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L.C. Lee & Associates, Inc.
2442 NW Market Street, #392
Seattle, Washington 98107
Tel: 206.979.5633
Email: [lyndon@lcleeinc.com]

Technical Memorandum
April 29, 2012

To: Mr. Tom Dickey
P.J. Taggares Company

Alexander Mackie
Perkins Coie

From: Lyndon C. Lee, Ph.D., PWS
Scott R. Stewart, Ph.D., PWS, CPSS
L.C. Lee & Associates, Inc.

Ref: Preliminary Analysis of Shoreline Conditions & Issues at P.J. Taggares Company Property, Blakely Island, Washington

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I. Introduction

We are writing to offer results of our preliminary analyses of shoreline[1] functioning and classification issues at the P.J. Taggares Company properties which are located on the north end of Blakely Island in San Juan County, Washington (Photo 1). The approximate latitude/longitude coordinates for the center of the main Taggares property are 48 35 14.12 N/122 48 41.01 W. The Taggares' also own a small duplex housing unit on the western extent of the bight that is located west and south of the Blakely Island Harbor entrance and fuel dock complex. The approximate latitude/longitude coordinates for the duplex property are 48 34 58.45N/122 49 17.83W. The northern extent of the main Taggares property forms the south shore of the middle reach of Peavine Pass. The western and southern portions of the property encompass the eastern extent of the Blakely Island Marina basin and surrounding slopes. The eastern portions of the Taggares property abut a high energy beach that faces northeast to Rosario Strait and the northwestern shore of Cypress Island. The main Taggares property is located within the northern and western extents of "Reach 89" on *Draft Map 37C: Shoreline Reaches, San Juan County Shoreline Master Program Update*. The duplex property is located within Reach 90 of the same draft map. The electronic version of Map 37C that we examined has no key that relates the patterns of mapped reaches to San Juan County shoreline designations. Therefore, we relied on a narrative description of shoreline designations presented by Herrera et al. on page 87 of the January 30, 2012 "*Shoreline Inventory and Characterization*

1Note: for the purposes of this Technical Memorandum, "shoreline" is defined consistent with standard the Washington State definition (RCW 90.58.030 (2) (d). It is the area that exists 200 feet landward on a horizontal plane from the mean higher high tide mark, or the landward edge of a water/wetland that spans the 200 ft boundary, whichever is greater. It is the area that exists 200 feet landward from the mean higher high tide mark, or the landward edge of a water/wetland that spans the 200 ft boundary, whichever is greater.

II. Materials Reviewed & Site Visit

In conducting the analyses presented in this technical memorandum, we reviewed several sets of background materials including pertinent sections of the January 2012 Shoreline Inventory and Characterization Report prepared for San Juan County by Herrera *et al.* We then visited Blakely Island on April 26, 2012. During this visit, we closely examined shoreline and near shore conditions on and in the vicinity of the Taggares' properties and compared these conditions to the assessment of conditions in reaches 89 and 90 offered by Herrera *et al.* (January 2012). It is important to note that *Report.*" Reach 89 is not mentioned directly, but we have assumed that the paragraph entitled "Shoreline Environment Designations" describes Reach 89 as being mapped as a Conservancy Reach. Using the same approach, we discern from the page 87 narrative that Reach 90 is mapped as Rural Residential. Page 87 also describes the portion of the shoreline surrounding the Blakely Island Marina as being "rural shoreline environment."

Drs. Stewart and Lee are quite familiar with ecosystem conditions and functioning throughout western Washington including the islands within the Puget Sound - Strait of Juan de Fuca, Strait of Georgia region (ie. the Salish Sea). For example, as a consequence of their ecosystem science and restoration work, Lee and Stewart have spent a great deal of time studying, observing and working with the shoreline, estuarine, and waters/wetlands resources of the Salish Sea Region. For the past thirty two years, Lee has made a point to circumnavigate and walk most of the islands in San Juan County and the Gulf Islands. In addition, he has completed many assessments and appraisals of ecosystem conditions throughout the Salish Sea Region, focusing their efforts on (a) waters, wetlands and forestry issues, and (b) on characterization and restoration of riverine, slope and depressionsal wetlands that form part of or that are adjacent to Salish Sea estuaries. Resumes for Lee and Stewart are attached as Exhibits 1 and 2.

In addition to our field observations and experience, prior to visiting Blakely Island, we reviewed several maps, images, correspondence, and technical reports. That are in the public domain. In particular, we relied on the following materials in developing the observations and conclusions included in this Technical Memorandum:

1. Shoreline Inventory and Characterization Report prepared for San Juan County by Herrera ert al, January 2012.

2. Natural Resources Conservation Service Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx)

3. San Juan County codes, policy statements, and draft Shoreline Master Plan Updates provided by the San Juan County Planning Department - particularly Shoreline Master Plan and Critical Area information provided on the San Juan county website (http://www.co.san-juan.wa.us).

