PROGRAMMATIC BIOLOGICAL EVALUATION
FOR
SHORELINE PROTECTION ALTERNATIVES
IN LAKE WASHINGTON

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PROGRAMMATIC BIOLOGICAL EVALUATION FOR SHORELINE PROTECTION ALTERNATIVES IN LAKE WASHINGTON

A. Introduction

The shoreline protection alternatives guidance (SPAG) is designed to streamline the federal permit process to replace existing rip rap and concrete bulkhead projects in Lake Washington. The SPAG also provides for a more environmentally appropriate erosion control method and enables direct beach and water access for land owners. In many situations the erosion control methods described in the SPAG may be more cost effective than traditional rip rap bulkhead replacements.

The applicant will fulfill the United States Army Corps of Engineers (COE) permit requirements under the Clean Water Act (CWA) and the Rivers and Harbors Act (RHA) for bulkhead replacement or repair by meeting the design elements in this SPAG. Issuance of a federal permit in Lake Washington includes consultation with the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) for Puget Sound Chinook (*Oncorhynchus tshawytscha*) and its critical habitat, Puget Sound Steelhead (*O. mykiss*), and Bull Trout (*Salvelinus confluentus*) and its critical habitat. Proposed actions that comply with SPAG and only involve bulkhead replacement will not require additional minimization measures for aquatic species under the ESA, Magnuson Stevens Act (MSA), RHA or CWA.

The three alternative methods for bulkhead replacement described below in this document will fulfill the federal permit process including consultation with NMFS and United States Fish and Wildlife Service (USFWS). All projects that meet the elements of this programmatic will receive a letter and a Nationwide Permit (s) from the COE. If bulkhead replacement projects do not meet this guidance then individual ESA consultation with the COE and the services will be necessary. For projects that involve both pier and bulkhead replacement or remodels, the use of both the SPAG and Regional General Permit (RGP) #3 is encouraged for expedited permitting and for more environmentally functional projects.

Erosion control methods that use ecological principles and techniques to achieve stabilization of the shoreline while enhancing habitat, improving aesthetics and reducing costs should be considered first before any other bank protection method. Where appropriate, rounded gravel, vegetation, wood and other natural materials should be used to protect shorelines and maintain shallow water and shallow gradients to re-establish the integrity of the shoreline. The range of gravel gradation is determined based on site specific conditions such as exposure, wave fetch and slope. Larger gravel is more resistant to higher wave action and will remain more stable on a steeper slope than smaller sized gravel. Because the functional effectiveness of gravel fill increases (and the cost of gravel decreases) as the extent of coverage increases, multiple lot projects are encouraged.

Gravel fill acts like other shore protection structures to prevent erosion of the backshore. At the same time gravel fill provides a shallow slope and substrate that is better for native juvenile salmonids by creating shallow water conditions. A shallow gravel beach is also a safe way for humans to access the water. Depending on site conditions, coarse sand may be retained on the beach, too. We recommend adding gravel fill to attain the shallowest grade possible at the site. We also recommend the addition of beach wood and native plants along the shoreline.

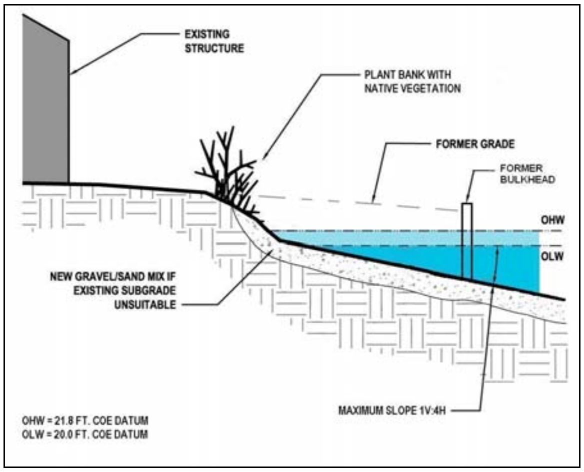
The City of Seattle Park Department has added gravel fill to the shorelines of two public beaches in Lake Washington, Seward Park and Magnuson Park, to improve habitat conditions along the shoreline, to protect the shoreline from erosion, and for the greater enjoyment of the public.

Seward Park Beach (north facing beach) Magnuson Park Beach (southeast facing beach)

B. Project Description

1. Shoreline Protection Alternatives

a. Cut Beach, Place Gravel Fill and Re-vegetate



Remove existing rip rap or concrete bulkhead and cut into the existing bank to attain a shallow shoreline grade and further reduce the effects of scouring wave action. Plant native riparian vegetation ten feet deep across at least 50% of the width of the shoreline. Plant emergents in areas where wave action is suitable for growth. Place gravel beach fill grading slope to range of 1Vertical (V):4 Horizontal (H) or less steep. The design target for the slope is 1V:7H. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review and consent by COE. Typically, gravel size should range from 1/8 inch to 2 inches. Add emergent plants in areas where wave action is suitable for growth. For higher energy areas shoreline logs may be partially buried within the new substrate at the water's edge. The area behind the logs will be planted with willows and/or emergent vegetation. Section F gives the COE web site for work windows at various locations around the lake. Best management practices including installation of silt fences for water quality control must be used. This method may be most appropriate for shallow-sloped shorelines with lawns. Site specific engineering may be needed depending on location and scale of project.

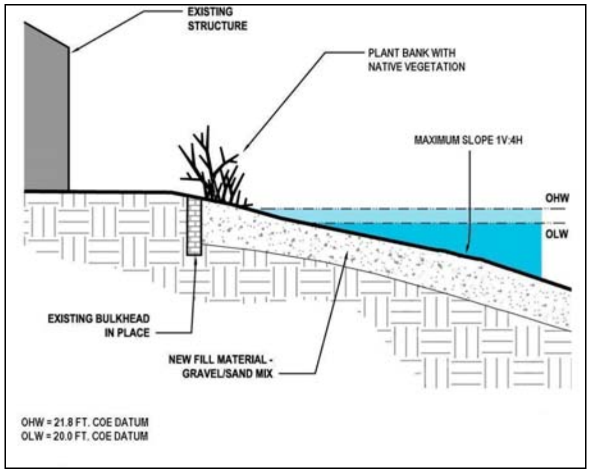
Below is an example of a residential shoreline on Lake Washington that formerly had a bulkhead at the water line across the front of the property. The owners removed the bulkhead, cut back the grass and built a gradual-sloped beach with small sized substrate placed several feet above the 21.85 foot elevation (ordinary high water (OHW)) to absorb wave action. The beach extends across the width of the property and includes emergent and riparian shoreline vegetation.

Shallow-sloped upland site on Lake Washington

Below is an example of a residential shoreline on Lake Washington that formerly had a bulkhead lower than 21.85 feet elevation (OHW) across the front of the property. The owners removed the bulkhead, cut back the grass and built a gradual-sloped beach with small sized substrate that extends above the 21.85 foot elevation (OHW) several feet to absorb wave action. The beach extends across the width of the property. The rockery functions as a retaining wall to allow a shallow- sloped beach at a steep-sloped site.

Steeper-sloped upland site on Lake Washington

b. Gravel Fill Beach and Re-vegetate



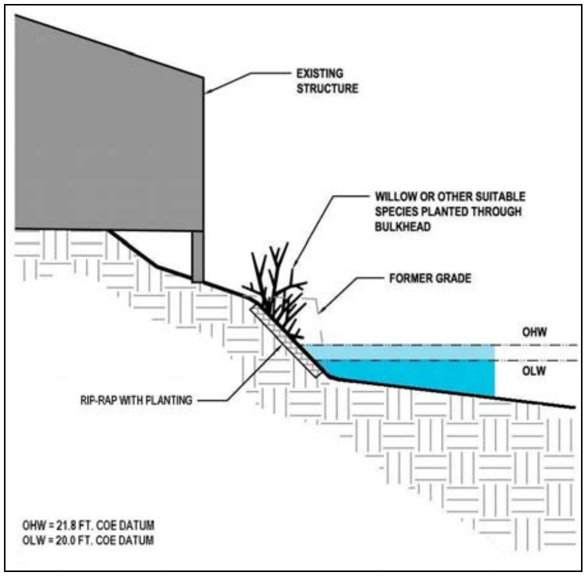
Where option #1 cannot be done, because of site conditions, place gravel beach fill in front of existing bulkhead (covering the rip rap) or remove rip rap and replace with gravel beach fill. Plant native riparian vegetation ten feet deep across more than 50% of the width of the shoreline. Place gravel beach fill grading slope to range of 1V:4H or flatter. Design target for the slope is 1V:7H. Typically gravel size should range from 1/8 inch to 2 inches. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review by COE. Add emergent plants in areas where wave action is suitable for growth. For higher energy areas shoreline logs may be partially buried within the new substrate at the water's edge. The area behind the logs will be planted with willows and/or emergent vegetation. Section F gives the COE web site for work windows at various locations around the lake. Best management practices including installation of silt fences for water quality control must be used. This method may be suited for those properties with a structure close to the shoreline and/or on a steep-sloped shoreline. Site specific engineering may be needed depending on location and scale of project.

A site where this technique has been used is the former seawall at Lincoln Park in west Seattle. Gravel fill was placed seaward of the wall to form a beach and protect a sewer main during the 1980s. Minimal gravel replenishment has been necessary over the past twenty years. See Appendix 1 for more details.

