LUMMI NATION
WETLAND AND HABITAT MITIGATION BANK PROSPECTUS

October 2008

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Prepared For:

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1. INTRODUCTION AND BANK OBJECTIVES

This prospectus documents the Lummi Nation's proposal to restore (re-establish and rehabilitate), enhance, and preserve wetlands and estuary habitats for the purpose of establishing a compensatory wetland and habitat mitigation bank. The Lummi Nation Wetland and Habitat Mitigation Bank (WHMB) will be used for compensatory mitigation of unavoidable impacts to "Lummi Nation Waters" and "Waters of the United States", including wetlands, which result from activities authorized under Lummi Code of Laws (LCL) Title 17 and Sections 401 and 404 of the Federal Clean Water Act. The goal of the mitigation bank is to restore, enhance, and preserve dynamic and self-maintaining environments that provide breeding, feeding, rearing, and migration areas for fish and wildlife. Achieving this goal takes advantage of a substantial opportunity to return a high level of ecological function to a large-scale wetland system.

This prospectus describes:

- The Lummi Nation's intent in creating the bank;
- The functions to be restored, enhanced, and preserved;
- The need for a mitigation bank;
- The service area within which credits will be available; and
- The proposed actions and bank objectives.

Many wetland professionals consider mitigation banking to be a viable and more desirable alternative to conventional on-site mitigation of unavoidable wetland impacts associated with development (United States 1995). Wetland mitigation banking is viewed by many as a more effective method of compensating for impacts than the typical mitigation programs implemented over the past two decades (Castelle et al. 1992, ELI 1994, Driscoll and Granger 2001).

The Lummi Nation WHMB will be developed by the Lummi Indian Business Council (LIBC) to compensate for wetland and related habitat impacts occurring on the Lummi Indian Reservation (Reservation) and in adjacent watersheds. It will provide for long-term mitigation needs for tribal members and the tribal government and will be used for compensatory mitigation for development projects on the Reservation and adjacent areas. The Lummi Nation WHMB will serve public and private end users by providing advance compensatory mitigation for authorized impacts to regulated areas that require mitigation, mitigation for enforcement claims, and other uses. Because the Lummi Nation WHMB will increase and greatly improve salmonid habitat in the Nooksack watershed, it is expect that the bank will also be used for unavoidable project impacts affecting threatened and endangered Puget Sound salmonids regulated under the federal Endangered Species Act (ESA).

Restoring, enhancing, and preserving wetlands and related habitats through mitigation banking will ensure effective compensation and replacement for development impacts and further the Lummi Nation's goal of enhancing salmonid and shellfish habitats on the Reservation (LWRD 2003). The primary benefits foreseen for the Lummi Nation WHMB include:

- Watershed restoration, creation of sustainable wetland systems;
- Higher success rates for mitigation;
- Improved salmonid and shellfish habitat; and
- More efficient use of permitting agency resources.

As shown in Figure 1, the proposed Lummi Nation WHMB will be comprised of three separate sites known as the Lummi Delta, Nooksack Delta, and the Blockhouse sites. The Lummi Delta Site contains a total of 396 acres, the Nooksack Delta Site contains 1,079 acres, and the Blockhouse Site[1] is 354 acres. The Blockhouse Site is comprised of two separate locations identified as "Area A" (located near the Lummi River) and "Area B" (located near the Kwina Road/Haxton Way intersection). The proposed sites are especially suitable for a mitigation bank because of their ecological value, landscape position, and large size. These three sites will allow effective in-kind replacement of lost functions and values through such actions as:

<u>Lummi Delta Site:</u>

- Exposing the existing palustrine emergent wetlands and areas that are currently not wetlands to direct tidal influence during higher tidal conditions (e.g., Mean High Water [MHW] or Mean Higher High Water [MHHW]).
- Opening remnant sloughs and distributary channels that are not connected to tidal hydrology to unobstructed pulses of tidal action.
- Removing dikes and a tide gate to allow the re-development of off-channel and side channel salmonid habitat during daily tidal pulses.
- Removing portions of the dike along the eastern boundary along the Lummi River channel to allow the existing channel to meander thereby enhancing and creating additional intertidal and subtidal emergent wetland habitats.