4. Current and historic imagery from Google Earth Pro, Washington State, and San Juan County

5. Washington State Department of Ecology guidance [http://www.ecy.wa.gov/programs/sea/shorelines/smp/faqs.html

6. Revised Code of Washington (RCW) 90.58

III. Summary of Blakely Island Ecosystem Conditions and Functioning

In its present day condition Blakely Island is relatively intact, diverse, and highly productive island ecosystem (Herrera et al, 2012). It serves as a good example of how even though portions of the Blakeley Island shoreline are hardened, cleared, subdivided or otherwise developed, a small island in San Juan archipelago can perform significant functions at both regional/landscape and local scales. Of note are the facts that the northern "shoreline" portions of Blakely Island that are the focus of this technical memorandum are tightly linked -

(a) Outward (generally east - west) to aquatic ecosystem processes that originate in Rosario Strait and the tidal/drift cell ecosystem that exists in the vicinity of Peavine and Obstruction Passes, and Lopez/East Sound/Harney Channel

(b) Inward (generally south) to the forested hillslopes that dominate the northern, central and southern portions of the island.

With particular respect to its "outward" linkages to the tidal/drift cell ecosystem in the vicinity of Peavine and Obstruction Passes, the north shoreline of Blakely Island is the direct recipient of nutrients, organic matter, and sediment from the Rosario Strait and the "inner sound" Lopez/East Sound/Harney Channel ecosystems. Circulation, cycling, storage, and export of these ecosystem "products" and processes serve to add a great deal of structural and geochemical diversity and productivity to the northern Blakely Island shoreline ecosystem. In part, northern Blakely Island shoreline structure and functioning can be seen as being "subsidized" by the Rosario Strait - Lopez/East Sound/Harney Channel ecosystem. For example, nutrients, organic matter, and large wood that originate in the estuarine, near shore, and forested complexes bordering Rosario Strait routinely find their way via drift to the shallow waters, beaches, and bluff bases that comprise the shoreline of northern Blakely Island. In the near shore and beach habitats that occur on the northern end of Blakely Island, these nutrients, organic matter and large wood imports are critical in providing the energy basis for ecosystem production and structural diversity and complexity that is important for maintenance of several species of fishes, avifauna, marine mammals, etc.

Added to the landscape connections introduced above, the shoreline on the northern end of Blakely Island is a complicated transitional area from Peavine Pass and the tidal waters of the cove/eelgrass system due west of the marina, to the forests that dominate the rest of Blakely Island. This transitional area is used by a host of faunal species that require both aquatic and terrestrial food and cover resources.

IV. Issues, Conclusions, and Recommendations

A. Scale

The scale of the draft San Juan County Shoreline map 37C is too broad. Within our test area at the northen end of Blakely Island, the mapped reaches 89 and 90 have low fidelity with existing conditions on the ground. Maps are planning and regulatory tools/models that need to be developed and used with careful considerations of scale, field quality controls, and administrative backup mechanism(s) that include case by case analyses and, if necessary, adjustment of shoreline designation results.

As with any map or set of geographic information tools that are part of land use planning and regulatory processes, the San Juan County map requires careful use. This includes comprehension of the limits of map scales, field checking and verification, and quality control efforts. Especially if it is used for regulatory purposes, the draft map needs to have (a) high fidelity with existing conditions on the ground, (b) consistency/conformity with the County's approach to developing Shoreline Environmental Designations, and (c) an open architecture that allows for iteration(s) between map predictions and observed/documented conditions in the field.

On the northern end of Blakely Island within San Juan County mapped reaches 89 and 90, we examined existing conditions on the ground in the shoreline areas between the Taggares' "duplex" property and then northeast - through the marina basin and through Peavine Pass and then southeast to the southern extent of Taggares' "east beach" area. Within the shoreline areas we examined, we observed a great deal of variation of physical, "habitat" and land use conditions within the two mapped reaches (89 and 90). In fact - for our analyses, we were compelled to partition the County mapped reaches 89 and 90 into 6 reaches on the basis of significant differences in geology/geomorphology, soils, hydrodynamics, vegetation conditions, and existing land uses. The six reaches we examined were as follows:

1. Duplex - extends approximately 1,600 feet from the Taggares' duplex property around the arc of the bight to the fuel dock.

2. Basin - extends approximately 2,700 feet from the marina fuel dock around the perimeter of the marina basin to the north shore of the marina channel entrance - midway.

3. Cook House - extends approximately 650 feet east from the end of the Basin reach on the marina channel entrance north shore, then northeast and northwest around the point on which the Taggares' main (Cook) house is located. It ends on the northeast side of the Taggares' Cook house.

4. Shoreline Houses - extends approximately 600 feet in a northeasterly direction from the northeast side of the Taggares' Cook House to a point along the Peavine Pass shoreline that is past the other (older) structures that are built within the Taggares'complex.

5. Bench - extends approximately 1,200 feet from the end of the Shoreline Houses Reach in a northeasterly direction along the Peavine Pass shoreline and then east and south around the northeast part of Blakely Island.

6. East Beach - extends approximately 1,000 feet from the end of the Bench reach - southeast to the southeast end of the high energy beach that is located along the eastern perimeter of the Taggares'property.