Photo courtesy of COE
Lincoln Park before construction

Photo courtesy of COE
Lincoln Park after construction

c. Re-vegetated Armored Banks (only for bulkheads within 25 feet of residence)



Where existing rip rap cannot be removed because of very close proximity to an existing residential or commercial structure (25 feet or less from 21.85 foot elevation), vegetation can be added to restore some functions. Willow stakes must be planted into replacement rip rap (or other material) with soil amendment or provide design with similar functional vegetation benefit in front of bulkhead. Gravel beach fill may be added in front of the bulkhead to provide some shallow water. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review by COE. Section F gives the COE web site for work windows at various locations around the lake. Overhanging riparian plantings must be added along the entire length of the rip rap bulkhead. Best management practices including installation of silt fences for water quality control must be used. Limited use of this shoreline treatment may only be allowed by COE depending on site specific constraints making alternatives #1 or #2 impossible.

2. Construction Equipment

Most standard types of equipment, including excavators, loaders, dozers and trucks are available in a range of sizes from miniature (Bobcat or smaller) to extremely large (e.g., mine-operations equipment). Landscape sensitivity may also be a consideration for equipment selection. Projects in Lake Washington will require smaller rather than larger construction equipment.

Examples of specialized equipment for bank stabilization applications include:

- **Bobcats:** Bobcat is a brand of small earth-moving equipment that can run on four rubber tires or on tracks and has the ability to use a number of different tools for a variety of applications. Bobcats can be outfitted with loaders, dozer blades, hoes, drills and numerous other tools. They are ideal for moving and installing materials within small areas.
- **Barges:** Barges can be used to transport construction material to a site and remove spoils without requiring construction equipment operating on the shoreline or in sensitive habitats. Barges can be

used in all situations where the barge can access the site without grounding against bottom substrates and disturbing benthic habitats.

3. Site Preparation

Construction preparations such as the location of utilities, land ownership, infrastructure, sensitive landscapes and access are issues that may influence many design components. For this reason, site limitations should be considered during all phases of design and implementation and are best addressed by including construction sequencing in permit documents with an outline of the major tasks and their sequential order of construction. By thinking through a conceptual construction-sequencing plan early in the design process, many issues that are dictated by site limitations can be resolved or at least brought to the forefront early on.

4. Stockpile and Disposal

Stockpiling of construction materials (e.g., gravel, rock, soil, fabric, wood materials) and disposal of waste materials (e.g., excavated bank materials, vegetation, trash) should be considered during the construction sequencing.

While some types of projects can be constructed solely with hand labor, the construction of most projects will require heavy equipment at the project site. Site access considerations include ingress and egress for construction staging, access to the shoreline and any planned stockpile areas (e.g., construction and waste materials), and dewatering and sediment-control systems. The following circumstances should be considered in designing and timing access to the site:

- refueling location and frequency,
- sensitivity of landscape soils and vegetation,
- size and character of equipment,
- frequency of ingress/egress, and season and soil moisture.

5. Construction Platform

Construction of most bank-protection projects will require some degree of heavy equipment mobility along and near the bank. Construction of bank stabilization can be conducted from the water, from the bank or from a temporary platform. Site limitations may determine where construction is conducted.

6. Erosion and Sediment Control

The success of erosion and sediment-control methods greatly depends upon weather patterns during the season of construction, dewatering methods applied and the character of the hydrograph at the project site. The period of construction will determine the method of erosion and sediment control required.

Erosion control includes both the prevention of soil loss through soil cover and the trapping of soils eroded by surface flow. Erosion-control mechanisms must be effective during precipitation events. In areas that are above anticipated inundation levels, the potential for soil loss through erosion can be reduced by applying mulch (e.g., straw, wood chips and other organic materials), hydro-seeding or adding biodegradable soil stabilizers. The Washington State Department of Ecology has guidance on erosion-control techniques in the *Stormwater Management Manual for Western Washington* (Washington Department of Ecology, 2005).

In addition to preventing soil loss, eroded soils must be trapped before reaching the lake. This is best accomplished using standard silt-barrier approaches, such as straw bales or a silt fence. The design and specification of silt barriers must include inspection and maintenance schedules, as well as a schedule for removal.

Sediment control is intended to minimize the input of sediment associated with constructing bank treatments. However, it is unrealistic in most circumstances to expect complete control of sediment inputs, because the installation process for most sediment-control systems itself generates some turbidity.

7. Site Restoration

Once a structure has been removed or installed, it will be necessary to return the project area to an approximation of the natural condition at a particular project site, as is reasonable and appropriate. This should include planting of native vegetation and incorporation of beach nourishment.

8. Post-Construction Monitoring

For all projects approved under this consultation, monitoring will be required annually for five years after construction. All monitoring will require the establishment of post construction photo-points that will be utilized for each monitoring event and will be including in each monitoring report. The monitoring program should identify photo-points that will allow a functional assessment of bank stabilization success and revegetation efforts. The schedule of monitoring will be as follows:

- Post-Construction: Establishment of photo-points, Submittal of As-Built drawings, and the establishment of any other benchmarks that will be used during the monitoring period.
- Years One through Five: monitoring will occur within three (3) months of the completion of the project and will occur annually until five (5) monitoring events have been completed and the monitoring reports submitted to the Corps.

This monitoring schedule will allow the applicant to observe the functions of the bank stabilization effort early in the projects life and will facilitate the early detection of potential design problems. Early identification of undesirable effects will allow the applicant the ability to quickly fix the problem before structure failure can occur. If problems are identified during monitoring, the monitoring period will be reinitiated each time corrective actions are taken (removal of non-native invasive species or replacement of dead vegetation will not require reinitiation of the monitoring program).

C. Action Area and Existing Environmental Conditions

The action area includes the lake and adjacent terrestrial areas within 1 mile of each proposed project site.

Lake Washington is the second largest natural lake in Washington State with a surface area of 34.59 square miles (22,138 acres). It is approximately 20 miles long with a mean width of 1.5 miles and over 50 miles of shoreline. The maximum depth of the lake is 214 feet, with a mean depth of 108 feet.

Lake Washington drains to Puget Sound via the Ship Canal and the Hiram Chittenden Locks (also called the Ballard Locks). The primary inflow to the system is the Cedar River, which contributes approximately 55 percent of the mean annual inflow. The Sammamish River contributes approximately 27 percent of the surface flow to Lake Washington. Numerous other small streams, including Thornton Creek, Juanita Creek, Kelsey Creek, Lyon Creek, and May Creek, also drain into the lake.

Lake Washington has been significantly affected by human activity. In 1916 the natural outlet for the lake was changed from the Black River to the Ballard Locks as Lake Washington and Lake Union were connected, and the Cedar River was redirected into Lake Washington to increase inflow. This action lowered the level of Lake Washington by approximately 10 feet, exposed 2.1 square miles (1,344 acres) of previously shallow water habitat, reduced the surface area of the lake by 7 percent, decreased the length of the shoreline by approximately 13 percent, and eliminated much of the lake's wetlands. Today the lake level is controlled by the release of water at the Ballard Locks and is not allowed to fluctuate more than 2 feet, while historically the lake level fluctuated by as much as 6.5 feet during flood events.

The shoreline of Lake Washington has been significantly altered. Historically, more commercial development was located on the lakeshore. Over time, as the population in the watershed has increased, the demand for residential waterfront property increased significantly. Today the majority of the shoreline is urban and residential, with the exception of some commercial and industrial developments. Thirteen incorporated cities now border the lake.

Development within the Lake Washington watershed has led to dredging and filling of shoreline areas, and construction of bulkheads, piers, ramps, and floats along the shoreline. Bulkheads occur along approximately 82 percent of the shoreline of the lake. Over 2,700 piers and floats occur along the shoreline of the lake, covering approximately 4 percent of the lake's surface within 100 feet of shore. Bridges, marinas, moored vessels, and commercial developments create additional overwater surface area that the 4 percent does not reflect.

Unretained shorelines include beaches, natural vegetation, and human-altered landscapes. Such shorelines exist along 24.0 percent to 32.4 percent of the northern Lake Washington shoreline and 6.0 percent to 41.0 percent of the southern Lake Washington shoreline.

Much of the large woody debris (LWD) that was probably associated with the lake's shoreline in the past has been eliminated. The only "natural" shoreline remaining along the lake, where recruitment and retention of LWD is likely to occur, is in the area of St. Edwards Park, which represents less than 5 percent of the lake's shoreline. A recent survey of the 33.2 miles of shoreline under the jurisdiction of the City of Seattle (which accounts for approximately 66 percent of the lake shore) indicated that "natural vegetation" occurred along 22 percent of the northern shoreline and 11 percent of the southern shoreline.

D. Status of Species and Critical Habitat

ESA listed species that use Lake Washington include Puget Sound Chinook (*Oncorhynchus tschawytscha)*, Puget Sound steelhead (*O. mykiss*) and Coastal-Puget Sound Bull Trout (*Salvelinus confluentus*). These species are listed as threatened. Critical habitat is designated for Puget Sound Chinook and Bull Trout.

1. Puget Sound Chinook in Lake Washington

Most of the wild juvenile Chinook enter Lake Washington from the Cedar River during January through June. These small wild fish use the southern shallow shoreline areas of the lake for feeding, for protection, and during their migration to the Lake Washington Ship Canal during the summer months. Wild fish also come from the Bear Creek and Issaquah drainages through Lake Sammamish and the Sammamish Slough to Lake Washington. At this time, most of the Chinook coming into the northern end of Lake Washington probably come from the Issaquah hatchery. However, as the numbers of wild fish from the Sammamish system increase, suitable habitat for feeding, migration and predator avoidance should be available in the north end of Lake Washington too. Wild Chinook can be found along all of the shoreline of Lake Washington and Mercer Island.