<u>Nooksack Delta Site:</u>

- Locating, mapping, removing, maintaining, and monitoring invasive species in extensive portions to promote native species diversity and wetland functions and values.
- Underplanting of native conifer species in large areas to increase the quality of wildlife habitats and wetland functions and values.

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[1] The Blockhouse Site is also located in the Lummi Delta but it is located on the opposite side of the Lummi River channel from the Lummi Delta Site. The Blockhouse Site is named after the concrete blockhouse that was part of the former U.S. Navy Radio Direction Finding Facility (RDFF) on one of the parcels. The buried antenna associated with the RDFF was removed when the facility closed in the 1970s and the abandoned blockhouse was demolished in July 2003.

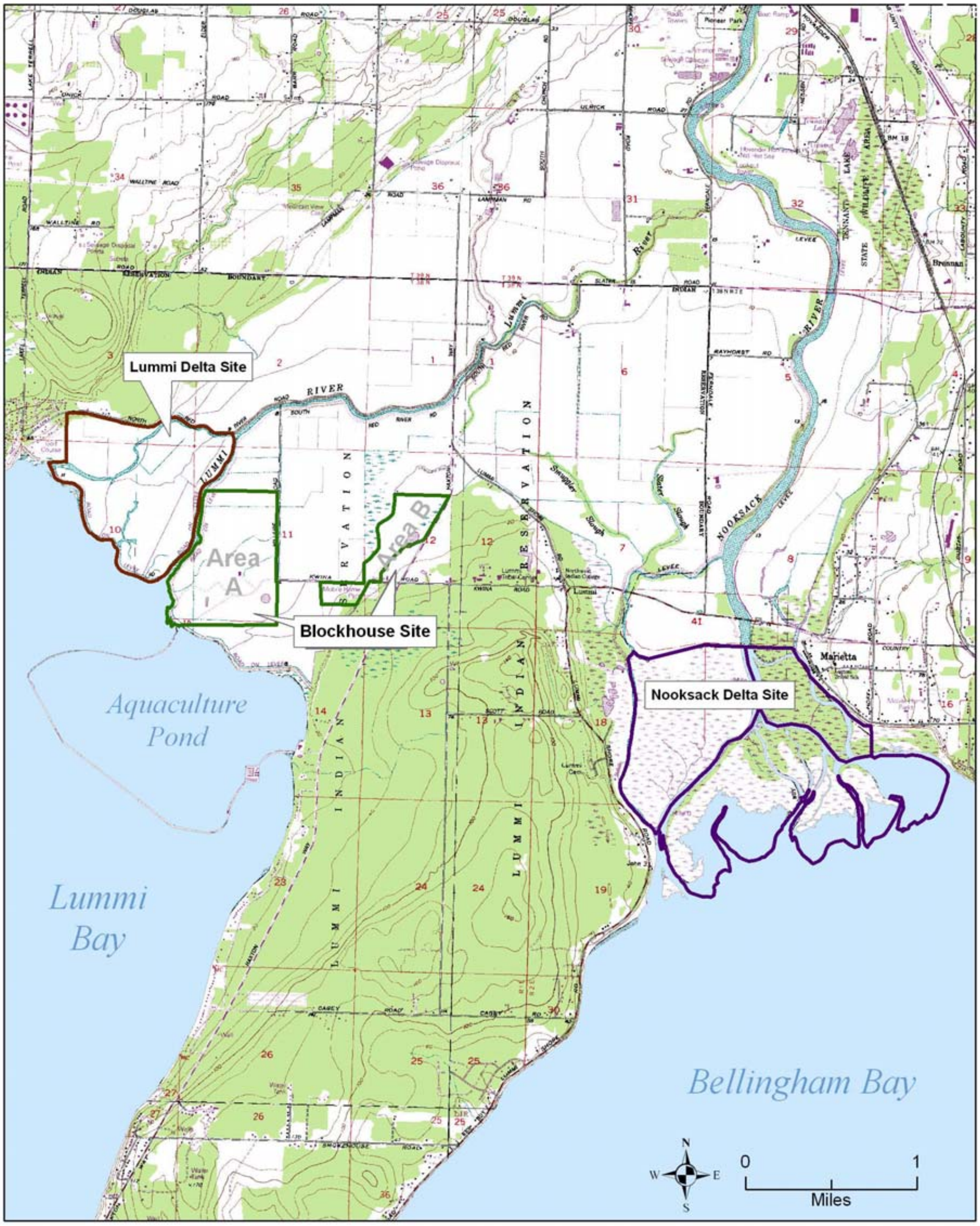

Figure 1. Lummi Nation Wetland and Habitat Mitigation Bank Sites

Blockhouse Site:

- Exposing the existing palustrine emergent wetlands and areas that are currently not wetlands to direct tidal influence during higher tidal conditions (e.g., Mean High Water [MHW] or Mean Higher High Water [MHHW]).
- Opening remnant sloughs and distributary channels that are not connected to tidal hydrology to unobstructed pulses of tidal action.
- Removing a tidegate to allow the re-development of off-channel and side channel salmonid habitat during daily tidal pulses.

Establishing a mitigation bank comprised of the Lummi Delta Site, the Nooksack Delta Site, and the Blockhouse Site represents a regionally significant opportunity for ecological restoration on a large scale. The potential credit conversion ratios used in this prospectus are based on personal communication with the United States Army Corps of Engineers (COE or the Corps) (Walker 1999) and are within the ranges for mitigation ratios identified in the multi-agency policies and guidance for wetland mitigation in Washington State (Ecology 2006). The actual credit generation/credit conversion ratios will be negotiated with the Mitigation Bank Review Team (MBRT) during the development of the Mitigation Banking Instrument (MBI). In