In our examination of County mapped reaches 89 and 90, we observed that the County's choice of a broad mapping scale along with the County's penchant to lump or "round up" shoreline designations to the "dominant" condition within mapped reaches often lead to an inaccurate characterizations or capture of existing conditions in land use(s), and ecologically intact shoreline areas. For example, on the northern end of Blakely Island within reaches 89 and 90, we observed that While the conservancy designation suggests a relatively intact undeveloped shoreline, in fact the a large proportion of the Tagarres property is platted with roads and lots in place. Map 37C failed to recognize (a) existing structures such as legal bulkheads and hardened slopes, (b) important but

small scale linkages among estuarine wetlands/waters, adjacent slope and depressional wetlands, and terrestrial or near shore habitats (and associated ecosystem processes). Further, we saw no administrative review measures or mechanisms in current San Juan County policies and guidelines that allow for case-by-case analyses and if warranted, adjustment of map predictions concerning whether or not a shoreline is ecologically intact or in fact conservancy, rural residential, etc.

Based on our examination of County/Herrera mapping protocols, scale-driven errors are poised to be amplified by the County's reluctance to split designations within a legal parcel and/or to take the time to tailor buffer designations (widths) to extant conditions. Over the past 10 - 15 years and throughout the Puget Sound/Salish Sea Region, we have seen that large, passive buffers that are universally applied in developed landscapes serve to create a great deal of nonconformity in land uses and bewilderment among the regulated public. It is clear that investment in a tailored approach at parcel by parcel or geomorphically homogeneous shoreline reach scales is the only way to go.

B. The Assessment Methodology

1. Overview

The science surrounding rapid assessment of ecosystem functioning is in its infancy. In fact, and as with any new science, current efforts to accurately capture and consistently categorize ecosystem conditions and associated functioning builds upon a tumultuous 30 year history. The most elegant science-based assessment methodologies in use today use reference systems to bound or limit model predictions to a range of variation actually witnessed and documented within a relatively homogeneous geographic and/or functional range (or "domain") of the models. At its core, the Herrera model apparently fails to use even a rudimentary reference framework that would provide bounds for predictions/scores using a range of metrics and field indicators that are registered against series of field observations within the San Juan County domain. In addition to lack of adequate reference, we found very little guidance in the document that leads a field observer to a consistent "score" for Physical or Habitat conditions. In fact, in Section 8.3.1 of their 2012 report (pages 289-290) Herrera *et al.* state that "it is difficult to describe the methodology" since there are "very few firm rules." Table 5A (page 13 of the Herrera et al. report) is an attempt at some rules, but its scope is too narrow, narrative or numeric conditions are inconsistent or not parallel, and overall it does not go far enough to serve as adequate guidance.. The authors of the Herrera *et al.* report go on to explain that they rely upon Washington State Department of ecology guidance which is "...further informed by GIS data." For example, Table 39 (pages 283-285) is an attempt to relate County/Herrera decisions to Washington State guidance, but it does not seem to be tightly referenced and integrated into standards and protocols that would guide users throughout the entire document. In our opinion and after our preliminary office and field review, the Herrera methodology is abstruse at best. It is poorly documented, not supported by adequate reference systems that are keyed to meaningful subclasses of shoreline within the San Juans, poorly linked to the science base, and thus often myopic with respect to its ability to capture important landscape-scale and local ecosystem processes and linkages within and between shoreline ecosystems As a result, one is not able to transfer the Herrera data in any meaningful way to the regulatory definition for designation purposes under WAC 173-26-211 or the more specific critical area known as "fish and wildlife habitat conservation areas" which are defined as ecosystems which:

"serve a critical role in sustaining needed habitats and species for the functional integrity of the ecosystem, and

"Which, if altered, may reduce the likelihood that the species will persist over the long term."

WAC 365-190-030 (:6)(a)

In our opinion, the Washington State legislature has made it clear that not all shorelines are critical areas and that within a shoreline zone only those areas which meet the specific definition of a critical area and are specifically designated in accordance with the critera are to be considered as such (See RCW 36.70A.480(5)

Since the County must rely on an accurate characterization to make the required determination, it is important to note two issues:

First - the authors of any rapid assessment tool use series of individual and linked assumptions and opinions to make the logic of the assessment models consistent, stable, and "friendly" to a wide range of users. This is the business of making rapid assessment work and the issue is that the authors are necessarily using their experience to craft interpretations of best available science and reference systems to make the model(s) work and to ensure consistency.

Second - given the issue introduced immediately above, it is wholly inappropriate and arbitrary for individuals who are the authors of a rapid assessment methodology to fail in the provision of clear and consistent guidance in application of the methodology. It is not OK that "it is difficult to describe the methodology" and that there are "very few firm rules." This is a guarantee for lack of consistency and conformity in use and explanation of assessment protocols and results - which is of course, the pathway to arbitrary and capricious decision making.