Most of the existing Lake Washington shoreline sustains degraded habitat poorly suited for protection from predators and migrating activities of Chinook. The shoreline lacks a shallow sloping gradient in many places. The substrate is composed of large and small riprap, cobble, and in some places some sand and gravel. Shoreline habitat is almost devoid of any woody debris. Shoreline habitat also contains many invasive plant species such as Eurasian milfoil (*Myriophyllum spicatum*).

Tabor and Piaskowski (2002) found that very small juvenile Chinook salmon concentrate in very shallow water, approximately 0.4 meters in depth, and prefer low gradient shorelines with small substrates such as sand and gravel. As juvenile Chinook grow larger, they move into 2 and 3 meter deep water by mid-June. Tabor and Piaskowski (2002) also found that juvenile Chinook use woody debris and overhanging vegetation as refuge from predators during the day. Their study results suggest the need to have a diverse shoreline with open areas as well as areas with woody debris and overhanging vegetation (Tabor and Piaskowski 2002). Later studies showed that most (over 80%) juvenile Chinook salmon are found at sites with overhanging vegetation and small woody debris as compared to sites without vegetation and small wood (Tabor et al. 2004a).

Photo courtesy Roger Tabor
Juvenile Chinook in Lake WA

Photo courtesy Roger Tabor
Overhanging vegetation in Lake WA

Tabor et al. (2006) found that the most important prey for juvenile Chinook salmon at lakeshore sites are emergent aquatic insect prey mainly chironomid pupae and adults. Chironomids live at the sediment/water interface called the epibenthos and are classified as Dipterans. Koehler (2002) also found that juvenile Chinook between 40-108 mm mean fork length were dependent on emergent chironomids. Christensen (1996) showed that riparian vegetation and woody debris contribute to organic detritus in lakes that support epibenthic invertebrates such as dipteran larvae. As juvenile Chinook grow larger and move to deeper water their major food source changes to the zooplankton *Daphnia spp.* Koehler (2002) found lower densities of Chinook prey at highly developed sites in Lake Washington. Improving shorelines back to native vegetation communities could also provide more terrestrial prey as a food resource. Terrestrial insect food sources are important in riverine and marine environments (Brennan et al. 2004) and were observed in nearly half of chinook diet samples collected by Koehler in 2002.

Predators of juvenile Chinook in Lake Washington are cutthroat trout, prickly sculpin (*Cottus asper*), smallmouth bass (*Micropterus dolomieui*), largemouth bass (*Micropterus salmoides*) and various species of birds (Tabor et al. 2004b). Increasing the amount of woody debris and overhanging vegetation could provide cover from bird predation. Removal of cobble, riprap, and large sized substrates removes the kind of habitat where small mouth bass and prickly sculpin are typically found. Nest sites for smallmouth bass are typically associated with benthic structure such as the base of an isolated boulder or pier piling and range in depth from 2-12 feet, most nests in about 5-7 feet of water (Pflug 1981).

In June, juvenile Chinook travel in schools in shallow water along the shoreline to migrate to the Lake Washington Ship Canal and eventually to Puget Sound. Chinook move to deeper water in areas where piers and Eurasian milfoil are located (Tabor et al. 2006). Control of Eurasian milfoil and removal of structure in the nearshore could also facilitate migration activities and help juvenile Chinook avoid predation pressures.

***Designated Critical Habitat*:** Critical habitat has been designated for chinook in Lake Washington. An analysis is included in Appendix 2.

2. Puget Sound Steelhead Trout in Lake Washington

Two populations of Puget Sound Steelhead inhabit the Lake Washington basin. The Cedar River population is of natural origin while the north Lake Washington population is introduced. Both populations of winter-run steelhead have undergone steep declines in abundance recently.

Winter-run or ocean maturing steelhead return as adults to the tributaries of Puget Sound from December to April (PSBRT 2005). Spawning occurs from January to mid-June with peak spawning occurring from mid-April through May.

The majority of steelhead juveniles reside in fresh water for two years prior to emigrating to marine habitats, with limited numbers emigrating as one or three-year old smolts. Smoltification and seaward migration occur principally from April to mid-May (PSBRT 2005). Two-year-old wild smolts are 140-160 mm in length (Wydoski and Whitney 1979). The inshore migration pattern of steelhead in Puget Sound is not well understood; it is generally thought that steelhead smolts move quickly offshore (PSBRT 2005).

At this time very little information is known about juvenile steelhead use of Lake Washington. WDFW researchers have captured steelhead migrants in the Cedar River from mid-April through the end of May (Volkhardt et al. 2006) but if or how they use the nearshore area of the lake has not been determined.

***Designated Critical Habitat*:** Critical Habitat for this ESU's is currently under development and it is likely that NOAA Fisheries will propose new critical habitat for this species in the future.

3. Coastal-Puget Sound Bull Trout in Lake Washington

Although specific data on bull trout use of Lake Washington is limited, the draft Bull Trout Recovery Plan has identified the Lake Washington system as important foraging, migration, and overwintering (FMO) habitat (USFWS 2004). FMO habitats are believed to be critical to the persistence of the anadromous bull trout life history form. Anadromous adult and subadult bull trout from nearby core areas may migrate through the marine environment into the Lake Washington FMO habitat. The Lake Washington FMO habitat is located within foraging and migratory distances of the following bull trout core populations: Stillaguamish, Snohomish-Skykomish, and the Puyallup Rivers.

The Lake Washington FMO habitat consists of the lower Cedar River below Cedar Falls; Sammamish River; Washington, Sammamish, and Union Lakes; the Lake Washington Ship Canal; and all accessible tributaries. Population status information and extent of use of this area is currently unknown. Adult and subadult size individuals have been observed infrequently in the lower Cedar River (below Cedar Falls), Carey Creek (a tributary to Upper Issaquah Creek), Lake Washington, and at the Ballard Locks. No spawning activity or juvenile rearing has been observed and no distinct spawning populations are known to exist in the Lake Washington basin aside from the upper Cedar River population located upstream of the Masonry Dam at the Chester Morse Lake.

The potential for spawning in the Lake Washington basin is believed to be low, with the exception of the upper Cedar River, as a majority of accessible habitat is low elevation, below 152 meters (500 ft), and thus expected to be too warm to sustain successful spawning. There are, however, some coldwater springs and tributaries that may come close to suitable spawning temperatures and that may provide thermal refuge for rearing or foraging individuals during warm summer periods. These include Rock Creek (tributary to the Cedar River below Landsburg Diversion) and Coldwater Creek, a tributary to Cottage Lake Creek immediately below Cottage Lake. Both Rock and Coldwater Creeks are relatively short, 1.6 to 3.2 kilometers (1 to 2 miles) in length, have high-quality riparian forest cover, and are formed by springs emanating from glacial outwash deposits.

Upper reaches of Holder and Carey Creeks, the two main branches of Issaquah Creek, have good to excellent habitat conditions and appear to provide potential bull trout spawning habitat due to their elevation and aspect. However, despite survey efforts by King County (Berge and Mavros 2001; KCDNRP 2002), no evidence of bull trout spawning or rearing has been found. Holder Creek drains the eastern slopes of Tiger Mountain, elevation of 914 meters (3,000 ft), and the southwestern slopes of South Taylor Mountain. Coho are found in Holder Creek up to an elevation of about 360 meters (1,200 ft) and cutthroat trout occur up to 427 meters (1,400 ft) in elevation.

Carey Creek originates at an elevation of roughly 700 meters (2,300 ft) in a broad saddle on the southeastern slopes of South Taylor Mountain. It is the only stream in the north Lake Washington/Sammamish drainage with a relatively recent sighting of char (unidentified, but either bull trout or Dolly Varden). The single observation of a pair of native char in the fall of 1993 (WDFW 1998) was about 0.8 kilometer (0.5 mile) downstream from natural upstream fish barrier—a 12-meter-high (approximately 40-ft) waterfall, approximately 12-meter (40-foot). However, this fish barrier is at an elevation of approximately 256 meters (840 ft), indicating the habitat is likely too low to support successful spawning.

Two large lakes (Lakes Washington and Sammamish) with high forage fish availability are dominant parts of the lower watershed and provide significant foraging habitat. A number of observations of subadult and adult-sized bull trout have been made in Lake Washington (KDNR 2000; Shepard and Dykeman 1977; H. Berge, King County Department of Natural Resources and Parks, pers. comm. 2003). Connection with the Chester Morse Lake core area (the population located in the upper Cedar River) is one-way only, as individuals may travel downstream, but are unable to ascend or reascend upstream through or around the Masonry Dam. Currently, the level of connectivity with other core areas is unknown. Observations of bull trout in the Ballard Locks suggest bull trout from other watershed are likely migrating into and/or through the area.

Bull trout have been caught in Shilshole Bay and the Ballard Locks during late spring and early summer in both 2000 and 2001. In 2000, up to eight adult and subadult fish (mean size 370 millimeters; 14.5 inches) were caught in Shilshole Bay below the Ballard Locks, between May and July. These fish were found preying upon juvenile salmon (40 percent of diet) and marine forage fish (60 percent of diet) (Footen 2000; 2003). In 2001, five adult bull trout were captured in areas within and immediately below the Ballard Locks. One bull trout was captured within the large Ballard Locks in June, and in May, one adult was captured while migrating upstream through the fish ladder in the adult steelhead trap at the head of the ladder. Three adult bull trout were also captured below the tailrace during the peak of juvenile salmon migration on June 18 (Goetz, pers. comm. 2003).

