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DRAFT Technical Memorandum

To: Guy Michaelson – The Berger Partnership

From: Ali Wick and Peter Hummel - Anchor Environmental, L.L.C.

Date: October 12, 2005

Re: Draft Shoreline Habitat Inventory Memorandum

Anchor Environmental, L.L.C. and The Berger Partnership are assisting the City of Mercer Island in Master Planning activities for Luther Burbank Park in Mercer Island, Washington. In the past, shoreline conditions have been evaluated for the purpose of visioning park improvements (Reid Middleton 2002) and addressing shoreline erosion (Parametrix 1991). However, the park's shoreline has not been evaluated relative to its habitat value. Thus, Anchor performed this shoreline habitat inventory to characterize existing shoreline conditions for an array of fish and wildlife, including juvenile and adult salmon, bald eagles, birds, and amphibians. In addition, this inventory presents an overview of restoration and conservation opportunities for the park, considering the feasibility of implementing the actions that could be applied to increase the habitat value of the park's shoreline.

INVENTORY AND RESULTS

To assess shoreline habitat conditions at the park, Anchor conducted a field site visit on September 29, 2005 to evaluate the park's approximately 4,280 lineal feet of shoreline (Figure 1). The shoreline of the park was divided into homogeneous shoreline segments ("reaches"), and conditions were identified based on key nearshore habitat parameters relevant to salmon and other species (Figure 1). Conditions were evaluated waterward between the ordinary low water (OLW) and ordinary high water (OHW) lines, and upland within 50 feet of the shoreline. Location data for the beginning and end of each reach were collected using a Differential Global Positioning System (DGPS). Data collected included physical habitat characteristics indicative of the natural shoreline habitat that would be present for fish and wildlife in this area (Table 1).

Shoreline conditions at Luther Burbank Park varied widely in almost all of the categories characterized in this inventory (Table 2). Conditions ranged from severe to little erosion, from

heavy vegetation to little or no vegetation, and from substrates of clay to cobble and boulder. Large woody debris (LWD) presence is limited along the shoreline, except where anchored wood exists in one short segment, and where several downed and standing poplar trees provide a source (Reaches 11-15).

Additional notable shoreline conditions include several small erosion pockets with sand/gravel substrate that are being created as a result of severe shoreline erosion on the eastern park shoreline in the areas south of the dog off-leash area (Reach 11) , as well as in the reaches between the two docks (Reach 18; Photo 1). In some of these pocket erosion areas, the mulch from the walking trail is sloughing down the slope, onto the shoreline, and into the water. Shoreline structures include two dock complexes which extend approximately 235 feet and 130 feet waterward from the shoreline (Reach 16, Reach 19), and six visible outfalls which range from approximately 3 to 8 inches in diameter. These outfalls were dry during the site visit, except where submerged.



Photo 1. Erosion pockets; trail mulch extending into water.

Though no studies have investigated shore drift at the park, previous research and observations made during the field visit suggest that shore drift at the park may shift seasonally and depend on shoreline exposure to wind and wave action. An earlier study examining shoreline erosion at the park concluded that waves from both wind and power boats contribute to erosion at the park, but that erosion is most severe at the northeastern shoreline (Calkins Point area) because of its exposure to refracted waves from both the east and west (Parametrix 1991)¹. The erosion report also indicated that wave direction varies seasonally, with winds originating in the winter/spring from the south/southwest and in the summer/early fall from the north/northwest; winds average 15 mph with a typical maximum of 40 mph during winter storms (Parametrix 1991). Fetch distances range from a maximum of approximately 3.5 miles to the

¹ Calkins Point is approximately 3.5 miles from the Evergreen Point Floating Bridge (SR 520) and the park's eastern shoreline is approximately 0.7 miles from the mainland.

north/northwest ending at the 520 Bridge, to 1 to 1.5 miles to the southeast at the I-90 east channel bridge. Calkins Point is exposed to the longest fetch distances in either direction. During the course of this shoreline habitat inventory, it was noted that along the eastern shoreline south of the dog off-leash area, there were several scattered boulder piles with visible, but minor, sediment accumulations on the south side of the rocks (Reach 11; Photo 2); at this time, a strong southerly wind was blowing, and wave heights were approximately 0.5 feet.



