Milltown Island Restoration Project
Biological Assessment

Prepared by
Skagit River System Cooperative

March 22, 2006

I. Background/History

A. *Project history*

The Milltown Island Restoration Project site is located in northwest Washington State, in Skagit County on the lower Skagit River delta. The project site is located on the South Fork of the Skagit River, just downstream and south of the town of Conway where the South Fork bifurcates into Tom Moore and Steamboat Sloughs as it drains to Skagit Bay (Figure 1). The area of Milltown Island totals approximately 313 acres and consists of two distinct zones. One zone is an area that has been anthropogenically disturbed by a levee constructed by settlers attempting to drain the island for cultivation (Figure 2). This area is approximately 160 acres in size. The second zone is the area existing on the outskirts of the levee, primarily to the south, that remains somewhat undisturbed. This area is approximately 153 acres.

The project area was diked and hydrologically disconnected from the Skagit River as well as Skagit Bay tides via a series of diking projects beginning in the late 1800s. One of these diking projects was the US Army Corps of Engineers (ACOE) Skagit River Project in 1911. The Washington Department of Fish and Wildlife (WDFW) obtained these lands in the late 1940s and early 1950s. The two sections of the project site, plus additional properties totaling approximately 14,000 acres, are managed by WDFW as the Skagit Wildlife Area. At one time the department intended to manage this property for attracting waterfowl. However, this approach was abandoned in 1976 when a large flood event breached the existing levees in several locations. Following the flood event the levees were not repaired and the fields were allowed to go fallow. In recent years some attempt has been made to improve hydrologic connection within the levee section by further breaching of the remaining levees. During construction of the neighboring Deepwater Slough restoration project (Corps 1998), demolition teams from the National Guard used the site for a training exercise setting off charges that resulted in three additional breaches in the relic levee system.

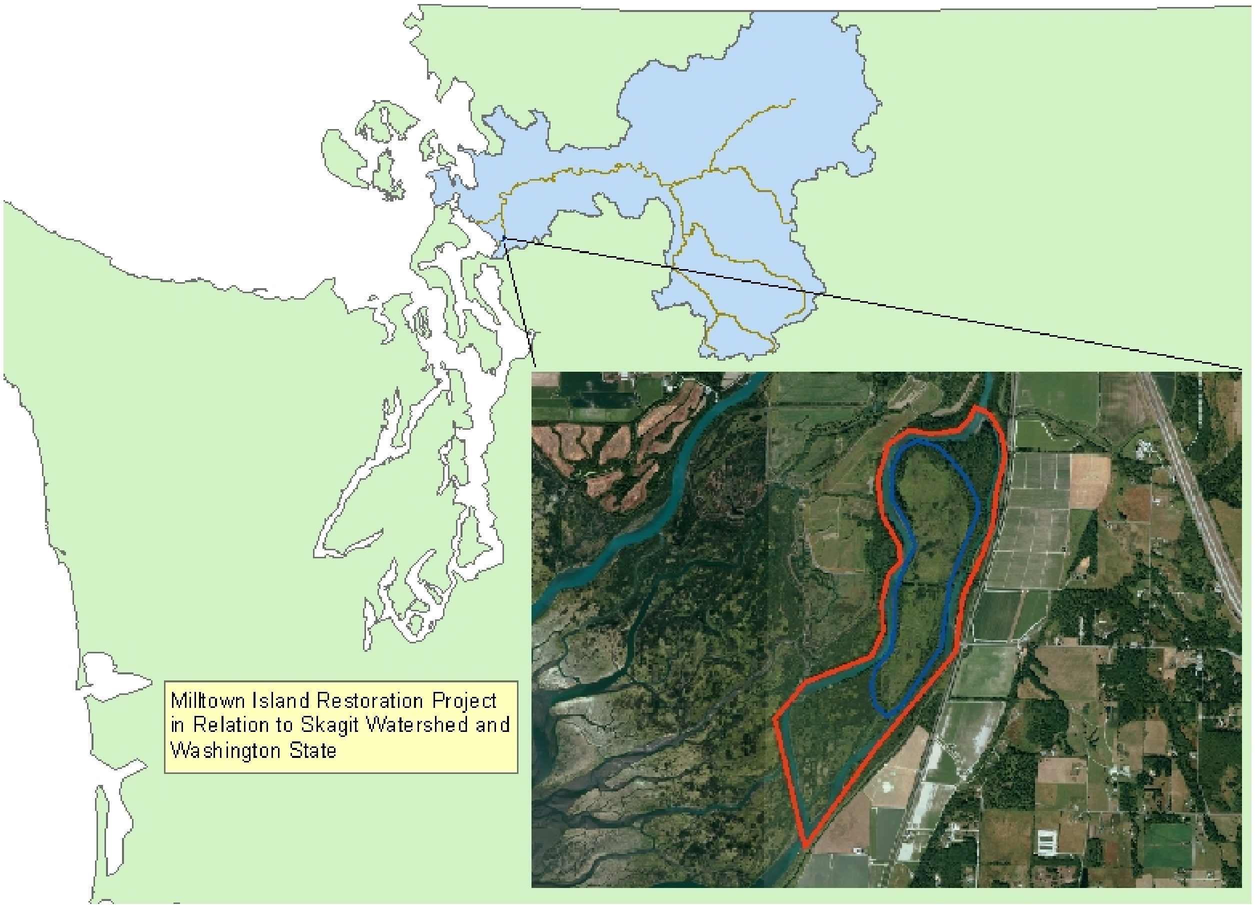

Figure 1. Location map of Milltown Island, Skagit County, Washington.

The goal of the Milltown Island Restoration Project is to restore natural processes, functions, conditions and biological responses within a portion of the project area. Specifically, the project seeks to restore the natural processes and conditions of the area that were disrupted by diking, by removing levees to restore river and tidal influence and inundation to the restored part of the project area. Secondarily, the project seeks to restore the native vegetative community that has been disrupted by farming and invasive species.

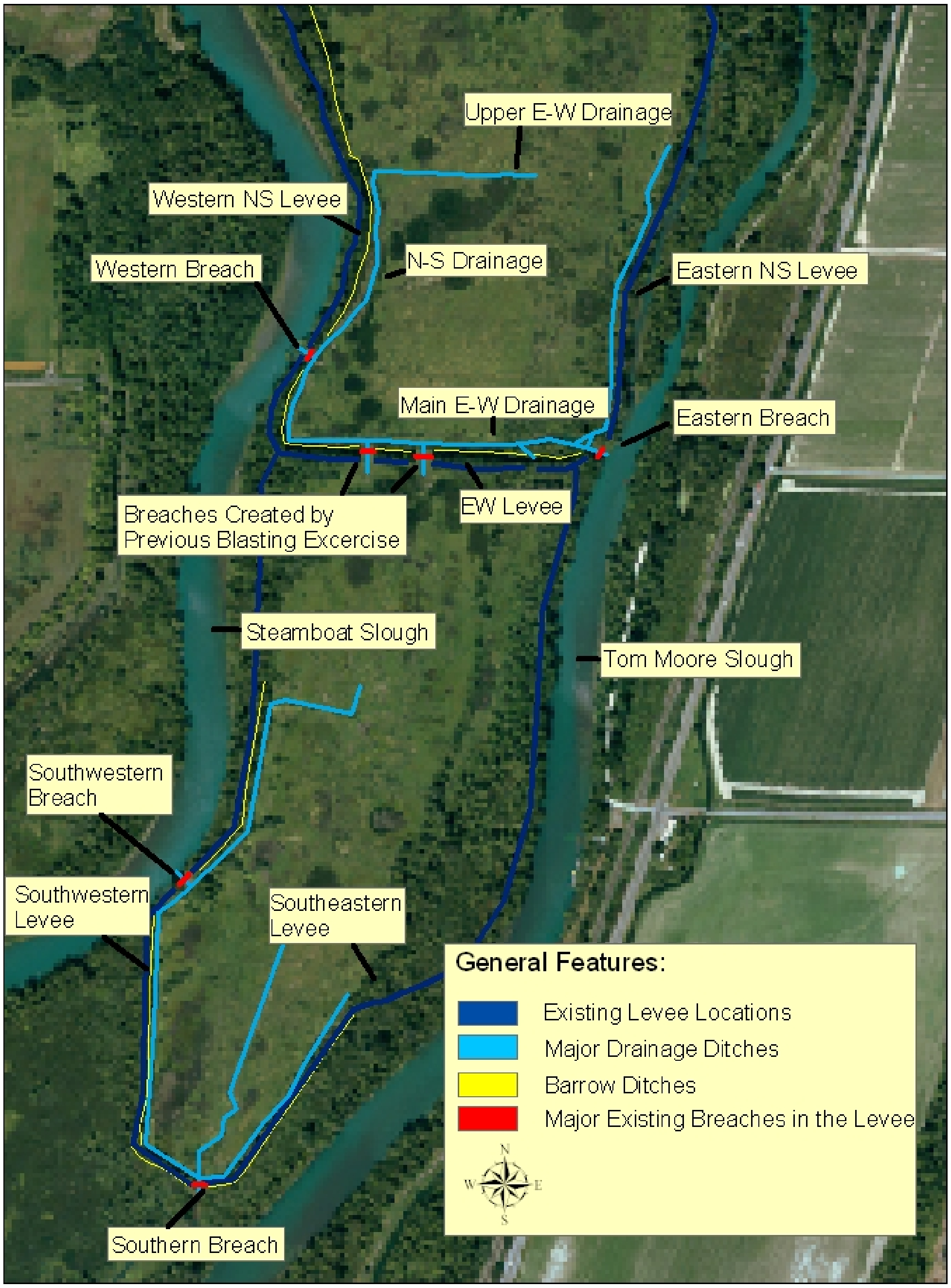

Figure 2. Key features of Milltown Island project area

B. ***Federal action history***

Milltown Island was included in the project area for the Deepwater Slough project completed by the ACOE in October 2000 (Corps 1998). This project removed 14,000 feet of existing levee and constructed 8300 feet of new levees in the Skagit Delta in an effort to restore delta habitats. At least two breaches in the Milltown Island dikes were blasted as part of the project.

The Skagit River System Cooperative (SRSC) has received funding from the Salmon Recovery Funding Board to do additional restoration work on Milltown Island. The restoration strategy includes actions such as the removal of levees and relocation of levee material that require permits from the ACOE and other governmental agencies. This biological assessment was submitted to the ACOE on March 22, 2006 to assist in the permitting process.

II. Description of the Action

A. ***Discussion of federal action***

Skagit River System Cooperative (SRSC) has prepared this Biological Assessment (BA) to facilitate review of the proposed action as required by Section 7(c) of the Endangered Species Act (ESA). This BA has been prepared to assist in coordination between NOAA Fisheries, the United States Fish and Wildlife Service (USFWS), and the US Army Corps of Engineers (ACOE). It demonstrates that the proposed project is not likely to adversely affect ESA-listed species.

The proposed federal action is issuance of permits to Skagit River System Cooperative by the US Army Corps of Engineers under section 404 of the Clean Water Act for the removal of levees and associated restoration work on Milltown Island.

B. ***Description of project purpose***

The purpose of this project is to restore natural hydrologic and biological function to the portions of Milltown Island that have been isolated by levees. Reconnecting the isolated portions of the island to river and tidal influence is expected to restore natural biological functions. This project has three specific objectives:

1. Remove or reduce artificial hydrologic controls in the diked portion of Milltown Island through levee removal or perforation.

2. Encourage channel development in the diked area in order to restore the quantity and quality of habitat for anadromous fish.

3. Restore natural vegetative communities through plantings and control of invasive species.

C. ***Project description***

1. Description of project activities

a) Overview

Milltown Island is located on the South Fork of the Skagit River delta, near the town of Conway, Washington. It is bounded on the west by Steamboat Slough, and on the east by Tom Moore Slough, both distributary channels of the Skagit River. Much of the island was extensively diked and converted to farmland in the late 19^{th} and early 20^{th} centuries. Before levee construction, Milltown Island was characterized by estuarine and palustrine shrub vegetation, which has largely been eliminated in the Puget Sound region. Since being diked, the interior of the island has been disconnected from tidal and riverine influences, and has largely converted to a marshy field dominated by invasive reed canarygrass (RCG) (*Phalaris arundinacea*). The area supports fewer tidal channels than are seen in undiked tidal marshes in nearby areas of the Skagit delta, and channel formation has been negligible (Hood, unpublished data). In comparison, the undiked portions of Milltown Island are largely tidal shrub wetlands and feature tidal channel numbers and area comparable to other areas of the delta. The contrast between the diked and undiked portions of the island strongly suggests that there is potential for significant restoration of tidal channel and estuarine shrub habitat in the diked portions of Milltown Island.

This project will address the loss of habitat function that has occurred as a result of the dike construction on Milltown. The project actions are designed to restore processes and conditions of the area that were disrupted by diking, eliminating the effects of river and tidal hydrology and sediment supply. Previous restoration efforts on Milltown Island by the ACOE during the Deepwater Slough Restoration Project (Corps 1998) used several levee breaches in an attempt to restore tidal and riverine influence to the area. These breaches were in addition to several that were created when sections of levee failed during flood events.

Despite these breaches, analysis of historical photos clearly indicates that significant tidal channel development has not occurred in this area (Hood, unpublished data). In contrast, complete dike removal in the Deepwater Slough restoration project in 2000 resulted in the development of new tidal channels within the first two years of dike removal. The number of tidal channels draining the Deepwater restoration site has doubled and tidal channels are elongating and elaborating through new headcutting (Hood 2003). The contrast between relatively rapid Deepwater channel development and negligible Milltown channel development suggests that the difference may be due to the likely differential effects of complete dike removal (as occurred for Deepwater) versus a few dike breaches (for Milltown). Consequently, we hypothesize that more extensive removal of levees that enclose formerly farmed portions of Milltown Island will result in significantly greater and more rapid tidal channel development in this area.

b) Specific actions

This project will consist of three specific actions, each intended to achieve the three primary project objectives (above).