Based on the observations described above, we expect foraging, migrating, and overwintering bull trout to use Lake Washington and other waterbodies within the basin, although the extent of such use is not yet fully known. However, subadult and adult bull trout would be expected to prey upon salmonids and other species with the system. Habitat conditions within and adjacent to Lake Washington are important both to bull trout as well as their prey species (as described in previous sections).

***Designated Critical Habitat*:** Critical habitat has been designated for bull trout in Lake Washington. An analysis is included in Appendix 2.

E. Effects Analysis

Table 1 summarizes the effects of bank stabilization. In the following sections, each of the listed direct and indirect effects is discussed in greater detail.

Table 1. Categories of Activity and Their Direct and Indirect Effects

Category of Activity	Construction and Operation Impact Mechanisms	Direct Effects	Indirect Effects
Large Wood Material	▪ Operation of Heavy Equipment ▪ Excavation ▪ Ingress and Egress	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Roughness Trees	▪ Operation of Heavy Equipment ▪ Excavation ▪ Ingress and Egress	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Removal of Bank Armoring	▪ Operation of Heavy Equipment ▪ Excavation ▪ Ingress and Egress	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Woody Plantings	▪ Operation of Heavy Equipment	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Herbaceous Cover	▪ Operation of Heavy Equipment	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Coir Logs	▪ Operation of Heavy Equipment	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Bank Reshaping	▪ Operation of Heavy Equipment ▪ Excavation ▪ Ingress and Egress	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat Alteration
Rock Bulkhead	▪ Operation of Heavy Equipment ▪ Excavation ▪ Ingress and Egress	▪ Noise ▪ Short-term risk of petroleum spills ▪ Short-term risk of sedimentation	▪ Habitat alteration

1. Direct Effects

The following potential effects are direct or immediate effects of the different types of covered activities described above:

- Mortality, injury, or sub-lethal adverse effects on fish species,
- Short-term stress to fish due to construction impacts to the waterbody within the action area,
- Short-term decrease in habitat complexity and function due to removal of vegetation and or other habitat structures,
- Short-term loss of potential habitat available to fish, wildlife, and plant species in the project vicinity (including loss of in-stream habitat during construction),
- Short-term decreases in localized air quality due to airborne dust and exhaust from heavy equipment.,
- Short-term displacement of fish and wildlife due to turbidity, human/machinery presence, activity, noise, and water quality,
- Short-term risk of petroleum spills in the construction area, and

The following sections describe these direct effects in detail.

a. Noise

Mechanized construction equipment would generate noise levels of approximately 60 to 110 decibels (dB). The action area is lightly to heavily developed with undeveloped areas, residential houses, industrials areas, and metropolitan areas. The action area is relatively large and ambient noise levels vary with location from quiet undeveloped areas to industrial areas with large equipment and ship operations (30 dB to 90 dB). Thus, the noise generated by the operation of heavy equipment during project construction could blend in with background noise levels in highly developed areas or exceed ambient levels in relatively undeveloped areas.

b. Water Quality

During construction, proposed activities may affect water quality by the production of suspended sediment and by the potential spill of hazardous materials. Disturbance and relocation of bottom sediments during construction can recontaminate the water column and substrate surfaces. Some sedimentation will also be caused during construction of mitigation buffers along the shoreline. It is likely that fish may also be attracted to construction sites due to the increased suspension of benthic organisms. This magnifies the importance of not contaminating such sites.

Temporary local increased sedimentation may occur as sediments are mobilized during the installation or removal of bank stabilization features, and from propwash associated with any barge or watercraft that may be used during construction. The duration and intensity of turbidity depends upon the quantity of materials in suspension, the particle size of suspended sediments, the amount and velocity of affected area, and the physical and chemical properties of the suspended sediments (NMFS 2001). Turbidity[1] within the immediate vicinity of the construction activity (several meters) would likely temporarily exceed the background levels by a significant margin and potentially affect fish and their prey by interfering with respiration (i.e., plugging gills), depleting the affected area of dissolved oxygen, altering

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Turbidity is the result of suspended particles; suspended particles undergo oxidation (chemical and biological), which consumes dissolved oxygen, resulting in reduced dissolved oxygen levels. In addition, turbidity reduces light penetration and photosynthesis, which can contribute to reducing dissolved oxygen levels.

the suitability of spawning areas, and smothering benthic organisms and communities (Martin et al. 1977, Carrasquero 2001, Mulvihill et al. 1980).

Although turbidity may cause stress to salmonid species, studies by Redding et al. (1987) found that relatively high suspended sediment loads (2,000 to 2,500 mg/l) did not appear to be severely stressful to yearling salmon. Studies indicate that suspended sediment concentrations occurring near dredging activity will not cause gill damage in salmonids. Servizi and Martens (1992) found that gill damage was absent in underyearling coho salmon exposed to concentrations of suspended sediments lower than 3,143 mg/l. A negligible risk of gill tissue damage is also expected for adult and sub-adult salmonids exposed to dredging turbidity. This assumption is based on the fact that salmonids in these life stages are generally more tolerant of elevated suspended sediment levels (Stober et al. 1981). Suspended sediments have been shown to cause stress in salmonids, but at concentrations higher than those typically caused by dredging. Underyearling coho salmon exposed to suspended sediment concentrations above 2,000 mg/l were physiologically stressed as indicated by elevated blood plasma cortisol levels (Redding et al. 1987).

While it is difficult to determine exactly how much of an increase in turbidity would result from these projects, suspended sediments are expected to be short-term and would not result in chronic sediment delivery to adjacent waters. Short-term, localized turbid areas associated with project construction would not be expected to result in mortality or to have any significant physiological effects on salmonids or their prey.

Machinery required for the construction would operate near the water, either from the shoreline or from floating barges. Because equipment will operate in the vicinity of water, there is a risk that petroleum products will leak or spill into the water. The risk to fish health depends on the type of contaminant spilled, time of the year, spill amount, and success of containment efforts. Although potentially detrimental to aquatic organisms, it is expected that impacts would be negligible because the projects authorized by this RBE will be small in scale and are required to meet water quality standards. Hazardous material containment materials such as spill absorbent pads and trained personnel will be required onsite during any phase of construction where machinery is in operation near surface waters. The level of impact to the aquatic environment is expected to be minor because of the small amounts of petroleum products likely to be spilled during typical construction activities and because of required spill containment measures.

Although project activities may result in short-term and localized effects to water quality, effects to listed species will be minor. All work would have timing restrictions to minimize contact with and effects on listed species.

2. Indirect Effects

The implementation of the activities would have some long-term effect on the ecology of the aquatic environment in which they are placed. Bank stabilization results in impacted shoreline and aquatic habitat, and altered hydrology. The appropriate application of each activity to specific on-site conditions is essential to the limitation of negative indirect effects such as further bank and beach erosion/scour. Conservation measures and mitigation activities would also act to offset or reduce many of the impacts of these activities. Properly designed and installed features should promote positive indirect effects such as the enhancement or creation of habitat features, and the slowing of erosion and scour. The following indirect effects may be caused by, or may result from, the covered activities and are based on the offsetting effects and implementation of mitigation activities.

a. Large Wood

Anchoring large wood material to shorelines can provide stability, provide fish habitat, and enhance the deposition of sediment. Because they are valuable to fish and wildlife, only construction impacts need to be mitigated. However, the long-term habitat benefits of large wood material would likely out-weigh these short-term impacts. Large wood material can create excellent cover and rearing habitats.

Summary of indirect effects of large wood material include:

- Creation of quality fish habitat, including excellent cover, and holding and rearing areas, and

- Accumulation of detritus that serves as a food to aquatic insects.

b. Removal of Bank Armoring

Removal of bank armoring could alter the habitat structure. The effects of removal have not been well studied, while the effects of installation of shoreline armoring have been well researched and documented. Removing shoreline armoring would reverse the effects of shoreline armoring, which include the narrowing of the beach resulting from the impoundment of sediment sources and isolation from storm forces, the lowering of the beach elevation due to the erosion of beach sediments, loss of organic debris, and modification of the groundwater regime.

A shift in substrate composition would likely be the greatest effect, as the sources of sediments to the nearshore environment are reestablished. This will directly affect emergent vegetation, small crustaceans, and fish communities in beneficial ways. Vegetated habitats buffer waves and, thereby, can stabilize shallow water habitats. Often, however, the depositional and erosional processes are not well understood at a restoration site. Extensive erosion can take place before vegetation communities are dense enough to slow this process. Concordantly, sediment can accumulate within a system in catastrophic amounts so as to alter the morphology of the system before it matures.

Properly designed restoration projects, including shoreline structure removal, may return a habitat to a close approximation of its condition prior to disturbance. However, restoration actions vary widely in their “success” rate. The potential for success varies depending on the degree of disturbance that exists at the site and within the landscape where the restoration site is located.

Mitigating activities should include an appropriate post-removal monitoring plan with an identified restoration goal to be implemented to evaluate the success and impacts of the bank armoring removal. This will increase the success rate by allowing appropriate changes to be incorporated into the plan.

Summary of indirect effects of bank armoring removal include:

- Reverses the effects shoreline armoring.

c. Woody Plantings

Woody plantings, if properly designed and implemented, can provide overhanging cover for fish, structural diversity for birds and wildlife, detritus for aquatic invertebrates and long-term recruitment of large, woody material. Consequently, this technique avoids impacts that may degrade habitat, and it can be used to compensate for habitat impacts created by other activities such as loss of riparian function, cover, complexity and flood refuge.

