

SHORELINE INVENTORY AND CHARACTERIZATION REPORT

Draft – March 2010

CITY OF PORT ORCHARD

APPENDIX A:

Nearshore Characterization & Analysis Methodology



CITY OF PORT ORCHARD

THE EAST KITSAP COUNTY NEARSHORE INVENTORY

SUMMARY OF METHODOLOGY

Field Work Completed:
August 2007

THE EAST KITSAP COUNTY NEARSHORE INVENTORY TABLE OF CONTENTS

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Nearshore Assessment Inventory

1.0 BACKGROUND

The nearshore inventory was an integral task of the *East Kitsap Nearshore Salmon Habitat Assessment*, funded by the Salmon Recovery Funding Board (RCO Project # 04-1442). The purpose of the nearshore inventory was to provide Battelle, the assessment contractor, with data that was critical to the assessment model scoring. The Kitsap County, Department of Community Development (DCD) Nearshore Assessment Team conducted the shoreline inventory to provide information on disturbances and nearshore natural beach characteristics that provided the foundation for conducting the nearshore assessment and in developing a management action habitat restoration prioritization framework. The field inventory is utilized with other available shoreline data for use in the prioritization model.

The collection of all field data was conducted in cooperation with The Suquamish Tribe, and a technical advisory committee. The methodology was derived from a collaborative effort between Battelle and Kitsap County Nearshore Assessment Team. Expertise, labor and a boat were donated by the Suquamish Tribe. Kitsap County DCD offered summer internships for several qualified interested individuals with college background in applicable and project appropriate sciences. Volunteers participated where they could be utilized and were invited to join the nearshore assessment team, but not collect data.

The shoreline inventory for the East Kitsap Shoreline was conducted in the Summer of 2007 when the lower tides were conducive to collecting needed data.

The east Kitsap marine shoreline covers 155 miles, starting at the Kitsap-Pierce County line, and finishing north to the Foulweather Bluff near Hansville.

Shoreline property owners were mailed notices of the field inventory schedule and were invited to workshops. Four workshops were scheduled at locations corresponding to the Nearshore Assessment team field collection schedule.

2.0 FIELD INVENTORY METHODOLOGY

2.1 Equipment

- *GPS Unit:* Trimble GeoXM (GeoExplorer 2005 series),
Maps were created using LiDAR and the Washington Department of Natural Resources, 2001 ShoreZone Reach maps. ¹ Uploaded to the GPS unit, these maps allowed the teams to know what reach they were in along the shoreline and give spatial reference to the data collected. ²
- *Digital Camera:* Canon Power Shot SD450 (PhotoLink software links photos to GPS positions)
- *Whiteboard and marker:* small whiteboard for noting Reach number in photos
- *Field notebook, pen, clipboard*
- *Maps:* aerial maps of reaches being studied (hardcopies for reference)
- *Outreach brochures/postcards*
- *Contacts:* Team cell phone list, office contacts and emergency numbers
- *Manual:* how to, method, data dictionary, glossary, etc.

- *Safety*: First Aid Kit, Safety Parameters Sheet (read and signed by each team member)
- Proper identification, “uniform” (blue t-shirts), field-work shoes
- Lunch, WATER, sunscreen

¹ The LiDAR-derived shoreline present in Kitsap County’s CAD files of property ownerships was utilized along with the addition of 200 ft on the upland side, and 1000 ft offshore to derive polygons. These polygons were further divided into smaller units, based on the Shorezone Units (as defined by the Nearshore Habitat Program in the Washington State Department of Natural Resources (DNR)). This was done to allow for the use of the highly accurate and detailed shoreline derived from LiDAR, while maintaining the connection to the Shorezone Inventory data.

² “The basic concept underlying the ShoreZone Inventory System is that a shoreline can be subdivided into smaller pieces, and the characteristics of each piece can be described and recorded. The primary data division is the unit. Units are alongshore stretches of beach with similar geomorphological characteristics. In Washington State, the average unit length is 0.5 miles.” Reference “*Washington State ShoreZone Inventory User’s Manual*”, Nearshore Habitat Program, Washington State Department of Natural Resources, PO BOX 47014, Olympia, WA , 98504-7014, 360.902.1600.