addition, it is understood that using only acres to calculate impact and needed mitigation does not address wetland or habitat functions. As a result, the potential credit conversion ratios and associated credit generation associated with each site presented in this prospectus are approximated. Based on the proposed ratios, all three sites combined could provide up to 714 credits to be used for compensatory mitigation of wetland impacts within the service area. A summary of restoration, enhancement, and preservations actions at each of the three mitigation bank sites along with the potential mitigation credit generation is provided in Table 1, Table 2, and Table 3 respectively. Proposed credit calculations are detailed in Section 9 of this prospectus and are subject to negotiation with the MBRT.

The 1999 inventory of Reservation wetlands (Harper 1999, LWRD 2000) indicates that approximately 43 percent of the Reservation land area is either wetland or wetland complexes. Approximately 50 percent of the total inventoried area of wetlands and wetland complexes on the Reservation is located in the floodplains of the Lummi and Nooksack Rivers (Lynch 2001). Wetland complexes are areas where wetlands and uplands form a highly interspersed mosaic. During the 1999 Reservation-wide wetland inventory, considering the available information, the geographic scale of the effort, and the planning level effort represented by the inventory, the boundaries were drawn around the outer edges of these mosaics and the entire area was labeled as a “wetland complex”.

Table 1. Lummi Delta Site – Existing Wetlands, Proposed Mitigation Actions, and Potential Credit Generation

Wetland Classification	Approximate Area (acres)	Area of Mitigation by Mitigation Type		Buffer (acres)	Potential Credits* (acres)
		Wetland Restoration			
		Re-establishment (acres)	Rehabilitation (acres)		
Palustrine emergent	111	0	107	4	71
Palustrine Scrub-shrub	4	0	0	4	0
Palustrine forested	8	0	0	8	0
Estuarine intertidal emergent or estuarine subtidal emergent	37	0	37	0	25
Uplands (drained wetlands)	247	247	0	0	247
Total	407	247	144	16	343

* See Section 9 for discussion of credit calculation.

