

Title: ***** FOR DISCUSSION PURPOSES ONLY ***** DRAFT

Species or Critical Habitat Type (Description and Functions provided to salmon)	Potential Threats & Stressors	Protective Measures Implemented by Kitsap County	Science & Regulatory Gaps	Measures planned to address threats/gaps & how	Possible actions if funding were available
<p style="text-align: center; transform: rotate(-90deg);">Pacific Herring (<i>Clupea harengus</i>) Habitat</p> <ul style="list-style-type: none"> • General: Herring deposit eggs on intertidal and shallow subtidal eelgrass and marine algae. Eggs may be deposited anywhere between the upper limits of high tide to a depth of -40 feet MLLW, but most takes place between 0 & -10 feet MLLW (WSDFW 2002a). • Spawning in Kitsap: spawning is well documented in several locations such as Agate Pass / Port Madison stock; Dyes Inlet stock; Port Gamble stock; and some smaller areas. Most of the spawning in Kitsap is subtidal. (See Map 1). Herring spawning habitat is well documented in Kitsap County (D. Small, WDFW, <i>personal communication</i>, 2005). • Function to salmon: Herring represent a considerable percentage of the diet for coho and Chinook salmon (58%) (Nightingale and Simenstad 2001b). <p>Healthy forage fish populations support the following Viable Salmon Population (VSP) parameters:</p> <ol style="list-style-type: none"> 1. Abundance: directly as food source. 2. Population growth rate: directly as food source. 3. Spatial structure: indirectly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore. 4. Diversity: indirectly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore. 	<ul style="list-style-type: none"> • Construction of overwater structures (floating docks, fixed piers, marinas, mooring buoys) can directly impact eelgrass and marine algae used for herring spawning by shading or by physical scouring. Kitsap Focus: Between 1999-2004 there have been 70 shoreline permits submitted, (SDP, CUP) approximately 85% include over the water structures. In addition there has been an additional 132 shoreline permit exemptions issued. Of these only 25% would be for over the water structures on salt water (Beam, Kitsap County Shoreline Administrator, 2005). • Vessels commonly associated with many overwater structures can cause prop scouring of sediment and submerged vegetation. Kitsap Focus: The extent of scouring has not been document for neither moorage facilities nor private docks, piers or buoys. • Water quality impacts are another potential issue associated with overwater structures. Toxic substances associated with the maintenance and operation of marine vessels may also affect herring spawn viability. Kitsap Focus: Port Madison Bay is one of three various locations in Puget Sound where mass mortality of herring spawn has been documented but more research is needed to determine cause (Jim West, WDFW, <i>personal communication</i>, 2002). • Unregulated mooring buoys can scour & shade marine vegetation. Kitsap Focus: The number of buoys showing up locally outnumbers the permit applications and once placed it is difficult to find owners (Small, WDFW <i>personal communication</i>). Observations are qualitative and the extent has not been documented. 	<p>Federal: Corps Section 404 & Section 10 permits initiate ESA Section 7 Consultations & Essential Fish Habitat Consultations. The Corps responsibility includes development activities below the mean, higher-water mark.</p> <p>State: All documented forage fish spawning sites in WA are considered “salt water habitats of special concern” and have been given “no net loss” protection in the application of Washington Administrative Code (WAC) “Hydraulic Code Rules”. Jurisdiction stops at ordinary high-water line. Direct effects are much easier to address than indirect effects.</p> <p>Kitsap County: Shoreline Master Program (SMP) is the primary regulatory tool. County staff rely extensively on WDFW biologists to provide habitat expertise to avoid impacting eelgrass or forage fish spawning habitat. Difficult to deny construction of docks and piers as a feature of single family homes due to existing policies and development standards in SMP – possession of an approved Hydraulic Project Approval permit from the State diminishes local ability to restrict development based on environmental considerations (Beam, <i>personal communication</i> 2005).