2.2 Daily Field Inventory Preparation

The GPS System parameters remained the same throughout the study. These parameters were periodically checked for assurance

- Antenna Height: about 3m
- Between feature logging interval: 5 s
- Coordinate System: US State Plane 1983
- Zone: Washington North 4601
- Datum: WGS 1984
- Altitude Reference: Mean Sea Level
- Altitude Units: feet
- Coordinate Units: feet
- Lat/Long. Format: DD MM’SS.ss”
- North Reference: Magnetic
- PDOP: Max 6

Daily Equipment Preparation was conducted as follows:

- Charge GPS and camera batteries
- Open a new file on the GPS unit for the days’ data,
- Select the proper Data Dictionary (Nearshore) on the GPS unit
- Open the proper map file in the GPS unit
- Take a photo of the time on the GPS screen. The photo was taken when enough satellites are in range to be collecting data. The photo was used to calibrate the clocks on the GPS and camera so that PhotoLink software could be used later in the office to link photos to a specific GPS location.
- Adjust GPS PDOP from the previous day
- Adjust GPS logging intervals for all features

2.3 Feature Collection

Data for the nearshore inventory was collected by teams consisting of two to three trained Kitsap County Natural Resources staff, interns, and/or Suquamish Tribe staff. A lead for each team was responsible for equipment, planning the location and answering public inquiries in the field. Team members alternated responsibilities for the GPS data collection and for taking photos/notes. Team members were qualified individuals with college background in applicable and project appropriate sciences. Project training for the team members was provided for field procedures, safety and health, use and care of equipment, data entry and field data evaluation procedures. Team members for the E. Kitsap Shoreline field inventory are listed as follows:

Susan Donahue, Kitsap County Watershed Projects Coordinator: Team Lead
Kathlene Barnhart, Kitsap County Stream Team Coordinator: Team Lead
Keith Folkerts, Kitsap County Natural Resources Coordinator: Team Lead
Michele Filey, Team Intern
Steven Millard, Team Intern
Jonathan Pavy, Team Intern
Colleen Von Forester, Suquamish Tribe Intern, Team
Paul Dorn, Suquamish Tribe, boat, boat operator and technical advisor

Limits were placed on where teams could walk or collect data. Teams did not walk above the Ordinary High Water Mark of the shoreline,. Data was gathered for areas 50 ft. upland and 2,000 feet out into the water. Where a road bisected the upland 50 ft., features beyond the road were not counted. Team judgment calls were utilized frequently to eliminate individual subjectivity.

Physical limits also played a role in data collection. For example, where overhanging vegetation or high bluffs blocked the satellite signal for the GPS, teams had to walk further out or away from the actual object being collected. This would be noted in the notebook. A boat was used for areas that were extremely muddy or for areas that did not have good access for a considerable distance.

All data was collected in the format of the GPS data dictionary. Attachment 1, *Data Dictionary*, lists the features, attributes and values logged into the GPS unit. A glossary of terms was completed for training so that consistent definitions were assigned to collected features (Refer to Attachment 2, *Glossary*). The type of features collected included:

- **Mid-Reach Features:** Features that describe the condition and attributes of the reach (or site). A single GPS point was taken, as close to mid-reach as possible. The mid-reach feature information included the type of vegetation, dominant substrate and shoreline use. Photos were taken at mid-reach. The first picture at midreach faced upland with the photo including the reach number written on the white board. Three photos were taken, turning 90 degrees clockwise to get a complete "snapshot" of the midreach location.
- **Point Features:** Data associated with a specific object such as a pier, boat launch or piling, A single GPS point as close to the object as possible was created,
- **Line Features:** Data associated shoreline armoring features such as bulkheads and rip-rap, collected in a linear fashion by walking the length of the structure.