2. Results of Field Testing on Northern Blakely Island

Part of our objectives in examining shoreline functioning and classification issues in San Juan County was to compare the results of the County/Herrera team's application of the Herrera *et al.* assessment methodology with our field observations and use of the method over the same shoreline reaches. The discussion offered in section IV A of this technical memorandum addresses our concerns with scale. It also includes our recommendations regarding adjustment of the reach designations within our test area on the northern end of Blakely Island - (Reaches 1-6 as presented above). With these scale and reach issues in mind, we examined the County's scores for reaches 89 and 90 (Tables 18A and 18B - Blakely Island Reaches 89 and 90 - pages 89-91 in Herrera *et al*, 2012). The pertinent data from these tables are offered in Exhibit 1 in this technical memorandum.

With respect to the reach 89 and 90 data offered in Exhibit 1, it is interesting to note that even though existing geomorphic, land use, and development conditions within reaches 89 and 90 are quite different, the physical condition scores are different only with respect to wave/current attenuation, and shade. With respect to habitat conditions, reach scores differ in the estuary/wetland habitat, shoreline alterations, shoreline sediment alterations, and fish metrics (herring, sandlance, lingcod, and salmon). We recognize that part of the variation in physical and habitat conditions is driven by changes in the geomorphic surface, current patterns and dominant

plant communities within reach 89 (generally rocky and steep) and 90 (gentle slopes, shallow bays, etc.), and by changes in dominant habitat types, substrates, etc. within each reach. However, we struggle to understand what the differences mean when we turn to look at existing conditions on the ground, especially at a finer (six reach) scale of resolution.

Our scores for the 6 shoreline reaches introduced above in Section IV A of this technical memorandum are shown in Exhibit B. We did not score the fish variables due to lack of time and lack of immediate access to the unpublished Beamer article upon which the fish ratings rely.

We found significant differences in physical and habitat conditions among the six reaches we examined. Apart from the "Bench" reach, which was in the best condition of all six reaches we examined, our results depart in dramatic and significant ways from the County ratings for the same areas. Granted, we looked at a finer scale, but we argue that our level of mapping/reach resolution had far greater fidelity to extant natural geomorphic, land use/development, and vegetation conditions on the northern part of Blakely Island. This is important, because while we show good conditions and general agreement with County/Herrera results in the Bench reach, we also show significant degradation of existing physical and habitat conditions in the Duplex, Basin, Cook House, Shoreline House, and East Beach reaches. This is important, because shoreline management protocols use existing conditions as the basis for examination and regulation of development activities. Scale drives the baseline for recognition of existing conditions. If we pick a large scale and round up to what might be a dominant or best condition in that reach, the baseline condition will be inflated within portions of the reach that are more degraded via development, shoreline hardening, and other land uses.

Of particular note is that the Herrera et al. assessment methodology failed to recognize important linkages and changes among different portions of a shoreline within a given reach. For example, our East Beach reach consisted of approximately 1,000 feet of high energy northeast-facing beach, a small fore dune feature and portions of a mowed pasture/lawn and slope-depressional wetland complex that forms part of the Taggares property. While the assessment methodology fairly characterized physical and habitat features on the beach/fore dune portion of the reach, it totally missed the degraded functions that were extant in the pasture/lawn/slope-depressional wetland complex that formed nearly half of the assessment unit. Consequently, we divided the shoreline area within the East beach reach and scored the beach/fore dune portion of this shoreline reach separately from the pasture/lawn/slope-depressional wetland complex. Thus in addition to reach scale, bounding conditions in a logical way at the sub-reach scale avoids averaging conditions within a reach and thus development of "central tendency" in model results. This is a classic problem in development and use of rapid assessment protocols and there need to be rules that guide users of the methodology on how to set up bounding and assessment areas so that field protocols, mapping conventions, and results among users conform to standards and are consistent.

Another observation that we made during our test is that the Herrera methodology does not deal at all with the concept of *site potential*. For example, Exhibit 2 includes many "Not Applicable"(N/A) scores that we assigned for both physical and habitat conditions. On what is the high energy East Beach Reach, there is no shade presently and no potential for shade. The East Beach system should not be down-rated for this condition. High energy beaches in San Juan county have virtually no shade. Thus, during our field testing, we judged that on the East Beach the shade condition was "not applicable" (N/A) for the site potential. Our other choice was to rate it as a "5" (even though there was no shade), because on the East Beach the site potential

makes no shade the best possible condition on the site. This issue is important, because assigning a "0" score in such situations makes the result indistinguishable from highly degraded "0" conditions in the shade metric that might result form mechanical clearing of vegetation, construction of rock walls, etc. Failure to deal with the site potential issue is another classic conundrum in development and use of rapid assessment methodologies. Because all shoreline conditions in San Juan County do not have the same site potential, if you compare them all to one another without adjusting the rating system to subclasses of shoreline (e.g. high energy beach, bluffs, low energy estuaries, etc.) the site potential issues will skew assessment results. In our experience, addressing the site potential issues is best handled by (a) grounding condition ratings within the assessment methodology to a reference system that is stratified by logical subclasses, and (b) providing clear guidance for use of the methodology, articulation of standard protocols, demand for consistent field practices, training, and insistence on minimum submittal materials that support peer review assessments (e.g. maps, narratives, etc.).