No mitigation is needed for this technique.

Summary of indirect effects of woody plantings include:

- Provides overhanging cover for fish, structural diversity for birds and wildlife, detritus for aquatic invertebrates and long-term recruitment of large, woody material.

d. Herbaceous Cover

Herbaceous cover can provide mitigation value for riparian and aquatic habitat loss. As mitigation, herbaceous cover can provide near-bank cover (especially when grasses are tall), detritus for aquatic invertebrates and structural diversity for birds and wildlife. As a result, this technique avoids impacts that may degrade habitat and can be used to compensate for habitat impacts such as loss of riparian function, cover, complexity and flood refuge.

No mitigation is needed for this technique. Summary of indirect effects of herbaceous cover include:

- Provides near-bank cover (especially when grasses are tall), detritus for aquatic invertebrates and structural diversity for birds and wildlife.

e. Coir Logs

Since coir logs can be installed using hand tools and because they trap sediment, they are less impacting in terms of sediment than many other types of bank protection. To reduce habitat risks associated with construction activities, restrictions are placed on the allowable construction period. Best management practices for sediment and erosion control are also required.

Coir-log installation avoids mitigation needs for long-term impacts. A benefit of this technique is that bank stability and erosion control are provided while also creating conditions conducive to the establishment of dense, native-vegetative cover.

Summary of indirect effects of coir logs include:

- Provides bank stability and erosion control, while creating conditions conducive to the establishment of dense, native-vegetative cover.

f. Bank Reshaping

By definition, bank reshaping consists of changes to bank slope and cross-section configuration. Bank reshaping is a necessary component of some of the biotechnical practices and structural remedies described in these guidelines. First, making the slope shallower adds stability and reduces the banks susceptibility to failure. Second, modifying the bank slope makes it easier for vegetation to take hold, and a shallower slope facilitates planting and long-term maintenance. Third, reducing vertical bank slopes that have excessive drainage improves soil moisture conditions. Fourth, bank sloping may improve recreational access and reduce safety hazards..

Considerable volumes of excavated soil can be generated by a bank reshaping project. The proper disposal of those soils should be planned for so they do not jeopardize other habitats.

Stable, low-gradient banks enable the re-establishment of native, riparian plant communities to occur more quickly than if left alone and may improve bankline habitat complexity.

Summary of indirect effects of bank reshaping include:

- Lowers the slope, adds stability, and reduces the banks susceptibility to failure,
- Increases the likelihood of sediment deposition,
- Improves soil moisture conditions, and
- Modifying the bank slope makes it easier for vegetation to take hold, and a shallower slope facilitates planting and long-term maintenance.

g. Armoring with Rip Rap Rock

Shoreline armoring can affect physical processes, habitat structure and ecology within the nearshore environment. Physical processes that can be affected include the impoundment of beach sediments, lowering of the beach profile, modification of beach substrates, increased energy waterward of the armoring structure, and modification of groundwater regime, among others (Thom et al. 1994). Through modification of the physical processes of the shoreline, habitat structure is likewise modified. The degree to which habitat structure is modified is dependent upon the type and degree of shoreline armoring and what affect it has on physical processes. Habitat structure consists of the substrate type and the communities of organisms associated with those substrates (Thom et al. 1994). The alteration of physical processes and habitat structure directly affects the ecology of the nearshore environment. Primary productivity, the flow of organic matter, and nutrient dynamics will be affected over time by shoreline armoring, as physical processes and habitat structure change (Thom et al. 1994).

The following impact reduction measures should be taken when installing bank armoring:

- Relocate bulkhead landward of ordinary high water,
- Construct beach area along shoreline to replace all or a portion of bulkhead,
- Slope the bulkhead landward as shallow as possible and plant with willow,
- Plant a buffer (recommended width and height of at least 10 feet) of native vegetation (i.e. willows, alder, cedar, Douglas fir) along all or part of the shoreline,
- Include plants that overhang the water such as willows,
- Plant native, emergent, aquatic vegetation (i.e. bulrush) along the shoreline, and
- Use a combination of plants/wood to stabilize the shoreline.

Summary of indirect effects of bank armoring include:

- The impoundment of beach sediments, lowering of the beach profile, modification of beach substrates, increased energy waterward of the armoring structure, and modification of groundwater regime, and.

- Altered primary productivity, the flow of organic matter, and nutrient dynamics.

3. Effects from Interdependent and Interrelated Actions

No interdependent or interrelated actions will be associated with the permitted activities within the programmatic. All permitted activities will be single and complete actions; therefore no effects from interdependent or interrelated actions will occur.

4. Effects on the Environmental Baseline

With the incorporation of the conservation measures described below, there would be no long-term degradation of the environmental baseline. Historical alterations to the environmental baseline have greatly altered and degraded aquatic habitats. The construction of the bank stabilization projects authorized by this RBE, in conjunction with mitigation measures to offset impacts, would maintain or improve baseline conditions of the aquatic environment. Implementation of the conservation measures would minimize the potential short-term construction impacts. The construction windows would serve to protect aquatic and terrestrial species during critical nesting, spawning, and foraging life stages.

F. Conservation Measures

The activities authorized by this RBE would incorporate conservation measures. Required design criteria will greatly reduce impacts to listed species by ensuring that the environmental baseline will not be degraded over the long term. The intent is to reduce construction impacts and have each stabilization project functioning well above the baseline condition by the end of the expected monitoring period of three years, if not sooner. The conservation measures will minimize the degradation of the existing environmental baseline through

- establishing in-water work windows for the protection of salmonids (refer to the Corps web site http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=work_windows),
- establishing construction timing restrictions near known species feeding, or spawning habitat,
- ensuring the restoration of functions is achieved through project planning and post construction monitoring, amd
- use of silt curtains and other best management practices to minimize the amount of sediment and other materials from entering the water during construction.

G. Determination of Effect

Chinook- *may affect, likely to adversely affect*

Chinook critical habitat- *may affect, likely to adversely affect*

Because of the bank armoring with rip rap, the impacts to Chinook are not insignificant and discountable. Juvenile Chinook use the nearshore area as a migration corridor in May and June, and possibly a small number may be migrating through in July. The work window will ensure that juveniles are unlikely to be present during construction, however indirect impacts from the hard bank stabilization could adversely impact juveniles and their critical habitat. Adult Chinook will be far enough offshore that there should be no impacts to adults.

Steelhead- *may affect, not likely to adversely affect*

Steelhead do not make use of the nearshore area, thus impacts to steelhead will be insignificant and discountable.

Bull trout- *may affect, not likely to adversely affect*

Bull trout critical habitat- *may affect, not likely to adversely affect*

Bull trout do not make use of the nearshore area, thus impacts to bull trout will be insignificant and discountable .

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APPENDIX 1
SHORELINE PROTECTION

Appendix 1

Shoreline Protection

Historically, erosion control materials in the form of rip rap or vertical concrete bulkheads have been used to contain fill and control bank erosion in Lake Washington. Toft (2001) found that 71% of Lake Washington shoreline had been armored resulting in degraded aquatic habitat for ESA listed fish.

Rip rap and vertical concrete walls provide poor quality habitat for salmon rearing and migrating activities because wave action causes scour at the base of the wall which eliminates shallow water and shallow nearshore gradients. The cumulative effect of many rip rap walls throughout the lake effectively eradicates shallow water habitat for fish and human enjoyment. The existence of rip rap bulkheads on properties encourages neighbors to install rip rap to avoid wave erosion on their property too, perpetuating an ongoing cycle of repeated rip rap use. Only when **no other alternative** is possible should the use of rip rap for erosion control be maintained.

Two local beach gravel fill projects, Lincoln Park (Seattle Park Department) and Seahurst Park (City of Burien) have been constructed on Puget Sound by the COE. Lincoln Park in West Seattle is an example of a shore erosion control project in which gravel was placed seaward of a failing vertical seawall to protect a sewer main and promenade. This project built in 1988 created an ecologically functional shoreline while allowing direct beach access to the general public. This project has required minimal maintenance over the last 20 years even though it is located in a location very exposed to strong wave action. For more information about the project see the environmental assessment at the COE website.

Photo courtesy COE
Lincoln Park before construction

Photo courtesy COE
Lincoln Park after construction

A similar, but more recent project built in 2005, is the Seahurst Park Shoreline Rehabilitation project in Burien. For more information about this project see the environmental assessment at the COE website.

Photo courtesy COE
Seahurst Park before construction

Photo courtesy COE
Seahurst Park after construction

While both of these projects are located on Puget Sound rather than Lake Washington, the same principles for shoreline protection apply. At these sites gravel fill protects uplands from waves 3-4 feet high and improves ecological functions. Wave action at these sites is probably even more exposed than most locations in Lake Washington.

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1. Toft, J.D. 2001. Shoreline and dock modifications in Lake Washington. Report SAFS-UW-0106, School of Aquatic and Fishery Sciences, University of Washington, Seattle, Wa.

2. Lincoln Park Environmental Assessment. COE website: http://www.nws.usace.army.mil/searches/Searchdb.cfm

2. Seahurst Park Environmental Assessment. COE website: http://www.nws.usace.army.mil/searches/Searchdb.cfm

APPENDIX 2

CRITICAL HABITAT ANALYSES

CRITICAL HABITAT

Critical habitat is defined to include:

1. The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (a) essential to the conservation of the species, and (b) which may require special management considerations or protection; and

2. Specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The physical and biological features include, but are not limited to: space for individual and population growth, and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Critical habitat extends from the bankfull elevation on one side of the stream channel to the bankfull elevation on the opposite side. If bankfull elevation is not evident on either bank, the ordinary high-water line as defined by the U.S. Army Corps of Engineers in 33 CFR 329.11 shall be used to determine the lateral extent of critical habitat.