Photo 2. Example of scattered boulders with minor sediment accumulation

CONCLUSIONS

Based on inventory results for reach condition, habitat restoration or conservation opportunities for each reach were identified, depending on whether the reach is more appropriate for restoration or conservation activity (Table 3). The relative priority of restoring or conserving each reach was then evaluated with respect to Capability (whether the habitat would be likely to be able to sustain the restored or conserved state without continued active management) and Feasibility (whether the existing habitat quality high enough to consider conserving this habitat rather than restoring it). Capability was assigned a value of Yes or No, and Feasibility was assigned 'Yes', 'No', or 'Yes, with design' (meaning constraints to feasibility could likely be overcome using relevant and practical design considerations for the reach), and Priority was assigned a value of High, Medium, Low, or None (Table 4). Generally, 'Yes, with design' values were considered slightly less valuable than 'Yes' values because of the additional monetary cost that would be incurred with the necessary design or construction considerations.

High Priority Restoration Reaches

Reaches 11-15, 18, 20, and 21 ranked as high priority for habitat restoration. In these reaches, the only use constraints are shoreline trail access and view corridors, and habitat benefits could be gained along continuous stretches of shoreline. In Reaches 11-15, major

problems to be addressed include erosion and poor substrate; the erosion here is moderate to severe, and the substrate is either clay hardpan or relatively large in places. The shoreline could be graded and/or beach nourishment substrate could be added to provide appropriate substrate. Key issues in Reach 18 include erosion pockets that have formed due to erosion, and mulch that is sloughing into the water. Reaches 20 and 21 have moderate shoreline erosion problems. In all of these high priority reaches, native vegetation is sparse or lacking and non-native vegetation is pervasive. To address this, non-native vegetation could be removed and existing vegetation could be supplemented with native plantings.

High Priority Conservation Reaches

Reaches with a high priority for conservation included Reaches 1, 2, and 23, which are in/adjacent to freshwater inputs with slightly modified but mostly intact wetlands.

As a final note, the context of reaches with respect to one another should be considered during the Master Planning decision-making process. It should be noted that the value of high priority restoration and conservation reaches would be slightly increased based on proximity to nearby high quality habitat areas. For example, although Reach 3 ranks as a low priority for restoration, it could be considered a high end of the low priority ranking because it is adjacent to higher quality habitat.

REFERENCES

- Parametrix. 1991. Luther Burbank Erosion Control Study – Final Report and Recommendations. Prepared for King County Parks Division in association with TAMS Consultants, Inc., and Rittenhouse-Zeman & Associates. October 1991.
- Reid Middleton. 2002. Luther Burbank Park – Waterfront Evaluation. Prepared for City of Mercer Island. February 2002.

TABLES AND FIGURES

Table 1
Shoreline Reach Data Collected

Habitat Parameter	Characteristic
Approximate Slope	Vertical, >5:1 OLW-OHW, <5:1 OLW, >5:1 OHW, <5:1 OLW-OHW
Armoring	None or Type (Riprap, Debris, Stacked Concrete, Vertical Concrete, Anchored Logs, Vertical Wood, Sheetpile, Other)
Approximate Toe Depth below OLW	(in feet)
Erosion ¹	None or Low, Moderate (<1-2' erosive height difference in water depth and shoreline), or Severe (>2-3' erosive height difference in water depth and shoreline)
Armor Notes	(qualitative)
Substrate (Primary and Secondary)	Type (Silt or Clay, Sand, Small Gravel (0.1-0.5" in diameter), Medium Gravel (0.6-1.5" in diameter), Large Gravel (1.6-3" in diameter), Cobble (6-12" in diameter), Boulder (>12" in diameter), Bedrock, Other)
Substrate Notes	(qualitative)
Vegetation – approximate percent overhanging OHW	(Percent)
Vegetation Type	Type (Native, Non-Native, Invasive, Other [mixed])
Vegetation Notes	(list dominant plants)
LWD	Count of pieces below OLW, at OLW, above OLW
LWD Notes	(qualitative)
Reach Notes	(qualitative)
Photos	(numbered)
Docks and Piers	Length Waterward at OLW (in feet)
	Approximate Width at OLW (in feet)
	Number of slips
	Use type (day, marina, other)
	Dock Notes
Freshwater Inputs	Input characteristics (approximate diameter, angle, drop)
	Notes
	Adjacent outfall? (True/False)

¹ Erosion types applied from Parametrix (1991).

