Montlake Cut Slope Stabilization Project
Environmental Assessment
Biological Evaluation
Lake Washington Ship Canal, Seattle Washington

U.S Army Corps of Engineers, Seattle District
August 2002

TABLE OF CONTENTS 2

1.0 INTRODUCTION

1.1 Authority

The LWSC was officially authorized as a navigation project by the Seattle District of the Corps in 1910. The construction of a double-lock ship passage facility, a six-bay spillway, and accessory works at the entrance to Salmon Bay, was authorized under provisions of the Rivers and Harbors Act (RHA). Authorization under the RHA was also granted for dredging two navigation channels, one from the locks to deep water in Puget Sound, and a second channel from the locks to Lake Washington. Additional improvements have been authorized under the RHA, Section 1135 of the Water Resources Development Act (WRDA), and the Sundry Civil Act. More detailed information on all authorizations is provided in Exhibit A in the LWSC Master Plan (Corps 1994).

1.2 Background

The Lake Washington Ship Canal (LWSC) was constructed between Puget Sound and Lake Washington more than 80 years ago (between 1911 and 1916) by the U.S. Army Corps of Engineers (Corps) to provide watercraft access between Lake Washington and Puget Sound (Figure 2-1). Construction of the LWSC rerouted the major rivers that fed and drained Lake Washington and lowered the lake surface elevation by about 9 feet (ft) (2.7 m). One consequence of these changes has been the development of a highly altered ecosystem, particularly for anadromous fishes such as salmon. Concurrently, the urban landscape surrounding the lake developed, and the urban structure is now dependent on the environment created by the construction of the LWSC. The current configuration and water surface elevation of Lake Washington and Lake Union, and the access provided by the LWSC between the lake and Puget Sound, are the backbones on which present day Seattle and the Lake Washington ecosystem exist.

The Corps operates the LWSC to provide navigation for commercial and recreational vessels between the lake and Puget Sound and to provide passage for fish migration. The LWSC consists of the Hiram M. Chittenden Locks (the Locks) and associated facilities, the Fremont Cut between Salmon Bay and Lake Union, and the Montlake Cut between Lake Union and Lake Washington.

The Montlake Cut is located in the eastern portion of the LWSC and is approximately 2,500 ft (762 m) long and 350 ft (107 m) wide. The center channel is 100 ft (31 m) wide and dredged to an authorized depth of 30 ft (9.1 m). Concrete revetments line both sides of the channel. The tops of the concrete revetments are used as waterside walks. On the south shore, a recreational trail was developed by the Corps in cooperation with the Seattle Garden Club in 1970. The trail connects to the Washington Park Arboretum trail and continues through and beyond the state-owned marshes of Foster Island to the Washington Park Arboretum. The Montlake Cut is characterized by steep side slopes, planted with a combination of ornamental English ivy, deciduous and evergreen trees, and native shrubs and grasses. Trees primarily consist of native conifers, but a row of approximately 12 Lombardy poplars lines the west end of the north shore.

A field inspection of the slopes along the South bank Montlake Cut by USACE engineers on April 2002 revealed slope stability problems. The area of concern is located west of the Montlake Bridge adjacent to 1822 through 1852 Shelby Street. This slope failure has the potential to mobilize without warning and could deposit several tons of soil on the lower pedestrian trail that cantilevers over the Montlake Cut. Geotechnical engineers requested a repair to the oversteepened bank be in place before the rainy season.

The Corps has prepared this Environmental Assessment and Biological Assessment pursuant to the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973. In addition, this document addresses requirements of the National Historic Preservation Act, the Coastal Zone Management Act and the Clean Water Act.

1.3 Project Need

The Corps maintains an approximately 80-foot strip of property along the south side of the Montlake Cut and has the responsibility for maintaining a safe and clean trail. In fact, the Corps primary resource objective for this area is to maintain and preserve the Montlake Cut Waterside Trail, associated features, and landscape plantings to ensure retention of its designation as a National Recreational Trail. On the western end of the Montlake Cut, a 30 ft wide and 22 ft tall section of the bank is slumping. This section has already slumped about 8 inches, and Corps geologists predict that a large section of the bank will fail this winter once the ground becomes saturated from rain unless something is done. The Corps installed slope indicators several years ago to monitor the slope's movement and there here have already been a couple slides in the area. Below this bank the Corps maintains a walking trail that is suspended over the cut, and it is feared that if the bank was to fail, someone could be seriously injured or killed as they are walking the trail. In addition, if the bank slumping is not addressed it will likely result in a large amount of soil and debris entering the cut along with damaging the suspended trail. If a failure was to occur, it would require a greater expenditure of time and money to fix than stabilizing the existing bank.

1.4 Project Purpose

The purpose of the Montlake Cut Slope Stabilization project is to safely stabilize the bank so that it does not fail resulting in an injury to the public or creating an environmental hazard along the western end of the south bank of the Montlake Cut.