Adjacent floodplains are not proposed as critical habitat. However, the quality of aquatic habitat within stream channels is intrinsically related to the character of the floodplains and associated riparian zones, and human activities that occur outside the river channels can have demonstrable effects on physical and biological features of the aquatic environment. The lateral extent of proposed lakes and reservoirs is defined by the perimeter of the water body as mapped on standard 1:24,000 scale maps (comparable to the scale of a 7.5 minute U.S. Geological Survey quadrangle topographic map).

Chinook Critical Habitat Analysis

The NMFS determined the primary constituent elements for bull trout from studies of their habitat requirements, life-history characteristics, and population biology. The primary constituent elements determined essential to the conservation of chinook salmon (*Oncorhynchus tschawytscha*) are:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.

Existing Conditions: *Lake Washington generally doesn't provide high quality spawning sites for chinook. Some lake spawning may take place.*
Effects to PCE: *Bank stabilization activities will not impact the normal spawning habitat found in streams and rivers. The addition of gravel in the nearshore may slightly increase the amount of habitat in the lake that is suitable for spawning.*

(2) Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Existing Conditions: *Water quantity is sufficient for normal growth, reproduction, and survival. Water quality is at risk. As a result of the urban nature of the watershed, Lake Washington likely receives a significant contaminant load. Dissolved oxygen levels are too low in the nearshore area in summer and fall and are borderline in the upper layer of the lake in deeper water. The pH levels are at risk. Nutrients and total phosphorus levels are too high. Physical habitat conditions are degraded with very little natural cover found throughout the lake.*
Effects to PCE: *Bank stabilization activities should slightly increase the amount of freshwater rearing habitat and slightly improve existing rearing habitat by providing natural cover with the exception of armoring with rip rap rock. This method of banks stabilization could result in scouring along the shoreline with an increase in depth in the nearshore..*

(3) Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Existing Conditions: *Lake Washington serves as a migratory corridor for chinook that spawn in the lake tributaries as they move from freshwater to the ocean.*
Effects to PCE: *Bank stabilization activities under this programmatic will improve the migratory corridor by increasing the amount of shallow water habitat. The existing bank stabilization in the lake often consists of rip rap rock or concrete walls placed below the ordinary high water line. These types of bank stabilization generally result in deeper water at the water's edge. Because most projects using this programmatic will replace the bulkheads with a soft bank alternative and may include the use of gravel to attain a shallow shoreline, the migratory corridor will be more suitable for juvenile migration. The exception to this is projects that armor the banks with rip rap rock. This method of banks stabilization could result in scouring along the shoreline with an increase in depth in the nearshore.*

(4) Estuarine areas free of obstruction with water quality, water quantity and salinity conditions supporting juvenile and adult physiological transitions between fresh-and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels, and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Existing Conditions: *There is no estuarine habitat in the action area.*
Effects to PCE: *The programmatic will have no impact on estuarine habitat.*

(5) Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.

Existing Conditions: *There is no nearshore marine habitat in the action area.*
Effects to PCE: *The programmatic will have no impact on nearshore marine habitat.*

(6) Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Existing Conditions: *There is no offshore marine habitat in the action area.*
Effects to PCE: *The programmatic will have no impact on offshore marine habitat.*

Bull Trout Critical Habitat Analysis

The USFWS determined the primary constituent elements for bull trout from studies of their habitat requirements, life-history characteristics, and population biology. These primary constituent elements are:

(1) Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.

Existing Conditions: *Water quantity is sufficient for normal growth, reproduction, and survival. Water quality is at risk. As a result of the urban nature of the watershed, Lake Washington likely receives a significant contaminant load. Dissolved oxygen levels are too low in the nearshore area in summer and fall and are borderline in the upper layer of the lake in deeper water. The pH levels are at risk. Nutrients and total phosphorus levels are too high.*
Effects to PCE: *The programmatic will have no effect on this PCE.*

(2) Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C) but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches that preclude bull trout use are specifically excluded from designation.

Existing Conditions: *Portions of Lake Washington experience water temperatures above 15° at 1 meter deep from late May through mid-October. At 20 meters deep, the water temperature is low enough to support bull trout use year round.*
Effects to PCE: *The programmatic will have no effect on this PCE.*

(3) Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures.

Existing Conditions: *Programmatic includes Lake Washington only and doesn't include bank protection in streams and channels.*
Effects to PCE: *The programmatic will have no effect on this PCE*

(4) Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 in (0.63 cm) in diameter.

Existing Conditions: *Programmatic includes Lake Washington only and doesn't include bank protection in streams and channels, where spawning normally takes place..*
Effects to PCE: *The programmatic will have no effect on this PCE*

(5) A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operate under a biological opinion that addresses bull trout, or a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation: This rule finds that reservoirs currently operating under a biological opinion that addresses bull trout provides management for PCEs as currently operated.

Existing Conditions: *Lake Washington shoreline was modified in the early 1900s and a natural hydrograph doesn't exist in this waterbody.*
Effects to PCE: *The programmatic will have no effect on this PCE*

(6) Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source.

Existing Conditions: *Locations of springs and seeps that may discharge into Lake Washington are unknown.*
Effects to PCE: *The programmatic will have no effect on this PCE*

(7) Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.

Existing Conditions: *Bull trout make use of Lake Washington for migrating, however, the migratory corridor for bull trout is generally not in the nearshore area..*
Effects to PCE *The programmatic will have no effect on this PCE*

(8) An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

Existing Conditions: *Lake Washington provides adequate food for the bull trout population.*
Effects to PCE: *The programmatic will have no effect on this PCE.*

(9) Few or no predatory, interbreeding, or competitive nonnative species present.

Existing Conditions: *This PCE is not properly functioning. There is an abundance of nonnative species such as smallmouth and largemouth bass residing in the lake.*
Effects to PCE: *The programmatic will have no effect on this PCE.*

Appendix C
General
Implementation Conditions

Implementation Conditions for NWPs and RGPs with Approved PBEs

Permittees must follow these conditions, as well as stipulations specifically related to the work, in order for the permit to be covered by this informal programmatic consultation.

I. General Conditions:

1. **Notification**. Applicants and permittees must notify the Corps via ESA Notification and Tracking form for all actions proposed or completed under this programmatic consultation. If the notification is accomplished prior to completing the work, applicants must complete the ESA Notification and Tracking form and submit it with their JARPA or pre-construction notification package.

2. **Agency Access.** Permittee must provide access to the work site to representatives of the Corps, NMFS, USFWS, Ecology, and WDFW during all hours of construction or operation.

3. **Suitable Material**. Only clean, suitable material shall be used as dredged or fill material (e.g., no trash, debris, car bodies, asphalt, etc.,). Material must be free from toxic pollutants in toxic amounts.

4. **Removal of Temporary Fills**. Any temporary fills must be removed in their entirety and the affected areas returned to their preexisting elevation and contours.

5. **No work in a Superfund or Model Toxic Clean up Site**. No work shall occur in or adjacent to an existing or previously designated Superfund Clean-up site by the U.S. Environmental Protection Agency, or a site currently or previously designated for clean up under the State Model Toxic Clean-up Act (except for projects meeting conditions of Nationwide Permit 20).

II. In-water Work Conditions:

1. **In-Water Work Period.** Where specified, all in-water work shall occur within the approved work window as outlined in Appendix D. Allowable in-water work periods are subject to revision as new information on ESA listed or proposed fish use is obtained.

2. **In-Stream Work Prohibited.** Work shall be done from the top of the bank. Operation of heavy equipment directly in the active flowing channel is not covered by this consultation.

3. **Restrictions on Heavy Equipment.** Permittee shall use equipment having the least impact. Hand labor rather than heavy equipment will be used when possible

and as required for individual actions under this informal programmatic consultation. Heavy equipment working in wetlands must be placed on mats, or other temporary structures to minimize soil disturbance and compaction. If gravel is used, the gravel must be placed on a mat and the gravel and mat removed in their entirety immediately after completion of construction.

4. **No Disturbance to Woody Riparian Vegetation.** Woody riparian vegetation shall not be disturbed or removed within 300 feet landward of the OHW of the stream, lake or MHHW of the marine/estuarine area.

5. **No Dumping.** Material shall be carefully placed, not dumped, into the stream, lake or marine/estuarine area.

6. **Discharges in Special Areas.** Discharges into or adjacent to fish spawning area or areas with submerged vegetation are not authorized.

7. **No Herbicides Use**. No herbicides, pesticides, fertilizers, or other toxic substances are to be applied within 300 feet of a stream, lake or marine/estuarine area.

<u>III.</u> <u>Erosion Control and Water Quality Monitoring:</u> Permittees must ensure they take all practicable steps to control erosion during construction, and establish permanent erosion protection upon completion of the work, or during extended work stoppages.