</p>	<p>Science Gaps:</p> <ul style="list-style-type: none"> • Current knowledge and understanding of cumulative effects of overwater structures on spawning habitat is limited. Methods for measurement of cumulative effects have not been developed • Uncertainties in algal population dynamics (e.g. Ulva blooms, Sargassum intro, attached vs. unattached algae contribution, eelgrass distribution variation) • The extent of habitat alteration or loss of spawning substrate due to vessel related prop-scour or water quality degradation is not quantified. • Ambient water quality monitoring for toxic substances is limited. <p>Regulatory Gaps:</p> <ul style="list-style-type: none"> • The limited knowledge of cumulative and indirect effects limits the ability of regulatory agencies to address some threats. • Regulations manage the shoreline through site-by-site consideration and do not allow for ecosystem management. • County staff is not available to look at cumulative impacts of overwater structures. 	<ul style="list-style-type: none"> • Nearshore Assessment (Complete April 2007). The nearshore assessment will 1) conduct a baseline characterization of the East Kitsap nearshore environment and assess its ecological health and function, 2) identify restoration and preservation opportunities and develop a strategy for ranking and prioritizing opportunities, and 3) develop a management framework based on functions and processes of nearshore ecology. The assessment will provide a baseline from which results of nearshore protection/restoration actions may be evaluated allowing an adaptive management approach to future nearshore activities. The same methodology used on Bainbridge Island will be used for East Kitsap. • The nearshore assessment will use existing forage fish data and at this time is not budgeted to do a comprehensive forage fish survey. • Adopt Kitsap County Draft Shoreline Environmental Designations • Update Shoreline Master Plan (2011). <ul style="list-style-type: none"> ○ Evaluate criteria for allowing docks and piers to protect herring habitat. ○ Identify herring habitat spawning areas as habitats of local importance requiring habitat management plans. ○ Consider cumulative effects from overwater structures in updating SMP (For example, build out scenarios w/overwater structures). Take into account processes that control functions. ○ Information from studies will be used to inform land use planners and managers to best manage natural resources • Actively seek funding to support protection of existing herring spawning areas. 	<ul style="list-style-type: none"> • Develop methods to quantify cumulative effects from overwater structures. • Develop long range planning tools to manage potential cumulative impacts of shoreline development on herring spawning areas. • Develop incentive programs to encourage community docks vs. single family docks. • Education and Outreach <ul style="list-style-type: none"> ○ Fund Education/ Outreach position ○ Implement shoreline stewardship program ○ Shoreline educational workshops ○ Develop video on how salmon are using Kitsap and what citizens can do to protect and improve conditions. Distribute videos widely. • Offer Sound Boater Program to educate recreational boaters on boating best management practices.

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<div style="writing-mode: vertical-rl; transform: rotate(180deg); font-weight: bold; font-size: small;">Surf Smelt (<i>Hypomesus pretiosus</i>) & Pacific sand lance (<i>Ammodytes hexapterus</i>)</div> <p>Surf Smelt:</p> <ul style="list-style-type: none"> General: Surf smelt are obligate spawners on the upper beach, with a specific mixture of coarse sand & pea gravel. Freshwater seepage areas or overhanging vegetation may be preferred spawning habitat due to lower fluctuation in gravel moisture and temperature. Spawning in Kitsap: See Map #2 & 2a. There are many documented beaches throughout upper intertidal of protected beaches. Function to salmon: Adult salmon eat smelt but to a lesser extent than sand lance and herring (Gearin et al., 1994). <p>Pacific sand lance:</p> <ul style="list-style-type: none"> General: Sand lance are thought to be obligate spawners in the upper beach, over a variety of beach substrates, including soft sandy beaches, muddy low energy beaches & beaches of higher energy w/ gravel up to 3-cm diameter (Pentilla 1995, WDFW 2002a). Sand Lance Spawning in Kitsap: See Map #3 & 3a. There are many documented beaches throughout upper intertidal of protected Kitsap beaches. However, sand lance spawning in Kitsap is the least understood of the forage fish (Small, WDFW, personal communication, 2005). Function to salmon: On average, 35% of juvenile salmon diets are comprised of sand lance and are particularly important to juvenile Chinook, where 60 percent of their diets are sand lance (WDFW Web page, 2005). VSP Parameters: See <i>Pacific herring</i> above. 	