2.0 DESCRIPTION OF THE PROPOSED PROJECT

A 300 ft long section of oversteepened bank will be graded to a stable 2:1 slope (Figure 1). The work is anticipated to begin on September 23, 2002, and will take 3 weeks to complete. Excavation will be accomplished by utilizing a hydraulic excavator, bulldozer and loaded onto 10 CY dump trucks working from land. An access way will need to be constructed near the east boundary of West Montlake Park. The access way will consist of 3" rock and would be 15 feet wide spreading out to 30 feet wide near its intersection with West Park Drive to be used as an equipment unloading area. The equipment will be unloaded, driven across the access way, and be kept on the Government's easement during the course of the work. Much of the bank will be removed and approximately 250

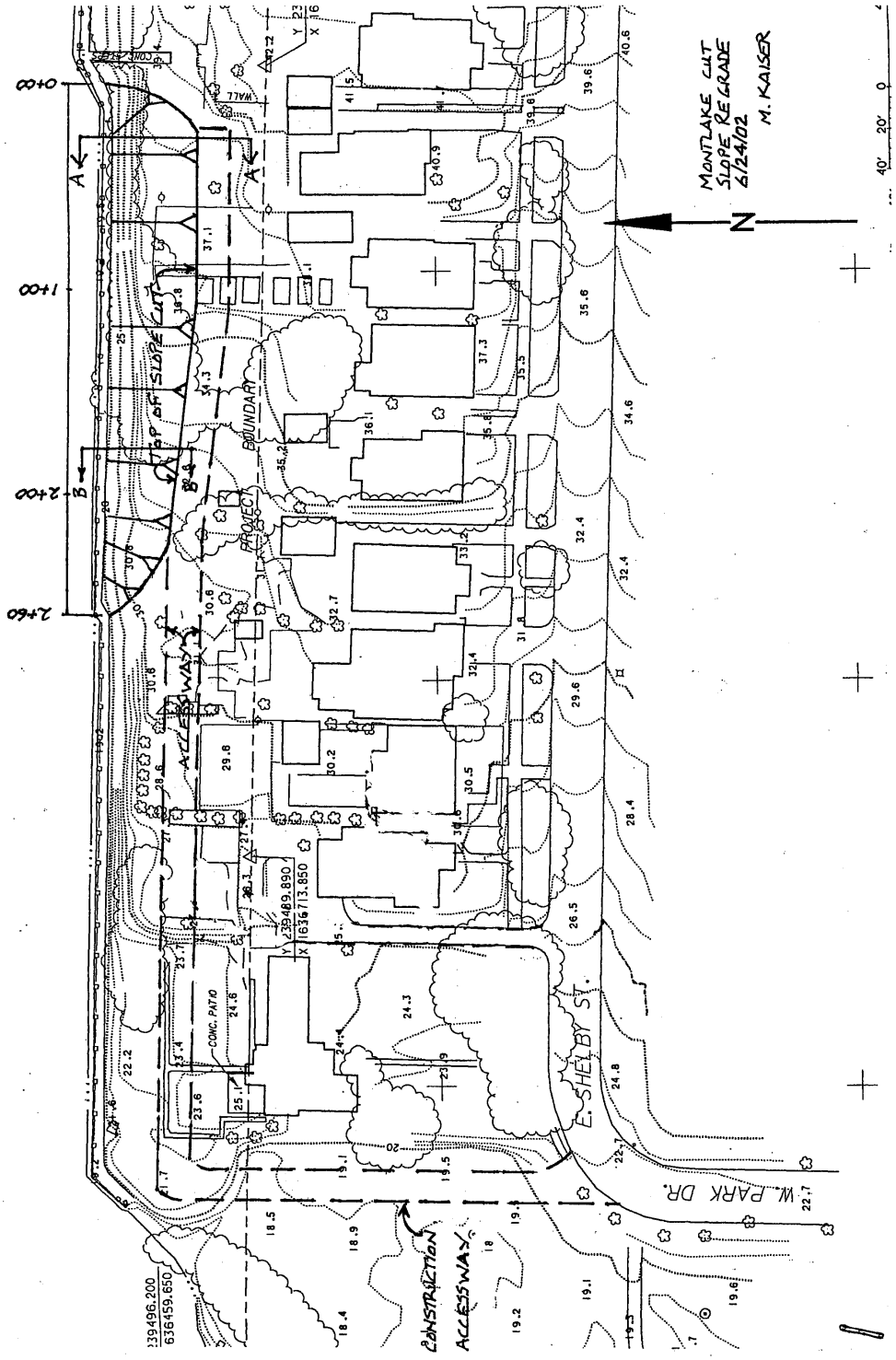

Figure 1. Proposed project plan view.

trips with dump trucks in and out of the project area are anticipated. Clearing and grading will require removal of several cedar trees and a cherry tree. Sod and vegetative debris will be hauled to commercial disposal. Dust and erosion control will be in place during the earthwork activities. Silt fencing will be installed to protect the trail, and to keep soil from entering the water. After construction the newly sloped bank will be immediately hydroseeded with grass to control erosion. After coordinating with botanists, staff gardeners and the public, the slope may be planted with native ground cover and shrub species. These plants will addresses concerns for fish and wildlife, neighbors, slope stability and trail users.

For access, a temporary city fence will need to be moved during the work, but will be repositioned after the work is completed. The construction access road will be removed upon completion of the work and be returned to pre-project condition according to City of Seattle Parks specifications.

WSDOT electrical conduit within the excavation footprint will be relocated in a manner that causes minimal outage to the bridge navigation signs. WSDOT will provide an electrician to make electrical connections.

Once again, all work will be conducted from the landward side and does not involve the use of a barge.

2.1 Action area

The action area is confined to the 400 feet long and 75 feet wide south bank of the ship canal extending from 1,000 feet west of the University Bridge to the East and the western end of the south bank of the Montlake Cut to the West. The action area includes a portion of West Montlake park for equipment access, and the 100 feet wide and 30 feet deep body of water in the canal.