(1) Levee removal actions

There are seven sections of levee identified for deconstruction (complete removal or extensive perforation) (Figure 3). These sections have been strategically selected to maximize the reconnection of tidal and riverine processes to the interior of the island.
The levee and associated silt berm at location B currently deflects the Skagit river away from the interior of Milltown Island and is a barrier to natural river meander. Location C also acts in a similar fashion but to a lesser degree. The proposed action involves excavating both lengths of levee (1120ft) to at or below the elevation of the outer silt berm. The silt berm elevation is above the ordinary high-water mark through most of its length, preventing direct connection between the interior and the river at ordinary flows. In several locations additional excavation will carve channels (see “Channel formation actions,” next section) through the silt berm, connecting interior habitats to direct influence from the river. This will also increase tidal prism and encourage channel development in areas that were behind the levee.

Locations F and G both mark preexisting weak spots in the West-East running levee, and will be breached to provide additional tidal prism on the east side of the lower half of Milltown island. Location F is a pair of small preexisting breaches in the levee that allows water passage during periods of high tide and large flows. Location G is a low spot near on the far eastern edge of the west-east running levee that also allows flow during times of high water. The proposal calls for both of these locations to be opened up into breaches of approximately 40 feet wide and deepened to allow flows for longer periods of time. These breaches are similar in size to the breaches excavated in the Deepwater Slough project (Corps 1998).

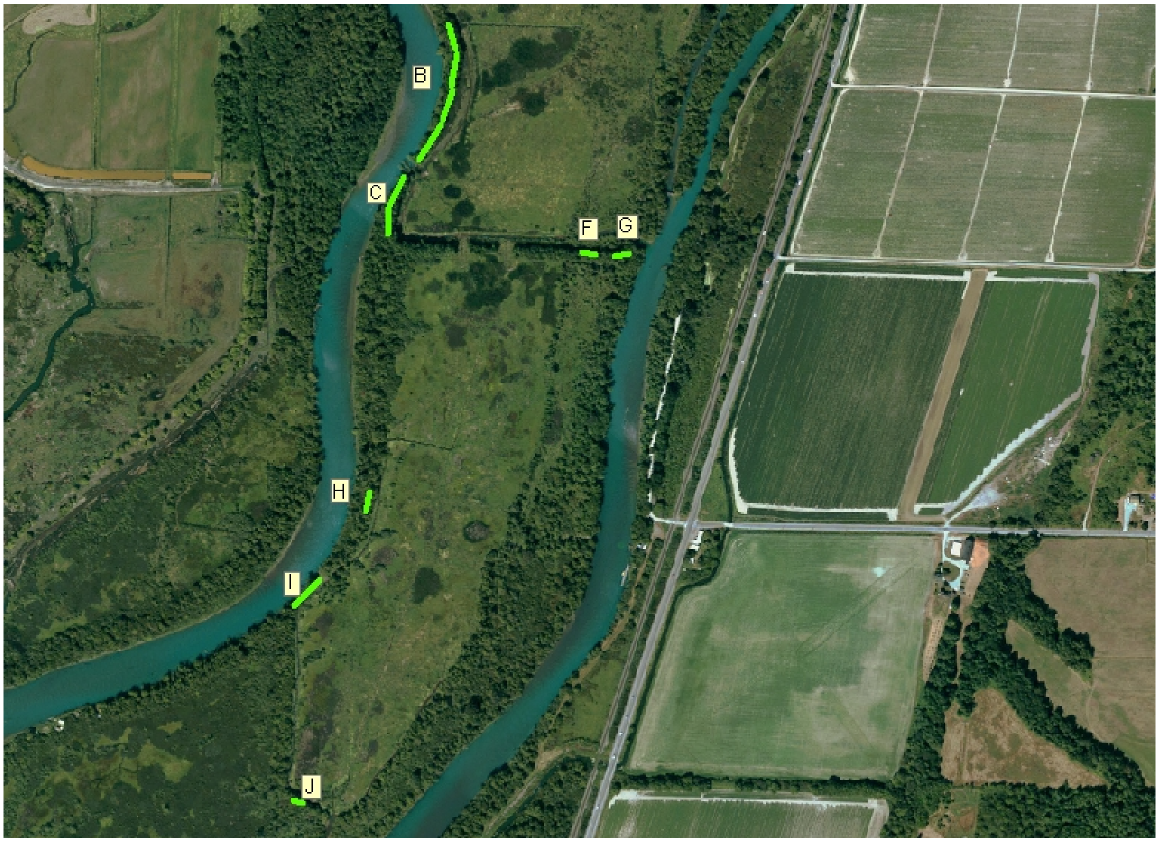

Figure 3. Levee sections to be removed under the proposed action.

Table 1. Levee removal actions

	Location	Length (ft)	Average width (ft)	depth (ft)	cu.feet	cu.yard
	North-South Levee					
B	North-South Levee Above western breach	760	20	4.25	64600	2393
C	North-South Levee Below western breach	360	16	4	23040	853
	West-East Levee					
F	breach 1	40	17	5	3400	126
G	breach 2	40	17	5	3400	126
	Southern half					
H	N. of current breach	40	13.3	5	2660	99
I	S. of current breach	40	13.3	3	1596	59
J	southern tip breach	40	13.3	4	2128	79
	Total:	1320			100,824	3735

Removal of the levee at locations H and I will allow additional flows into the lower half of Milltown Island. Levee perforation at location J will open up additional connectivity between the diked interior and the undiked portions of the southern end of Milltown Island. At all three of these locations approximately 40 feet of levee will be removed for flow access.

Similar levee removal projects have used heavy equipment to excavate and haul material off-site. The isolated location, heavy vegetation, and saturated soils of Milltown Island make the use of excavators, heavy trucks, and other equipment cost and time-prohibitive or impossible. Therefore, levee removal will be accomplished primarily through the use of carefully controlled and directed explosive charges.

Blasting holes will be drilled in the levee using a 4" auger to depths equaling ~120% of the height of the levee. These holes will be lined with thin walled PVC pipe or waterproof cardboard tubes to hold blasting powder. Depending on the depth and consistency of the material to be removed, 1 to 4 pounds of blasting agent will be used per cubic yard of material removed.

Blasting will be directed so that the levee material is thrown to the interior side of the levee and away from the Skagit River. This will place levee material in and around the barrow ditch created by the original construction of the levee (Figure 4). Assuming that most material will be deposited within 50 feet of the levee, approximately 1.28 acres of barrow ditch and adjacent wetlands will be covered by displaced levee material. The areas covered by levee material are expected to remain wetlands after excavation, and approximately 0.5 acres of levee footprint will be restored to wetland elevations. The displaced levee material will be immediately replanted with native grass seed mix along with willow stakes and other shrubs.

Alder and other trees that are present on the levee top will be removed in the process of deconstruction (Table 2). These will be used as LWD in the barrow ditches after blasting occurs, to both provide sediment retention and habitat value for fish.

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Location	Total trees	<12"	12" – 24"	>24"
B	68	18	46	4
C	76	50	26	0
F	21	16	5	0
G	2	0	1	1
I	12	1	10	1
H	10	2	8	0
J	2	0	1	1
Total	191	87	97	7

Table 2. Number of trees to be removed in each section of levee removal. Size classes are diameter at breast height, in inches.

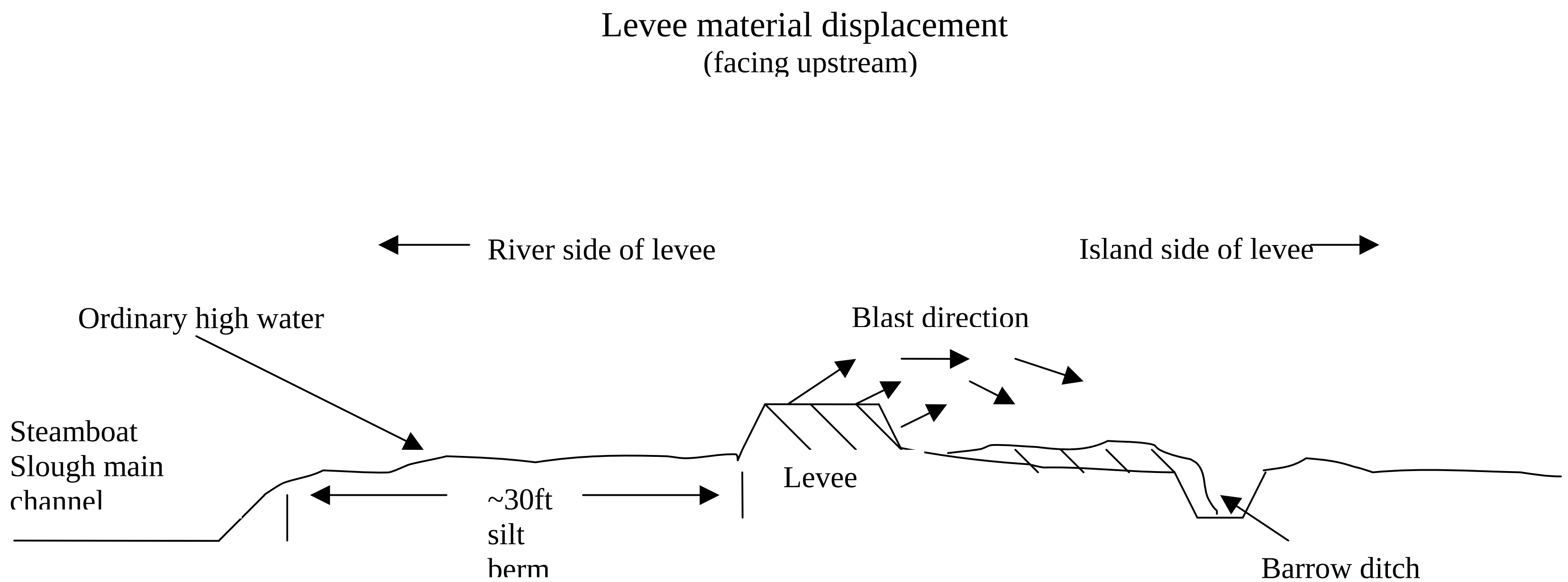

Figure 4. Schematic of typical levee excavation.

The use of explosives near water can produce a shock wave that can be transmitted into the water. To limit fish mortality due to this shock wave, the Canadian Department of Fisheries and Oceans (CDFO) recommends limiting the potential overpressure of the blast to less than 100 kPa (Wright and Hopky 1998). This can be attained by using time-staggered charges in rapid series, so that each breaching action is a series of smaller individual blasts, rather than a single unified blast. Additionally, overpressure is reduced over distance and medium. Using the recommended setback distance table from the CDFO guidelines (Table 3) the use of individual charges of 5 to 10 kg provide sufficient setback from the water's edge (6.5m – 9.2m) to accomplish most of the levee removal.

Substrate Type	Weight of Explosive Charge (kg)							
	0.5	1	2	5	10	25	50	100
Rock	3.6	5.0	7.1	11.0	15.9	25.0	35.6	50.3
Frozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Unsaturated Soil	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

Table 3.   Setback distance (m) from center of detonation of a confined explosive to fish habitat to achieve 100 kPa guideline criteria for various substrates. (Wright and Hopky 1998)

While the vast majority of the levee network lies more than 10 meters away from the ordinary high-water mark (OHWM), there are portions of the levee network that fall within this distance. During the proposed work window, Skagit River flows are typically at their lowest, so that the water edge is considerably below the OHWM. During summer low flows, water depth in Steamboat Slough can drop to a point where access to Milltown Island is only possible during high tides, even in a small jet-powered skiff. These seasonal low flows increase the distance between the excavation site and the mainstem channel, increasing the effective setback distance between the blasting zone and the water's edge.

Although the levee deconstruction will be during a work window designed to minimize any adverse effect to fish, conservation measures are planned to further reduce the possible impacts. In the interior channels and barrow ditches that may be affected by the blasting and still have standing water, we will set up block nets to prevent access by listed fish before the excavation begins. Before each excavation, any standing water in the ditch system will be seined, and any fish present will be carefully removed and released into the mainstem channel downstream of the project area. At least one pass using a stick seine will be made through any standing water; if ESA-listed fish are captured, additional passes will be made until none are captured. Capture and removal of listed species through electrofishing is not practical in the area due to the turbidity in the channels that makes seeing stunned fish difficult.

Sediment control measures will be used to reduce turbidity in excavated areas (Washington State Department of Ecology 2005). Perimeter sediment fencing will be placed along areas of levee excavation, and straw will be scattered where exposed soils have the potential to contribute to sediment loads. A native grass seed mix will be planted immediately following excavation to stabilize exposed soils.

(2) Channel formation actions

Channel formation within the project area is expected to increase as the area is subjected to the direct influence of river and tidal action. However, the presence of significant ditching and the dense root structure of RCG in the interior of the island will impede formation of new channels. To overcome these controls, new channels will be excavated with explosives in areas that will encourage channel elongation and elaboration through headcutting.