Table 2. Nooksack Delta Site – Existing Wetlands, Proposed Mitigation Actions, and Potential Credit Generation

Wetland Classification	Approximate Area (acres)	Area of Mitigation by Mitigation Type		Buffer (acres)	Potential Credits* (acres)
		Enhancement (acres)	Preservation (acres)		
Palustrine emergent	161	146	0	15	24
Estuarine intertidal emergent areas or estuarine subtidal emergent (prograded lands)	258	0	258	0	26
Palustrine Scrub-shrub	140	0	135	5	14
Palustrine Forested	443	145	283	15	52
Uplands	18	0	0	0	0
River Channel	59	0	0	0	0
Total	1,079	291	676	35	116

* See Section 9 for discussion of credit calculation.

Table 3. Blockhouse Site – Existing Wetlands, Proposed Mitigation Actions, and Potential Credit Generation

Wetland Classification	Approximate Area (acres)	Area of Mitigation by Mitigation Type		Buffer (acres)	Potential Credits (acres)*
		Wetland Restoration			
		Re-establishment (acres)	Rehabilitation (acres)		
Area A					
Palustrine scrub-shrub/emergent	126	0	123	3	82
Uplands (drained wetlands)	139	127	0	12	127
Area B					
Palustrine emergent/scrub-shrub	66	0	49	17	33
Uplands (drained wetlands)	23	13	0	10	13
Total	354	140	172	42	255

* See Section 9 for discussion of credit calculation.

The Lummi Nation WHMB will make it possible to compensate for small wetland losses that might otherwise go unmitigated because of their insignificant size coupled with the frequent inability to mitigate on-site. By consolidating mitigation for numerous small wetland losses in these three sites, the mitigation bank is expected to be more environmentally beneficial than traditional on-site compensatory mitigation and more easily protected. Use of these three sites, which contain a variety of wetland types, will provide a diversity of habitats and abundant habitat improvement opportunities for fish and wildlife species. Buffer areas will be designated on each site to protect the wetland areas from disturbance on adjacent parcels and increase habitat value for fish and wildlife.

The probability of successful implementation on the Lummi Delta Site is high because of the presence of salt marsh colonizing plant species, hydric soils, and the relative ease of sea wall breaching. A relatively rapid increase in wetland functions is expected once salt water and tidal cycles are returned to the area. There is also a high probability of success at the Blockhouse Site because removing the existing tidegates to return tidal influence to the disturbed wetlands is a relatively straightforward approach to restoring hydrologic functions and connectivity to other aquatic systems. The probability of successful enhancement on the Nooksack Delta Site is high for the proposed conifer underplanting and moderate for the proposed invasive plant species control. Conifers planted on the site are expected to establish quickly and grow well because of the partial shade provided by the existing deciduous forest and the undisturbed condition of the soil. Efforts to manage invasive species are expected to be successful within a short period of time for some plant species (e.g., English ivy and yellow flag iris), but the effort to remove and control Japanese knotweed and reed canarygrass will be more challenging and will take more time.

Population projections, planned economic and institutional growth on the Reservation, and the small percentage of tribal land that has been developed suggest that portions of presently forested, agricultural, and wetland areas on the Reservation will be converted to residential, commercial, municipal, and/or industrial uses in coming years. A recent study projected that the number of American Indians living on the Reservation will increase from 2,346 in 2000 to 3,767 in 2020 and to 15,451 in 2100 (Northwest Economic Associates 2003). These projections and the large percentage of Reservation land that is wetland clearly demonstrate a need for a mitigation bank on the Reservation because unavoidable impacts will arise due to housing needs and economic and municipal development projects. Similarly, the future land use in the Lummi River and Nooksack River watersheds and along the shoreline of Puget Sound is projected to include more residential, commercial, municipal, industrial, and urban development to accommodate projected population increases (Whatcom County 1997).

Enabling permit applicants to subvert or bypass the regulatory process protecting critical areas and habitats is not a goal of this project. Instead, the intent is to offer effective environmental replacement as an alternative to traditional compensatory mitigation methods once it has been determined that wetland impacts have been avoided and/or minimized to the extent practicable. This alternative requires compliance with federal and tribal regulations and works to achieve the long-term goal of a net gain in wetland area and function.