3.0 AFFECTED ENVIRONMENT

3.1 Geology and Soils

The soils and land types of the King County Area were formed largely in deposits of glacial drift laid down during the Vashon period of the Fraser glaciation late in the Pleistocene. The major kinds of material left by the glacier are till, recessional outwash, and pro-glacial lacustrine and outwash sediments (Washington Agricultural Experiment Station 1973).

The action area and project are founded upon the landtype known as “Vashon till” commonly found throughout King County. Vashon till consists of very dense, consolidated lodgement till that ranges in thickness from about 5 feet to nearly 100 feet and has a mantle of ablation till about 3 feet thick. The ablation till is loose, and it is in this material that soils of the Alderwood series formed (Washington Agricultural Experiment Station 1973). The till plain is undulating and slopes are mostly between 6 and 15 percent.

3.2 Water Quality

Water flows westward through Montlake Cut from Union Bay to Portage Bay. Lake Washington and Union Bay serve as the control of water quality in the Montlake Cut. Generally, the water quality of Lake Washington is extraordinary for a large lake surrounded by urban development. Some of the factors that contribute to the lake's excellent water quality include the cleanliness of the Cedar River, which provides half the lakes inflow, a rapid flushing rate, with average water residence of 2.3 years, and the lake's depth, which results in a thorough annual mixing. However, downstream of the Montlake Cut, Lake Union contains a seasonally fluctuating saltwater layer at the bottom. This saltwater layer intrudes into Lake Union from operation of the Chittenden Locks several miles downstream. The saltwater layer becomes larger, and intrudes further into the system during summer when inflow decreases and boat use through the Locks increases. According to the Washington state surface water quality standards (173-210A-130(58)WAC), salinity in the Ship Canal shall not exceed one part per thousand at any point or depth along a line that transects the Ship Canal at the University Bridge which is always adhered to except during the driest of years.

3.3 Air Quality

Air quality in the Puget Sound Basin is generally good. However, urban areas experience moderately degraded air quality during certain times of the year. Motor vehicles are the largest source of air pollutants in King County, although wood-burning stoves also contribute. Particulates, sulfur dioxide, ozone, and carbon monoxide are the pollutants of concern. High concentrations of these pollutants generally occur during the dry, late summer months when minimal wind conditions persist for long periods of time or during mid-winter thermal inversions.

Carbon monoxide, a product of incomplete combustion, is generated by automobiles and other fuel burning activities (e.g. residential heating with wood). The highest ambient concentrations of carbon monoxide tend to occur in localized areas such as major roadways and intersections during periods of low temperatures, light winds, and stable atmospheric conditions. Ozone is a highly reactive form of oxygen created by sunlight-activated chemical reactions of nitrogen oxides and volatile organic compounds. Unlike high carbon monoxide concentrations which tend to occur close to emission sources, ozone problems tend to be regional since ozone precursors can be transported far from their sources. Ozone precursors are primarily generated by motor vehicle engines.

3.4 Vegetation

The Montlake Cut is characterized by steep side slopes, planted with a combination of ornamental English ivy, deciduous and evergreen trees, and native shrubs and grasses. Trees primarily consist of native conifers, but a row of approximately 12 Lombardy poplars lines the west end of the north shore in West Montlake park. In the project area of the Montlake Cut the vegetation consists primarily English Ivy, several Western Red cedars, a few shrubs, and grass.

3.5 Aesthetics

The vegetation along both sides of Montlake Cut provides a park like atmosphere in an otherwise residential area. The area is now dominated by the University of Washington on the north shore, and residential property on the south shore. The vegetation in the project area however is very minimal and is probably the least aesthetically pleasing section of the cut.

3.6 Cultural Resources

The project area lies within a historic district nominated by the U.S. Corps of Engineers to satisfy National Historical Preservation Act requirements. The district was listed on the National Register of Historic Places in 1978.

According to the Bureau of Indian Affairs, adjudicated Indian treaty fishing rights at Salmon Bay, Lake Union, Lake Washington, Lake Sammamish, and Cedar River are held by the Muckleshoot Indian Tribe. Prior to the construction of the Montlake Cut, the local tribes may have used the site for hunting, fishing and gathering local food items. Temporary harvest camps may have been established in the project area but none have yet been found along the Montlake Cut.

Fishing within the project area is restricted to sport and tribal harvest. The Montlake Cut is not conducive to commercial harvest due to its narrow width and high boat traffic. Tribal net fisheries historically took advantage of the areas surrounding the project site. However, the site as it is today does not encourage the fishing of tribal nets due to heavy boat traffic, high landward recreational use, and lack of anchoring locations.

3.7 Aquatic Resources

The Montlake Cut serves as the only migration route for anadromous fish species that inhabit Lake Washington, Lake Sammamish, Cedar River, and their associated tributaries. Fish may be found passing through the project area almost year-round and include the pacific salmon species of chinook, coho, and sockeye. The sockeye salmon of Lake Washington make up the largest sockeye run in western Washington exceeding 650,000 in 1988, 1996 and 2000 but more commonly exceeding around 150,000 fish. The coho of Lake Washington and its adjacent systems have been the focus of severe fishing restrictions within Puget Sound and the Pacific Ocean. Steelhead trout of the Lake Washington system also travel through the project are during their annual outmigration and upward spawning runs. The Lake Washington steelhead is of special concern and is being considered as a candidate for the Endangered Species Act. Habitat destruction and alterations have impacted this species severely. Other species expected to travel through the project area include longfin smelt, northern pikeminnow, and peamouth chub. The salmon and trout species use the project area only for feeding or as a migratory corridor.