This technique is planned in three areas. The first area is in the large east-west ditch that bisects the northern section of the project area (location K, Fig. 5). This ditch currently receives some tidal prism through the existing breach to the southwest. It also captures sheet flow and flow through small channels that feed into it from the north. Since this ditch captures flow and prevents the formation of new channels to the south, meanders will be excavated with explosives so that the apex of the meanders point to the north and south. These meanders will each be about 100 feet in total length, and diverge from the main ditch by about 30 feet at their farthest point. Creating new channel meanders will create habitat complexity within the existing ditch system while encouraging diversion of water and new channel formation to the south.

The second area of planned channel construction is on the central east-west levee, in the breaches created by the Deepwater Project’s previous blasting (locations D & E, Fig. 5). These existing breaches have small blind channels that end ten to twenty meters to the south of the levee, and receive water only at high tides and high river flows. These existing channels will be deepened and widened to improve flow through the existing levee breaches and initiate channel formation in the field south of the cross levee.

The third area of channel construction is on the north end of the island (location A, Fig 5). At this location a channel will be excavated along an existing relic channel and through the levee. This channel is intended to connect low-lying portions of the northwest interior of the island to periodic river flow. Increasing the frequency and volume of water flow into this area is expected in aid in channel formation in the area north of the east-west ditch, which currently diverts flow coming through the existing breaches to the south, and has impeded channel formation north of the ditch.

Channel creation will also occur in the silt berm on the outside of the levee, as mentioned above (location B, figure 5.) These channels will penetrate the silt berm to allow hydrologic connection between the river and the island's interior over a wider range of flows and tides. In areas where setback guidelines cannot be met during construction of these channels (i.e. adjacent to the river), excavation will be completed using hand or small power tools instead of blasting.

The blasting technique for the channel creation will use the same general methods as for the levee removal, except that blasting holes will be drilled to a depth of 4 feet. Whenever RCG is encountered, two charges will be placed in each hole, one at channel depth and the second just below the surface. The charges will be set off in sequence, with the top blowing first to break the RCG root mat, so that the lower charge can move material out of the channel.

Figure 5. Locations of channel formation excavations.

Table 3. Channel construction excavations

Location		Length (ft)	Average Width (ft)	depth (ft)	cu.feet	cu.yard
	North-South Levee					
A	Northern access	260	4	3	3120	115.56
B	Cut 1	120	4	3	1440	53.33
	Cut 2	100	4	3	1200	44.44
	Cut 3	80	4	3	960	35.56
	Cut 4	60	4	3	720	26.67
	East-West Levee					
D	Modification 1	120	4	3	1440	53.33
E	Modification 2	120	4	3	1440	53.33
	Southern half					
H	Cut 5	120	4	3	1440	53.33
	E-W Cross ditch					
K	Meander 1	100	4	3	1200	44.4
	Meander 2	100	4	3	1200	44.4
	Meander 3	100	4	3	1200	44.4
	Meander 4	100	4	3	1200	44.4
	Total:	1380			16560	613.33

Channel construction will use the same general conservation measures as outlined for levee removal. Since the amount of material to be moved is relatively small compared to the levee removal blasting, little or no wetlands will be filled during channel construction. Instead, material will be scattered around the site, without substantial accumulation in one place. This technique has been used in wetlands restoration in South Slough, Oregon, with good results (Cornu 2005).

(3) Invasive vegetation control actions

The interior of the project area (both north and south Milltown Island) is primarily occupied by reed canarygrass (RCG). Intermixed in the RCG-dominated fields are large patches of cattail (*Typha spp),* small groupings of rushes (*Juncus spp*.) and individual willows (*Salix spp*.) and Sweetgale (*Myrica gale*). As an invasive plant, RCG is notorious for being difficult to control and remove once it has occupied a site. It is capable of tolerating both saturated and dry soils, and has a long-lived seed bank that allows RCG to repopulate a controlled area if not addressed. Though there are several recommended procedures for the control of RCG, most of these only addresses the existing plant and only for short periods of time. Establishing a canopy cover appears to be the most effective, long-term method of control (Antieau 2006).

Invasive vegetation control will be conducted in two stages. The first will be to establish riparian buffers of native vegetation along existing channels on the eastern half of the interior field. The second will be to identify potential new channels after the levee have been breached and high flows have had a chance to affect the interior. These locations will then be treated with the same riparian buffers as the channels in the first stage.

Due to the remote location and difficulty of access of the project area, disking or the use of other heavy equipment to till the RCG under is not an option. For this fact we also intend to set up the buffers to require a minimum of maintenance activity. The buffers (~5'x~100ft) will be created by mechanically mowing the buffer zones free of RCG and cattail. A light-excluding groundcloth will be set down and stapled to the area to impede the regeneration of RCG. Riparian vegetation will be established by puncturing the barrier and planting appropriate species. Initial treatment will be large willow and cottonwood stakes to rapidly establish a canopy cover. Sweetgale and spruce will be planted on a smaller scale.

(4) Work windows

The following work windows apply to the proposed project:

Bald eagles:

> For compliance with Nationwide Permit (NWP) National General Condition 11, the following construction activity prohibitions apply to protect bald eagles, listed as threatened under the Endangered Species Act. These windows also serve as a general guideline for other permit activities (regional general permits, letters of permission and standard individual permits).
>
> (a) No construction activity authorized under a NWP shall occur within 1/4 mile of an occupied bald eagle nest, nocturnal roost site, or wintering concentration area, within the following seasonal work prohibition times.
> (b) No construction activity authorized under a NWP shall occur within 1/2 mile BY LINE OF SIGHT of an occupied bald eagle nest or nocturnal roost site, within the following seasonal work prohibition times.
>
> Work prohibition times:
> (1) Nesting between January 1 and August 15 each year.
> (2) Wintering areas between November 1 and March 31 each year.

Figure 6 illustrates the ¼ mile and ½ mile zones around two known nesting sites within the action area.

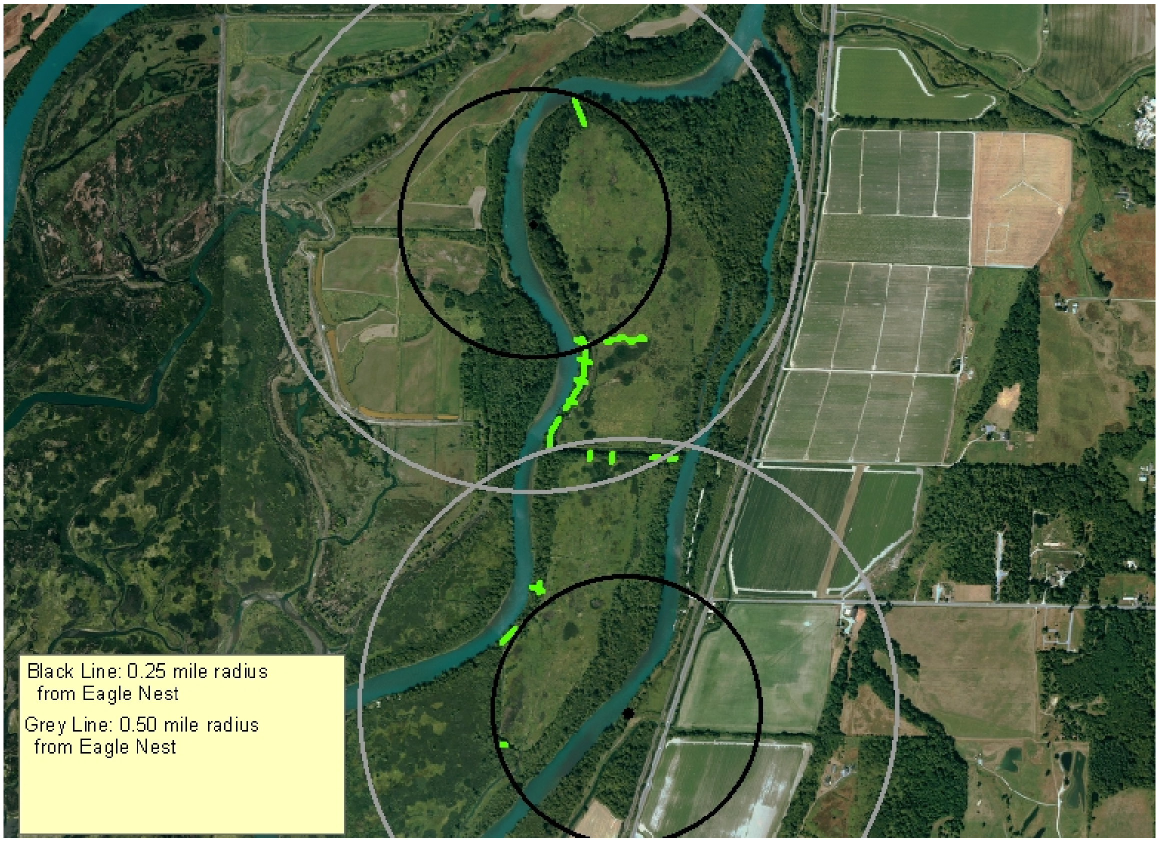

Figure 6. Eagle nests within action area

In-water work window:

Skagit River (mouth to Sauk River): June 15th to August 31st.

The combination of the bald eagle and in-water work windows would limit most levee removal and channel construction activities to August 15th to August 31st. In order to have sufficient time to complete these activities, the proposed action includes an extension of the in-water work window to September 30th. The proposed work-window extension will allow work to be completed during September, the month with the historically lowest Skagit River flows. This will also help mitigate possible impacts to migrating adult Chinook salmon, which are much less abundant in the action area by mid- to late-September (see section IV (B) (1) (a), Environmental Baseline). Excavation work closest to the river, which has the most potential to disturb adult Chinook, will be performed towards the end of this work window extension.

D. ***Discussion of previous projects in the action area***

As part of the Deepwater Slough restoration project, the Army used explosives to create three breaches in Milltown Island levees (Figure 2). While these breaches helped increase water flow and tidal flushing into the interior ditching network, they have not grown with time and flood events. Two breaches were blasted in the east-west cross levee, which pass a limited volume of water from the interior barrow ditch only at high flows and tides. An additional breach was blown in the outer levee adjacent to the river, on the east side of the island.

Photos of the Deepwater Slough project blasting work are shown in Appendix I.

E. ***Project area and action area defined***

The action area for the purpose of a section 7 evaluation encompasses all areas that could be affected directly or indirectly by the proposed action (50 C.F.R. §402.02). Direct effects are the direct or immediate effects of the project on the species or its habitat. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 C.F.R. §402.02).

The action area for this project includes all areas where work will occur and any adjacent uplands, wetlands, or aquatic habitats that may be affected by the proposed project (Figure 7). The action area includes all of Milltown Island. The action area also includes areas beyond the immediate site that could be directly or indirectly affected by the proposed action.

Potential indirect effects could result in water quality impacts to the Skagit River distributaries downstream of the project area. Therefore, the entire length of Steamboat and Tom Moore Sloughs, between their northern and southern confluences, including all associated wetlands, aquatic, and semi-aquatic habitat, is included within the action area. Since the project area includes only the northern portion of Milltown Island within or near levees (Figure 7), the action area extends approximately 2 km downstream of the project area. The species lists for this project includes bald eagle, an avian species. The action area for the proposed action extends for a radius of approximately one mile from the project site as the potential disturbance zone for bald eagle.

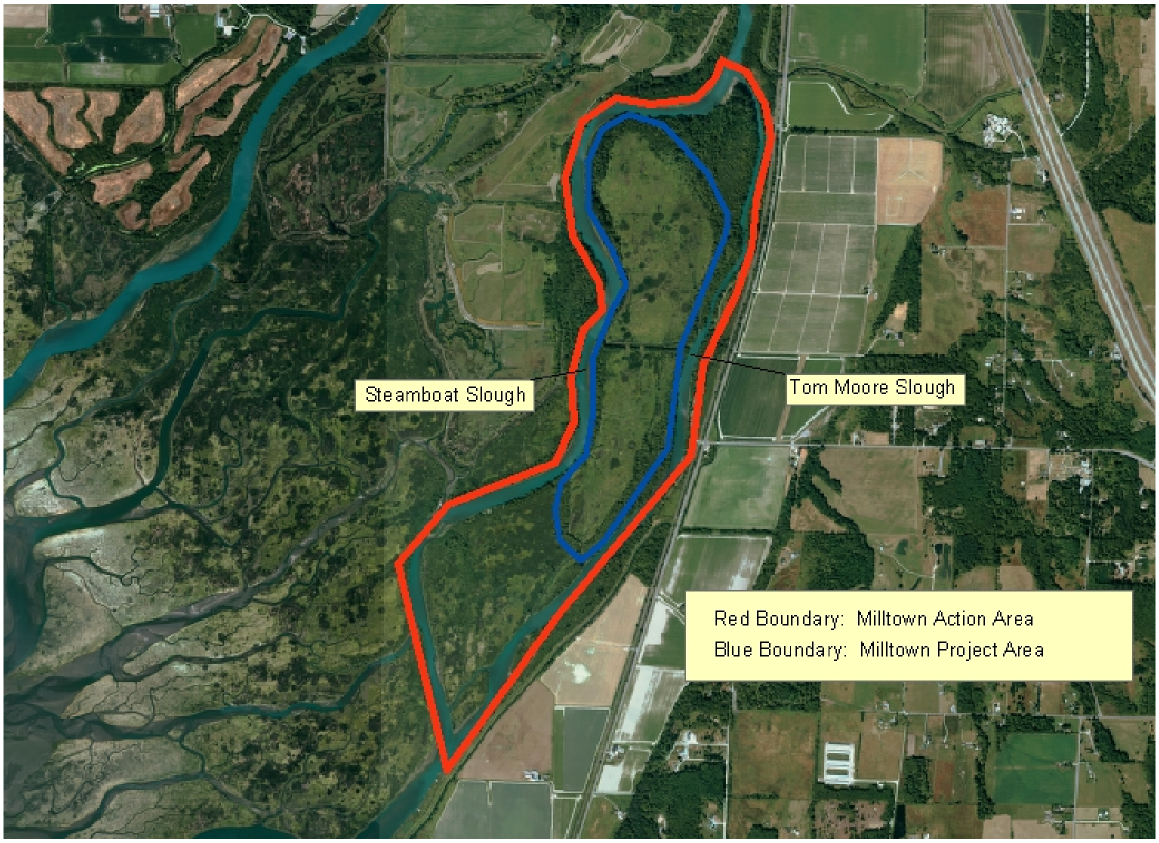

Figure 7. Milltown Island Restoration Project Area and Action Area

III. Status of Species and Critical Habitat

A. *Species list*

The project occurs within the general range of the following ESA regulated species:

Common Name	Scientific Name	ESA Status	Regulatory Agency
Bald Eagle	*Haliaeetus leucocephalus*	Threatened	USFWS
Coastal/ Puget Sound Bull Trout	*Salvelinus confluentus*	Threatened	USFWS
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened	USFWS
Puget Sound ESU Chinook Salmon	*Oncorhynchus tshawytscha*	Threatened	NOAA Fisheries
Puget Sound DPS Steelhead	*Oncorhynchus mykiss*	Proposed for listing	NOAA Fisheries

B. *Description of species*

1. Chinook salmon

The life history of Puget Sound Chinook salmon is described in detail in *NOAA Technical Memorandum NMFS-NWFSC-35 Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California* (Myers *et al*., 1998) and is included herein by reference. A summary follows to assist in the discussion of effects related to the proposed action.