V. Responses to Questions From the Taggares Team

Question 1. Does the characterization for the reaches in question enable you to determine if the aquatic environment (from ohm waterward) meet the test for a "fish and wildlife habitat critical area under the two part test set out in the WAC?

A = No

Question 2. Does the characterization for the reach enable you to determine if the upland shoreland area (the lands above OHM abutting the shoreline for the first 200 feet) meets the test for a "fish and wildlife habitat conservation area" under the two part test set out in the WAC?

A = No

Question 3. Does the rating reflect the importance of the undeveloped upland to the functionality of the abutting aquatic environment or merely reflect the extent of the built (1) to undeveloped (5) character of the upland landscape?

A = No - Not consistent because of selection of reach scale and lack of bounding within reaches.

4. Is there evidence of listed species (either endangered, threatened) dependent upon the terrestrial patch abutting the shoreline (upland 200 feet) for its existence in the islands?

A = No - linkages such as this are not recognized/poorly treated.

Question 5. Is the undeveloped shoreline (first 200 feet) on each reach critical to the survival of terrestrial animals on the islands e.g. are they dependent upon habitat within 200 feet of the shoreline to survive?

A = Some faunal species in the San Juans require intact transition zones between terrestrial and aquatic environments to complete critical parts of their life cycles. To our knowledge, none of these species are listed. It is important to note that approximately 50% of the islands are in public ownership where development is not likely to occur. Further, a substantial portion of the private ownership is steep, rocky, and with limited accessibility.

Question 6. Where the scoring system shows a relatively intact upland vegetation (4 and 5 scores), can the upland portion of the platted shoreline be developed without causing a change (the "no net loss" test) to the habitat function and values of the abutting aquatic habitat fronting shoreline if such shoreline meets the definition of a critical area and is so designated.

A = Perhaps, if best management practices regarding stormwater management, sediment and erosion control, fertilization etc. are used and maintained. Landscape practices should stipulate maintenance of a native vegetation community to standards that emulate the pre-development conditions. Hardening landscapes and conversion of native plant communities to non-native horticultural "gardens" results in significant degradation of many habitat and some physical conditions within the current assessment protocol.

Question 7. Where the tree canopy within 200 feet of the shoreline provides terrestrial habitat not essential in that location to the preservation of shoreline functionality, can any overall terrestrial habitat loss caused by development of the shoreline platted lots be mitigated outside the shoreline area by creation of equivalent or better habitat patches of a similar nature or the protection of such a patch from further development outside of the shoreline area?

A = Using the caveat *"not essential in that location to the preservation of shoreline functionality"*, we can see a protocol develop where a site is examined by a qualified technical team, functions are determined, a development plan is articulated, and off site mitigation for terrestrial habitats *"not essential in that location to the preservation of shoreline functionality"* could be designed and implemented. The main thing here is to recognize that one function of shoreline terrestrial habitats is to exist as a component of a transitional zone for several classes of faunal species. This is a landscape-cale function that the current assessment methodology does not address.