This report is divided into the following sections:

- Section 1 is this introductory section.
- Section 2 describes the location of the Lummi Reservation and the proposed Lummi Nation WMHB sites, including historical information and the rationale for site selection.
- Section 3 describes the existing conditions and provides an ecological assessment of each site.
- Section 4 describes the site design, including the actions that will be undertaken at the sites to promote the restoration, enhancement, and preservation goals.
- Section 5 discusses the ecological benefits that are expected to be achieved when the bank is established.
- Section 6 describes the potential effects of the project on adjacent land uses.
- Section 7 identifies the regulations and permits that apply to this project.
- Section 8 identifies the area to be served by the Lummi Nation WHMB.
- Section 9 discusses credit development and exchange.
- Section 10 describes proposed monitoring, reporting, and long-term protection assurances.
- Section 11 is a brief summary of this prospectus.
- Section 12 lists the references cited in this prospectus.

2. PROJECT LOCATION AND SITE SELECTION

This section describes the location of the Lummi Indian Reservation and the proposed mitigation sites, including historical information and the rationale for site selection.

2.1 Project Setting and Historical Review

As shown in Figure 2, the Lummi Indian Reservation is located approximately eight miles west of Bellingham, Washington; 90 miles north of Seattle, Washington; and 60 miles south of Vancouver, British Columbia, Canada.

The Reservation is located at the mouth of the Nooksack River and along the western border of Whatcom County, Washington (Figure 1). The Nooksack River drains a watershed of approximately 786 square miles, flows through the Reservation near the mouth of the river, and discharges to Bellingham Bay (and partially to Lummi Bay during high flows). The Reservation is located at the southern extent of Georgia Strait and the northern extent of Puget Sound. Approximately 38 miles of highly productive marine shoreline surround the Reservation on all but the north and northeast borders. Much of the high-density development to date has occurred along the marine shoreline. The Reservation includes the Nooksack and Lummi River deltas, tidelands, and forested uplands. The Reservation also features relatively low topographic relief and a temperate marine climate.

The Lummi Reservation is comprised of the surrounding tidelands and two relatively large upland areas on the mainland, a smaller upland area on Portage Island, and two distinct lowland areas (the floodplains of the Lummi and Nooksack Rivers and the Sandy Point Peninsula). The maximum elevation of the northwestern upland area of the Reservation is about 220 feet above mean sea level (ft msl). The southern upland area is the Lummi Peninsula with a maximum elevation of about 180 ft msl. The maximum elevation on Portage Island near the southeastern extent of the Reservation is approximately 200 ft msl. The floodplain of the Lummi and Nooksack rivers has an average elevation of 10 ft msl and is located between the northern and southern upland areas. The Nooksack River and the Nooksack River Delta are located along the northeastern extent of the Reservation. The Sandy Point Peninsula lies to the southwest of the northwestern upland. Figure 3 displays the topography and surface water on the Reservation.

Historically, the greater Nooksack River Delta (including the Lummi and Nooksack rivers) included extensive estuarine and riverine-tidal freshwater wetlands primarily on the Lummi River side, which had been the dominant outlet to salt water until the mid- 1800s (Collins and Sheikh 2002). Prior to 1860, the main channel of the Nooksack River emptied into Lummi Bay, with smaller distributary channels flowing into Bellingham Bay (WSDC 1960). The diversion of flow from Lummi Bay to Bellingham Bay occurred around 1860, when a log jam near what is now the City of Ferndale blocked the Nooksack River and diverted it to a small stream that flowed into Bellingham Bay. Since around 1860, the Nooksack River has flowed to Bellingham Bay because of the construction of a dam across the headwaters of the Lummi River (Koert 1976). This shift of the lower Nooksack River virtually eliminated migration of stream channels over the Lummi Delta (Bortleson et al. 1980).