Chinook salmon have a historic range from the Ventura River in California to Point Hope, Alaska in North America; and from Hokkaido, Japan to Anadyr River in Russia (Myers *et al.* 1998). Chinook salmon are anadromous. The 1992 *Salmon and Steelhead Stock Inventory* (SASSI) report states that adult Chinook salmon return to the Skagit River system to spawn during three peaks between April and October (WDFW, 1994). Fry emerge in the winter and spring. Juvenile Chinook may rear in freshwater from three months to two years, with outmigration occurring year-round (NMFS, 1998). The literature is somewhat in conflict on the timing of the peak outmigration of Skagit River Chinook. Shepard (1981) reports that outmigration peaks in the Skagit River system occur in mid April and again in mid June. However, SASSI reports that Skagit Chinook generally migrate to salt water in the summer and fall, with some fish overwintering in fresh water and outmigrating in the spring (WDFW, 1994). Regardless of outmigration timing, Puget Sound Chinook spend from two to four years foraging in the Puget Sound and/or the North Pacific before returning to spawn. Chinook salmon die after spawning.

Chinook require varied habitats during different phases of their life. Chinook typically spawn in the mainstem of larger rivers and tributaries. Spawning habitat generally consists of riffles and the tailouts of pools with clean substrates dominated by cobbles. Juvenile Chinook rear in the lower mainstem of rivers before entering the estuary and salt marshes. This is a period of intense growth; Shepard (1981) reports individual juvenile Chinook may grow from 1 percent to 2 percent a day in salt marsh environments. Individual juvenile Chinook may spend, on average, two to six days in salt marsh habitats (BIA *et al.,* 1996); however, the year-round out-migration from the rivers results in a generally constant recruitment to marsh habitat over the entire year (Stober *et al.* in Shepard 1981). After using estuary or salt marsh habitats, Puget Sound Chinook move to more pelagic habitats.

2. Bull trout

The life history of coastal bull trout is described in detail in the *Determination of Threatened Status for Bull Trout in the Coterminous United States; Final Rule* (Federal Register, 1999) and is included herein by reference. A summary follows to assist in the discussion of effects related to the proposed action.

The historical distribution of bull trout extends from northern California to Alaska. In Washington, bull trout are found throughout coastal and inland streams and lakes (WDW, 1991).

Bull trout have a complex life history that includes a resident form and a migratory form. The individuals of the migratory form may be stream dwelling (fluvial), lake-dwelling (adfluvial), or ocean- or estuarine-dwelling (anadromous) (USFWS, 1998). Individuals of each form may be represented in a single population; however, migratory populations may dominate where migration corridors and sub-adult rearing habitats are in good condition (USFWS, 1998). Most inland populations of bull trout are either fluvial or adfluvial, migrating from larger rivers and lakes to spawn in smaller tributary streams in September through October (Wydoski and Whitney, 1979). Bull trout spawn in streams with clean gravel substrates and cold (less than 9 degrees Celsius) water temperatures (USFWS, 1998). Spawn timing is relatively short, spanning from late October through early November. Redds are dug by females in water eight to 24 inches deep, in substrate gravels 0.2 to 2 inches in diameter (Wydoski and Whitney, 1979). Emergence generally occurs in the spring. Bull trout are opportunistic feeders, consuming fish in the water column and insects on the bottom (USFWS, 1998). Bull trout do not necessarily die after spawning, and may spawn more than once.

3. Bald eagle

The life history of bald eagles is described in detail in the *Pacific Bald Eagle Recovery Plan* (USFWS, 1986) and is included herein by reference. A summary follows to assist in the discussion of effects related to the proposed action.

The range for bald eagles extends from Alaska and Canada across North America to the Chesapeake Bay and Florida (USFWS, 1986). Bald eagles primarily eat fish, although they sometimes feed on waterfowl and carrion (Erlich *et al*., 1988; WDFW, 1991). Stalmaster (1987) states that over 50 percent of an eagle's diet commonly consists of fish, 25 percent of other birds, and 15 percent of mammals.

Bald eagles are both residents in, and migrants through the Puget Sound region. Eagle populations are usually highest in the region in the winter months when both resident birds and winter migrants are present due to the mild winter climate and abundant fall salmon runs (Stinson et al., 2001). Bald eagles generally perch, roost, and build nests in mature trees near water bodies and available prey, usually away from intense human activity. They prey on a variety of foods including fish, birds, mammals, carrion, and invertebrates. In the Puget Sound region, waterfowl and fish are generally the most common food for eagles (Watson, 2002). In western Washington, bald eagles breed during mid- to late winter. Bald eagles typically return to one of several nests located within an established nesting territory (Stalmaster, 1987).

4. Marbled murrelet

Marbled murrelets are found from the Aleutian Islands of Alaska south to central California, and individual birds may winter as far south as southern California. In Oregon and Washington, marbled murrelets are year-round residents on coastal waters. Murrelets feed near the surface or dive in pursuit of small fish and invertebrates in shallow marine waters (generally less than 330 feet deep) typically within 0.6 to 1.2 miles or 1-2 km of shore (USFWS, 1997). The diet of the marbled murrelet varies according to availability but typically includes Pacific sand lance (*Ammondytes hexapterus*), Pacific herring (*Clupea harengus*), northern anchovy *(Engraulis mordax*), and smelts (Osmeridae) (USFWS, 1997).

In western Washington, marbled murrelets nest and roost in mature coniferous forests and mid-successional forests with old-growth characteristics (USFWS, 1997), usually within 50 miles or 80 km of coastal waters (USFWS, 1997). The nesting period ranges from April 1 to September 15. Murrelets may nest in clusters (but not colonies) and they tend to breed in the same forest stand in successive years (USFWS, 1997). Nest trees are typically greater than 32 inches (81 cm) in diameter at breast height (dbh). Murrelets prefer large flat conifer branches, often covered with moss (WDW, 1991). These branches can range from four to 25 inches (10 to 63 cm) in diameter. Nesting branches are usually located in the upper third of the tree canopy layer (USFWS, 1997). Noise and visual disturbances near nesting habitat can result in abandonment of the nest, decreased feeding rates, impaired development of nestlings, and avoidance of suitable habitat (USFWS, 1997).

Major threats to this seabird include degradation and outright loss of nesting habitat due to timber harvesting and land conversion practices (USFWS, 1997). Murrelets are vulnerable to impacts from oil spills and other marine pollution because of their association with near-shore marine environments (USFWS, 1997).

5. Steelhead

The Puget Sound Steelhead Distinct Population Segment (DPS) is under consideration for listing under the ESA, and a status review is being completed (Federal Register 2005). The life history of steelhead is described in detail in *Status Review of Steelhead from Washington, Idaho, Oregon and California* (Busby et al. 1996) and is included herein by reference. A summary of the life history of the Puget Sound Steelhead DPS is presented in the Federal Register notice of consideration of listing (Federal Register 2005); and is excerpted here:

> Steelhead is the name commonly applied to the anadromous form of the biological species *O. mykiss*. The present distribution of steelhead extends from Kamchatka in Asia, east to Alaska, and down to the U.S. Mexico border (Busby e*t al.*, 1996; 67 FR 21586, May 1, 2002). *O. mykiss* exhibit perhaps the most complex suite of life history traits of any species of Pacific salmonid. They can be anadromous (‘‘steelhead’’), or freshwater residents (‘‘rainbow or redband trout’’), and under some circumstances yield offspring of the opposite life-history form. Those that are anadromous can spend up to 7 years in freshwater prior to smoltification (the physiological and behavioral changes required for the transition to salt water), and then spend

up to 3 years in salt water prior to first spawning. O. mykiss is also iteroparous (meaning individuals may spawn more than once), whereas the Pacific salmon species are principally semelparous (meaning individuals generally spawn once and die). Within the range of West Coast steelhead, spawning migrations occur throughout the year, with seasonal peaks of activity. In a given river basin there may be one or more peaks in migration activity; since these ‘‘runs’’ are usually named for the season in which the peak occurs, some rivers may have runs known as winter, spring, summer, or fall steelhead.

Steelhead can be divided into two basic reproductive ecotypes, based on the state of sexual maturity at the time of river entry and duration of spawning migration (Burgner et al., 1992). The summer or ‘‘stream-maturing’’ type enters fresh water in a sexually immature condition between May and October, and requires several months to mature and spawn. The winter or ‘‘ocean-maturing’’ type enters fresh water between November and April with well-developed gonads and spawns shortly thereafter. In basins with both summer and winter steelhead runs, the summer run generally occurs where habitat is not fully utilized by the winter run, or where an ephemeral hydrologic barrier separates them, such as a seasonal waterfall,. Summer steelhead usually spawn farther upstream than winter steelhead (Withler, 1966; Roelofs, 1983; Behnke, 1992).

C. ***Critical Habitat designation***

1. Chinook salmon

Critical habitat for the Puget Sound Chinook ESU was designated in September 2005, in 70 CFR 52686, and became effective January 2, 2006. Critical habitat for this species includes areas that contain physical or biological features essential to the conservation of the ESU (for example, spawning gravels, water quality and quantity, side channels, forage species). These features are referred to as Primary Constituent Elements (PCEs). Specific types of sites and the features associated with them include:

> *1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;*
>
> *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;*
>
> *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;*
>
> *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.*
>
> *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.*
>
> *6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.*

The action area for the proposed project is within the area designated as critical habitat for the Puget Sound Chinook ESU. (Fig. 8) Within the general region designated as critical habitat (i.e. the Skagit River upstream from the mouth), the critical habitat boundaries are designated as the lateral extent of the ordinary high-water mark. While this would exclude much of the interior of the island that has been shielded from regular inundation, this analysis includes the entirety of the action area, including the interior of Milltown Island in its consideration of critical habitat. The interior is included because following levee removal, some of this area will be inundated during high water, effectively expanding the extent of critical habitat.

The PCEs that are most applicable to the habitats present in the action area are #2 (freshwater rearing sites); #3 (freshwater migration corridors); and #4 (estuarine areas). No known spawning (PCE #1) of Chinook occurs in the action area, and PCEs 5 and 6 apply to marine areas.

As detailed in the environmental baseline section below, the PCEs within much of the action area have been degraded from their historical condition. Factors responsible for degraded freshwater rearing include the loss of floodplain connectivity and channel habitat due to the diking of the island, and the conversion of native estuarine shrub vegetation to invasive reed canarygrass. The loss of the original estuarine shrub community has also lead to the loss of beavers, which construct dams in tidal channels that provide low-tide pools which act as predation refuges for juvenile salmon. Factors responsible for degraded estuarine habitat include a reduction in side channel habitat, and reduced flows into remaining side channels. The freshwater migration corridor for spawning adults is not seriously degraded, as both Tom Moore and Steamboat Sloughs are easily passable; however, juvenile outmigration is likely compromised by the loss of holding and foraging habitat due to levee construction.