<ul style="list-style-type: none"> Shoreline armoring can have effects on physical processes, primarily sediment transport, that can reduce the number and diversity of habitats (Douglas and Pickel 1999). These modifications can have effects on nearshore processes and the ecology of spawning habitat for surf smelt and sand lance. Armoring can also reduce prey production and refuge areas for juvenile salmonids (Macdonald et al. 1994; Allee 1982). Kitsap Focus: Approximately 1/3 of unincorporated shoreline is armored. (Of the approximately 8000 shoreline lots, 5000 are developed. Between 1999-2004 there have been 192 building permits submitted for constructions of bulkheads. The majority of those would have been for replacement or repairs as the county is very conservative about issuing permits for new bulkheads. Approximately 10-20% are new bulkheads (Beam, Kitsap County Shoreline Administrator, 2005) Past shoreline armoring impacts included direct removal of habitat by bulkhead construction and fill. Kitsap Focus: It is not known how much habitat was lost in East Kitsap. The nearshore assessment will look at historical surveys (t-sheets) to get an idea of how much habitat was lost due to direct impacts such as fill and bulkheads. Removing trees and other shoreline vegetation can increase erosion and decrease shading. Areas with shading have been found to experience greater egg viability than areas without shade (Pentilla, 2001. Proceeding from PS Research Conference) Kitsap Focus: Removal of “danger trees” in shoreline areas is subject to case by case evaluation. Vegetation removal associated with shoreline armoring is a common occurrence. The extent of vegetation removal is not documented. 	<p>Federal: Corps Section 404 & Section 10 permits initiate ESA Section 7 Consultations & Essential Fish Habitat Consultations. The Corps responsibility includes development activities below the mean, higher-water mark.</p> <p>State: All documented forage fish spawning sites in WA are considered “salt water habitats of special concern” and have been given “no net loss” protection in the application of Washington Administrative Code (WAC) “Hydraulic Code Rules”. Jurisdiction stops at ordinary high-water line.</p> <p>Kitsap County: Shoreline Master Program (SMP) is the primary regulatory tool. The SMP specifies that a geotechnical survey must be conducted to document that a residence is threatened by erosion if a shoreline permit is to be approved. A shoreline permit to replace or repair an existing bulkhead must document, through a geotechnical survey that the residence is threatened and must show that soft bank protection techniques are not possible¹. The County relies extensively on WDFW habitat biologists to provide habitat expertise that is otherwise not available at the county due to lack of staff. The shoreline planners said this relationship is very helpful.</p> <p>The Kitsap County Critical Areas Ordinance (Title 19 Kitsap County Code) requires a 35 ft. buffer and 15 building set-back for marine shorelines designated as Urban, Semi-Rural, Rural and Conservancy in the SMP. Shorelines designated as Natural require a 100 ft. buffer and 15 ft. building set-backs. All buffers require the maintenance of native vegetation, however view clearing is allowed.</p>	<p>Science Gaps:</p> <ul style="list-style-type: none"> Current knowledge and understanding of cumulative effects of shoreline armoring on spawning habitat is limited. Sand lance spawning areas are the least understood. Only first recognized in 1989. It is the most documented food for Chinook but the documented habitat is probably under-represented (Small, WDFW, personal communication 2005). Surf smelt documentation is more comprehensive, but funding was cut in mid 1990s so documentation is done site-by-site and does not take into account protracted spawning (9-12 months). Need updated comprehensive survey for sand lance and surf smelt. Largest gap in documentation is from Kingston to Foulweather Bluff (Small, WDFW, personal communication, 2005). <p>Regulatory Gaps:</p> <ul style="list-style-type: none"> The limited knowledge of “cumulative effects” and how it is assessed or measured limits the ability of regulatory agencies to address these effects. Regulations manage the shoreline through site-by-site consideration and does not allow for an ecosystem-based management. County staff is unavailable to look at cumulative impacts. 	