**Table 2
Shoreline Reach Data Summary**

Reach	Approximate Slope	Armoring	Approximate Armor Depth (in feet)	Erosion	Armor Notes	Primary Substrate	Secondary Substrate	Substrate Notes	Approximate Overhanging Vegetation Percent	Vegetation Type	Vegetation Notes (dominant vegetation)	LWD below at OLV	LWD at OLV
1	<5:1OLW>5:1OHW	None	0	None or Low	some placed logs and riprap at start of reach	Sand	Large Gravel 1.5-3		20	Other (mixed)	shrubs	0	4
2	<5:1OLW>OHW	None	0	None or Low	single cement block present in water	Sand	Large Gravel 1.5-3		90	Native	willow	0	0
3	Vertical	None	0	Severe		Med Gravel 0.5-1.5	Silt or Clay		50	Native	hawthorn	0	0
4	<5:1OLW>5:1OHW	None	0	Severe	boulders	Sand	Small Gravel 0.1-0.5		0	Other (mixed)	turfgrass	0	0
5	Vertical	None	0	Severe	short bluffs	Silt or Clay	Large Gravel 1.5-3	some concrete blocks at end of reach	0	Other (mixed)	turfgrass	0	0
6	Vertical	None	0	Severe	short bluffs	Silt or Clay	Large Gravel 1.5-3		70	Native	hawthorn	0	0
7	Vertical	None	0	Moderate/Severe	short bluffs	Silt or Clay	cobble 6-12	clay offshore, sand inshore	90	Native	trees	0	0
8	<5:1OLW>5:1OHW	None	0	None or Low/Moderate	short bluffs	Sand	Large Gravel 1.5-3		50	Native	large trees and Carex	1	0
9	<5:1OLW>5:1OHW	None	0	None or Low/Moderate		Sand	Small Gravel 0.1-0.5	some med gravel offshore	20	Other (mixed)	large trees - also some willow and elderberry	0	0
10	<5:1OLW>5:1OHW	Riprap	0	None or Low/Moderate	riprap and wood steps ~20 feet long some boulders and med gravel and cobble offshore	Sand	Small Gravel 0.1-0.5	some med gravel offshore	0	Other (mixed)	none - this area is mulched some conifers, blackberry, horse chestnut, and downed live poplars	0	0
11	<5:1OLW>5:1OHW	None	0	Severe	some boulders and med gravel and cobble offshore	Sand	Med Gravel 0.5-1.5		30	Other (mixed)	some conifers, blackberry, horse chestnut, and downed live poplars	0	0
12	<5:1OLW>5:1OHW	None	0	Severe	some boulders and med gravel and cobble offshore	Med Gravel 0.5-1.5	Large Gravel 1.5-3	some clay hardpan offshore	75	Other (mixed)	large trees	0	0
13	<5:1OLW>5:1OHW	None	0	Moderate	some boulders and med gravel and cobble offshore	Med Gravel 0.5-1.5	Large Gravel 1.5-3	some clay hardpan offshore	10	Other (mixed)	poplars, turfgrass, blackberries, and downed live poplar	2	0
14	<5:1OLW>5:1OHW	None	0	Moderate	some boulders and med gravel and cobble offshore	Med Gravel 0.5-1.5	Large Gravel 1.5-3	some clay hardpan offshore	30	Other (mixed)	poplars, turfgrass, and blackberries	0	0
15	<5:1OLW>5:1OHW	None	0	Moderate	some boulders and med gravel and cobble offshore	Sand	Med Gravel 0.5-1.5	some clay hardpan offshore	10	Other (mixed)	poplars, turfgrass, and blackberries	0	0
16	Vertical	Vert. Concrete	3	Severe	seawall adjacent building some conc debris and anchored logs and failing riprap	Boulder >12	Cobble 6-12		0	None	none - this area is mulched	0	0
17	<5:1OLW>5:1OHW	Riprap	0	Severe		Sand	Cobble 6-12	conc debris	40	Other (mixed)	blackberries, large trees	0	0
18	<5:1OLW>5:1OHW	None	0	Moderate	logs above/at OHW	Med Gravel 0.5-1.5	Large Gravel 1.5-3	boulders offshore some sandy pockets	90	Other (mixed)	large decid trees, shrubs; English ivy, blackberries, and lots of holly	3	0
19	Vertical	Anchored Logs	0	Severe		Large Gravel 1.5-3	Silt or Clay	clay hardpan offshore, quarry spill at start of reach	10	Other (mixed)	large decid trees, shrubs; English ivy, blackberries, and lots of holly	0	0
20	<5:1OLW>5:1OHW	None	0	Moderate	short bluffs	Large Gravel 1.5-3	Med Gravel 0.5-1.5	sand	80	Other (mixed)	large decid trees, shrubs; English ivy, blackberries, and lots of holly	0	0
21	<5:1OLW>5:1OHW	None	0	Moderate	short swim beach seawalls present above OHW	Large Gravel 1.5-3	Med Gravel 0.5-1.5	sand and some boulders and concrete blocks offshore	0	No-Native	turfgrass, blackberries	0	0
22	<5:1OLW>OHW	None	0	None or Low		Sand	Silt or Clay	med gravel at start of reach	0	No-Native	turfgrass	0	0
23	<5:1OLW>5:1OHW	None	0	None or Low		Sand	Small Gravel 0.1-0.5	med gravel at start of reach	60	Native	emergent marsh vegetation and some large trees	0	0