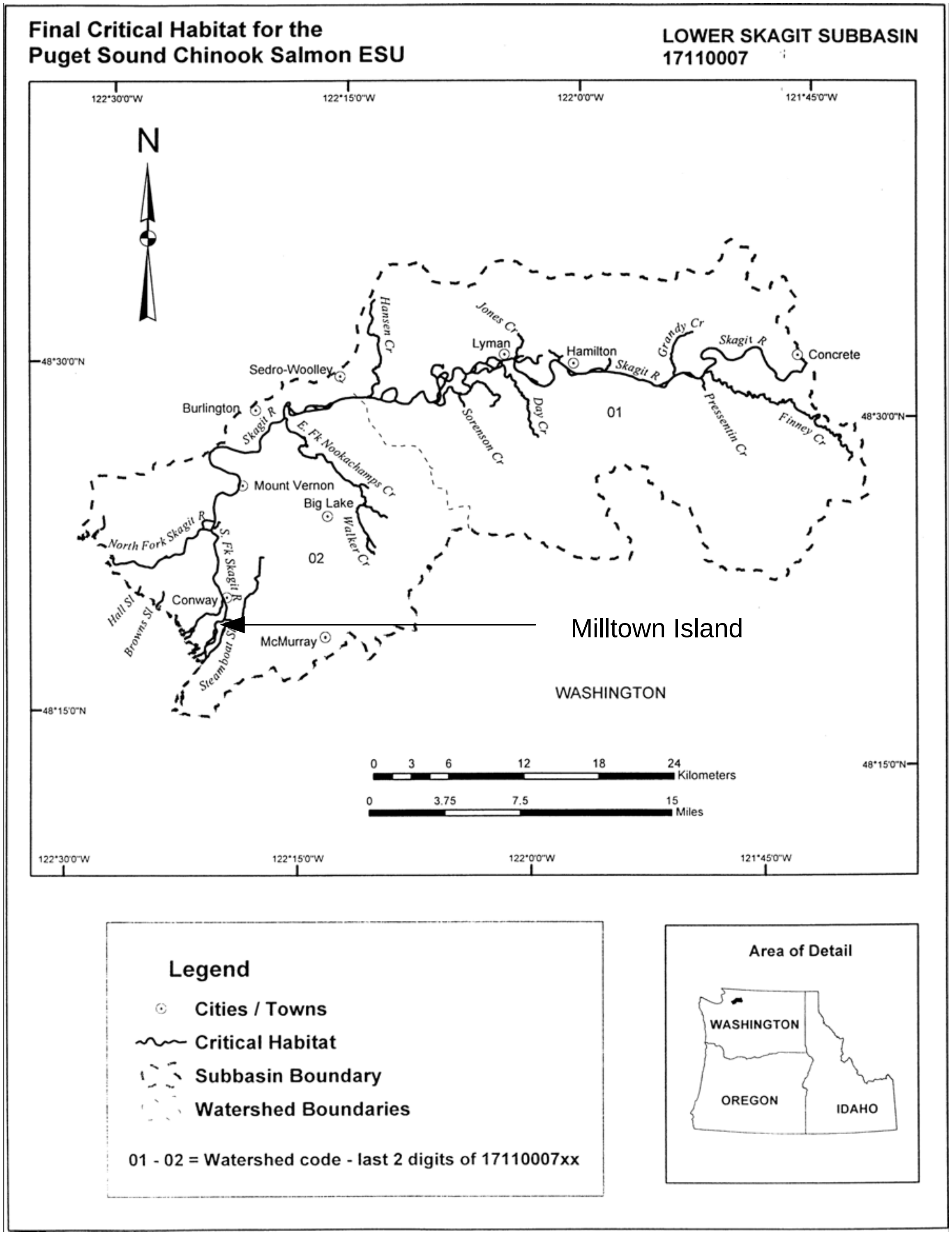

Figure 8. Critical habitat designation for Puget Sound Chinook Salmon in the Lower Skagit watershed. from **Federal Register** / Vol. 70, No. 170 / Friday, September 2, 2005 / Rules and Regulations **52693**

2. Bull trout

Critical habitat for the Coastal Puget Sound Bull Trout ESU was designated in September 2005, in 70 CFR 56212, and became effective October 26, 2005. The PCEs for Coastal Puget Sound Bull Trout were determined to be:

> *(1) Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 2 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 with temperatures that preclude any bull trout use are specifically excluded from designation;*
>
> *(2) 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;*
>
> *(3) 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 inch (0.63 centimeter) in diameter.*
>
> *(4) 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;*
>
> *(5) Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source;*
>
> *(6) 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;*
>
> *(7) An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;*
>
> *(8) Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.*

The action area for the proposed project is within the area designated as critical habitat for the Coastal Puget Sound Bull Trout (Fig. 9). As for Chinook, while the lateral limit of the critical habitat designation is the ordinary high water mark, which would exclude the interior of Milltown Island, this analysis considers the entire action area.

The PCEs for the area are generally degraded. In the interior of the island, diking has reduced tidal channel habitat, and remaining channels receive less flow than in historical conditions. While no baseline temperature data is available, the reduction of flow and tidal flushing may result in water temperatures above the preferred range for bull trout. Complex channel structures have been replaced by ditches, and the original shrub vegetation has been replaced by invasive reed canarygrass. The combination of these factors have degraded the PCEs in the interior of the island.

In the mainstem sloughs that surround the island, bull trout PCEs are relatively intact. Spawning migrations and juvenile outmigration corridors do not have serious impediments to passage. Water flows, woody debris, and habitat complexity are functioning acceptably. Water quality has been somewhat impacted by upstream development and agricultural uses, and is typically turbid, but fish have adapted to these local conditions.

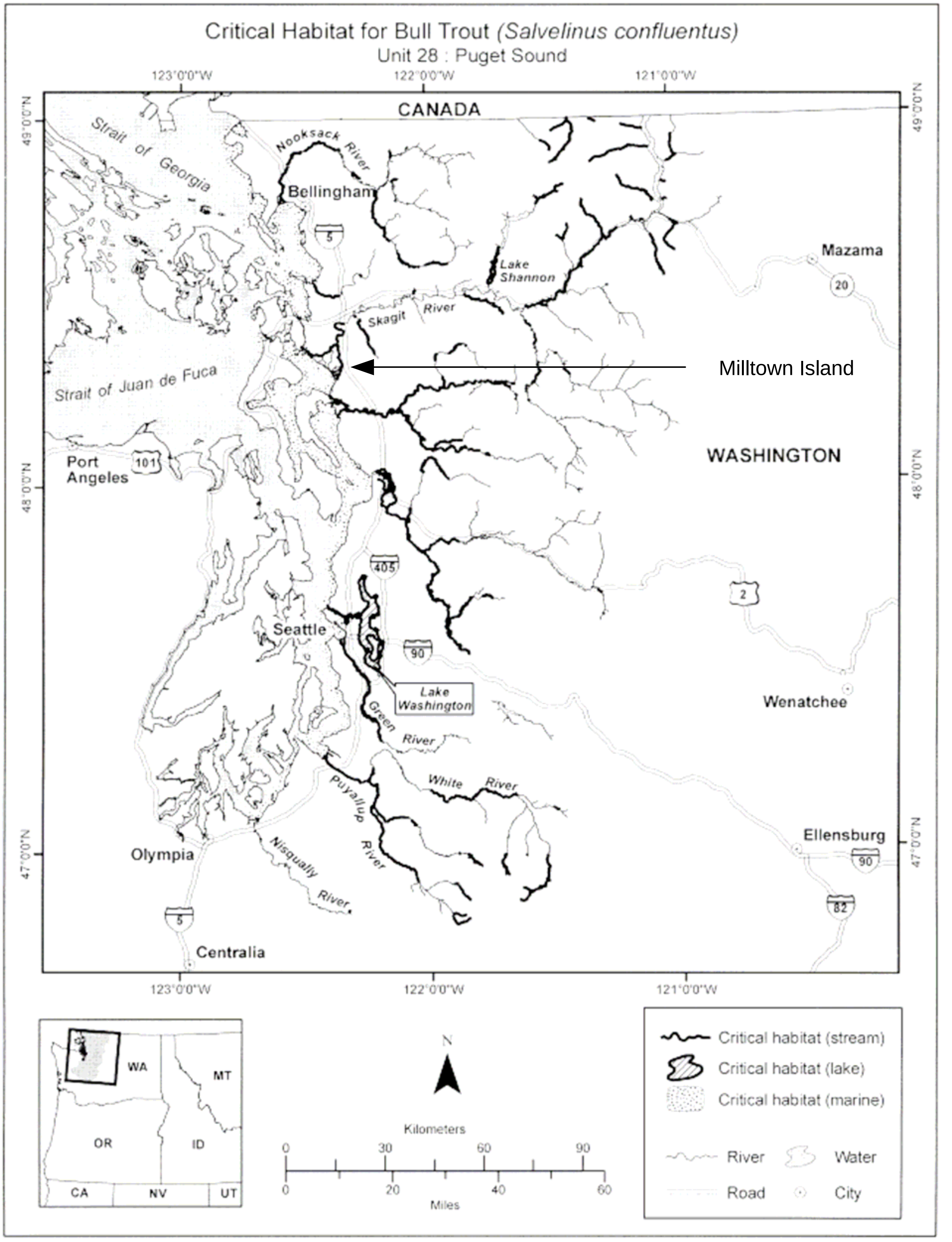

Figure 9. Critical habitat designation for bull trout in Puget Sound.
(from **Federal Register** / Vol. 70, No. 185 / Monday, September 26, 2005 / Rules and Regulations **56309)**

3. Bald eagle

No Critical Habitat has been designated for bald eagles.

4. Marbled murrelet

Marbled murrelet critical habitat was designated in May 1996 in 50 CFR Part 17. In general, critical habitat for the marbled murrelet in Oregon and Washington includes terrestrial areas that support nesting, roosting, and other behaviors essential to the conservation of this species (USFWS, 1996). Critical habitat does not include marine foraging areas. Important features of critical habitat within suitable areas include 1) individual trees with potential nesting platforms, and 2) forested areas within 0.5 miles of individual trees with potential nesting platforms and with one-half the site-potential tree height (USFWS, 1996). Refer to Appendix 1 of the marbled murrelet recovery plan for an illustration of critical habitat in Oregon, Washington, and California (USFWS, 1997).

5. Steelhead

Since Puget Sound steelhead are only under consideration for listing, critical habitat has not been designated for steelhead. Section 4(a)(3)(a) of the ESA requires that, to the extent prudent and determinable, critical habitat be designated concurrently with the listing of a species, so that critical habitat is likely to be designated if the Puget Sound steelhead DPS is listed under the ESA. If critical habitat is designated for Puget Sound steelhead, the action area would likely be included in the designation.

IV. Environmental Baseline

A. *Description of the Action Area and Project Area*

The project area for the proposed action is the northern part of Milltown Island, within the area encircled by levees, including the associated dikes and silt berms. The action area is all of Milltown Island, plus the entire length of Steamboat and Tom Moore Sloughs (adjacent to Milltown Island), including all associated wetlands, aquatic, and semi-aquatic habitat. (See section II (D) and Figure 7).

B. *Description of the environmental baseline*

1. Species

a) Chinook salmon

The PS Chinook ESU has been defined to include all naturally spawned PS Chinook populations residing below impassable natural barriers (e.g., long-standing natural water falls) from the Nooksack River to the Elwha River on the Olympic Peninsula, inclusive. The PS Technical Review Team (PSTRT), an independent scientific body convened by NMFS to develop technical de-listing criteria and guidance for recovery planning of PS Chinook, has identified 22 geographically distinct populations representing the primary historical spawning areas of PS Chinook (PSTRT 2001). Overall abundance of PS Chinook salmon in this ESU has declined substantially from historical levels, and many populations are small enough that genetic and demographic risks are likely to be relatively high (March 9, 1998, 63 FR 11494). Status reviews have identified a number of factors for decline including habitat conditions, artificial propagation, and harvest of the species. Degradation and loss of estuarine, riparian, and freshwater habitats through past and present urbanization, agricultural activities, man-made impassible barriers, and the ecological legacies of past forest practices remain the significant 5 limiting factors to recovery (June 14, 2004, FR 33102), threatening ESU abundance, diversity, spatial structure and productivity.

Significant portions of the historic life-history diversity and spatial structure of the ESU have been lost; it is estimated that 15 spawning aggregations are extinct that were either demographically independent historical populations, or major components of the life history diversity of the remaining 22 populations. An estimated nine of the 15 extinct populations were likely spring Chinook. Their loss represents a disproportionate loss of this life history to the ESU. Of these 22 remaining populations, five (North Fork Stillaguamish, North Fork Nooksack, Dungeness, White, and Elwha) are supported by hatchery programs designed to ensure that abundance remains above critical levels.

The Skagit River system is the origin of the most abundant wild Chinook salmon populations in Puget Sound. The Puget Sound Recovery Team (2001) recently estimated that the Skagit River and its tributaries historically produced approximately 370,000 Chinook salmon annually. In contrast, wild Chinook terminal run sizes have averaged about 14,000 annually since 1990 (R. Bernard, personal communication).

Juvenile Chinook are known to occur in the Skagit River distributaries that surround the entire project site (Beamer et al. 2000; Beamer et al. 2005; Beamer et al. 2006). As a result of Chinook life history studies in the Skagit watershed and nearshore, rearing habitat constraints in the Skagit delta have been shown to be a major limiting factor in the survival of Skagit Chinook smolts. (Beamer et. al. 2005) Currently, delta habitat is at capacity and additional smolt production over the current capacity results in density-dependent displacement of smolts into Skagit Bay, where they experience poor survival. Restoration of rearing habitat for juvenile Chinook in delta estuarine habitats has been identified as a key factor in the recovery of Skagit Chinook.

The use of Skagit delta habitats by juvenile Chinook was first studied by SRSC crews in 1992, and has continued to the present. Beach seine and fyke trap sampling is conducted in distributary and blind channel habitats throughout the delta, beginning in early February and ending in December. Data from sampling sites at Deepwater Slough was selected to evaluate the current and potential use of habitat within the action area by juvenile Chinook. The Deepwater Slough site was chosen because of its proximity to Milltown Island, the similarity of its habitat types, and its history as a restoration project similar to the one being planned at Milltown Island.

The restoration project at Deepwater Slough, approximately 1 km northwest of the Milltown Island area, removed several miles of levees and returned over 200 acres of estuary back to river and tidal hydrology. (Corps 1998) Following levee removal, beach seine and fyke net trapping were used to monitor the presence and abundance of juvenile Chinook in both newly restored and nearby untreated tidal channels (Beamer et. al 2006). Sampling was conducted in March through July of 2001 to 2003, in both blind and distributary channels.