Figure 2. Regional Location of the Lummi Indian Reservation

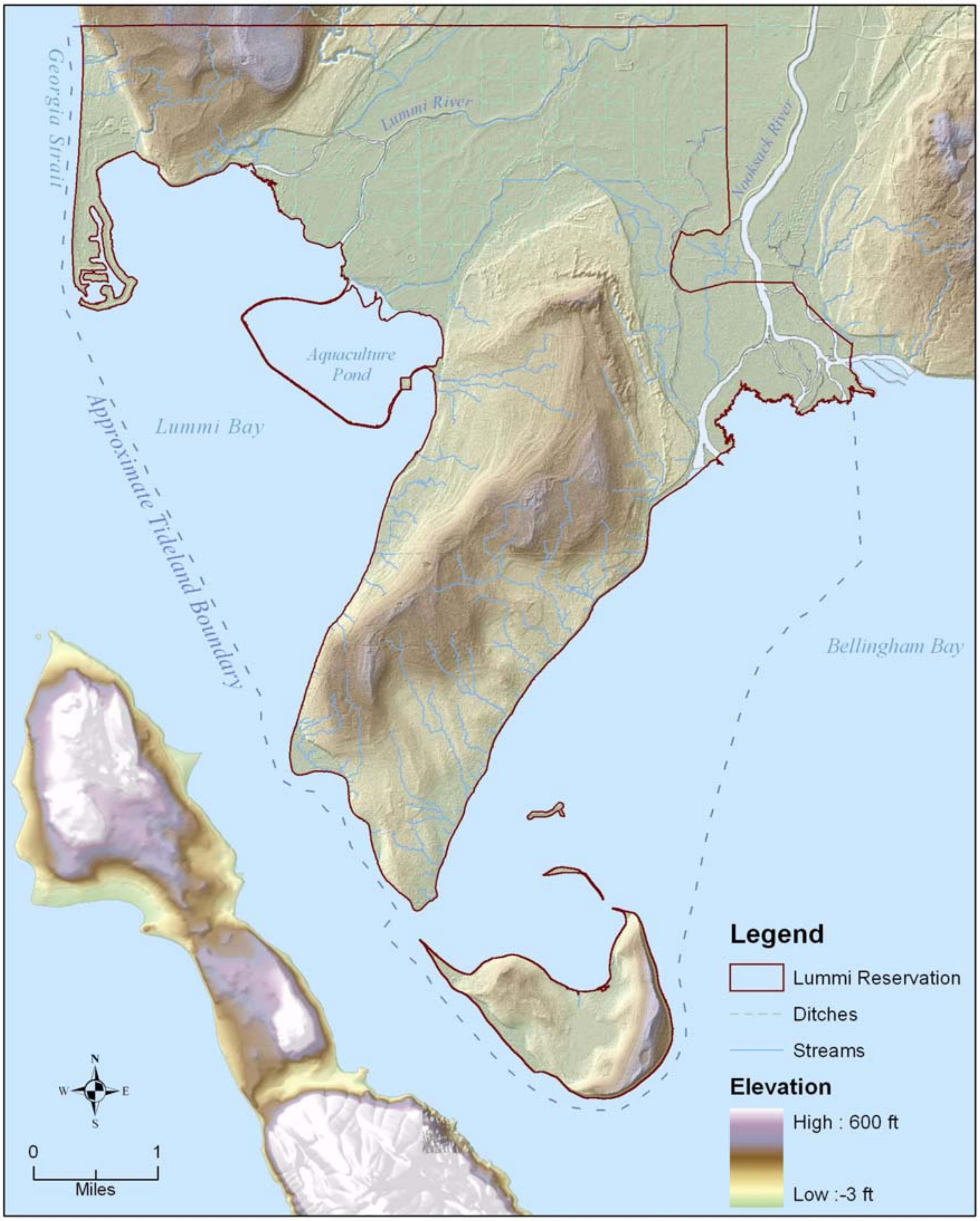

Figure 3. Topography and Surface Water Drainage of the Lummi Reservation

Like most areas in the Nooksack River watershed downstream from Everson, conversion of forestland to agricultural land occurred on the Reservation following the arrival of Euro-Americans. In 1896 there were reported to be approximately 1,222 acres under agricultural cultivation on the Reservation. Conversion to farmland involved the installation of agricultural ditches, construction of dikes, clearing of log jams, and other actions that helped create a permanent separation between the Nooksack River and the Lummi River. These alterations in hydrology changed the distribution and patterns of wetland- and riparian-associated plant communities in both delta areas. The 1887-88 U.S. Coast Guard and Geodetic Survey topographic maps indicate that the Lummi Delta site contained subsidiary channels within its present boundaries prior to diking (Bortleson et al. 1980). Although these channels are discernable on recent aerial photographs and remain tidally influenced, they do not provide a flow-through role of a fully functioning blind channel. Instead, some have been straightened and/or periodically dredged to facilitate drainage.

In the 1920s, a reclamation project was initiated to construct a dike/seawall to keep back the marine waters along the shore of Lummi Bay and to construct a levee along the west side of the Nooksack River (Deardorff 1992). Levees were also constructed along the Lummi River to prevent saltwater intrusion onto adjacent farm fields. The reclamation project, which was started in 1926 and completed in 1934, resulted in the nearly complete separation of the Lummi River from the Nooksack River. However, when salt water intrusion into the newly reclaimed farmlands and damage to the dam at the head of the Lummi River occurred during flooding, the dam was replaced with a spillway structure (Deardorff 1992). This spillway structure was damaged in subsequent years during high flow conditions, and was replaced in 1951 by a five-foot-diameter culvert that allowed flow from the Nooksack River into the Lummi River (FEMA 2003). Currently a four-foot diameter culvert (Deardorff 1992) allows flow into the Lummi River only during relatively high-flow conditions (greater than 10,000 cubic feet per second).