Table 2
Shoreline Reach Data Summary

Reach	LWD above OLV	LWD Notes	Reach Notes	Dock Present?	Dock Length Waterward	Approximate Dock Width at OLV	No. of dock slips	Use Type	Dock Notes	Freshwater Input?	F/W Input diameter	F/W Input Angle	F/W Input Drop	Adjacent Outfalls?	F/W Input Notes	Reach Length (in feet)
1	0	placed lwd	woody debris and soil pile, old beaver dam? evidence of beaver cuts on debris	No						No						166
2	0			No						No						151
3	0			No						No						74
4	0		homogenous pebble rock; boulders forming small jetty-like structure at point	No						No						115
5	0			No						No						44
6	0			No						No						96
7	0			No						No						158
8	0			No						Yes	5	5	0	No	dry	208
9	1			No						Yes	5	10	0	No		146
10	1		erosion severe except where riprap exists	No						No						95
11	2		some pocket beaches	No						No						506
12	0			No						No						215
13	0			No						No						155
14	0			No						Yes	3	Not visible	Not visible	No	catch basin	126
15	2			No						No						150
16	0			Yes	235	8		Day Use	some derelict	Yes, 2	3.8	5.5	0.0	Yes, Yes	dry, dry	224
17	0		riprap and wood steps ~20 feet long	No						Yes	8	5	0	No	submerged	80
18	0		some pocket beaches created by erosion	No						No						536
19	0			Yes	132	8		Day Use		No						49
20	0			No						No						118
21	2			No						No						187
22	0		swim beach; slope sleeper than <5:1 at start of reach	No						No						118
23	10	scattered pieces		No						No						561