In both treated and untreated channels, Chinook were present between March and July, with peak abundances in April (Figure 9). Juveniles had largely left blind channel habitat in July, but were still present in distributary channels in some years. Treated sites, i.e. channels that had been opened as a result of levee removal, had juvenile Chinook abundances that were as high as or higher than comparable untreated sites, suggesting that levee removal was an effective tool to create rearing habitat at Deepwater Slough (Beamer et al 2006).

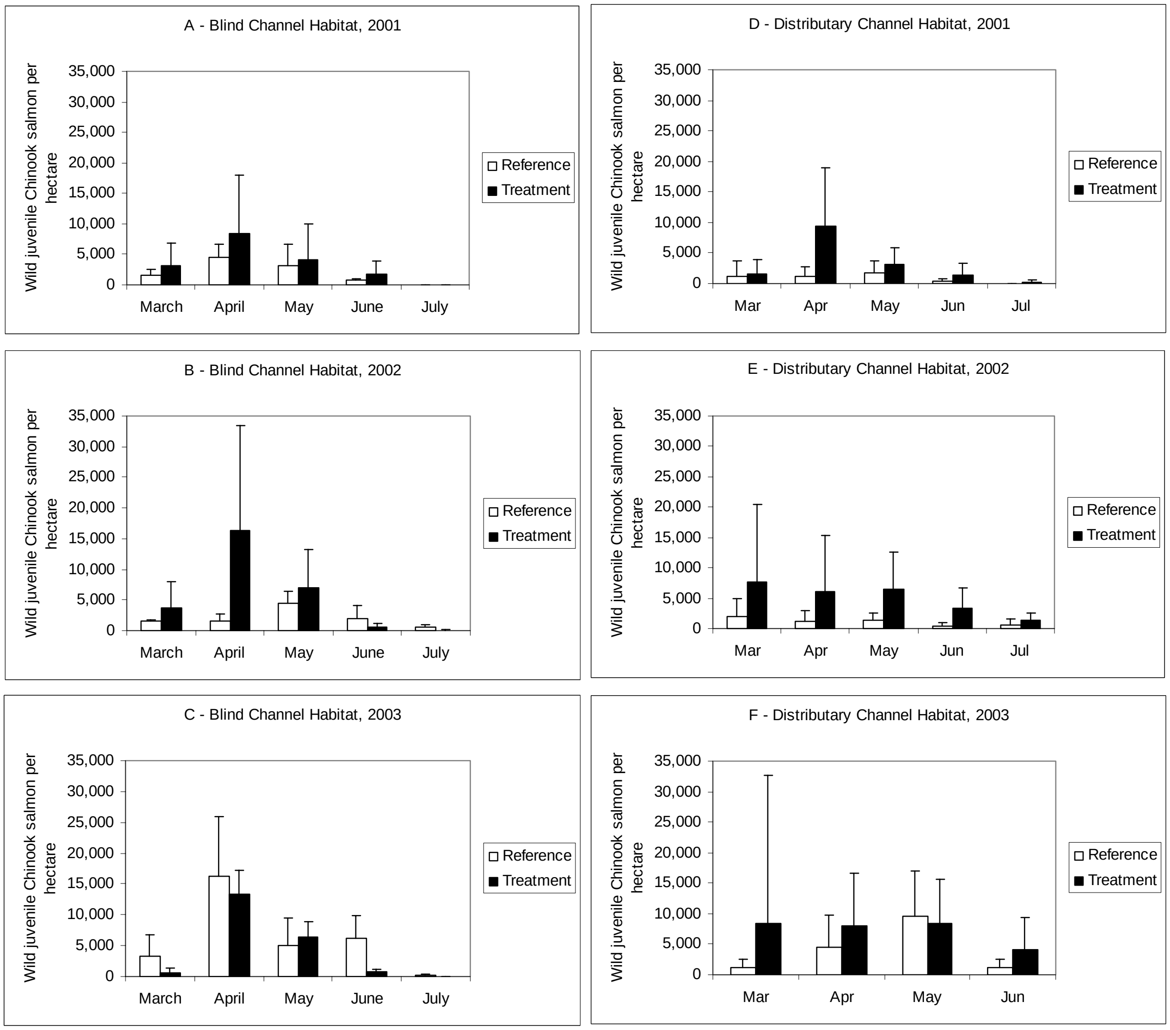

Figure 9. Monthly average juvenile Chinook salmon densities at reference and treatment sites for the Deepwater Slough Restoration Project. Yearly results for blind channel sites are shown as figures A-C. Yearly results for distributary channel sites are shown as figures D-F. Error bars are 1 standard deviation. (from Beamer et. al 2006)

Test fisheries have been conducted on the Skagit River since 1985 to provide run timing and composition information to fisheries managers. These fisheries are conducted at Blake's drift, at river mile 1 on the North Fork distributary, and at Spudhouse drift, immediately above the divergence of the North and South Forks. Two test fisheries are conducted at Blake's drift: a six-hour Chinook fishery conducted weekly from management weeks 19 to 35 (about the first week of May to the end of August) and a twelve-hour coho fishery conducted weekly from weeks 34 to 45 (about the third week of August to the first week of November). The

Spudhouse test fishery is a twelve-hour coho fishery that also occurs weekly from week 34 to week 45.

Run timing information from these test fisheries can be used to illustrate when adult Chinook are likely migrating through the action area (Figure 10). Since Spudhouse drift is only a few miles upriver from the action area, and Blake's drift is at a similar position on the North Fork, adult Chinook abundance in the action area likely parallels the timing seen in the test fisheries. The peak of spring Chinook migration is seen in the peak catches of week 21; summer and fall Chinook migration peaks occur between weeks 32 and 37.

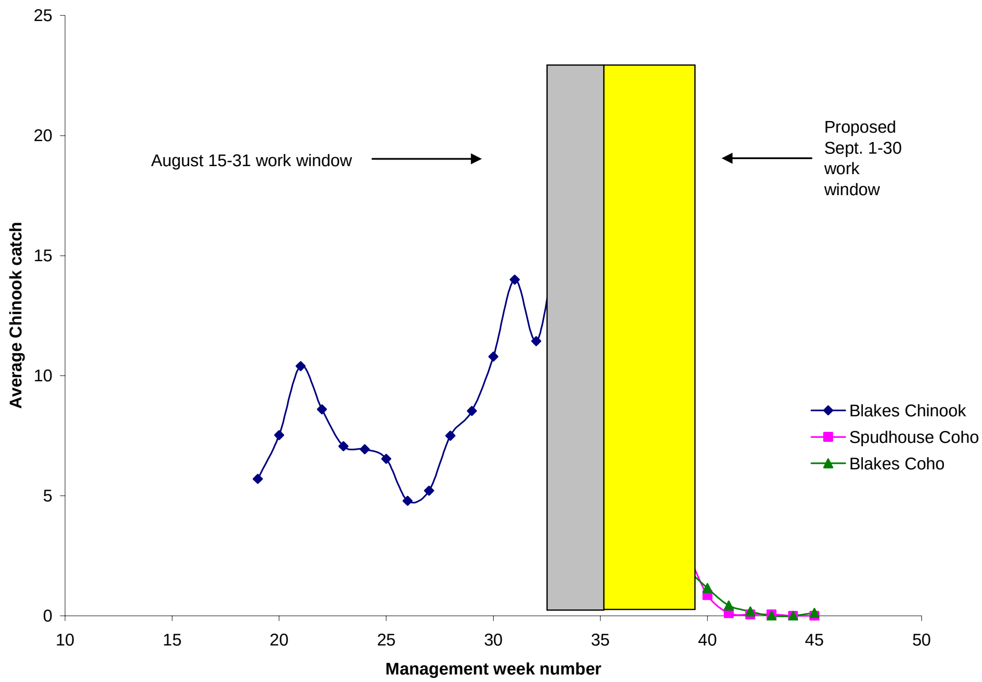

Figure 10. Average Chinook catch during test fisheries on the Skagit River, 1985-2005.

b) Bull trout

Anadromous native char are known to occur in the Skagit River system (WDFW, 1998). The Skagit River stock is considered a robust population, with a 1997 fall count of 10,000 adults (Kraemer, personal communication, 1999). This population includes anadromous, fluvial, adfluvial, and resident fish. Individuals of each form may be represented in a single population; however, migratory populations may dominate where migration corridors and subadult rearing habitats are in good condition (USFWS, 1998). Most coastal bull trout are anadromous.

Bull trout seasonally inhabit the Skagit River delta and associated distributary channels, including blind tidal channels. Data from beach seine and fyke trap sampling in the delta between 1995 and 2002 have demonstrated patterns in bull trout habitat use in the Skagit delta (Beamer and Henderson, 2004).

Bull trout were shown to use both larger distributary channels and blind channels, but showed a preference for deeper water. No bull trout were found in areas with a water depth of less than 0.3 m, and were infrequently caught in water depths of less than 1 m. Bull trout were most frequent in water more than 2.5 m deep. Delta habitats are used seasonally, with bull trout presence beginning in April and extending through August, with a peak in June. Most of the fish found in delta habitats were sub-adults (<300mm fork length) (Beamer and Henderson 2004).

Adult bull trout typically migrate through the delta to reside in marine, estuarine and nearshore areas during the spring and summer (Goetz et. al. 2004). Sub-adult fish first migrate to marine waters in early March, and adults usually migrate in April and May. The period of marine residency usually ends by late July, as fish return to upriver spawning areas. Spawning occurs from August to November (Goetz et. al. 2004)

c) Bald eagle

Eagle populations have decreased within the region as a result of hunting, legal until the 1940's, and the widespread use of DDT, which was banned in 1972. Bald eagle numbers have been increasing since that time. In 1998, there were 664 occupied nests in the state of Washington and there are some indications that the bald eagle population has reached carrying capacity in parts of western Washington (Final Bald Eagle Status Report, WDFW, 2001) Eagle populations are usually highest in the Puget Sound Region in January, as birds that had moved north in late summer to feed on coho salmon runs in British Columbia and Alaska return to the region (Matthews, 1988).

Bald eagles are both residents in, and migrants through, Skagit County. Bald eagles have been occasionally observed flying over the island during preliminary field work. There are two bald eagle nesting sites in the action area, of which one of is on Milltown Island itself (Figure 6). The nest on the island was unoccupied in 2005, but was occupied in 2001 (Julie Stofel, personal communication). The other nest is across Tom Moore Slough to the east and it was not in the WDFW database but will be added. The nearest occupied territories in 2005 were Lake Ketchum which is about 2 miles to the south and Conway Hill which is about 2.5 miles to the north (Julie Stofel, personal communication). It is possible that one of these nests will be occupied during the spring of 2006 as bald eagles were observed landing in both of these nests on separate days (12/20/05 and 12/28/05).

d) Marbled murrelet

In Washington, marbled murrelets are year-round residents on coastal waters. They feed on saltwater within 1.2 miles (2 kilometers) of the shore, at depths of less than 100 feet (30 meters) (WDW, 1991). The estimated breeding population of marbled murrelets is 5,000 on Washington coastal waters (Speich et al., 1991). An estimated 1,800 marbled murrelets were observed along Washington's outer coast during aerial surveys (USFWS, 1997).

Although they do not nest in colonies like many other seabirds, they may nest in clusters. They nest and roost in mature and old growth forest areas of western Washington (WDFW, 1991). The nest trees are often emergent canopy trees (Bush, personal communication, 1994). The branches used for nesting are 5 to 7 inches (12 to 18 cm) in diameter, and located at the high point of the canopy (Bush, personal communication, 1994). The nesting period extends from April 1 to September 15.

WDFW has indicated that from PSAMP data from 92-99 (published PSAMP report) the closest murrelet use area is Saratoga Passage: not east of Strawberry Point in winter, and not east of Brown Point (Camano Island) in winter (Stofel, personal communication). This is several miles from the action area. The action area does not contain any known marbled murrelet nest sites or potential nesting sites due to the lack of suitable mature or old growth tree stands within the action area. There is no critical habitat within the vicinity of the proposed project.

e) Steelhead

The Skagit River and its tributaries are home to six stocks of steelhead (WDFW 2002), including three winter and three summer stocks. Escapement information is collected on only one stock, the "Mainstem Skagit/Tribs Winter Steelhead." In the 2002 SaSI report (WDFW 2002), this stock was rated "Depressed" due to a long-term negative trend in escapements since 1992 and a short-term severe decline in 2000 and 2001.

Spawning generally occurs from early March to early June (WDFW 2002). Juveniles typically spend a year in freshwater before migrating to marine habitats in the spring. Beach seine and fyke net sampling of a wide range of Skagit delta habitats infrequently capture steelhead smolts (Eric Beamer, personal communication, 2006).

C. ***Physical habitat***

The majority of the Milltown project site is protected from direct influence of the Skagit River by an encompassing levee network. Two cross-island levees divide the island into three regions (Fig. 2). The northernmost cross-island levee runs east-west, and divides the diked portion of Milltown Island into two sections, referred to as the “upper section” to the north, and the “lower section” to the south of the levee. The southern cross-island levee runs north-south, and forms the southern boundary of the diked area. On the interior of the levees are barrow ditches excavated during construction of the levees. The southern part of the island is undiked, and is largely in its original condition.

There are three openings in the levee on the upper section and two in the lower section. During high river flows and periods of high tides, water is able enter the island through the openings into the series of barrow ditches. These barrow ditches constrain and limit the potential energy of the moving water, restricting the amount of channel development. The interior functions as a “bathtub”, collecting water, which slowly drains away over the year. The result of this drainage can be seen in the southeast portion of the upper section, where a series of small channels drain into the barrow ditches.