The dike and levee construction activity was accompanied by agricultural ditching to drain fields and wetland areas. Based on 1887-88 topographic surveys, Bortleson et al. (1980) estimated that wetlands located landward of the general saltwater shoreline in the lower Lummi River watershed have decreased by approximately 95 percent (from approximately 2.0 square miles [mi^2] to 0.1 mi^2) over the 1888 to 1973 period.

Currently, the Lummi River is not influenced by the dynamic river environment of the past. Instead, the Lummi River occasionally receives a small amount of overflow from the Nooksack River, but otherwise its channels carry storm water runoff and discharged ground water from the Ferndale uplands as well as drainage from a complex network of agricultural ditches in the floodplain. Tidal waters enter the Lummi River from Lummi Bay twice daily. During the late dry season, saline water has been measured as far upstream as Slater Road.

The Nooksack watershed hosts nine species of salmonids, including three listed under the Endangered Species Act (ESA): chinook, steelhead, and bull trout. The Nooksack populations also appear to provide critical genetic diversity to the Puget Sound, where Nooksack chinook populations are one of only five geographic areas considered essential for recovery of the Puget

Sound evolutionarily significant unit (ESU). Unfortunately, many of the Nooksack populations have declined substantially from historic levels and only 3 of 25 salmonid stocks identified in the Nooksack watershed by Washington State Salmonid Stock Inventories are currently considered healthy. Habitat degradation is considered the leading cause for the decline of Nooksack watershed salmonid populations with current habitat conditions substantially less productive than historic conditions.

2.2 Project Location

As was shown in Figure 1, the three areas of the proposed Lummi Nation WHMB are within the Lummi Reservation boundaries. The Lummi Delta Site is flat and is bordered to the south and east by the Lummi River. It is bound on the north by North Red River Road and on the west by Lummi Bay. The Northern Lummi River Distributary Channel runs through the northern half of the property, and is the downstream end of a modified stream system currently known as Jordan's Creek. This distributary channel, as well as all of the agricultural and borrow ditches on the site, discharge to the marine waters of Lummi Bay through two tidegates located near the northwestern part of the project site.