Table 3
Shoreline Habitat Summary and Restoration Opportunities

Reach	Reach Condition (summary)	Habitat Improvement Restoration Opportunities (what could change to benefit habitat?)	Reach-Appropriate Measure (Restoration or Conservation)	Capability (is the habitat likely to be able to sustain the restored or conserved state without continued active management (Y/N)?)	Feasibility (is the existing habitat quality high enough to consider conserving this habitat rather than restoring it?)	Conservation or Restoration Priority (Low, Med, High, None)	Justification and Restoration Recommendations
1	Moderate steep slope, no armoring, sm/lg substrate, mixed native/non-native veg w/ little cover	None	C	Yes - habitat is intact wetland	Yes	High	Reaches 1-2 are in/adjacent to a freshwater input with a modified but mostly intact wetland. Conservation is recommended.
2	Gentle slope, no armoring, sm/lg substrate, native veg with high cover	None	C	Yes - habitat is intact wetland	Yes	High	
3	Vertical slope (2-3), no armoring, med and scoured (hardpan exposed) substrate, native veg w/ med cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	No - shoreline would likely require periodic renourishment	Yes, but constraints could be overcome with design (lake views)	Low	
4	Moderate steep slope, no armoring, sm substrate, mixed veg w/ no cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	No - shoreline would require erosive forces	Yes, but constraints could be overcome with design (lake views)	Low	Reaches 3-7 are near an existing stream/wetland but have low cut-banks from erosion. Most of these reaches have a clay hardpan substrate and would require beach nourishment to provide a new and adequate substrate, but grading would not be recommended because there is little existing shoreline vegetation to stabilize the bank. Park uses for lake viewing limit the potential to restore vegetation here, and exposure to continued erosion would need to be addressed in light of any restoration action.
5	Vertical slope (2-3), no armoring, scoured (hardpan exposed) and med substrate, native veg w/ no cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	No - shoreline would require erosive forces	Yes, but constraints could be overcome with design (lake views)	Low	
6	Vertical slope (2-3), no armoring, scoured (hardpan exposed) and med substrate, native veg w/ med cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	No - shoreline would require erosive forces	Yes, but constraints could be overcome with design (lake views)	Low	
7	Vertical slope (1-3), no armoring, scoured (hardpan exposed) and med substrate, native veg w/ high cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	No - shoreline would require erosive forces	Yes, but constraints could be overcome with design (lake views)	Low	
8	Moderate steep slope, no armoring, sm/lg substrate, native veg w/ med cover	Beach nourishment (sand/gravel), plant natives where possible to increase overhanging vegetation - outfall present -5" diam.	R	No - erosion would still be moderate and heavy foot traffic would affect substrate stability	Yes, but constraints could be overcome with design (partly in dog off-leash area, also shoreline access)	Low	Reaches 8, 9, and 10 are part of dog-off-leash area as well as experience heavy erosion (Reach 8 is partly out of the area). In the northern area, the vegetation cover is moderate and mostly native; reach 10 is barren and mulched. Substrate restoration in parts of this area would be valuable to increase value of adjacent habitats near wetland at north end of park, balanced with dog-off-leash uses (shoreline access and viewpoints). Although habitat restoration of Reach 10 conflicts with the dog off-leash use, some stabilizing measures could be completed which would increase the habitat value of this area and also provide for shoreline use and access (terrace/grade slope, remove armor, add sand/gravel).
9	Moderate steep slope, no armoring, sm substrate, mixed veg w/ low cover	Terrace or grade slope, plant natives where possible to increase overhanging vegetation - outfall present, -5" diam.	R	No - erosion would still be moderate and heavy foot traffic would affect substrate stability	Yes, but constraints could be overcome with design (dog off-leash area and shoreline access)	Low	
10	Moderate steep slope, riprap armor, sm substrate, no vegetation, mulch	Terrace or grade slope, remove armor, increase native veg cover where possible, replace mulch with plantings and sand/gravel where possible	R	No - erosion would still be moderate and heavy foot traffic would affect substrate stability	No - restoration conflicts with dog-park use. However, see justification column at right.	None	
11	Moderate steep slope, no armoring, sm/med substrate, mixed veg w/ some cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes, but constraints could be overcome with design (shoreline trail and views)	High	
12	Moderate steep slope, no armoring, lg substrate, mixed veg w/ high cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes, but constraints could be overcome with design (shoreline trail and views)	High	Reaches 11-15 represent areas where the only use constraints are access and view corridors, and much habitat could be gained along a continuous stretches of shoreline. Erosion is mostly moderate, and the substrate is either clay hardpan or relatively large in places, and (with exception of Reach 12), shoreline vegetation is sparse and heavy on non-natives. Shoreline could be graded and beach nourishment could provide appropriate substrate in these areas; existing vegetation could be supplemented with natives. The end of Reach 15 abouts the historic boiler-building and bulkhead, so restoration would have to be integrated into existing uses here.
13	Moderate steep slope, no armoring, lg substrate, mixed native/non-native veg w/ little cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes, but constraints could be overcome with design (shoreline trail and views)	High	
14	Moderate steep slope, no armoring, lg substrate, mixed native/non-native veg w/ little cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation - catch basin present	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes, but constraints could be overcome with design (shoreline trail and views)	High	
15	Moderate steep slope, no armoring, sm substrate, mixed native/non-native veg w/ little cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes, but constraints could be overcome with design (shoreline trail, shoreline access, and views)	High	