Resident fish include cutthroat trout, rainbow trout, freshwater sculpin, three-spine stickleback, peamouth chub, longnose dace, and several species of exotic warm water species such as largemouth bass, bluegill, catfish, yellow perch and carp. Despite the intrusion of saltwater into Salmon Bay and Lake Union, marine species of fish and invertebrates are not expected to occur within the project area.

3.8 Terrestrial Resources

A variety of birds may be found along the Montlake Cut including Bald Eagles, Double-Crested Cormorants, Canadian Geese, Mallard ducks, Gulls, and song birds.

Mammals and furbearers found in the area are limited to the common opossum, raccoons, feral cats, domestic dogs, rabbits, eastern gray squirrels, rats, mice and moles.

3.9 Threatened and Endangered Species

The Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*), Puget Sound Bull Trout (*Salvelinus confluentus*) and the Bald Eagle (*Haliaeetus leucocephalus*) are the only federally listed species likely to be present in the project area. The bald eagle and bull trout are administered by the U.S. Fish and Wildlife Service. The chinook salmon is administered by the National Marine Fisheries Service. These three species are the focus of this Biological Evaluation.

3.9.1 Puget Sound Chinook Salmon

Chinook are anadromous and semelparous. Within this general life history strategy, however, chinook display a broad array of tactics that includes variation in age at seaward migration, variation in length of freshwater, estuarine, and oceanic residence, variation in ocean distribution and ocean migratory patterns, and variation in age and season of spawning migration. In an extensive review of the literature, Healey (1991) used differences in life history patterns to divide eastern Pacific Chinook salmon into two broad races: stream-type populations and ocean-type populations. Lake Washington Basin chinook appear to be relatively well-matched with the description for ocean-type chinook. Ocean-type chinook migrate to sea during the first year of life, generally within the first 3 months after emergence.

Chinook spawning behavior is similar to that of other salmonids. The female selects an appropriate location over gravel and small cobble substrate where she excavates the redd. After spawning, females have been reported to remain on the redd from 4 to 26 days until they die or become too weak to hold in the current (Neilson and Green 1981, Neilson and Banford 1983). During the period, females will vigorously defend their redd against the spawning activity of newly arriving fish.

There are a number of factors that have affected the survival of Lake Washington Basin Chinook salmon, including loss and degradation of stream habitat resulting from a variety of land and water management practices. Predation by native and introduced species in the river and lake, injury to juvenile fish exiting the lake via the Hiram M. Chittenden Locks, droughts, floods, over-harvest and unfavorable ocean conditions have also been implicated in the Chinooks decline.

Three stocks of chinook are present in Lake Washington Basin: (1) the Issaquah Creek stock, a composite population that is at least partially sustained by production from the Issaquah hatchery; (2) the Cedar River stock, classified as native/wild; and (3) the north Lake Washington tributary stock also classified as native/wild. Annual counts of

spawners for the period from 1989 to 1996 averaged approximately 1,600 fish in Issaquah Creek, 420 fish in the Cedar River, and 285 fish in the north Lake Washington tributaries. Of the three species of salmon returning to Lake Washington, Chinook salmon are the least numerous. Adult chinook enter Lake Washington through the Chittenden Locks from late June through September with a peak in late August. Juvenile chinook migrate out through the Chittenden Locks and into Puget Sound between May and July (Woodey, 1967,1969,1970)(Traynor, 1971).

3.9.2 Bull Trout

Bull trout are known to exhibit four types of life history strategies. The three freshwater forms include adfluvial forms, which migrate between lakes and streams; fluvial forms, which migrate within river systems; and resident forms, which are non-migratory. The fourth strategy, anadromy, occurs when the fish spawn in fresh water after rearing for some portion of their life in the ocean.

In fluvial and adfluvial bull trout populations, adults undergo spawning migrations of up to 140 miles (Shepard et al 1984). Adults from fluvial populations are found in rivers and larger streams. Smaller tributaries act as breeding grounds and rearing areas for juveniles. Adfluvial populations are found in regions with lakes or reservoirs. Juveniles may remain from one to six years in nursery streams before migrating to rivers (fluvial) or lakes (adfluvial). As adults, they usually live in rivers or lakes for two to three years before spawning (Allan 1980; Fraley and Shepard 1989). The anadromous form of bull trout has been little studied, however, larger juvenile and adult bull trout are known to migrate through the marine waters of Puget Sound (Goetz 1989).

The largest single population of bull trout, adfluvial form, in western Washington is found above Cedar Falls in the upper Cedar River watershed. It is believed a small number of bull trout pass through the reservoir and downstream hydroelectric facilities to river reaches below Cedar Falls. However, it is apparently not sufficient to support the establishment of bull trout populations under the current ecological conditions (City of Seattle 1999). Anecdotal reports point to a historic population at the headwaters of Issaquah Creek in the Sammamish Lake Basin. Recent surveys have not confirmed these reports (B. Fuerstenberg, King County, pers. comm.).

Native char, presumably bull trout, have been observed in the fish ladder viewing pool at the Locks as recently as 1997 (E. Warner, pers. comm.) while isolated reports of native char being caught in or around Lake Washington occur every few years. A larger juvenile char, again presumably a bull trout (~250 mm, 3 year old) was caught in the lower Cedar River in July of 1998 (M. Martz, Corps, pers. comm.). An adult char was also caught in the lower Cedar River in April of 1993 (E. Warner, MIT, pers. comm).