<ul style="list-style-type: none"> Nearshore Assessment (Complete April 2007). The nearshore assessment will 1) conduct a baseline characterization of the East Kitsap nearshore environment and assess its ecological health and function, 2) identify restoration and preservation opportunities and develop a strategy for ranking and prioritizing opportunities, and 3) develop a management framework based on functions and processes of nearshore ecology. The assessment will provide a baseline from which results of nearshore protection/restoration actions may be evaluated allowing an adaptive management approach to future nearshore activities. The same methodology used on Bainbridge Island will be used for East Kitsap. The nearshore assessment will use existing forage fish data and at this time is not budgeted to do a comprehensive forage fish survey. Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process) in 2006. Update Shoreline Master Plan (2011). <ul style="list-style-type: none"> Evaluate criteria for allowing shoreline armoring in documented sand lance and surf smelt spawning habitat. Identify sand lance and surf smelt spawning habitat areas as habitats of local importance requiring habitat management plans. Consider cumulative effects from shoreline armoring in updating SMP. Take into account processes that control functions. Information from studies will be used to inform land use planners and managers to best manage natural resources Actively seek funding to support protection and restoration of existing forage fish spawning areas. 	<ul style="list-style-type: none"> Conduct comprehensive forage fish spawning survey to update documentation maps, especially for sand lance and for the area from Kingston to Foulweather Bluff. Develop a method of identifying cumulative effects from shoreline armoring and stormwater on spawning habitat.. Develop long range planning tools to address potential impacts to surf smelt and sand lance spawning areas. Develop incentive programs to encourage removing unnecessary shoreline armoring and use of soft bank protection. (e.g. Public Benefit Rating System) Education and Outreach <ul style="list-style-type: none"> Fund Education/ Outreach position Implement shoreline stewardship program Shoreline educational workshops Develop video on how salmon are using Kitsap and what citizens can do to protect and improve conditions. Distribute videos widely. Offer Sound Boater Program to educate boaters on boating BMPs. Develop a beach nourishment program to restore lost sediment supply to beaches and restore/maintain spawning area substrate.

¹ However, beach erosion at some level was often taking place and experts debated the causes of erosion and if the rate of erosion was excessive or within the expected range. Local staff and state biologists are hampered by the inability to challenge the geotechnical analysis in an expert capacity and few bulkhead applications have been denied shoreline armoring (Small, WDFW, personal communication 2005)

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<p align="center">Eelgrass (<i>Zostera marina</i>) Habitat</p> <ul style="list-style-type: none"> General: Low intertidal and upper subtidal zone, along protected and semi-protected shorelines. Eelgrass in Kitsap: See Maps 4 & 4a. Eelgrass occupies an estimated 48% of East Kitsap shoreline (Washington State DNR 2001). Function to salmon: Habitat for fish. Juvenile chum and Chinook are often found feeding and residing in and around eelgrass. Eelgrass is a major contributor to the detritus used in both nearshore and deep-water food webs. <p>Healthy eelgrass areas support the following VSP parameters:</p> <ol style="list-style-type: none"> Abundance: directly by providing shelter; indirectly as the basis for food webs that support prey populations. Population growth rate: directly by providing shelter; indirectly as the basis for food webs that support prey populations. Spatial structure: indirectly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore. Diversity: indirectly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore 	<ul style="list-style-type: none"> Construction of overwater structures (floating docks, fixed piers, marinas, mooring buoys) can directly impact eelgrass by shading or by physical scouring. Kitsap Focus: Unknown Kitsap specific studies. See Pacific herring regarding overwater structures. Vessels commonly associated with many overwater structures can cause prop scouring of sediment and submerged vegetation. Kitsap Focus: No specific Kitsap studies. Water quality impacts are another potential issue associated with overwater structures and sewage outfalls. In addition, sediments loads carried by streams may limit available light. Kitsap Focus: No specific information available. Unregulated mooring buoys can scour & shade marine vegetation. Kitsap Focus: The number of buoys showing up locally outnumbers the permit applications and once placed it is difficult to find owners (Small, WDFW <i>personal communication</i>). Observations are qualitative and the extent has not been documented. Boats anchoring in eelgrass and not using designated buoys causes scouring from anchor and anchor chain. Kitsap Focus: Lots of examples throughout the shoreline (Small, WDFW, <i>personal communication</i> 2005). Observations are qualitative.. 	