- Notes: Notes were taken each day to record team members, time, date, location and any anomalies to the data collection process or for added descriptions of the features. For example, notations were made for observed large debris items in the shoreline. Technical GPS problems were also noted.

3.0 FIELD INVENTORY DATA COMPILATION AND CORRECTION

3.1 Daily Compilation

After each field inventory day, the GPS files were downloaded into GPS Pathfinder Office 3.10 and saved for later manipulation in ArcGIS. The pictures for that day were also downloaded and saved in the same file.

3.2 Data Corrections

In order to make the collected field data usable and more accurate, some specific data corrections were needed. The field notes were used, usually for reference and/or identification of feature attributes.

When collecting GPS data, it is best to always run the data through a process known as "Differential Correction". Differential correction removes errors in GPS data caused by various factors. It can improve the accuracy of GPS positions to approximately submeter to approximately ten meters, depending on the receiver and data collection technique used. By post-processing the data once back in the office, the user is able to correct for errors caused by such things as an erroneous satellite clock, atmospheric and ionospheric disturbances, and errors caused by satellite orbit prediction errors. All of these problems can be corrected by using this process, which incorporates the use of continually operating base stations as a source of this correction. For the duration of this project, Trimble software and GPS data collectors were used.

4.0 FIELD INVENTORY VALIDATION

To insure that the data were collected under a consistent understanding of terms, a training manual was created. This included a written and photographic glossary of terms used in the data dictionary. After briefings about the dictionary and collection methods, the team went out into the field in groups of four (4) for on-the-job training. For the majority of the Assessment, two (2) teams of two (2) members each were used. The members of the teams were switched daily to insure the same sets of methods and understanding of definitions were used. Team decisions were utilized for midreach features to further reduce the subjective element.

A data collection validation exercise was conducted on 8/24/07 to evaluate the consistency of the data for the more subjective mid reach recorded attributes.

Reaches were randomly chosen, and further selected for location and access. The validation exercise was conducted by members of the team that remained (Susan Donahue, Kathlene Barnhart, Jonathan Pavy and Michele Filley). Worksheets were created for mid-reach data collection. At mid-reach, each member recorded their choices of attributes for the reach on the

worksheet. Once each team member completed their worksheet, the team reviewed their selections, deciding as a group, on the best answer (see Mid Reach Feature Validation Exercise, ATTACHMENT 3).

In conclusion, 92% of the assigned validation attributes matched the original data collected for the sample reaches. The validation exercise illustrated that the decisions made regarding the vegetation features were the most often inconsistent. The determination of categorizing vegetation as “invasive”, “landscaped”, or “shrubs” illustrated inconsistency by team members in the interpretation of definitions. Another explanation for shoreline feature inconsistencies may be due to varying tide levels where beach visibility differs.

5.0 RESULTS

The information from the nearshore inventory provided Kitsap County with the following:

- 1) An Inventory (or baseline) of the Kitsap County Shoreline
- 2) Packaged GIS Data posted on the Kitsap County Website
<http://www.kitsapgov.com/dcd/nr/nearshore/default.htm>
Kitsap County DCD plans to maintain the database as new information is available. The continued maintenance of the data base is contingent on available funding.
- 3) Shoreline data for Battelle to complete the *Eastern Kitsap County Nearshore Habitat Assessment and Prioritization Framework*.

6.0 REFERENCES

Myers, Rian D, Michele Lorilla, and Jane N Myers. 1995. *Surface Water and Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners. Shorelands and Water Resources Program*, Washington Department of Ecology, Publication 95-107

Shipman, H. 2008. *A Geomorphic Classification of Puget Sound Nearshore Landforms*. Puget Sound Nearshore Partnership Report No. 2008-01. Published by Seattle District, US Army Corps of Engineers, Seattle Washington. Available online at <http://pugetsoundnearshore.org>.