The factors affecting Puget Sound bull trout decline include; habitat degradation, with a variety of causes, including reservoir operations, dams, agricultural practices, urbanization, forest management, and human constructed barriers in streams; over-fishing and poaching; inadequacy of existing regulatory mechanisms; and impacts from introductions of nonnative species.

3.9.3 Bald Eagle

The bald eagle is a federally listed threatened species and a threatened species at the state level in Washington. The bald eagle was listed as endangered throughout the lower 48 states in 1978, except for Michigan, Minnesota, Wisconsin, Washington, and Oregon, where it was listed as threatened. In 1995, bald eagle populations in other states were downlisted from endangered to threatened by the U.S. Fish and Wildlife Service. In Washington State, the number of active bald eagle nests has increased steadily since 1980, and now numbers over 550 (WDFW 1997c). However, for unknown reasons, reproductive rates in the Hood Canal and Lower Columbia River areas remain below the target level of one young per nest per year.

Destruction or degradation of habitat and human disturbance are the main threats to bald eagle populations. Habitat alteration can limit suitable nesting and roosting habitat, and human disturbance can cause birds to leave their nests and can affect prey availability (WDW 1991). Bald eagles are particularly intolerant of human disturbance during the breeding season (USFWS 1986). Human activity has been documented to cause nest abandonment and reproductive failure (Bogener 1980; Lehman 1983).

Bald eagles are observed within the Seattle metropolitan area throughout the year. Bald eagles have been sighted every month of the year near the Ship Canal and Locks, however, no nests have been confirmed in the project area. The closest nest site is at Discovery Park, approximately one mile from the locks. There is also a nest at Woodland Park, approximately 1.5 miles from the project. Salmon carcasses are assumed to be an important food source for bald eagles throughout the Lake Washington watershed.

4.0 ALTERNATIVES

Several alternatives were considered during the planning of this project. The alternatives centered on several techniques to stabilize this section of the bank. The no action alternative was also considered.

4.1 No Federal Action

If the slumping bank is not stabilized it will eventually fail resulting in at least 30 cubic yards of soil sliding over the trail below the bank and into the Montlake Cut. If this occurs it will most likely result in the need to repair the cantilevered trail, dredge the soil from the bottom of the cut, and it could result in the injury of someone using the trail. If the bank stabilization project is not pursued, it will continue to pose a serious hazard for people and boats that recreate along the Montlake Cut. Damage to human life, power lines, boats, and buildings are all possible if the bank is not stabilized in the project area. The No-Action alternative does not address existing safety issues or eliminate the Government's current liability.

4.2 Alternatives Not Selected

Alternative two

This alternative included the construction of a vertical concrete retaining wall. There are several factors that resulted in the rejection of this alternative. One such factor is that installing a retaining wall would require approximately as much excavation as the preferred plan, and it would result in an unattractive concrete wall rather than a vegetated bank. In addition, this alternative requires the construction of a handrail that the local residents are opposed to, and the cost of this alternative is much higher than any other alternatives.

Alternative three

This alternative is essentially the same as the preferred alternative but it included the use of a barge to remove the soil rather than dump trucks. This alternative is preferred by the local residents as it would be less invasive and would not increase the traffic on the local streets as will be the case with the dump trucks. This alternative was rejected primarily due to the environmental impacts associated with the use of a barge, and it also increased the budget of the project substantially.

4.3 Preferred Alternative

The Montlake Cut Slope Stabilization project as detailed in Section 2.0 currently describes the preferred alternative. The project will be completed utilizing an excavator, bulldozer and 10 cubic yard dump trucks all operating from land. The unstable bank will be graded to a safe slope of 2:1 and revegetated to a state similar to existing conditions. Selection of this alternative was based on several factors. First, working from land best minimizes the potential impacts to the fish and wildlife thus meeting the requirements of the Endangered Species Act. Secondly, it provides a safe and aesthetically pleasing environment for the public. Lastly, by working from land it enables the Corps to resolve the problem with an existing budget in a timely manner.

5.0 ENVIRONMENTAL CONSEQUENCES OF THE PREFERRED ALTERNATIVE

5.1 Geology and Soils

Construction activities associated with the proposed project will result in the removal of approximately 2,500 cubic yards of soil from the project site. This material will be taken off-site for disposal. In addition, soils will be compacted in areas where heavy machinery will be operating such as the access road. After construction the access road will be covered with approximately 4-6 inches of soil and replanted with grass.

5.2 Water Quality

The proposed project will not significantly impact water quality. All work will be conducted from the landward side of the Montlake Cut to eliminate the need for a barge. Water quality of the Montlake Cut appears to be controlled by the larger surrounding water bodies particularly Lake Washington. The trees along Montlake Cut may provide partial filtered shade to the water in the morning and evening hours during the winter

months but do not have a noticeable effect on water temperature therefore, the removal of the five cedar trees will have no effect on water temperature.

5.3 Air Quality

During construction, there will be a temporary and localized reduction in air quality due to emissions from chainsaws and trucks operating during tree removal. These emissions will not exceed EPA's de minimis threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone) or affect the implementation of Washington's Clean Air Act implementation plan. Significant impacts are not anticipated.

Ambient noise levels will increase slightly during tree removal. However, these effects will be temporary and localized, and occur only during daylight working hours. Given the busy nature of the project area, the temporary elevations in noise level will not be significant.