<p>Federal: Corps Section 404 & Section 10 permits initiate ESA Section 7 Consultations & Essential Fish Habitat Consultations. The Corps responsibility includes development activities below the mean, higher-water mark.</p> <p>State: All documented eelgrass in WA are considered “salt water habitats of special concern” and have been given “no net loss” protection in the application of Washington Administrative Code (WAC) “Hydraulic Code Rules”. Jurisdiction stops at ordinary high-water line.</p> <p>Kitsap County: Shoreline Master Program (SMP) is the primary regulatory tool. County staff relies extensively on WDFW biologists to provide habitat expertise to avoid impacting eelgrass or forage fish spawning habitat. Difficult to deny construction of docks and piers as a feature of single family homes due to existing policies and development standards in SMP – possession of an approved Hydraulic Project Approval permit from the State diminishes local ability to restrict development based on environmental considerations (Beam, personal communication 2005).</p>	<p>Science Gaps:</p> <ul style="list-style-type: none"> While East Kitsap shorelines support aquatic vegetation the aerial extent and condition of eelgrass has not been accurately and comprehensively surveyed. Current knowledge and understanding of cumulative effects of overwater structures and shoreline development on eelgrass habitat is limited. (proximity, etc.) While eelgrass is known to be important, the ecology of eelgrass and Chinook is still under study. For example, landscape scale (patchy vs. dense) preferences; food sources; variation in distribution over time. Impacts of increased <i>Ulva sp.</i> And <i>Sargassum spp.</i> distribution Uncertainties in algal population dynamics (e.g. <i>Ulva</i> blooms, <i>Sargassum</i> introduction, attached vs. unattached algae contribution, seasonal/interannual eelgrass distribution variation) <p>Regulatory Gaps:</p> <ul style="list-style-type: none"> The limited knowledge of cumulative effects limits the ability of regulatory agencies to address these effects. Regulations manage the shoreline through site-by-site consideration and does not allow for ecosystem management. County staff is not available to look at cumulative impacts. We do not have a count of the number of un-permitted buoys and it is difficult to find the owners once they are in. 	<ul style="list-style-type: none"> Nearshore Assessment will use existing eelgrass data and groundtruth. (Complete April 2007) Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process) in 2006. Update Shoreline Master Plan (2011). Kitsap County is scheduled to update master plan by 2011. <ul style="list-style-type: none"> Evaluate criteria for allowing development activities in documented eelgrass habitat. Identify eelgrass habitat as Class 1 Wildlife Conservation Areas, requiring habitat management plans. Consider cumulative effects from shoreline development in updating SMP Information from studies will be used to inform land use planners and managers to best manage natural resources Actively seek funding to support protection and restoration of eelgrass habitat areas. 	<ul style="list-style-type: none"> Develop a method of identifying cumulative effects from overwater structures and other stressors. Instead of the use of site-by-site overwater structure permits, use long range planning tools to address potential impacts to eelgrass areas. Develop incentive programs to encourage community docks versus single family docks. Education and Outreach <ul style="list-style-type: none"> Fund Education/ Outreach position Implement shoreline stewardship program Shoreline educational workshops Develop video on how salmon are using Kitsap and what citizens can do to protect and improve conditions. Distribute videos widely. Develop Volunteer Anchor Free Zones modeled after Jefferson County. Provide designated moorage buoys at all public facilities and install marker buoys showing boaters where eelgrass is located so they may avoid anchoring there. Monitor eelgrass sites over time to access health and trend.