Williams, G.D., Evans NR, and RM Thom 2004. *Bainbridge Island Nearshore Habitat Assessment Management Strategy Prioritization, and Monitoring Recommendations*. PNWD-3391. Prepared for the City of Bainbridge Island, Bainbridge Island, WA, by Battelle Marine Sciences Laboratory, Sequim, WA. Available online at:
http://www.ci.bainbridge-isl.wa.us/nearshore_report.aspx

Attachment 1

DATA DICTIONARY

<u>Feature</u>	<u>Attribute</u>	<u>Value</u>
Armoring (Line)	Type	*Bulkhead; Rip-Rap; Alternative Bank Protection; Mixed
	Angle of Face	*Vertical; Less than 90 Degrees
	Material	*Concrete; Wood; Wood-Creosote; Plastic/Tires; Gabion; Mixed/Other; Rock
	Encroachment	*Yes; No; Unknown
	Vegetation in Front	*No; Yes; Unknown
	Condition	*Good; Damaged; Failure; Unknown
	Fill	*Soil/Rock/Gravel; Pavement; Other
Buoy (Mid)	No. Per Reach	(0-50)
Shoreline Type (Mid)	Low Bank/Bluff	*0-25%; 25-50%; 50-75%; 75-100%
	High Bank/Bluff	*0-25%; 25-50%; 50-75%; 75-100%
	No Bank	*0-25%; 25-50%; 50-75%; 75-100%
	Marsh/Lagoon/EsTuary	*0-25%; 25-50%; 50-75%; 75-100%
	Rock Shore	*0-25%; 25-50%; 50-75%; 75-100%
	Pocket Estuary	*No; Yes
Shoreline Factors (Mid)	Condition	*Intact; Erosion/Feeder Bluff; Erosion/Other
	Major Substrate	*Mixed Coarse; Clay; Mud; Sand; Gravel; Cobble
	Road	*No; Yes
	Large Woody Debris	*Absent; Present; Abundant/Unnatural
Vegetation (Mid)	Conifers	*0-25%; 25-50%; 50-75%; 75-100%
	Deciduous	*0-25%; 25-50%; 50-75%; 75-100%
	Shrubs	*0-25%; 25-50%; 50-75%; 75-100%
	Grasses/Tidal	*0-25%; 25-50%; 50-75%; 75-100%
	Bare	*0-25%; 25-50%; 50-75%; 75-100%
	Invasives	*0-25%; 25-50%; 50-75%; 75-100%
	Landscaped	*0-25%; 25-50%; 50-75%; 75-100%
% Overhanging	*0-25%; 25-50%; 50-75%; 75-100%	
Shoreline Use (Mid)	Single Family	*Yes; No
	Multi-Family	*No; Yes
	Commercial	*No; Yes
	Industrial	*No; Yes
	Public Use/Park	*No; Yes
	Marina	*No; Yes
	Undisturbed	*No; Yes
Picture (Point)	Reach Number	
Overhanging Structure (Point)	Type	Deck; House; Both; Boat Hoist; Other

	Piling Material	*Wood Creosote; Wood; Concrete; Metal; Mixed
Outfall (Point)	Type	*Pipe/Tubing; Natural; Culvert; Other
	Material	Plastic; Metal; Concrete; Ceramic; Other
	Erosion	*No; Yes
	Deposition	*No; Yes
	Condition	*Good; Damaged
	Diameter (inches)	0-4; 5-8; 9-12; 12+
	Multiples	*0; 2; 3-4; 5-6; 7-12; 12+
	Placement	*On Beach; Above Beach; In Armoring
Pilings (Point)	Material	*Wood Creosote; Wood; Concrete; Metal; Mixed
	Number	*1-5; 6-12; 13-25; 26+
	Orientation to Shore	*Perpendicular; Parallel; Unknown
Pier/Dock/Float (Point)	Material	*Wood Creosote; Wood; Concrete; Metal; Mixed
	Float	Yes; No
	Overhanging	Yes; No
	Condition	*Good; Damaged; Poor/Not-Functioning
Boat Launch (Point)	Material	*Concrete; Beach/Sand; Gravel; Metal/Rails; Other; Wood; Wood-Creosote
	Elevated	*No; Yes; Unknown
	Drift Interception	*No; Yes; Unknown
	Condition	*Good; Damaged; Poor/Abandoned; Unknown
Access (Point)	Material	*Concrete; Wood; Metal; Stone; Dirt/Path; Other
	Orientation to Shore	*Perpendicular; Parallel; Other
	Inset into Armoring	*Yes; No
	Ascend Cut-Bank	*No; Yes
	Length(steps or feet)	*1-10; 10+
	Condition	*Good; Damaged; Poor/Non-Functioning
	Combo	*No; Yes
Pollution (Point)	Yes	*Yes
Tidal Construction (Point)	Groin	*No; Yes
	Tidal Gate	*No; Yes
	Other	*No; Yes
	Drift Interception	*No; Yes
Slide (Point)	New	*No; Yes
	Old	*No; Yes
Point Generic		
Line Generic		(* = default attribute)
Area Generic		