1. **Erosion Control**. Erosion and siltation controls (such as hydro seeding, filter bags, silt fences, grass and rock-lined swales, check dams, sediment traps, truck wheel wash, soil coverings (bonded fiber matrix), organic or fabric soil detention systems, leave strips, berms, temporary sediment basins, etc.) must be used and maintained in effective operating condition during construction to protect all exposed soil, stock piles and fills from erosion. Permittees are expected to implement the following erosion control measures as appropriate:

   a. <u>Stabilize exposed ground</u>. All exposed ground surfaces are stabilized prior to the closure of the approved work window and/or within one week of project completion, whichever occurs first. Rock check dams will be used, although sterile straw bales may be used as an adjunct.

   b. <u>Stockpiling to minimize erosion</u>. Stockpiles shall be constructed in a manner that minimizes erosion, and is permanently stabilized at the earliest practicable date. Material will be stockpiled to reduce erosion by preventing runoff from the top of the stockpile from flowing down the stockpile face. Stockpiles shall be sloped away from the side facing the waterbody or wetland at all times (i.e. placing fill in tiers). Stockpiles shall be stabilized by hydroseeding (for long-term stockpiles) or covered with visqueen or other appropriate material for short-term erosion control of the stockpile.

c. No stockpiling in a wetland or the waterbody. No stockpiling shall occur in a wetland, riparian zone, or waterward of the OHW in any stream or lake, or MHHW in any marine/estuarine area.

d. Excess material stockpiled in uplands. All excess dredged or excavated material shall be placed in an upland location.

e. Temporary erosion control. Permittee shall install and maintain temporary erosion control and ensure that erosion control measures are inspected on a regular basis during the life of the construction.

f. Use non-persistent and non-invasive plants. If plants are utilized for temporary erosion control, species selected shall be non-persistent and non-invasive. Sterile straw or hay bales shall be used to prevent introduction of weeds. Native vegetation will be planted on disturbed sites (including project site, disposal and staging areas, and access roads) when necessary to reduce soil erosion, establish cover, prevent invasive plant colonization, and provide shade.

g. Stabilize and restore temporary upland access areas. Any temporary access areas will be built to avoid impacts to fish, wildlife, wetlands, or other sensitive resources. Construction of access roads and associated staging areas shall be protected with appropriate matting, i.e. sheet piling or geo-textile fabric placed under a gravel blanket or other suitable material. Any temporary roads or staging areas and associated matting constructed for the project will be removed and the area restored to pre-existing or enhanced conditions upon project completion.

h. Use existing access areas. Where specified, existing upland access areas will be used to access the beach or stream areas.

i. Sedimentation ponds. Sedimentation ponds, sump ponds, swales, pumps, and any supplemental treatment facilities (may include chemical batch treatment cells, high-volume mechanical filtering devices, with or without chemical treatment, flow-through clarifiers, with or without chemical treatment, flow-through ponds, with chemical treatment) necessary for a particular project must be constructed and operational prior to fill placement. The facilities will be designed to accommodate the runoff flow that can be expected depending on the time of the year project construction will take place.

j. Wet season construction. If construction occurs during 1 November through 30 April of any year, only fill material containing less than 5 percent of very fine particles (such as silts, clays or the like) will be placed in the project area to reduce the amount of sedimentation generated in the construction stormwater runoff.

k. Stormwater treatment. Stormwater collected in temporary sedimentation basins must be treated before release into any waterbody or wetland and monitored for pH, turbidity, and settleable solids, as well as bioassays to assess treated water toxicity.

l. Pumping of stormwater. Pumping of stormwater runoff to sedimentation ponds will be used when such a procedure can minimize impacts and/or allow flexibility in locating sedimentation ponds.

m. Construction runoff. During construction, runoff from undisturbed areas will be routed around disturbed areas. This will reduce runoff quantities from exposed surfaces to further assure water quality standards are met. Diversion will be accomplished using diversion swales and/or temporary piping around construction areas. Pipe outlets, level spreaders, swales, or other devices may be used to reduce erosion at the discharges of these diverted clean water flows.

n. Stormwater management maintenance. The stormwater management facilities will be regularly maintained throughout the life of the project. Maintenance may include soil and turf repair as necessary, removal of sediment accumulation from the swales and ponds, and restoration of silt fencing, pipe outlets, and outfalls.

2. **Water Quality Limited Streams**. Before beginning work on Water Quality Limited streams with limits on toxic substances, metals or organic chemicals, the permittee shall coordinate with the Washington State Department of Ecology (Ecology) to develop a sediment testing plan. The plan shall include the proper testing protocol and reporting requirements. The results shall be submitted to Ecology, and permittee must receive Ecology approval before beginning work. The Washington State Water Quality Standards (WAC 173-201A) requires that runoff from construction projects not increase receiving stream turbidity by more than 5 NTU (Nephelometric Turbidity Units).

IV. Spill Prevention and Control: Petroleum products, chemicals, fresh cement, construction, or deleterious materials shall not be allowed to enter waters (streams, lakes, or marine/estuarine areas) or wetlands. Permittees shall take the following precautions:

1. **No fuel storage in or adjacent to waterbody.** Areas for fuel storage, and refueling and servicing of construction equipment and vehicles, shall be located a minimum of 300 feet landward from the edge of any water body or wetlands.

2. **No uncured concrete.** No uncured concrete shall be placed in any water body. Where specified in this informal programmatic consultation, concrete must be cured before it comes into contact with the waterbody.

3. **Use Biodegradable[2] Hydraulic Fluids**. Hydraulic fluids for machinery used for in-water work should be biodegradable in case of accidental loss of fluid.

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[2] According to established ASTM (American Society of Testing Material) procedures the following is the definition of biodegradability: A minimum of 40% of the original sample has been decomposed to inert ingredients within twenty-eight (28) days.

4. **Use Clean Equipment and no “washout” of equipment in or adjacent to a waterbody.** All equipment that is used for in-water work shall be cleaned to remove external oil, grease, dirt and mud prior to placing the equipment in the water. Wash sites shall be placed so that wash water does not flow into the water body or a wetland without adequate treatment, no sediment will enter the waterbody or wetland, and it is located at a minimum of 300 feet landward from the edge of any waterbody or wetland.

5. **Report Accidental Spills to Ecology**. In the event of a spill, permittee shall stop work immediately and notify the Washington State Department of Ecology (Ecology). For Northwest Washington, contact Ecology's Northwest Regional Spill Response Office at (425) 649-7000. For Southwest Washington, contact Ecology’s Southwest Regional Spill Response Office at (360) 407-6300. For Central Washington, contact Ecology’s Central Regional Spill Response Office at (509) 575-2490. For Eastern Washington, contact Ecology’s Eastern Regional Spill Response Office at (509) 456-2926. In addition, for Endangered Species Act purposes, accidental spills must also be reported immediately (within one business day) to the Corps at (206) 764-3495, NMFS at (360) 753-9530, and USFWS at (360) 753-9467.

V. Minimization and Revegetation Guidelines:

1. **Minimization.** All projects and associated construction activities must be designed so that impacts to waters of the U.S., wetlands, and habitat for listed or proposed fish species are avoided and minimized to the full extent practicable.

2. **Natural Beach/Stream Complexity Features.** Boulder, rock, and woody debris material must not be removed from any stream or shoreline area.

3. **Revegetation Guidelines.** Upon completion of work covered in this informal programmatic consultation, all disturbed herbaceous areas of the site shall be replanted with native herbaceous and/or woody vegetation. Herbaceous plantings shall occur within 48 hours of the completion of construction. Woody vegetation components shall be planted in the Fall or early Winter, whichever occurs first. The applicant shall take appropriate measures to ensure revegetation success.

    a. Planting Plan. A planting plan must be submitted to the Corps for approval, including species names of all plants proposed and method of planting (i.e. hydroseeding, density of cuttings, etc.).

    b. As-built Drawings. “As-built” drawings and photographs of the planted areas or a status report must be submitted to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch (the Corps) and USFWS within 13 months of the date of permit issuance.

    c. Submittal of Monitoring Reports. Two monitoring reports with photographs must be submitted to the Corps and USFWS: the first monitoring report one year after the Corps written approval of the “as-built” drawings and a final monitoring report three years after the Corps written approval of the “as-built” drawings. Monitoring reports must include information on the percent of plants replaced, by species. Monitoring reports should state what caused plant failure.

d. Performance Standard - Year 1. At the end of “Year 1” (Year 0 being the year of “as-builts”), planted species must have a survival rate of 100%, and be considered viable and healthy. Replanting shall be done as necessary to meet the 100% performance standard.

e. Final Performance Standard – Year 3. At the end of “Year 3”, planted species must have a survival rate of 80% and be considered viable and healthy. Eighty percent (80%) of the herbaceous revegetated area must be covered with native planted species or native recruit species.

f. Contingency Plan. If the percent survival and cover of planted species (herbaceous and woody as outlined in the planting plan) does not achieve success (*guidelines d and e*), then remedial measures (e.g. replanting, soil amendments, or additional monitoring) may be required until the Corps and USFWS have determined that success has been achieved.

g. Non-native, invasive plant control. The presence of non-native, invasive plant species shall not exceed 10% coverage of the revegetated area during the three-year monitoring period. A list of non-native, invasive wetland plant species for Western Washington is provided in Table 1.

h. Preservation. During and after the three-year monitoring period, any planted woody vegetation within the revegetated areas shall not be removed, cut, or otherwise disturbed unless specifically approved, in writing, by the Corps. Herbaceous plants may be cut or mowed but not removed.

Table 1: Common Non-native Plants Often Found in Western Washington
(Source: Methods for Assessing Wetland Functions, Part 2: Procedures for Collecting Data, Washington State Department of Ecology (99-116), 1999.)