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<p style="text-align: center; transform: rotate(-90deg);">Native Marine Riparian Habitat</p> <p>General: The role of marine riparian vegetation is not clearly understood. Much of the functions associated with this element are derived in part from studies focused on fresh water riparian functions and limited site-specific nearshore studies.</p> <p>Functions to salmon:</p> <ul style="list-style-type: none"> • Water quality protection: riparian vegetation serves as a sink for upland derived contaminants. It also traps sediments. • Hydrology regulation: riparian vegetation intercepts and regulates storm water inputs to the nearshore environment. • Shade: riparian vegetation supports viability of forage fish eggs (Pentilla, 2001) and presumably viable populations of other prey organisms subject to mortality due to increased desiccation. • Organic/Nutrient input: Riparian vegetation contributes organic materials utilized in nearshore food webs. • Prey input for salmon: direct input of insects and other terrestrial organisms have been documented as food source for juvenile salmon (Brennan, 2004). • Bank stabilization: vegetation root systems stabilize shorelines and contribute to regulation of sediment supply. • Large woody debris (LWD): provides habitat structure, assumed to provide refuge and cover for juvenile salmon and other marine organisms. <p>Healthy riparian vegetation support the following VSP parameters:</p> <ol style="list-style-type: none"> 1. Abundance: directly by providing food and shelter. 2. Population growth rate: directly by providing food and shelter. 3. Spatial structure: directly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore. 4. Diversity: directly by supporting individuals from a variety of independent Chinook populations assumed to use the East Kitsap nearshore <p>○</p>	<ul style="list-style-type: none"> • Shoreline develop is associated with increased impervious surfaces and runoff and loss of riparian vegetation effecting water quality and potential impacts to salmon transitioning from fresh to saltwater. • Shoreline armoring is typically associated with loss of riparian vegetation and the corresponding function loss. • Altered riparian vegetation due to shoreline modifications may lead to a decrease in primary and secondary production in the nearshore (i.e. reduced prey abundance and variety) <p>Kitsap: Approximately 1/3 of unincorporated shoreline is armored. Of the approximately 8000 shoreline lots, 5000 are developed. Shoreline that is armored is usually accompanied with loss of native marine riparian habitat. The <i>2003 Kitsap Salmon Refugia Report</i> (May and Peterson, 2003) classified a significant portion of the East Kitsap shoreline, from Point No Point to Applecove Point (See Map 6) as Category A refugia (“priority refugia with natural ecological integrity”). The majority of remaining East Kitsap nearshore and estuarine habitat areas were designated Category D refugia (“potential refugia with altered ecological integrity”) primarily due to shoreline modification and loss of riparian vegetation. May and Peterson (2003) also note that their assessment of nearshore habitat conditions for salmon should be considered “interim” due to the sparse data.</p>	<p>Federal: N/A</p> <p>State: N/A</p> <p>Kitsap County: The Kitsap County Critical Areas Ordinance (Title 19 Kitsap County Code) requires a 35 ft. buffer and 15 building setback for marine shorelines designated as Urban, Semi-Rural, Rural and Conservancy in the SMP. Shorelines designated as Natural require a 100 ft. buffer and 15 ft. building setback. All buffers require the maintenance of native vegetation, however view clearing is allowed.</p> <p>The Critical Areas Ordinance also classifies all streams in the County where listed salmonids are present as Category I wetlands, requiring a 200 ft. buffer. Estuarine areas associated with streams that do not contain listed salmon may also be categorized as Category II wetlands with a buffer requirement of 100 ft.</p>	<p>Science Gaps:</p> <ul style="list-style-type: none"> • Limited Puget Sound specific marine riparian buffer research. • Do non-native species function in similar manner to native species? • How can we use adaptive management to vary buffer areas to provide suitable function? <p>Regulatory Gaps:</p> <ul style="list-style-type: none"> • Enforcement: hard to enforce what happens in buffers after the permits are issued. No monitoring. • Lack of regulatory awareness to property owners who purchase lots already developed. They many not know that the property is subject to CAO. 	