Attachment 2

GLOSSARY

- Alternative Bank Protection: a type of shoreline armoring using anchored logs or other natural means of reducing wave action impact on the shoreline
- Armoring: Shore erosion control structures or organic material to stabilize the shoreline landward of the structure
- Ascend Cut-Bank/Bluff: beach access; stairs or path situated up an open cutbank
- Beach Access: Any purposeful access structure to the beach (stairs, path); usually not a public access
- Boat Launch: a sloping ramp, traditionally made of concrete or metal rails, which may extend into the tidelands, used for the purpose of placing a boat in or taking one out the water
- Bulkhead: a man-made wall built to protect land from water action; usually made of concrete or rock and vertical; syn. seawall
- Buoy: a floating anchoring device used to secure a vessel, especially during low tides
- Creosote Wood: a thick, oil based water-proofed wood used for pilings, armoring, docks
- Commercial: a place of business open to the public (restaurant, hotel, etc.)
- Conifers: cone producing trees (fir, cedar, spruce)
- Culvert: a covered channel that carries water under a road or through an embankment
- Deciduous: trees or large native shrubs that have seasonal foliage (maple, cottonwood)
- Deck: (overhanging structure) platform structure, either attached to a building or not, which hangs over the shoreline; may or may not have associated pilings)
- Dock: a structure floating upon the water and attached to the shore; used as a landing place for marine transport or for recreational purposes; sets on shore at low tide
- Drift Interception: interfering with the natural flow of water, sediments or debris; noticed by accumulation on the side of the drift direction and loss or absence on the opposite side
- Elevated: (boat launch) raised above the shoreline to allow for drift transport
- Encroachment: (armoring) when the structure is within the OHWM area (ie. encroaching on the natural shoreline and wave action)
- Erosion: (outfall) water from the outfall is causing a breaking up/wearing out of the sediment or material
- Fill: sediment, sand, rock, gravel or other material used along the shoreline below the OHWM to create new land or on upland areas to raise elevation (behind a bulkhead)
- Gabion: (armoring) rocks, shells or other hard material encased in wire to reduce wave action impact
- Grasses/Tidal: (vegetation) rushes, sedges growing along the shoreline, sometimes a marsh
- Grated/Transparent: (pier/dock/float) structure surface that has even breaks in it to allow light to pass through (metal grating)
- Groin: (tidal construction) a barrier-type structure the extends from the back shore towards the water across the beach to interrupt the trap sediment; formal structure or purposely placed boulders having a similar impact
- High Bank/Bluff: a sudden increase in the elevation face from the shoreline; 6ft.+
- House: (overhanging structure) a house on pilings that overhangs the shoreline anywhere within 50 ft. above the OHWM
- Industrial: facilities for processing, manufacturing and storage of finished or partially finished goods; military installations
- Inset into Armoring: (access) stairs or path built into or situated over the armoring
- Invasive: (vegetation) any plant not native to western Washington and known to out compete native plants (Himalayan Blackberry, Scotch Broom, Knotweed)