A model to predict tidal channel geometry from marsh area has been developed for the South Fork Skagit River tidal marshes (Hood, unpublished data). The model is based on undiked reference tidal marshes in the South Fork Skagit delta. It predicts that a marsh area of 212 acres (the amount of area within the Milltown Island levees) should support approximately 19 tidal channels amounting to a total of 14.8 acres. Instead, only 5 tidal channels amounting to 4.5 acres are observed in the portion of Milltown Island behind levees, which is far less than predicted by the model (Hood, unpublished data). In comparison, the southern portion of Milltown Island, which was never farmed or diked and consists of 96 acres of tidal shrub wetlands, is predicted to support 11 tidal channels amounting 4.8 acres total. In fact, 10 tidal channels totaling 3.2 acres are observed, which is in good agreement with model predictions. The contrast between predicted and observed tidal channel geometry for the diked versus undiked portions of Milltown Island strongly suggests that there is potential for significant restoration of tidal channels to the diked portion of Milltown Island.

The vegetation has been significantly altered from historical conditions. The project area is located in a transition zone between forested freshwater wetland and estuarine emergent habitats. While historical conditions are uncertain, all of the project area has been diked. Much of the natural forest, shrub, and herbaceous vegetation have been eliminated. Large, formerly forested areas and other habitats that were replaced with seasonally planted cereal grain cropland, have converted to weedy and invasive wetland and upland species. The interior marshy fields are dominated by RCG and patches of cattails. Some areas retain emergent and shrub-scrub wetland conditions, although they are cut off from tidal influence and isolated from use by native aquatic fauna. Forests exist on levee berms and other high areas. Forested areas on the levees are primarily alder and cottonwood, while northern end of the island is predominantly conifers.

The current baseline conditions are considered “not properly functioning” for the channel condition and dynamics pathway of the Matrix of Pathways and Indicators (NMFS 1996), due to the loss of hydrologic connectivity to riverine and tidal dynamics, and the alteration of riparian and wetlands vegetative communities.

V. Effects of the action

A. *Direct effects*

1. Fishes

a) Excavation

The proposed action includes using explosives to remove levees along the Skagit River and create new channels in the area currently behind levees.

Juvenile salmonids could be harmed if they were occupying habitat directly adjacent to the project area during the removal of the levee or excavation of channels. This harm would result from either exposure to concussive forces of blasting, or being buried in excavated material. In the interior barrow ditches where listed fish would potentially be present, direct injury to salmonids will be mitigated by the exclusion or removal of fish prior to blasting. Some stress and mortality could result from exclusion and removal efforts, and any fish remaining in areas to be filled may suffer stress or death. Fish remaining in channels that are isolated by filling will be prevented from leaving the interior ditches, which will cause delayed outmigration or mortality.

The potential direct harm to adult salmonids would be limited to exposure to concussive forces of blasting. Adult salmonids are present only in the larger distributary channels (Steamboat and Tom Moore Sloughs). Since excavated material is being directed toward the interior of the island, and away from the river, injury due to burying is unlikely. The proposed extension of the in-water work window to September 30th will aid in avoiding impacts to adult Chinook that migrate through the action area on their way to upriver spawning areas.

The direct exposure of listed salmonids to excessive concussive forces will limited by the use of appropriate setback distances and smaller “decked” charges detailed in section II (C). The use of these conservation measures will limit the lethal radius of explosives used near mainstem channels so that injury and mortality should not occur. In the interior barrow ditches, the exclusion and/or removal of listed salmonids will reduce potential direct effects, both of concussive forces and burying.

To further reduce potential direct effects on Chinook salmon and bull trout, deconstruction of the dike will occur only during the proposed in-water work window. The established in-water work window for salmon and bull trout in the action area occurs between June 15th and August 31st, inclusive (Corps, 2006), and the application of the bald eagle work window further restricts work to August 15th to August 31st. This period is generally beyond the period of peak outmigration and delta residency for juvenile salmonids from the Skagit River. (Beamer et. al. 2006). Seasonal low flows during the work window also prevent or discourage salmonid access to interior ditches, which will limit the potential exposure of salmonids to direct harm from excavation. The proposed extension of the in-water work window to September 30th will aid in avoiding impacts to adult Chinook that migrate through the action area on their way to upriver spawning areas.

b) Physical habitat alteration

The proposed action is not anticipated to result in a permanent reduction of the quantity or quality of habitat available to Chinook salmon or bull trout. After construction is complete, the proposed action is anticipated to result in a net increase of physical habitat accessible to juvenile Chinook and bull trout.

The partial filling of the interior barrow ditches along sections of levee to be removed will result in the temporary loss of some marginal habitat for rearing salmonids. After construction is complete, winter and spring high flows will change the size, shape and position of some existing channels, and create new ones through erosive processes. Low-lying portions of the interior fields will experience more frequent and prolonged inundation, which will likely result in vegetation changes beyond the ones associated with plantings. Some wetlands adjacent to the excavated sections of levee will be covered with displaced levee material, but will remain wetlands after construction. Much of the current levee footprint will convert to wetlands after removal of levee material (approximately 0.5 acres).

c) Turbidity

Turbidity is defined as a measurement of relative clarity due to an increase in dissolved or suspended, undissolved particles (measured as total suspended sediment, or TSS). At moderate levels turbidity can reduce primary and secondary productivity and at high levels has the potential to interfere with feeding and will, in extreme cases, injure and kill adult and juvenile fish (Bjornn and Reiser 1991). Salmonid fishes may move laterally and downstream to avoid turbid plumes (Sigler et al. 1984; Lloyd 1987; Servizi and Martens 1991). Juvenile fishes tend to avoid streams that are chronically turbid (Lloyd et al. 1987). A potential positive effect of increased turbidity is refuge and cover from predation (Gregory and Levings 1998).

Short-term increases in sediment loads are expected in waters adjacent to newly excavated areas, and in newly excavated channels. Excavation to remove levees will remove vegetation and expose soil, and channel excavations will create areas of bare soil. Since excavation is planned to coincide with seasonal low flows, river levels will be below the elevation of most newly exposed soils. Sediment retention techniques (Washington State Department of Ecology 2005) will be used where appropriate to reduce potential turbidity increases. Revegetation of exposed soils will provide long-term sediment control.

Increased suspended sediments from construction can adversely affect salmonid fishes. The size of the sediment particles and flow velocities typically affect during the duration of sediment suspension in the water column. Larger particles (> 2mm), such as sand and gravel, settle rapidly, but silt and very fine sediment may be suspended for several hours. Suspended sediments can adversely affect salmonid migratory and social behavior and foraging opportunities (Bisson and Bilby 1982; Sigler et al. 1984; Berg and Northcote, 1985)

Exposure duration is a critical determinant of the magnitude of physical or behavior effects (Newcombe and McDonald 1991). Salmonid fishes have evolved in systems that periodically experience short term pulses (days to weeks) of high suspended sediment loads, often associated with floods, and are adapted to such exposures (Bjornn and Reiser 1991).

A similar restoration project used explosives to excavate stream channels in South Slough, Oregon (Cornu 2005). Monitoring of excavated channels showed only short-term increases in turbidity downstream of the excavation. The turbidity management used in this project should minimize the duration and extent of any increase in turbidity. In addition, the long-term effect of increased amount and quality of habitat should more than offset the short-term effects of turbidity associated with project construction.

2. Bald eagle

Potential direct effects to bald eagles as a result of the proposed action will be related to increased noise, increased human activity on the site, and habitat alternations within the action area.

a) Noise and disturbance

Eagles have been observed flushing as a result of high intensity noises like pile driving at distances up to 4,000 feet (WSDOT, 1986). Although blasting will be louder than pile driving, it will be considerably shorter in duration.

Eagles in the action area are likely habituated to human sources of noise and disturbance. The Milltown Island area is a high-use waterfowl hunting location, and shotgun blasts are frequent during the hunting season. There is also a Burlington Northern railroad line that is located 0.5 miles to the east which has several trains scheduled daily. These trains and train whistles are clearly audible from the island. Finally, less than 0.25 miles to the west is WDFW land that is managed for waterfowl. These fields are plowed and seeded yearly with use of a tractor that would also be audible by any nesting eagles.

In August of 1999, there were four levee breaches blasted on Milltown Island in association with a dike removal project on Deepwater Slough to the west. While no monitoring of this nest was done during the Deepwater Slough project, a bald eagle nesting survey was done in 2001 by WDFW and this nest was occupied despite the blasting that had occurred just a few years earlier.

Since heavy equipment and other persistent noise sources will not be used in this project, the primary potential source of disturbance will be noise from blasting. Eagles in the area appear to be habituated to loud percussive blasts (i.e. shotguns), which are not as loud but much more frequent than levee removal blasting will be.

The proposed action includes the use of established work windows and conservation zones around the eagle nests in the action area, designed to avoid disturbance of nesting and wintering eagles. Due to the acclimation of eagles in the area to disturbance, and the use of prescribed work windows and conservation zones, the project is not anticipated to result in more than a brief disturbance to bald eagles.

b) Habitat alteration

The project includes plans to remove parts of the levee on the island which contains the nest tree. Red alders that have grown on the levee will be knocked or cut down if they are in the blasting zone. The project does not include the removal of trees within 1,300 feet of the nests. The nest trees and the trees around it will not be affected by tidal inundation (Julie Stofel, WDFW, personal communication).

3. Marbled murrelet

Potential direct effects to marbled murrelet as a result of the proposed action will be related to increased noise during construction, increased human activity on the site, and habitat alternations within the action area.

In Washington, marbled murrelets are year-round residents on coastal waters. They feed on saltwater within 1.2 miles (2 kilometers) of the shore, at depths of less than 100 feet (30 meters) (WDW, 1991). Impacts to nearshore environments where marbled murrelets forage are not likely to be directly affected by the proposed project. The project is likely to increase the forage base for marbled murrelet by providing habitat for small fish. In western Washington, marbled murrelets nest and roost in mature coniferous forests and mid-successional forests with old-growth characteristics (USFWS, 1997), usually within 50 miles or 80 km of coastal waters (USFWS, 1997). Based on the absence of nest trees in the project area, there will be no direct effect on marbled murrelet nesting habitat.

B. *Indirect effects*

The proposed action will allow river and tidal action in areas of Milltown that are currently protected by levees. This will lead to deeper and more persistent inundation of some areas, channel formation, and possible failure of remaining dike structure. The changes in vegetative communities to estuarine shrub will lead to colonization by beavers, whose dams affect channel morphology. Since the action is designed to restore natural processes that have been circumvented by dike construction, the condition of the area is expected to gradually convert to resembling nearby undiked areas, such as the south end of Milltown Island.

C. *Effects from ongoing project activities*

As planned, the bulk of the project would be completed in a single year. Once dike removal and channel construction is complete, ongoing activities would consist mainly of maintaining plantings.

After levee removal actions are complete, we will be conducting regular maintenance of the plantings and reed canarygrass control measures. Light barriers will be maintained until plantings have been established, and dead plants will be replaced. This maintenance will be accomplished in two or three visits, and the only equipment used will be gas-powered weed eaters and hand tools. The effects of disturbance related to this maintenance will be minimal.

D. ***Effects of action on Critical Habitat***

Critical habitat for Chinook and bull trout in the action area consists of freshwater rearing habitat, spawning migration and juvenile outmigration corridors, and their essential physical and biological features, as described in Section III (C). The effects listed here summarize the effects detailed more fully above. The water quality effects listed here will be short, on the order of days or weeks. In the longer term, the amount and quality of habitat will be increased as a result of the proposed action.

Freshwater rearing

Short-term increases in turbidity may result from work near water, and when new channels are connected. Floodplain connectivity and rearing habitat will be increased. The increased water exchange in tidal channels will improve water quality, temperature regimes, and access to refugia for salmonids.

Migration corridors

Steamboat and Tom Moore Sloughs are used as spawning migration corridors, and may experience short-term increases in turbidity from work near the water. The proposed actions will have little effect on adult mobility and survival as they pass through the action area. Juvenile outmigration corridors will be enhanced, as the project will reconnect and create offchannel habitat for outmigrating and foraging smolts.

The degraded condition of many PCEs in this habitat will be improved by the proposed action. The poor conditions of these PCEs, especially for rearing habitat in the delta, have been shown to be a limiting factor in the recovery of Chinook (Beamer et al. 2005).

E. ***Effects determination for listed species***

1. Chinook Salmon

The proposed action “may affect” but is “not likely to adversely affect” Puget Sound Chinook salmon.

This determination is based on the following rationale:

1. Chinook salmon occur within the action area foraging and migrating to and from spawning and rearing areas in the Skagit River system.

2. Direct injury to Chinook is possible from blasting and filling associated with the project. The project proposal includes appropriate conservation measures to prevent direct injury to Chinook.

3. The proposed action will cause short-term and localized increases in turbidity with in the action area. Implementation of sediment control measures are expected to minimize transport of sediment at the project site and minimize the area of potential increased turbidity.

4. The proposed action will alter the amount of available habitat for Chinook salmon and their forage and prey base. These alterations are anticipated to increase the net habitat available to Chinook and be beneficial to their long-term survival.

2. Bull Trout

The proposed project “may affect,” but is “not likely to adversely affect” coastal bull trout.

This determination is based on the following rationale:

1. Coastal bull trout occur within the action area foraging and migrating to and from spawning areas in the Skagit River system.
2. The proposed action will affect habitats utilized by bull trout. Most of these benefits are anticipated to be beneficial.
3. Few bull trout are expected to be in the action area during the planned work window. Any bull trout that were within the action area are expected to be in deeper mainstem channels where they would be less exposed to direct

effects from excavation. The project proposal includes appropriate conservation measures to prevent direct injury to bull trout.