<ul style="list-style-type: none"> • Nearshore Assessment (Complete April 2007). The nearshore assessment will also look at historical surveys (t-sheets) to get an idea of how much habitat was lost due to direct impacts such as fill and bulkheads. • Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process), which includes dual designations for some areas that include important habitat types or forage fish spawning. Dual designations provide one designation for the above ordinary high water (OHW) to reflect current and surrounding land uses and a more restrictive designation for nearshore areas below OHW. • Adopt proposed revisions to the Critical Areas Orinance, including extending buffers for shorelines designated as Conservancy to 50 ft. and adopting the new DOE’s wetland rating system and recommended flexible buffers option • Actively seek funding to support protection and restoration of marine riparian areas. 	<ul style="list-style-type: none"> • Revegetate public lands wherever possible. • Protect existing riparian habitat through acquisitions and conservation easments. • Fund more enforcement activities. • Identify intact habitat and look into purchasing or conservation easements to protect them. • Develop incentive programs to encourage removing unnecessary shoreline armoring and use of soft bank protection. (e.g. Public Benefit Rating System) • Education and Outreach <ul style="list-style-type: none"> ○ Fund Education/ Outreach position ○ Implement shoreline stewardship program ○ Shoreline educational workshops ○ Develop video on how salmon are using Kitsap and what citizens can do to protect and improve conditions. Distribute videos widely. • Native vegetation workshops for local shoreline owners and master gardeners (Mason county model)

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<p>Tidal Marsh Habitat (Vegetated)</p> <p>Tidal Vegetated Marsh Habitat</p> <ul style="list-style-type: none"> • Primary production • Juvenile fish and invertebrate production support • Adult fish and invertebrate foraging • Salmonid osmoregulation and overwintering habitat • Water quality • Detrital food chain production • Wave buffering • Juvenile salmon reside in tidal marshes and forage on prey resources produced in and imported to the marsh system, where significant growth has been recorded (Shreffler et al. 1992). Tidal marshes are believed to be one of the most important habitats contributing to juveniles salmon growth and survival (Bottom et al. 2001). <p>Kitsap doesn't have a bunch of this from large river systems (such as the studies cited) but does have marsh habitat in upper tidal inlets. This may not be our habitat of highest importance for chinook, but may be more so for multispecies approach</p> <ul style="list-style-type: none"> • Viable Salmon Population (VSP) Parameters: <ul style="list-style-type: none"> ○ Abundance: ○ Population growth rate: ○ Spatial structure: ○ Diversity: 	<ul style="list-style-type: none"> • Disturbed community structure, disturbed plant growth, presence of non-native species, buffer encroachment, runoff scour, alteration of dendritic tidal channels, alteration of sediment dynamics, loss of upland hydraulic connectivity, elevated soil contaminant concentrations, presence of man-made debris, physical disturbances from dredging, filling and diking, & chemical contamination. • Past land use practices; similar to tidal flats, these are likely areas for development. 	<p>Federal: Same</p> <p>State: Same</p> <p>County: Wetland buffer protection.</p>	<p>Science: Not sure how much salt marsh we have lost historically.</p>	<ul style="list-style-type: none"> • Nearshore Assessment • Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process). • Apply for SRFB Grants 	<ul style="list-style-type: none"> • Protect and Restore • Education and Outreach