Photo 1 - Locations for Taggares Properties, Blakely Island, Washington

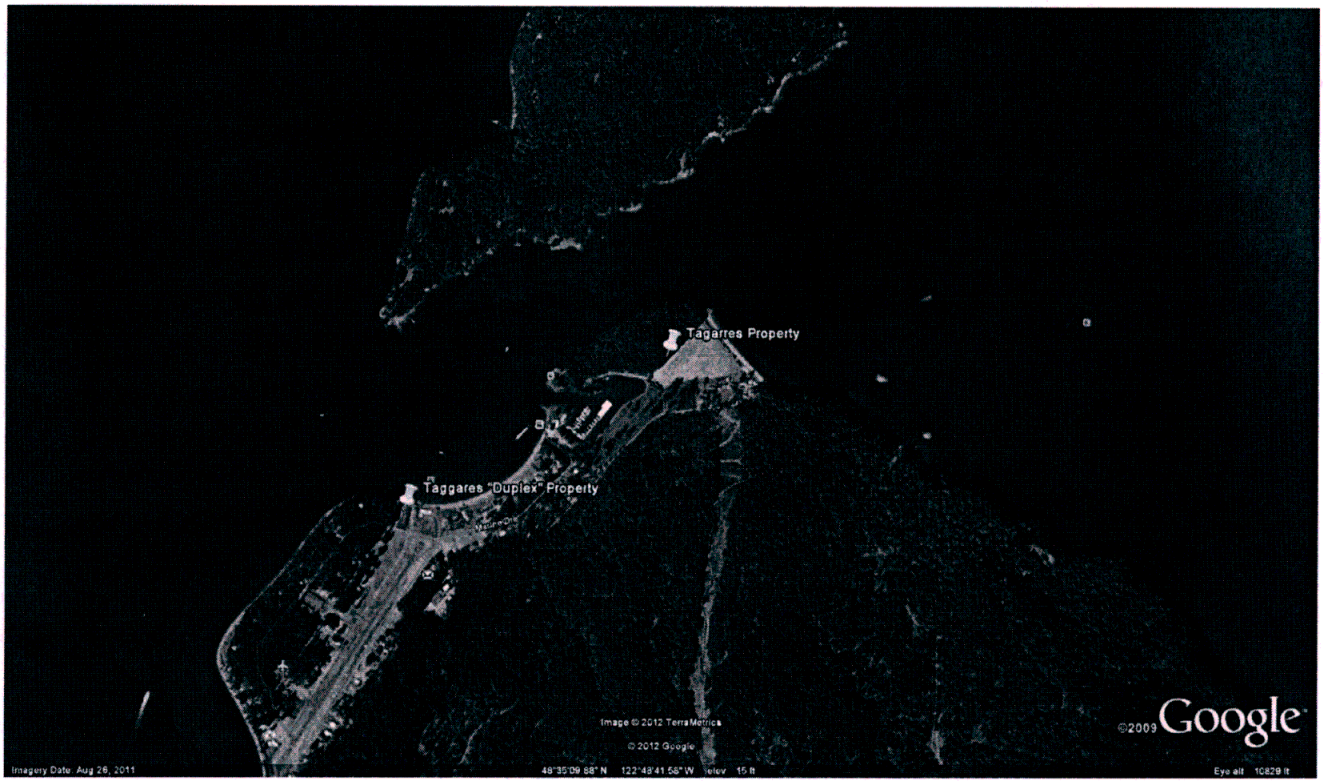

Exhibit 1 - Blakeley Island Reach 89 & 90 Data from Table 18 A and 18 B In Herrera et al., 2012.

From Table 18A. Blakely Island Management Area Reach Assessment – Physical Conditions.

Reach	Natural Sediment Transport Patterns	Natural Current Patterns	Wave/Current Attenuation	Nutrient and Toxics Removal	Shade	Total Vegetation	Total Score
89	5	5	5	5	4	5	29
90	5	5	4	5	3	5	27

From Table 18B. Blakely Island Management Area Reach Assessment – Habitat Conditions.

Reach	Estuary/ Wetland Habitat	Total Vegetative Cover	Shoreline Alterations	Shoreline Sediment Input Alterations	Bat Presence	Bird Presence	Haul-out Habitat	Eelgrass Habitat	Kelp Habitat	Forage Fish Priority Spawning Habitat	Shellfish Habitat
89	1	5	5	5	0	1	0	5	5	0	3
90	5	5	4	4	0	1	0	5	5	0	3

From Table 18B. Blakely Island Management Area Reach Assessment – Habitat Conditions Continued.

Reach	Smelt Presence Probability	Herring Presence Probability	Sandlance Presence Probability	Lingcod Presence Probability	Pink Salmon Presence Probability	Chum Salmon Presence Probability	Chinook Salmon Presence Probability	Total Score
89	5	3	4	3	4	3	4	56
90	5	2	2	2	2	1	2	48

Exhibit 2 - L.C.Lee & Associates, Inc. Reach Data for the Northern end of Blakely Island, WA. April 26, 1012

Blakely Island Management Area Reach 89 Assessment – Physical Conditions.

Reach	Natural Sediment Transport Patterns	Natural Current Patterns	Wave/Current Attenuation	Nutrient and Toxics Removal	Shade	Total Vegetation	Total Score
Duplex	4	5	5	3	1	3	21
Basin	1	3	2	1	2-3	2	11 - 12
Cook House	1	5	5	1 – 2	3	2* - 3	17 – 19
Shoreline Houses	5	5	5	5	4	4	28
Bench	5	5	5	5	5	5	30
East Beach	4/2	5/1	5	5/1	NA/0	4/1	23/10

Blakely Island Management Area Reach 89 Assessment – Habitat Conditions.

Reach	Estuary/ Wetland Habitat	Total Vegetative Cover	Shoreline Alterations	Shoreline Sediment Input Alterations	Bat Presence	Bird Presence	Haul-out Habitat	Eelgrass Habitat	Kelp Habitat	Forage Fish Priority Spawning Habitat	Shellfish Habitat
Duplex	1	1	4	3	1	3	2	5	2	0	3
Basin	1	2	1	2	1	3	0	1 – 2	0	2	3 – 4
Cook House	NA	NA	2* - 3	1	1	4	3	3	4	1	3
Shoreline Houses	NA	4	3	4	1	4	2	3	5	1	3
Bench	1	5	4	5	1	4	2	5	5	0	3
East Beach	NA/1	4/1	4/1	4/3	1	3	3/NA	5/NA	5/NA	0	3

Blakely Island Management Area Reach 89 Assessment – Habitat Conditions Continued.