- Landscaped: (vegetation) manicured lawns and gardens within 50 ft. of the OHWM; also includes grasses growing above armoring and along roadsides
- Low Bank: a gentle upslope from the shoreline; a 1-6 ft. cutbank
- Marina: public or private facilities which provide dry or wet boat moorage; such facilities may also provide boat launching, boat storage, sale of supplies, or service for pleasure or commercial craft
- Multi-Family: a building containing two or more dwelling units, each intended for occupancy by one family/person
- No Bank: no cut bank or immediate change in elevation between the shoreline and upland
- OHWM: Ordinary High Water Mark; mark that is found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual (and has been so during normal years), as to mark upon the soil a character distinct from that of the abutting upland; determined in the field by a line of shore debris on the beach or where barnacles/algae stop on armoring
- Outfall: any place where stormwater exits into a large body of water; usually from pipes, but can be natural streams
- Overhanging Structure: a man-made structure not on the water, but hanging over the shoreline/water below the OHWM; includes decks and houses
- Overhanging Vegetation: vegetation that is hanging over the shoreline, at or below the OHWM; not just casting a shadow
- Pier: a rigid structure built over the water attached to the shore, used as a landing place for marine transport or for recreational purposes; will have pilings to keep the platform from touching water
- Pilings: support structures for docks, piers, houses, etc., whether currently in use or not; not utility poles (Pilings Feature are for those not associated with an attached structure; pilings as listed under piers/docks/floats are associated with a structure)
- Pollution: any presence of contamination, not naturally occurring (abandoned car parts, oil,)
- Public Use/Park (Community Use): space open to the public or a certain larger community, includes playgrounds, boardwalks and/or open space
- Reach: for the purposes of this inventory, Washington Department of Natural Resources' ShoreZone reaches and associated numbers, compiled in 2001. They are based on Observational differences in the shoreline geomorphology; how the shoreline was divided into sections for collecting some shoreline attributes
- Rip Rap: (armoring) usually pieces of rock or concrete, but can be made of tires, wood or other consistent debris; stacked, usually at a slope to reduce wave action
- Shoreline: for the purposes of this inventory, includes the sub-tidal zone out 1,000 feet and upland 50 ft. from the OHWM; if a road is within the 50ft., vegetation and other features are not counted beyond the road
- Shoreline Use: the type of activity or the character and form of improvements to which the land is devoted (50ft. above the OHWM)
- Shrubs: (vegetation) short vegetation not usually greater than 10 ft.; Nootka rose, Indian Plum, Salmonberry
- Single Family: a building containing one dwelling unit intended for occupancy by one family or person
- Substrate: the material makeup of the shoreline ground surface; majority visible at time of inventory (mixed coarse= gravels, small and large cobbles, shells pieces...)
- Tidal Construction: any barrier that has been constructed along the shoreline and continues out into the water with the purpose of blocking wave impact or associated sediment drift
- Tidal Gate: (tidal construction) a fence-like barrier that minimizes the effects of tidal currents to a specific area (usually a marina)
- Unit #: (see Reach) refers to the WADNR ShoreZone Inventory units; used for determining spatial location in the field and during analysis of the inventory as the "site scale"

-Unknown (shoreline use): as with any "unknown" in this inventory, use or condition is unable to be determined due to height of bluff, blocking vegetation or other view hinderances

-Woody Debris: logs having drifted ashore by tides or storms; approx. 1.5 ft. in diameter and larger