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<p align="center">Beaches (sand and rocky)</p> <p>Beaches (sand and rocky) and Backshore</p> <ul style="list-style-type: none"> • Primary production • Nutrient cycling • Refuge for multiple species • Prey production for juvenile salmon <p>Forage fish spawning habitat</p> <ul style="list-style-type: none"> • Viable Salmon Population (VSP) Parameters: <ul style="list-style-type: none"> ○ Abundance: ○ Population growth rate: ○ Spatial structure: ○ Diversity: 	<ul style="list-style-type: none"> • Fecal and chemical contamination, alteration of natural habitats, alteration of sediment supply, alteration of groundwater hydrology, loss of riparian habitat. 	<p>Federal:</p> <p>State:</p> <p>County:</p>		<ul style="list-style-type: none"> • Nearshore Assessment • Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process). • Apply for SRFB Grants 	<ul style="list-style-type: none"> • Protect and Restore • Education and Outreach
<p align="center">Banks and Bluffs</p> <p>Banks and Bluffs</p> <ul style="list-style-type: none"> • Source of sediments to beaches • Support for marine riparian vegetation <p>Notable eroding bluffs include the shoreline from Foulweather Bluff to Port Madison Bay, Murden Cove to Point Monroe, Wing Point to Murden Cove; Fletcher Bay to Arrow Point, Manzanita Bay to Agate Point.</p> <ul style="list-style-type: none"> • Viable Salmon Population (VSP) Parameters: <ul style="list-style-type: none"> ○ Abundance: ○ Population growth rate: ○ Spatial structure: ○ Diversity: 	<ul style="list-style-type: none"> • Shoreline armoring and development. • Alteration of hydrology 	<p>Federal:</p> <p>State:</p> <p>County: WDFW is good at providing identification of feeder bluffs. In order to armor bluff, property owner must show good cause that structure is threatened.</p>		<ul style="list-style-type: none"> • Nearshore Assessment • Adopt Kitsap County Draft Shoreline Environmental Designations (subject to future public review and adoption process). • Apply for SRFB Grants 	<ul style="list-style-type: none"> • Protect and Restore • Education and Outreach

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Species or Critical Habitat Type (Description and Functions provided to salmon)	Potential Threats & Stressors	Protective Measures Implemented by Kitsap County	Science & Regulatory Gaps	Measures planned to address threats/gaps & how	Possible actions if funding were available
<p>Tidal Mud Flats</p> <ul style="list-style-type: none"> • Primary production • Nutrient cycling • Habitat/support for juvenile and adult fish • Prey production for juvenile salmon (harpacticoid copepods, amphipods) • Detritus sink • Predator protection for sand lance • Wave dissipation for salt marsh and fish • Extensive tidal flats are present in areas such as Carpenter Creek/Appletree Cove, Miller Bay, Liberty Bay, Dyes Inlet, Sinclair Inlet, Clam Bay, Pleasant Cove, Manzanita Bay, Murden Cove, Rolling Bay to Point Monroe, Fletcher Bay, Blakely Harbor, and Eagle Harbor. Kitsap <p>protected shallow shoreline habitat is of regional importance in Puget Sound</p> <ul style="list-style-type: none"> • Viable Salmon Population (VSP) Parameters: <ul style="list-style-type: none"> ○ Abundance: ○ Population growth rate: ○ Spatial structure: ○ Diversity: 	<ul style="list-style-type: none"> • Unnatural erosion or deposition of sediment • Overabundance of organic matter loading including ulvoid mats • Alteration of dendritic tidal channels • Fecal and chemical contamination • Physical disturbances from shoreline armoring, marina construction. • Competition from non-native species. • Spartina • Maybe change to direct effects & indirect effects to make it clearer • Note that habitat changes affect biological community – this is the main link you are looking for. 	<p>Federal: Army Corps Section 10 (Dredging & Filling)</p> <p>State: same</p> <p>County: Protected</p>	<p>Can we restore tidal flats in highly urbanized settings or where physical processes have been highly disturbed?</p> <p>Can we substitute other measures for highly disturbed physical processes when they cannot be restored? (e.g. beach feeding)</p>	<ul style="list-style-type: none"> • Nearshore Assessment (Complete April 2007) • Update Shoreline Master Plan (2011) • Develop method of identifying cumulative effects. • Find funding to implement comprehensive monitoring to look at cumulative impacts. • Monitor for Spartina infestation and curtail growth. • Apply for SRFB Grants 	<ul style="list-style-type: none"> • Protect and Restore • Education and Outreach