Washington's Wetlands

SPECIES NAME	***COMMON NAME***
Agropyron repens	Quackgrass
Alopecurus pratensis, A. aequalis	Meadow foxtail
Arcticum minus	Burdock
Bromus tectorum, B. rigidus, B. brizaeformis, B. secalinus, B. japonicus, B. mollis, B. commutatus, B. inermis, B. erectus	Bromes
Cenchrus longispinus	Sanbur
Centaurea solstitialis, C repens C cyanus, C maculosa, C diffusa	Knapweeds
Cirsium vulgare, C. arvense	Thistles
Cynosurus cristasus, C echinatus	Dogtail
Cytisus scoparius	Scot's broom
Dactylis glomerata	Orchardgrass
Dipsacus sylvestris	Teasel
Digitaria sanguinalis	Crabgrass
Echinochloa crusgalli	Barnyard grass
Euphorbia peplus, E. esula	Spurge
Festuca arundinacea, F. pratensis, F. rubra	Fescue
Holcus lanatus, H. mollis	Velvet grass
Hordeum jabatum	Foxtail barley
Hypericum perforatum	St. John's Wort
Iris pseudacorus	Yellow iris
Ilex aquifolium	English holly
Lolium perenne, L. multiflorum, L. temulentum	Ryegrass
Lotus corniculatus	Birdsfoot trefoil
Lythrum salicaria.	Purple loosestrife
Matricaria matricarioides	Pineapple weed
Medicago sativa	Alfalfa
Melilotus alba, M. offiinalis	Sweet clover
Phalaris arundinacae	Reed canarygrass
Phleum pratense	Timothy
Phragmites australis	Common reed
Poa compressa P. palustris, P. pratensis	Bluegrass
Polygonium aviculare, P. convolutus, P. cuspidatum, P. lapathifolium, P. persicaria, P. sachalineuse	Knotweeds
Ranunculus repens	Creeping buttercup
Rubus procerus (discolor), R. lacinatus, R. vestitus, R. macrophyllus, R. leucodermis	Non-native blackberries
Salsola kali	Russian thistle
Setaria viridis	Green bristlegrass
Sisymbrium altissimum, S. loeselii, S. officinale	Tumblemustards
Tanacetum vulgare	Tansy
Trifolium dubium, T. pratense, T. repens, T. arvense, T. subterraneum, T. hybridium	Clovers
Misc. cultivated species	Wheat, corn, barley, rye, etc.

APPENDIX D
APPLICATION FORM

APPLICATION FORM
For Impacts to Listed Species and Designated Critical Habitat from Shoreline Protection in Lake Washington

US Army Corps of Engineers®
Seattle District

TO BE COMPLETED BY THE CORPS

Corps Reference Number _____

☐ The proposed work meets all of the conditions of the "*Programmatic Biological Evaluation for Shoreline Protection Alternatives in Lake Washington*."

☐ The proposed work does not meet all of the conditions of the programmatic. This form constitutes a Reference Biological Evaluation. Application will be submitted to NMFS and FWS for consultation.

1. **Proposed Activity**: Shoreline Protection

Alternative:

☐ **a.** Cut Beach, Place Gravel Fill and Re-vegetate

Remove existing riprap or concrete bulkhead and cut into the existing bank across the maximum width of the property to attain a shallow shoreline grade and further reduce the effects of scouring wave action. Plant native riparian vegetation ten feet deep across at least 50% of the width of the shoreline. Plant emergents in areas where wave action is suitable for growth. Place gravel beach fill grading slope to range of 1Vertical (V):4 Horizontal (H) or less steep. The design target for the slope is 1V:7H. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review and consent by COE. Typically, gravel size should range from 1/8 inch to 2 inches. Add emergent plants in areas where wave action is suitable for growth. For higher energy areas shoreline logs may be partially buried within the new substrate at the water's edge. The area behind the logs will be planted with willows and/or emergent vegetation. Section F gives the COE web site for work windows at various locations around the lake. Best management practices including installation of silt fences for water quality control must be used. This method may be most appropriate for shallow-sloped shorelines with lawns. Site specific engineering may be needed depending on location and scale of project.

☐ **b.** Gravel Fill Beach and Re-vegetate

Where option #1 cannot be done, because of site conditions, place gravel beach fill in front of existing bulkhead (covering the rip rap) or remove riprap across the maximum width of the property possible and replace with gravel beach fill. Plant native riparian vegetation ten feet deep across more than 50% of the width of the shoreline. Place gravel beach fill grading slope to range of 1V:4H or flatter. Design target for the slope is 1V:7H. Typically gravel size should range from 1/8 inch to 2 inches. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review by COE. Add emergent plants in areas where wave action is suitable for growth. For higher energy areas shoreline logs may be partially buried within the new substrate at the water's edge. The area behind the logs will be planted with willows and/or emergent vegetation. Section F gives the COE web site for work windows at various locations around the lake. Best management practices including installation of silt fences for water quality control must be used. This method may be suited for those properties with a structure close to the shoreline and/or on a steep-sloped shoreline. Site specific engineering may be needed depending on location and scale of project.

☐ **c.** Re-vegetated Armored Banks (only for bulkheads within 25 feet of residence)

Where existing riprap cannot be removed because of very close proximity to an existing residential or commercial structure (25 feet or less from 21.85 foot elevation), vegetation can be added to restore some functions. Willow stakes must be planted into replacement riprap (or other material) with soil amendment or provide design with similar functional vegetation benefit in front of bulkhead. Gravel beach fill may be added in front of the bulkhead to provide some shallow water. More than 2 cubic yards of gravel fill per lineal foot at or below the 21.85 foot elevation will need additional review by COE. Section F gives the COE web site for work windows at various locations around the lake. Overhanging riparian plantings must be added along the entire length of the riprap bulkhead. Best management practices including installation of silt fences for water quality control must be used. *Limited use of this shoreline treatment may only be allowed by COE depending on site specific constraints making alternatives #1 or #2 impossible.*

2. **Drawings - See attached Drawings.**
3. **Date**:
4. **Applicant**:

   Address:

   City: State: Zip:
5. **Agent**:

   Address:

   City: State: Zip:
6. **Project Name**:
7. **Location(s) of Activity**:

   Section: Township: Range:

   Latitude: Longitude: GPS Coordinates:

   Waterbody: Lake Washington County: King
8. **Description of Work:**

Describe the proposed project.

9. **Construction Techniques**:

Describe methods and timing of construction to be employed in the bank stabilization. Discuss construction techniques associated with any interdependent or interrelated projects.
Address the following:

A. Construction sequencing and timing of each stage (duration and dates):

B. Site preparation:

C. Equipment to be used:

D. Construction materials to be used:

E. Work corridor:

F. Staging areas and equipment wash outs:

G. Stockpiling areas:

H. Running of equipment during construction:

I. Soil stabilization needs / techniques:

J. Clean-up and re-vegetation:

K. Storm water controls / management:

L. Source location of any fill used:

M. Location of any soil disposal:

N. New Pier or Replacement Pier Activities anticipated within 10 years on the property:

10. Action Area

Action area is Lake Washington, 0.5 miles surrounding the project site.

11. Species Information:

Listed species in Lake Washington include chinook salmon, steelhead trout and bull trout.

12. Existing Environmental Conditions:

Provide color photographs of local area, shoreline conditions and proposed project site.

Existing environmental conditions are described in the "*Programmatic Biological Evaluation for Shoreline Protection Alternatives in Lake Washington*" dated December 13, 2007.

13. Effects Analysis:

Effects analysis is provided in the "*Programmatic Biological Evaluation for Shoreline Protection Alternatives in Lake Washington*" dated December 13, 2007.

If your project doesn't meet all the programmatic conditions, please describe any impacts from your project that are not covered: ______________________________

____

____

14. Conservation measures:

Conservation measures are measures that would reduce or eliminate adverse impacts of the proposed activity.

- establish in-water work window using the table below ______________________________

Specific Area in Lake Washington	Allowable Work Window
South of I-90	
---within 1 mile of Mercer Slough or Cedar River	July 16-July 31 ***and*** November 16-December 31
---further than 1 mile from Mercer Slough or Cedar River	July 16-December 31
Between I-90 & SR 520 July 16-April 30	July 16-April 30
North of SR 520	
----Between SR 520 & a line drawn due west from Arrowhead Point	July 16-March 15
----North of a line drawn due west from Arrowhead Point	July 16-July 31 ***and*** November 16- February 1

- **establishing construction timing restrictions near known species feeding, or spawning habitat,**

  Please describe any known salmonid feeding or spawning habitat in the project vicinity. An example is sockeye spawning habitat. ____________________________________

- **ensuring the restoration of functions is achieved through project planning and post construction monitoring, and**

  ☐ **Applicant agrees to the following monitoring protocol:**

  A. Post-Construction: Establishment of photo-points, Submittal of As-Built drawings, and the establishment of any other benchmarks that will be used during the monitoring period.

  B. Years One through Five: monitoring will occur within three (3) months of the completion of the project and will occur annually until five (5) monitoring events have been completed and the monitoring reports submitted to the Corps.

- **use of silt curtains and other best management practices to minimize the amount of sediment and other materials from entering the water during construction.**

  Please describe best management practices not discussed in the construction techniques section

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15. Determination of Effect:

Determination of effect is covered in the "*Programmatic Biological Evaluation for Shoreline Protection Alternatives in Lake Washington:"*

Chinook salmon: may affect, likely to adversely affect
Steelhead trout: may affect, not likely to adversely affect
Bull trout: may affect, not likely to adversely affect

16. EFH Analysis

This project will not adversely affect essential fish habitat.

____ _____________________
Applicant/Agent Date

TO BE COMPLETED BY THE CORPS IF PROJECT DOESN'T MEET ALL CONDITIONS:

Project doesn't meet the following programmatic conditions:

____

____

____