Reach	Smelt Presence Probability	Herring Presence Probability	Sandlance Presence Probability	Lingcod Presence Probability	Pink Salmon Presence Probability	Chum Salmon Presence Probability	Chinook Salmon Presence Probability	Total Score
Duplex	-	-	-	-	-	-	-	25
Basin	-	-	-	-	-	-	-	16 - 18
Cook House	-	-	-	-	-	-	-	22 – 23
Shoreline Houses	-	-	-	-	-	-	-	30
Bench	-	-	-	-	-	-	-	35
East Beach	-	-	-	-	-	-	-	31 – 13

L.C. Lee & Associates, Inc.
2442 NW Market Street, #392
Seattle, Washington 98107
Tel: 206.979.5633
Email: [lyndon@lcleeinc.com]

Exhibit 3 - Resume for Lyndon C. Lee

Resume
Lyndon C. Lee, Ph. D., PWS

President and Principal Ecologist
L.C. Lee & Associates, Inc.
2442 NW Market Street, #392
Seattle, WA 98107
Tel: 206.979.5633
Email: lyndon@lcleeinc.com

Lyndon C. Lee is a national wetland and river science and regulatory expert and Director of the National Wetland Science Training Cooperative. His emphasis is on the application of good science and design to projects that interact with federal, state, and local programs regulating activities in wetland, river, and forested ecosystems. Lyndon founded L.C. Lee & Associates, Inc. in 1989 and ran it until 2004.

Prior to re-starting L.C. Lee & Associates, Inc, in August, 2009, and during the interval February, 2007 – August, 2009, Lyndon co-led the Ecosystem Science & Restoration Services group (ESR) for the London – based WSP Environment & Energy. ESR included several senior scientists who have applied national and international experience in wetland and river science, conservation biology, design/build approaches to ecosystem restorations, regulatory assistance, and training. In addition to waters/wetlands, ESR focused its operations in many different types of ecosystems including forests, grasslands, riparian areas, urban landscapes, brownfields, and other contaminated sites. Prior to joining WSP, Lyndon worked as the Senior Ecosystem Ecologist for Entrix, Inc. (2006) and as Principal Ecologist & Vice President for BBL/Arcadis (2005-2006). He ran L.C. Lee & Associates during the interval 1989 – 2004.

From 1986 to 1989, Lyndon served as the Senior Wetland Ecologist for the U.S. Environmental Protection Agency (EPA) Headquarters Office of Wetlands Protection, Washington, D.C. During this time, he was involved directly with the formulation and application of national waters/wetlands policy, basic and applied research, and regulatory/enforcement procedures. At EPA, Dr. Lee directed a national team of EPA technical and regulatory experts who dealt with top priority waters/wetland issues throughout the U.S. He also served as the liaison from the Office of Wetlands Protection to the EPA Superfund and RCRA programs. During his tenure at EPA, Lyndon led the team that produced a landmark

study of cumulative impacts to bottomland hardwood forests of the southeastern U.S. He also founded the National Wetland Science Training Cooperative, which he has continued to run since leaving EPA.

Lyndon came to EPA from the University of Georgia Institute of Ecology, Savannah River Ecology Laboratory (SREL), Aiken, South Carolina. During the interval 1984 – 1986, he was the Research Manager of the SREL Division of Wetlands Ecology where he managed SREL's wetland research programs at the U.S. Department of Energy's Savannah River Nuclear Facility and National Environmental Research Park. Savannah River is a principal production site for weapons-grade plutonium and many other radionuclides. SREL's basic and applied research focused on (a) assessment and monitoring of the effects of radionuclide production on riverine waters/wetland ecosystems, (b) management of the movement and fate of radionuclide, heavy metal and organic contaminants in waters/wetlands, and (c) restoration of wetland and river ecosystems degraded by chronic thermal and/or contaminant inputs.

While pursuing his graduate degrees, Lyndon spent six years researching the structure and functioning of riverine waters/wetlands and riparian forested ecosystems throughout the Pacific Northwest and Northern Rocky Mountain regions. He focused on interactions among physical and geochemical processes and development of the structure and functioning of floodplain and riparian plant communities. Between his Master's and Ph.D. programs, (1977 – 1980) he worked as a Senior Habitat Ecologist for the Interagency Grizzly Team's Border Grizzly Project, which was based at the Montana Forest and Range Conservation Experiment Station, Missoula, Montana. There he developed, conducted, and supervised research dealing with the definition, description, classification, protection, and restoration of grizzly bear and grey wolf habitat throughout the northern Rocky Mountains, southeastern British Columbia, and in northern Chihuahua, Mexico. Lyndon's work highlighted the importance of waters/wetlands ecosystems as essential components of critical habitat for endangered, free-ranging grizzly bears and other wide-ranging carnivores.

The scope of Lyndon's consulting experience over the last 20 years has taken him to all areas of the U.S., and to Canada, Europe, Japan, South America, Australia and many Pacific and Caribbean islands. He has completed more than 150 contracts with federal, state, and local government agencies, private industry, research and conservation organizations, and private landowners. Dr. Lee has focused most of his day to day efforts on the (a) application of science to the design and construction of large and small wetland and river restoration projects, and the (b) development and implementation of practical silvicultural, and land-use management programs for wetlands and riverine ecosystems. Currently Lyndon's research interests are focused on responses of wetland, river, and forested ecosystems to perturbation, assessment of site-specific and cumulative impacts to waters/wetland ecosystems, design and construction of waters/wetlands ecosystem restorations, and management of the movement and fate of contaminants in waters/wetlands ecosystems.