5.4 Vegetation

As stated in section 3.4, the vegetation in the project area consists of primarily English Ivy, grass, and a few trees. This project will result in the temporary removal of all vegetation, but it will be immediately hydroseeded after excavation. Five Cedar trees will be permanently lost but the bank may be revegetated making up for the loss

5.5 Aesthetics

The proposed project will attempt to minimize any degradation to the aesthetic values by only removing as much soil as required to stabilize the bank and by the replacement of the vegetation as included in the preferred alternative. In addition, existing structures such as the stairway, and the Montlake Cut Waterside Trail will not be altered in any way.

5.6 Cultural Resources

The Montlake Cut is a highly modified boat transportation canal which did not exist prior to European settlement. The land surrounding the project was highly modified by extensive excavation and fill activities commensurate with construction of the Chittenden Locks early in the 20th Century. It is unlikely that archaeological sites or artifacts would have survived this period of alteration and be subject to discovery by activities associated with this plan. However, this project will result in significant excavation therefore a Corps Archeologist will be present during construction as a safeguard. If any artifacts of cultural significance are discovered, construction will halt and SHPO will be contacted.

5.7 Aquatic Resources

The bank stabilization project will be conducted just prior to the fish work window of October 15 to March 15. This timing will avoid the migration of juvenile salmonids but adult salmonids may be present in the project area. Resident fish inhabiting Union Bay and the Montlake Cut may be present during the construction. Work will be conducted from land in order to avoid the use of barges and the potential for petroleum spills or excess turbidity entering the water and affecting resident fish.

Very little if any food is produced as a result of the minimal vegetation present in the project area. However, if any food production for resident fish is reduced as a result of the bank stabilization project it will have no effect on adult salmonids or resident fish. Adult salmonids will not be feeding at this time of the year as they are preparing to spawn and other fish such as cutthroat, resident rainbow trout and northern pikeminnow of Lake Washington are not generally considered to rely heavily on terrestrial prey items. Chironomide and other aquatic benthos as well as other fishes are most often found in the stomachs of Lake Washington resident salmonids. For both resident salmonids and small resident fishes, the proposed project will not result in a measurable reduction in available food items. Warm water species will not be affected by a small reduction in terrestrial food items as they are generally piscivorous and feed mostly during the spring and summer months when food supplies are abundant.

5.8 Terrestrial Resources

As stated in previous sections the only significant terrestrial resource present are the five cedar trees located on the top of the existing bank. The removal of these trees along the Montlake Cut will have no affect on the birds in the area as there are many other trees located less than 200 ft from the existing cedars.

Mammals found in the project area do not require large cedars for any of their life stages. The bank stabilization project is not expected to have any significant effects to mammals in the area.

5.9 Threatened and Endangered Species

5.9.1 Puget Sound Chinook Salmon

The project site provides very little fishery support function. Based on qualitative surveys, habitat found within the Montlake Cut is generally described as severely degraded. A lack of habitat complexity and existing bank hydromodification greatly limits rearing and feeding opportunities in the project area. The Corps expects no disturbance of the water column or aquatic habitat, as the project will be conducted with land based equipment. The nature of bank stabilization is not considered unusual or extraordinary to the experience of juvenile chinook salmon and would not, therefore, be considered likely to cause migration delay or otherwise significantly alter behavior. The bank stabilization project will be conducted just prior to the fish work window of October 15 to March to avoid juvenile chinook salmon presence and, therefore, minimize effects to that species.

The potential loss of insect production is not an affect as the Montlake Cut is not utilized as rearing habitat by Chinook salmon. Juvenile chinook salmon pass through the project area only to make their way to the marine waters west of the Chittenden Locks. Although juvenile salmon are thought to feed while in transit to the marine environment, stomach analysis of juvenile chinook of Lake Washington shows that, aquatic zooplankton and macrobenthos make up the majority of the Lake Washington chinook diet. Since the characteristics of the Montlake Cut closely model that of Lake Washington, it is believed that chinook that may feed in the project area would prefer a

similar diet and be unaffected by small scale changes to terrestrial vegetative composition. Likewise, the construction of this project and final project results will likely enhance, not reduce, the current level of allochonous prey production.

The existing vegetation is not a potential source of woody debris as the Montlake Cut is a navigation channel kept clear of all significant woody debris. Existing levels of woody debris and overhanging vegetation will not be reduced by this project. In addition, all future introductions of small woody debris into the navigation canal because of windfall or tree removal will remain providing it does not become a navigational hazard

Corps measurements repeatedly record summer surface temperatures at the in the Montlake Cut area Bridge up to 70^{o}F. These high summer water temperatures can be detrimental to adult chinook and are a function of Lake Washington stratification expected to appear with or without the 5 cedar trees and associated vegetation. The loss of filtered shade from the removed trees and subsequent increase in direct sunlight upon the Montlake Cut represents the only possible affect to Chinook salmon from this project however, the five existing cedar trees are believed to be located too far from the water to provide any shade. Furthermore, this potential effect is limited to juvenile salmon that do transit the project area in their directed migration toward the Chittenden Locks. Adult chinook transiting the area prefer the deeper relatively cooler waters found deep in the navigation channel and will be, therefore, unaffected by the upland removal of five trees. The bank stabilization project will cause no perceptible decrease in water quality or alter the energy expenditure of chinook found transiting the Montlake Cut.