Attachment 3

Mid Reach Feature Validation Exercise: Table 1, 2007

Reach 3341: Bay Street (Port Orchard) Original: 6/13 ; Susan and Colleen

Shoreline Type			Vegetation		
	Original	Validation		Original	Validation
Low Bank	25-50%	75-100%*	Conifers	0-25%	0-25%
High Bank	25-50%	0-25%	Deciduous	25-50%	0-25%
No Bank	0-25%	0-25%	Shrubs	25-50%	0-25%
Marsh/ Lagoon/ Estuary	0-25%	0-25%	Grasses/Tidal	0-25%	0-25%
Rock Shore	0-25%	0-25%	Bare	0-25%	0-25%
Pocket Estuary	no	yes*	Invasives	0-25%	50-75%*
			Landscaped	50-75%	75-100%
			%Overhanging	0-25%	0-25%
Shoreline Factors			Shoreline Use		
Condition	erosion/other	intact*	Undisturbed	no	no
Major Substrate	mixed coarse	cobble*	Single Fam.	yes	yes
Road	yes	yes	Multi-Fam.	no	no
LWD	absent	absent	Commercial	no	no
			Industrial	no	yes*
			Public Use/Park	no	no
			Marina	no	no

*Not knowing end of reach and Inconsistent vegetation definition use

Reach 3347: Gorst/Sinclair Inlet Wildlife Sanctuary Original: 7/20 Susan, Kathlene, Jon, Steven (Boat)

Shoreline Type			Vegetation		
	Original	Validation		Original	Validation
Low Bank	25-50%	0-25%	Conifers	0-25%	0-25%
High Bank	0-25%	0-25%	Deciduous	0-25%	50-75%*
No Bank	50-75%	75-100%	Shrubs	25-50%	25-50%
Marsh/ Lagoon/ Estuary	0-25%	75-100%*	Grasses/Tidal	75-100%	75-100%
Rock Shore	0-25%	0-25%	Bare	0-25%	0-25%
Pocket Estuary	yes	yes	Invasives	50-75%	25-50%
			Landscaped	0-25%	0-25%
			%Overhanging	0-25%	0-25%
Shoreline Factors			Shoreline Use		
Condition	intact	intact	Undisturbed	no	no
Major Substrate	mud	mud	Single Fam.	no	no
Road	yes	yes	Multi-Fam.	no	no
LWD	absent	absent	Commercial	yes	yes
			Industrial	yes	yes
			Public Use/Park	no	yes*
			Marina	no	no

*7/20/2007 boat view vs. on shore for validation

Reach 3642: Chico Boat Ramp (Silverdale/Chico) Original: 7/5 Keith and Jon

Shoreline Type			Vegetation		
	Original	Validation		Original	Validation
Low Bank	75-100%	75-100%	Conifers	0-25%	0-25%
High Bank	0-25%	0-25%	Deciduous	0-25%	0-25%
No Bank	0-25%	0-25%	Shrubs	0-25%	0-25%
Marsh/ Lagoon/ Estuary	0-25%	0-25%	Grasses/Tidal	0-25%	25-50%
Rock Shore	0-25%	0-25%	Bare	25-50%	0-25%
Pocket Estuary	yes	no*	Invasives	0-25%	0-25%
			Landscaped	75-100%	75-100%
			%Overhanging	0-25%	0-25%
Shoreline Factors			Shoreline Use		
Condition	intact	intact	Undisturbed	no	no
Major Substrate	mixed coarse	mixed coarse	Single Fam.	yes	yes
Road	no	no	Multi-Fam.	no	no
LWD	absent	absent	Commercial	no	no
			Industrial	no	no
			Public Use/Park	no	no
			Marina	no	no

* Pocket estuary is loosely defined and tide level can have an impact on making this decision

Reach 3675: Lions Park (Bremerton) Original: 7/10 Jon and Michele

Shoreline Type			Vegetation		
	Original	Validation		Original	Validation
Low Bank	50-75%	75-100%	Conifers	0-25%	0-25%
High Bank	0-25%	0-25%	Deciduous	0-25%	0-25%
No Bank	0-25%	0-25%	Shrubs	0-25%	0-25%
Marsh/ Lagoon/ Estuary	0-25%	0-25%	Grasses/Tidal	0-25%	0-25%
Rock Shore	0-25%	0-25%	Bare	0-25%	25-50%
Pocket Estuary	no	no	Invasives	0-25%	25-50%
			Landscaped	50-75%	25-50%
			%Overhanging	0-25%	0-25%
Shoreline Factors			Shoreline Use		
Condition	intact	intact	Undisturbed	no	no
Major Substrate	mixed coarse	gravel	Single Fam.	yes	no*
Road	yes	yes	Multi-Fam.	no	no
LWD	absent	absent	Commercial	no	no
			Industrial	no	no
			Public Use/Park	yes	yes
			Marina	no	no