In addition to his technical and applied work, Lyndon continues to work as a U.S. national expert and team leader on federal U.S. Clean Water Act jurisdictional and functional assessment issues as they relate to management of waters/wetlands. In this capacity, his emphasis always has been on the application of science to federal, state, and local programs that focus on protection of aquatic ecosystems. He has a great deal of experience in U.S. federal regulatory and enforcement procedures, assessment of impacts to waters/wetlands ecosystems, and training of others in all of

the above. For example, since 1993, Lyndon has been one of the principal architects responsible for development and implementation of the "Hydrogeomorphic Approach" (HGM) for assessment of waters/wetlands ecosystem functions. In this regard, he has extensive practical knowledge of ecological modeling, and application of science to regulatory, enforcement, and restoration programs. Further, since 1989, Lyndon has served as a lead expert and technical team leader for the National Resources Conservation Service, the U.S. Department of Justice (DOJ) - Environment and Natural Resources Defense Division, and several U.S. EPA Regions. Working with DOJ, Lee has helped win or settle at least ten major Clean Water Act cases that have been argued in three Districts of U.S. federal court, three circuit courts of appeal, and the U.S. Supreme Court.

Lyndon has been active in teaching and training throughout his career. He held the position of Assistant Research Professor at the University of Georgia's Institute of Ecology while working at the Savannah River Ecology Laboratory and at EPA Headquarters. He has also served as an Adjunct Assistant Professor at both the University of South Carolina and George Mason University. While at the universities of Washington and Montana, Lyndon taught or assisted in teaching a variety of forestry and natural resource management courses. He also served as a principal instructor for the Montana Forest Habitat Type Short Courses, sponsored by the U.S. Forest Service Rocky Mountain Forest and Range Experiment Station. Since 1987, Dr. Lee has led over 100 waters/wetlands training courses for EPA and several other federal, state, and local agencies and organizations through the National Wetland Science Training Cooperative.

Lyndon is an active member of the scientific community. He has published two books, more than 25 refereed professional papers and chapters, and at least 18 peer-reviewed HGM Guidebooks, and over 200 technical reports. He has presented more than 70 oral papers and seminars at professional meetings and conferences. He edited the *Bulletin* and served on the National Board of Directors of the Society of Wetland Scientists (SWS) for seven years. Lyndon co-founded the "SWS Student Awards Program" and endowment, and served as the Program Chairman for two national SWS meetings (Seattle, 1987 and Washington, D.C., 1988). In 1992, Lee was awarded Life Membership in the Society of Wetland Scientists for his service. In 1995, he earned certification as a Professional Wetlands Scientist (#385). In addition to SWS, Lyndon is member of standing in the Society For Ecological Restoration (SER), the American Association for the Advancement of Science (AAAS), and the Association of State Wetland Managers.

Exhibit 4 - Resume for Scott R. Stewart

Education
PhD/Soil Science, Oregon State University, 1997
MS/Soil Science, Oregon State University, 1993
BS/Biology, University of Oregon, 1980

Years of Experience
With ARCADIS Since 2004

Professional Registrations
Certified Professional Soil Scientist
Professional Wetland Scientist

Professional Qualifications
- USDA-NRCS Certificate of Merit - Outstanding team effort in conducting the Western Kenai Soil Survey
- USDA-NRCS Certificate of Merit - Outstanding team effort and cooperation in producing a Superior Soil Resource Inventory
- Soil Science Society of America
- Society of Wetland Scientists

Scott R. Stewart, PhD, CPSS, PWS

Principal Scientist

Dr. Stewart has more than 15 years of experience as a soil scientist/geomorphologist, biogeochemist, and wetland scientist. Dr. Stewart's current focus includes biogeochemical and hydrologic processes in wetland ecosystems, ecosystem restoration and permitting, assessment and delineation of waters of the U.S., including wetlands (waters/wetlands), soil survey and geomorphology and landscape analyses, fluvial geomorphology, hydric soil characterization and interpretation, and adaptive management and monitoring of restored ecosystems.

Dr. Stewart has mapped soils and surficial geology for the U.S. Department of Agriculture – Natural Resource Conservation Service and has performed identification and mapping of various sensitive areas including slopes, erosion hazards, seismic hazards, waters/wetlands, and threatened and endangered species habitat. He has helped develop mitigation plans, budgets, and maps and reports for private entities as well as city, county, state, and federal government. He has delineated hundreds of waters/wetlands throughout Alaska, Washington, Idaho, Ohio, Texas, Illinois, California, and Oregon, including the arid west, gulf coastal plain, western mountains, valleys and coast, and midwest regions as defined in the U.S. Army Corps of Engineers Regional Supplements, and has assisted in jurisdictional determinations in Colorado and Arizona. He has assisted in the process of permit acquisition and provided oversight on permitted work in and near waters of the U.S., including wetlands. He has been accepted as a national expert in soil sciences and hydric soils in federal court and has provided expert testimony for the U.S. Department of Justice and the U.S. Army Corps of Engineers. He has helped develop strategies, as well as provided seasonal and annual oversight, for sediment and erosion control and stormwater management as related to construction practices and surface-water quality at several large state (Washington and California) construction and restoration projects. He has also provided construction oversight and direction for ecosystem restorations.