5.9.2 Bull Trout

The impacts to bull trout as a result of this proposed project follow the same general trend as discussion in 5.9.1. above. Bull trout would only be in the Montlake Cut if they were migrating to the Puget Sound. Bull trout are the most temperature-sensitive fish found in the state of Washington. It would be highly unlikely to find bull trout residing in the warm waters of the Montlake Cut.

5.9.3 Bald Eagle

Due to the low numbers of Bald Eagles utilizing the habitat at the Montlake Cut, bank stabilization will have no impact to Bald Eagles. Only five large trees will be removed as a result of this project. With a maximum of three eagles spotted in the area at one time, there will be plenty of trees available for perching, roosting, feeding, and preening.

6.0 INTERDEPENDENT AND INTERRELATED EFFECTS

None anticipated.

7.0 MANAGEMENT ACTIONS RELATED TO THE SPECIES

To ensure minimal potential for affect to Chinook salmon due to this project, the bank stabilization will be conducted from the landward side to eliminate any barging or temporary impact to the aquatic environment.

Project construction will occur in the fall outside that of juvenile chinook migration.

7.1 Habitat Restoration Potential

The high degree of urbanization and vegetation management in the uplands of the project area inhibits large scale restoration opportunities. The full-length of the project area on the south bank is heavily managed for the Montlake Cut Waterside trail. The site is currently listed on the National Register of Historic Places as described by the NHPA and is required to remain in a similar condition into the future (USCOE, 1998). This precludes any significant re-vegetation efforts within the project area under this bank stabilization effort. However, the specific actions in proposed project are exempt from these requirements as detailed in section 13.3. The U.S. Army Corps of Engineers proposes to develop a planting plan that will include ground cover to increase the amount of vegetation along the bank. These plants may increase the amount of insects and leaves entering the water resulting in an increase in productivity. It is also thought that the proposed species will provide better habitat and food sources for native songbirds. No other restoration activities are included in this plan.

8.0 DETERMINATIONS

The U.S. Army Corps of Engineers concludes, based on the above analysis and supporting documentation, that the Montlake Cut Slope Stabilization Project will have no effects on Chinook salmon transiting the Montlake Cut if carried out as described. The U.S. Army Corps of Engineers also concludes that this project will not inhibit the recovery of Chinook salmon within its Evolutionary Significant Unit. As such, the U.S. Army Corps of Engineers determines this project will **not affect** Puget Sound Chinook salmon. In addition, the U.S. Army Corps of Engineers determines this project will **not affect** bull trout or the Bald Eagle.

9.0 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects associated with this project include: (1) a reduction of five large trees which may temporarily disrupt wildlife in the area, and (2) a temporary and localized increase in noise which may temporarily disrupt wildlife in the area.

10.0 COORDINATION

Coordination was conducted with federal, state, city, and local agencies along with the general public.

11.0 CUMULATIVE EFFECTS

None anticipated.

12.0 IRREVERSABLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irreversible and irretrievable commitment of resources is described as the use of materials, resources, or land during implementation of an alternative that makes these resources unavailable for other uses, given known technology and reasonable economics.

Industrial resources that will be required during implementation of the selected alternative include fossil fuels, as well as labor and capital.

13.0 ENVIRONMENTAL COMPLIANCE

13.1 National Environmental Policy Act

In accordance with the National Environmental Policy Act, federal projects are required to declare potential environmental impacts and solicit public comment. The purpose of this document is to solicit public comment and fulfill the Corps of Engineers documentation requirements under the National Environmental Policy Act.

13.2 Endangered Species Act Section 7

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, federally funded, constructed, permitted, or licensed projects must take into consideration impacts to federally listed or proposed threatened or endangered species. This document provides the resource agencies with the wildlife impact analysis of the proposed bank stabilization project. Both the National Marine Fisheries Service and the U.S. Fish and Wildlife service provided verbal concurrence with our determination of no effect if the proposed project is completed as detailed in this document.

13.3 National Historic Preservation Act

The National Historic Preservation Act of 1966, as amended requires that the effects of proposed actions on sites, buildings, structures, or objects included or eligible for the National Register of Historic Places must be identified and evaluated. The Lake Washington Ship Canal was listed on the National Register of Historic Places on December 14, 1978. However, according to the Memorandum of Agreement the Corps has with SHPO, this project is classified as routine maintenance therefore, the stabilization of the slope is exempt from coordination with SHPO. According to the Historic Properties Manual, the existing vegetation was planted in the early 1970's and is therefore not eligible for listing on the National Register of Historic Places, which results in an exemption from coordination with SHPO. The appropriate SHPO office was contacted and they provided verbal concurrence with our assessment of the proposed project.

13.4 Clean Air Act

The Clean Air Act requires states to develop plans, called State Implementation Plans (SIP), for eliminating or reducing the severity and number of violations of National Ambient Air Quality Standards (NAAQS) while achieving expeditious attainment of the NAAQS. The act also required Federal actions to conform to the appropriate SIP. An action that conforms with a SIP is defined as an action that will not: (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The U.S. Army Corps of Engineers has determined that emissions associated with this project will not exceed EPA's *de minimis* threshold levels (100 tons/year for carbon monoxide and 50 tons/year for ozone).

13.5 Coastal Zone Management Act

The Coastal Zone Management Act of 1972, as amended, requires Federal agencies to carry out their activities in a manner which is consistent to the maximum extent practicable with the enforceable policies of the approved Washington Coastal Zone Management Program.