*During original data collection it was not known where the end of the reaches were and features outside of the reach may have been counted

Reach 3665: Tracyton Original: 7/10 Jon and Michele**Shoreline Type**

	Original	Validation
Low Bank	50-75%	75-100%
High Bank	0-25%	0-25%
No Bank	50-75%	0-25%*
Marsh/ Lagoon/ Estuary	0-25%	0-25%
Rock Shore	0-25%	0-25%
Pocket Estuary	no	no

Shoreline Factors

Condition	intact	intact
Major Substrate	gravel	gravel
Road	yes	yes
LWD	absent	absent

**Not knowing end of reach and Inconsistent vegetation definition use*

Vegetation

	Original	Validation
Conifers	0-25%	0-25%
Deciduous	0-25%	0-25%
Shrubs	0-25%	0-25%
Grasses/Tidal	25-50%	0-25%
Bare	75-100%	75-100%
Invasives	0-25%	0-25%
Landscaped	75-100%	0-25%*
%Overhanging	0-25%	0-25%

Shoreline Use

Undisturbed	no	no
Single Fam.	yes	yes
Multi-Fam.	no	no
Commercial	no	no
Industrial	no	no
Public Use/Park	yes	yes
Marina	no	no

Reach 3228: Suquamish/Pebble Beach Original: 7/30 Steven, Keith, and Jon**Shoreline Type**

	Original	Validation
Low Bank	0-25%	0-25%
High Bank	75-100%	75-100%
No Bank	0-25%	0-25%
Marsh/ Lagoon/ Estuary	0-25%	0-25%
Rock Shore	0-25%	0-25%
Pocket Estuary	no	no

Shoreline Factors

Condition	intact	intact
Major Substrate	cobble	cobble
Road	no	no
LWD	present	present

** Inconsistent vegetation definition use*

***Public boat launch is right on reach border, counted accidentally*

Vegetation

	Original	Validation
Conifers	0-25%	0-25%
Deciduous	50-75%	0-25%*
Shrubs	25-50%	0-25%
Grasses/Tidal	0-25%	0-25%
Bare	0-25%	0-25%
Invasives	25-50%	75-100%*
Landscaped	25-50%	75-100%*
%Overhanging	50-75%	25-50%

Shoreline Use

Undisturbed	no	no
Single Fam.	yes	yes
Multi-Fam.	no	no
Commercial	no	no
Industrial	no	no
Public Use/Park	yes	no**
Marina	no	no

Reach 3290: Point No Point Park Original 8/9 Michele and Jon**Shoreline Type**

	Original	Validation
Low Bank	0-25%	0-25%
High Bank	0-25%	0-25%
No Bank	75-100%	75-100%
Marsh/ Lagoon/ Estuary	0-25%	0-25%
Rock Shore	0-25%	0-25%
Pocket Estuary	no	no

Shoreline Factors

Condition	intact	intact
Major Substrate	sand	sand
Road	no	no
LWD	present	present

Vegetation

	Original	Validation
Conifers	0-25%	0-25%
Deciduous	0-25%	0-25%
Shrubs	0-25%	0-25%
Grasses/Tidal	75-100%	75-100%
Bare	0-25%	0-25%
Invasives	0-25%	0-25%
Landscaped	0-25%	0-25%
%Overhanging	0-25%	0-25%

Shoreline Use

Undisturbed	no	no
Single Fam.	no	no
Multi-Fam.	no	no
Commercial	no	no
Industrial	no	no
Public Use/Park	yes	yes
Marina	no	no