes in background are located in zone of proposed embankment fill. Field had been planted in pumpkins earlier in year. Several hundred mallards and widgeons were using field at the time. Waterfowl use at site will significantly decrease after restoration. These photos represent the baseline conditions for the project at the farm.



Photo C: Vacca Farm pumpkin field 4-29-97. This field over-wintered without a cover crop, resulting in chronic discharges of sediment and nutrients to the un-buffered creek. Urban waterfowl are a significant source of fecal coliform in urban basins.



Photo D: Miller Creek through Vacca Farm 4-29-97. Note lack of buffer on creek, with structures built on edge of creek on right side, and field ploughed within ten feet of creek on the left.

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PHOTO E: Flooded corn field at Vacca Farm 11-16-98. Peat soils are sufficiently drained by on-going agricultural manipulations during the growing season to support a crop of corn. November 1998 had unusually high amount of rainfall. This flooding is unusual.



PHOTO F: Flooded corn field at Vacca Farm, 11-16-98.

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Photo G: Photo of Des Moines Creek as it flows through the golf course at the southern end of the runway, taken 11-16-98. Visit followed storm event, which resulting in fairly significant flooding of golf course fairways. Golf course attracts waterfowl, presenting a bird strike hazard to the airport. Implementation of the NRMP will result in the restoration of the golf course fairways that are wetland to a scrub-shrub wetland community.



Photo H: Tyee Golf Course, flooding after storm event. Des Moines Creek flows from right to left. Use of golf course by waterfowl presents a significant bird strike hazard. Taken 11-16-98.