4. The proposed action will cause short-term and localized increases in turbidity with in the action area. Implementation of sediment control measures are expected to minimize transport of sediment at the project site and minimize the area of potential increased turbidity.

3. Bald Eagle

The proposed project “may affect,” but is “not likely to adversely affect” bald eagle.

A “may affect” determination is based on the following rationale:

1. Nesting and perching bald eagles occur within the action area.
2. Two bald eagle nests occur within the action area.
3. Blasting and construction activities can be a source of disturbance to bald eagles.

A “not likely to adversely affect” determination is based on the following rationale:

1. No habitat alterations will occur within 1,300 feet of the nests.
2. Prescribed work windows and conservation zones around nest trees will prevent disturbance of eagles during nesting periods.
3. Eagles present in the project area are likely acclimated to ambient disturbance and human activity.
4. It is unlikely that potential impacts to prey fish species will be of consequence to the foraging success of bald eagle in the action. Effects upon prey are expected to be minimal.

4. Marbled Murrelet

The proposed project “may affect,” but is “not likely to adversely affect” marbled murrelet.

1. A “may affect” determination is based on the following rationale:
2. Marbled murrelets may pass over the project area as they travel to and from inland nesting sites.

A “not likely to adversely affect” determination is warranted based on the following rationale:

1. The nearest known marbled murrelet activity is approximately 25 kilometers from the site.

2. No nesting sites or Critical Habitat exists in the project action area and no noise-intensive activities will occur within kilometers of marbled murrelet nest areas.
3. It is unlikely that potential impacts to prey species will be of consequence to the foraging success of marbled murrelets in the action. Effects upon prey are expected to be minimal.

F. ***Effect of the proposed action on tribal resources or interests***

This project is proposed by Skagit River System Cooperative, which is a natural resource management agency working on behalf of the Sauk-Suiattle and Swinomish Indian Communities. Completion of the proposed action is supported by the member tribes and is expected to benefit the productivity and sustainability of tribal salmon fisheries.

VI. Conclusions

The proposed Milltown Island restoration project seeks to restore natural hydrologic processes to parts of Milltown Island that have been isolated by diking. The proposal calls for the removal of over 1300 feet of existing levee and the excavation of over 1200 feet of channels within the project area. The levee removal and channel excavations have been designed to reconnect the interior of Milltown Island to river and tidal hydrology. Once this connection is made, natural erosive processes are expected to create new tidal channels, which have been recognized as important habitat for Chinook and other fish (Beamer et al. 2005).

The current vegetative community in the project area is dominated by reed canarygrass. A combination of reed canarygrass control and plantings of shrubs along riparian areas is planned to help revert to the original estuarine shrub vegetation to portions of the project area.

Construction of the proposed project will result in habitat alteration and short-term disturbance in the area. Since the island is inaccessible to heavy equipment, explosives will be used to remove levees and excavate channels. Conservation measures such as setback distances, limitations on charge sizes, and designated work windows will be used to mitigate the possible direct injury of ESA-listed species from blasting. Exposed soils following excavation have the potential to add to sediment loads in the area; sediment control measures will limit the extent and duration of any turbidity impacts. Following construction, the project will result in a net gain of delta tidal channel habitat for Chinook, bull trout, and other fish species.

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VIII. Essential Fish Habitat

A. *Background*

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), requires the inclusion of essential fish habitat (EFH) descriptions in federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat, “waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50CFR600.110).

B. *Identification of EFH*

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

C. *Proposed Actions*

The proposed actions are detailed above in section II. The action area includes the affected streambed, streambank, adjacent riparian zone, and aquatic areas of Milltown Island, Steamboat Slough, and Tom Moore Slough between their northern and southern confluences. The action area includes habitats that have been designated as EFH for various life-history stages of three species of Pacific salmon (Chinook salmon, coho salmon, and Puget Sound pink salmon). Although the area is tidally influenced, it is beyond the area of saltwater intrusion (Eric Beamer, personal communication 2006), and is not considered EFH for groundfish and pelagic species.

D. *Effects of Proposed Action*

The proposed action may result in short- and long-term adverse effects to any salmonid species which may be present. Effects to the freshwater habitat within the action area are described in detail in section V of this biological assessment, and are summarized below:

1. Excavation

The use of blasting agents could lead to direct injury or disturbance of salmonids. Appropriate conservation measures to limit exposure of salmonids to concussive forces and burying are included as part of the proposed action.

2. Turbidity

Dike removal and creation of new channels could result in erosion and increased turbidity. An increase in turbidity can adversely affect any fish and filter-feeding macro-invertebrates that may provide food to fish downstream of the work site. Implementation of sediment control measures are expected to minimize transport of sediment at the project site and minimize the area of potential increased turbidity.

3. Rearing habitat

The filling of barrow ditches as a result of dike removal will eliminate some marginal habitat for rearing salmonids. The habitat loss will be temporary, and the proposed action is anticipated to result in a net increase of physical habitat accessible to juvenile salmonids.

E. *Conclusion*

The proposed action will not result in the permanent loss of habitat for salmonids. Conservation measures will reduce the temporary impact of turbidity and disturbance on salmonid habitat. Therefore, it is concluded that the project will not adversely affect salmonid EFH.

Appendix I.
Location photos for Milltown Island Restoration Project

Milltown Island, showing locations of photos in this appendix.

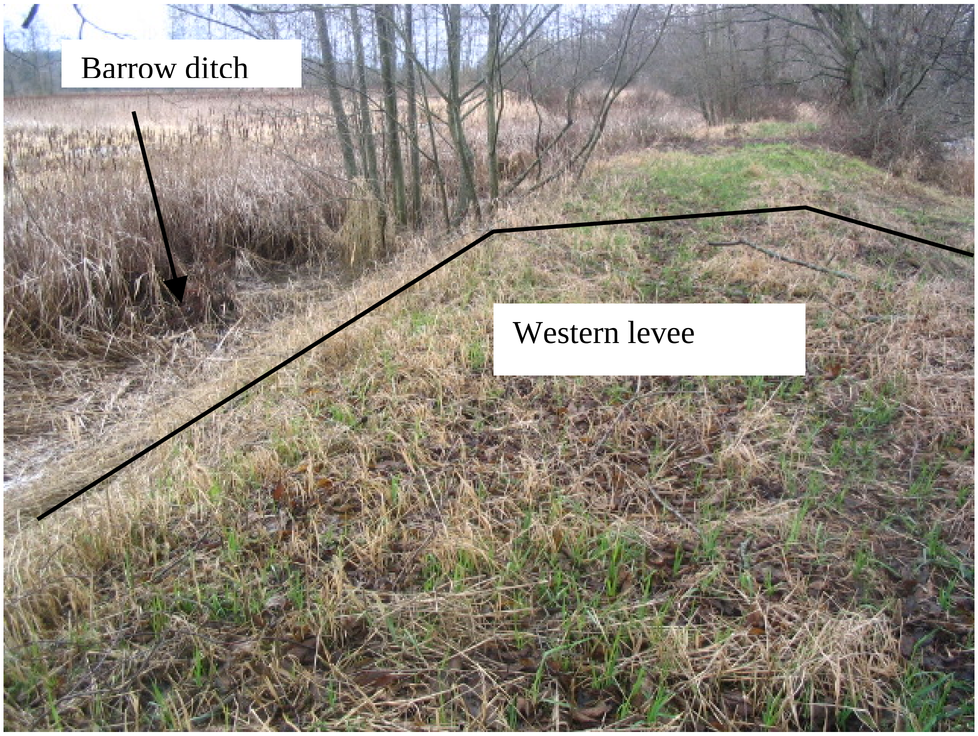

Photo 1. Western levee with adjacent barrow ditch.

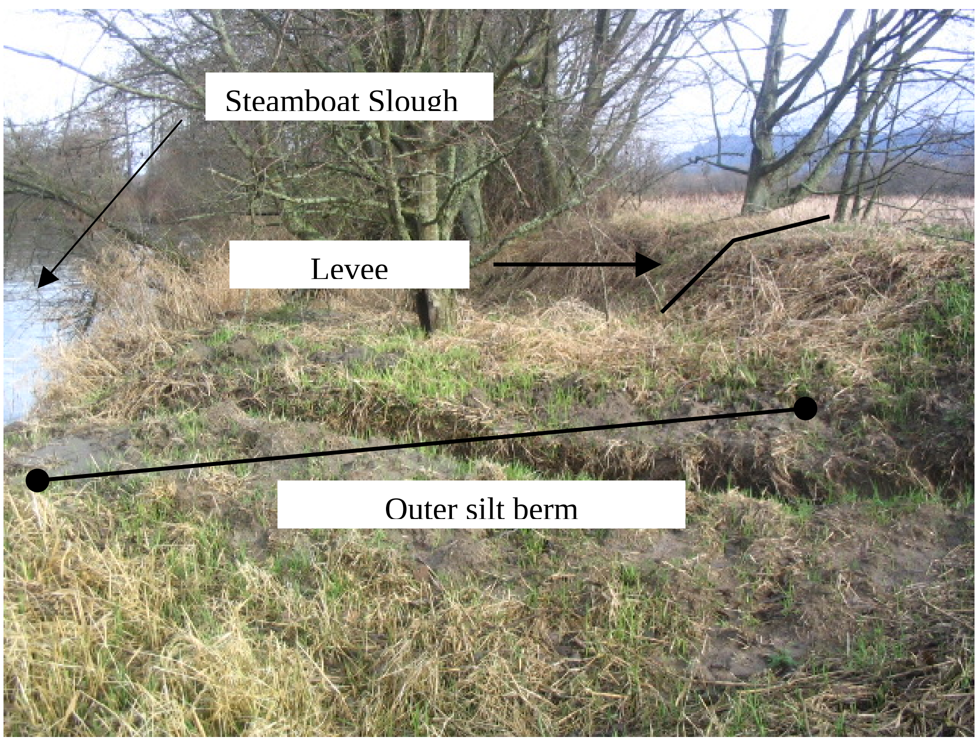

Photo 2. Western levee and adjacent silt berm.

Photo 3. Western levee and outer silt berm.

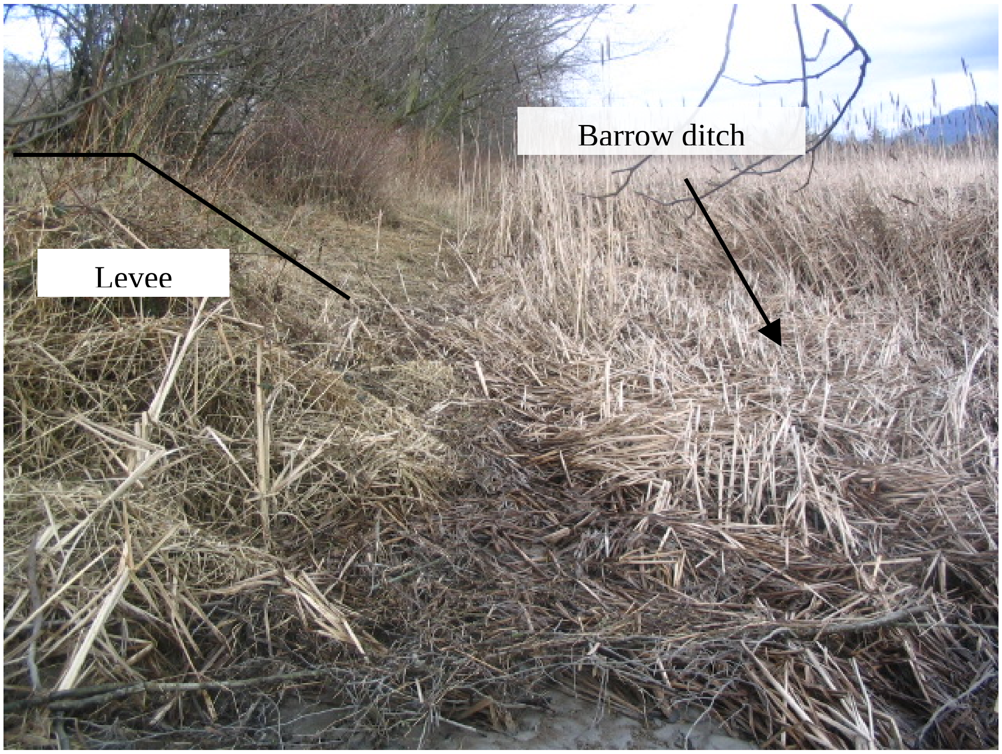

Photo 4. Interior of western levee


Photo 5. Interior of eastern Milltown Island.


Photo 6. Interior of western Milltown Island.

Photo 7. Large east-west cross ditch at point of intersection with interior barrow ditch. Photo taken at high (approx. 12 ft.) tide.

Photo 8. Smaller ditch in field interior.

Photos 9 and 10. Western levee and silt berm as seen from Steamboat Slough. Photo illustrates approximate extent of ordinary high water. At summer low flows, the berm is four to six feet above the water surface.

Photo 11. Breach in western levee as seen from Steamboat Slough

Photo 12. Breach in eastern levee as seen from Tom Moore Slough.

Photos 13 and 14. Levees breached with use of explosives as part of the Deepwater Slough project.
From http://www.new.usace.army.mil/publicmenu/DOCUMENTS/deepwater.pdf

Photo 15. Time series photos of channel excavated with explosives in South Slough, Oregon.
From *Restoring Cox, Dalton and Frederickson Marshes* (Cornu 2005).