Table 3
Shoreline Habitat Summary and Restoration Opportunities

Reach	Reach Condition (summary)	Habitat Improvement Restoration Opportunities (what could change to benefit habitat?)	Reach-Appropriate Measure (Restoration or Conservation)	Capability (is the habitat likely to be able to sustain the restored or conserved state without continued active management (Y/N)?)	Feasibility (is the existing habitat quality high enough to consider conserving this habitat rather than restoring it?)	Conservation or Restoration Priority (Low, Med, High, None)	Justification and Restoration Recommendations
16	Vertical concrete bulkhead (water depth at bulkhead toe = 3'), dock, and boiler building, sm/med substrate, no vegetation	Remove bulkhead and dock, grade slope, plant natives to increase overhanging vegetation - 2 outfalls present, ~3" and ~8" diam.	R	No - distance between building and beach would be too short for unarmored habitat.	No - removal of historic building, bulkhead, and dock not feasible	None	Reaches 16 and 17 represent highly modified shorelines around the historic boiler building. It is assumed that the removal of this building, bulkhead and functioning dock would not be feasible and would preclude restoration actions in these reaches. However, actions could be taken to increase habitat value in nearby reaches.
17	Moderate steep slope, riprap armor, mixed substrate, concrete debris, mixed veg w/some cover	Grade slope, remove armor and debris, plant natives to increase overhanging vegetation - outfall present, ~8" diam.	R	No - distance between building and beach would be too short for unarmored habitat.	No - removal of historic building, bulkhead, and dock not feasible	None	Reach 18's shoreline has shoreline erosion problems with varying severity; pocket beaches have formed due to erosion and mulch is sloughing into the water. Like Reaches 11-15, this reach is an area where the only use constraints here are access and view corridors, and much habitat benefit could be gained along a continuous stretch of uninterrupted shoreline.
18	Moderate steep slope, no armor, med/ig substrate, mixed veg w/ high invasive cover	Beach nourishment (sand/gravel), plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes	High	It is assumed that the removal of Reach 19's bulkhead and dock is not feasible and would preclude restoration actions here.
19	Vertical anchored-log bulkhead and dock (2-3'), mixed native/non-native veg with large substrate and clay hardpan offshore	Remove bulkhead and dock, fill or grade slope, remove invasives, plant natives to increase cover	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	No - removal of bulkhead and dock not feasible	None	
20	Moderate steep slope, no armor, lg/med substrate, mixed veg w/ high invasive cover	Beach nourishment (sand/gravel), remove invasives, plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes	High	Reaches 20 and 21 are similar to Reach 18 in representing areas where the only access constraints are view corridors.
21	Moderate steep slope, no armor, lg/med substrate, mixed veg w/ no cover	Beach nourishment (sand/gravel), remove invasives, plant natives to increase overhanging vegetation	R	Yes - placed substrate and existing/new vegetation would likely be sustainable	Yes	High	Swim beach in Reach 22 receives high use and requires access and view corridors. It is assumed that this use precludes vegetation restoration actions here; however, substrate renourishment would provide some habitat benefit for nearshore fish species.
22	Swim beach, gentle slope, no armor below OLV, sm and scoured (hardpan exposed) substrate, no veg cover	Beach nourishment (sand/gravel), remove invasives, plant natives to increase overhanging vegetation	R	No - erosion would still be moderate and heavy user traffic would affect substrate stability	Yes - but constraints could be overcome with design (swim beach)	Low	Reach 23 is in/adjacent to a freshwater input with a modified but mostly intact wetland complex. Conservation is recommended.
23	Moderate steep slope, no armor, small substrate, native veg w/ med/high cover	None	C	Yes - habitat is intact wetland	Yes	High	

Table 4
Decision Process for Restoration and Conservation Priorities

Restoration			Conservation		
Capability (Y or N)	Feasibility (Y, N, or Y w/design)	Priority (High, Med, Low, or None)	Capability (Y or N)	Feasibility (Y, N, or Y w/design)	Priority ¹ (High, Med, Low, or None)
Y +	Y =	High	Y +	Y =	High
Y +	Y w/design =	High	Y +	N =	None
N +	Y =	Med	N +	N =	None
N +	Y w/design =	Low			
Y +	N =	None			
N +	N =	None			

1 Not all of the combinations of the table values existed or made sense. For restoration, the last two combinations for restoration would be non-starter projects. Also, the combination of N (Capability) and Y (Feasibility) did not exist at the park. For conservation, the combination of N (Capability) and Y (Feasibility) does not make sense; if the habitat is not capable of sustaining a conserved state, then it would not be under consideration for conservation. Also, design would not be a consideration if reaches were to be conserved because construction and design would not be necessary.



Figure 1
 Shoreline Habitat Reaches
 Luther Burbank Park Shoreline Habitat Inventory