The Corps conducted a review of the Seattle Municipal Code Chapter 23.60-Shoreline District. Based on that review, the Corps has determined that the proposed project is consistent to the maximum extent practicable with enforceable policies of the City of Seattle shoreline management program. The following sections of the code are relevant to our project:

SMC 23.60.152 letter H, All shoreline developments and uses shall be located, designed, constructed and managed to avoid disturbance, minimize adverse impacts and protect fish and wildlife habitat conservation areas including, but not limited to, spawning, nesting, rearing and habitat areas, commercial and recreational shellfish areas, kelp and eel grass beds, and migratory routes. Where avoidance of adverse impacts is not practicable, project mitigation measures relating the type, quantity and extent of mitigation to the protection of species and habitat functions may be approved by the Director in consultation with state resource management agencies and federally recognized tribes. The work will be conducted from land limiting disturbance to the aquatic environment and the addition of native understory vegetation is designed to avoid or minimize the adverse impacts to the natural areas of biological significance.

SMC 23.60.152 letter I, All shoreline developments and uses shall be located, designed, constructed and managed to minimize interference with or adverse impacts to beneficial natural shoreline processes such as water circulation, littoral drift, sand movement, erosion and accretion. By conducting all work from the land, no impacts to shoreline processes such as water circulation will occur. The revegetation of the project area will also reduce erosion, which is consistent with the code.

SMC 23.60.152 letter O, Navigation channels shall be kept free of hazardous or obstructing development or uses. By stabilizing the bank, the project is consistent with the code.

SMC 23.60.152 letter Q6A, An open channel, unobstructed by vessels or structures for access to and from the water for public navigation and for access to adjacent properties shall be maintained. By stabilizing the bank and replacing the vegetation, the project is consistent with the code.

SMC 23.60.332 letter A, Development in the CP Environment shall be located and designed to minimize adverse impacts to natural areas of biological or geological significance and to enhance the enjoyment by the public of those natural areas. By stabilizing the bank the U.S. Army Corps of Engineers are enhancing the enjoyment by the public, therefore, the project is consistent with the code.

13.6 Clean Water Act.

The Clean Water Act was created to establish and enforce water quality standards as well as regulate the dredging and filling of navigable waters. The proposed project has been reviewed in regards to section 401, 402, and 404 of the Clean Water Act of 1972 as amended. The project will not include in-water work, will not discharge material into navigable waters or violate water quality standards. Best management practices for stormwater and sediment control will be used above ordinary high water, therefore, no additional Clean Water Act certifications are required.

14.0 CONCLUSION

Based on the above analysis, this project is not a major Federal action significantly affecting the quality of the human or natural environment; and, therefore, does not require preparation of an environmental impact statement.

15.0 REFERENCES

Allan, J. H. 1980. Life history note on the Dolly Varden char (Salvelinus malma) in the upper Clearwater River, Alberta. Alberta Energy and Natural Resources, Fish and Wildlife Division, Red Deer, Alberta, Canada.

City of Seattle, 1999. Environmental Assessment/Final Environmental Impact Statement. Cedar River Watershed Habitat Conservation Plan.

Fraley, J.J. & B. B. Shepard. 1989. Life History, ecology, and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River System, Montana, Northwest Science 63: 133-143.

Goetz, F. 1989. Biology of the bull trout: a literature review. USDA Forest Service, Technical Report for Willamette National Forest.

Hansen, L.T. Geogianna, D. Houck, and J. Frodge, 1994. Lake Union Data Compilation and Review. King County Department of Metropolitan Services. March 1994.

King County. 1998. Ecology of Pacific Salmon and Chinook; the Status of Puget Sound Stocks. Fact Sheet. 2 pp.

Kurl, H., 2000. Personal Communication. Seattle Audubon Society, Seattle Washington.

Traynor, J. 1971. Lake Washington sockeye salmon smolt studies. Unpublished memorandum. University of Washington. 9pp.

USACE, 1994. Master Plan (PM 9)- Lake Washington ship canal. Prepared by Seattle District, US Army Corps of Engineers. Seattle, WA.

USACE, 1994. Historic Property Management Plan for Lake Washington ship canal. Draft submittal prepared by the technical center of expertise for preservation of historical structures and buildings. Seattle District, US Army Corps of Engineers. Seattle, WA.

USACE, 1998. Renewing the Historic Colonnade- Fremont Cut. Unpublished. Prepared by: Seattle District, U.S. Army Corps of Engineers. Seattle, WA.

USFWS. 1986. Recovery plan for the Pacific bald eagle. U.S. Fish and Wildlife Service, Portland, Oregon.

Washington Department of Fish and Wildlife. 1997. State of Washington wild salmonid policy. Draft Environmental Impact Statement. Washington Department of Fish and Wildlife. Olympia, WA.

Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Tribes. 1993. 1992 Washington State salmon and steelhead stock inventory, Olympia. Cited as SASSI 1993.

Washington Department of Wildlife, 1991. "Endangered and Threatened Species; 1991 Status Report." Washington Department of Wildlife Nongame ProgramOlympia, Washington. 14 pp.

Williams, R. W., R. M Laramie, and J. J. Ames. 1975. A Catalog of Washington Streams and Salmon Utilization, Vol. 1, Puget Sound Region. Washington Department of Fisheries.

Woodey, J.C. 1970. Lake Washington sockeye salmon smolt studies. Unpublished memorandum. University of Washington. 7pp.

Woodey, J.C. 1969. Lake Washington sockeye salmon smolt studies. Unpublished memorandum. University of Washington. 9pp.