The Nooksack Delta Site is located near the seaward extent of the Nooksack River, and is bound on the north by a forested parcel along Marine Drive, on the east by the town of Marietta, on the west by Kwina Slough, and on the south by Bellingham Bay. The Nooksack River distributary channels flow through the site and discharge to the marine waters of Bellingham Bay.

The third mitigation bank site, the Blockhouse Site, consists of two areas; the area bounded by the Lummi River to the west, Hillaire Road to the east, agricultural fields to the north, and the Lummi Casino Mitigation Site to the south (Area A); and several parcels near the intersection of Kwina Road and Haxton Way (Area B). The Lummi Casino Wetland Mitigation Site, an 18-acre salt marsh, is located north of the Lummi Aquaculture Pond. The ditches throughout the Blockhouse Site flow into a channel along the south end of the site, which empties to Lummi Bay through tide gates located near the northwestern end of the dike that forms the Lummi Aquaculture Pond.

The existing wetland types found on the Reservation range from low salinity salt marshes to freshwater forested wetlands. The Lummi Peninsula, Portage Island, and the northern upland of the Reservation contain a variety of forested, scrub-shrub, and emergent wetlands. Strips and islands of high salinity salt marsh border Lummi Bay in the Lummi River delta. The outer fringes of the Nooksack Delta contain extensive areas of low salt/brackish marshes. The floodplains of the Lummi and Nooksack Rivers contain wetlands, prior converted croplands (i.e., croplands that at one time were wetlands), and inactive agricultural areas that are reverting back to wetlands. The Sandy Point area contains fresh and/or brackish marshes intermixed with dense residential development.

2.3 Rationale for Site Selection

Establishing a wetland and habitat mitigation bank on the Lummi Delta Site, the Nooksack Delta Site, and the Blockhouse Site represents a regionally significant opportunity for ecological restoration on a large scale. To protect wetlands, the Lummi Nation developed a Wetland Management Program that currently includes a technical background document (which includes the 1999 inventory), a wetland ordinance literature review, an assessment of wetland mitigation banking, and a Water Resources Protection Code (Lummi Code of Laws Title 17) that includes a Stream and Wetland Management chapter (Chapter 17.06). As part of this program, the Lummi Delta Site and the Nooksack Delta Site were identified as potential sites for a wetland mitigation bank (LWRD 2002). The Blockhouse Site was added to the proposed bank because removal of tide gates near the western edge of the site will return tidal hydrology to this area and result in ecological benefits similar to those expected at the Lummi Delta Site.

The Lummi Indian Business Council authorized evaluation of the restoration potential of the Nooksack and Lummi River estuaries in 1998 as part of the Nooksack Estuary Recovery Project (LIBC Resolution 98-62). As part of this effort, in 1999 the U.S. Army Corps of Engineers conducted a Section 22 Planning Study to evaluate restoration alternatives in the Nooksack/Lummi River Estuary (COE 2000). One of the identified alternatives (Alternative B3.3) was to restore a portion of the Northern Lummi River Distributary Channel area by removing tide gates and/or breaching the existing sea wall.

The three sites proposed for the Lummi Nation WHMB provide the opportunity for wildlife and fish habitat improvements on a large scale and are in a location that will benefit wildlife and fish outside of the bank boundaries. The Lummi Delta Site and the Blockhouse Site together provide 387 acres for wetland re-establishment and 316 acres for wetland rehabilitation. The existing river levees, dikes, and ditches inhibit some of the wildlife habitat functions that these areas would ordinarily provide. The proximity of these wetlands to the Lummi River and tidelands in Lummi Bay increase the likelihood that improvements in ecological functions will benefit wildlife and fish habitat over a large area. The Lummi Delta Site and the Blockhouse Site were chosen because the hydrologic conditions are suitable, hydric soils are present, a seed bank with salt marsh species is present adjacent to the sites, and restoration of former wetlands has a high success probability (Frenkel and Morlan 1990).

Re-establishing and rehabilitating salt marsh in the Lummi Delta area is desirable because salt water marshes are among the most productive ecosystems in the world (Mitsch and Gosselink 1993). In a summary of studies on the function of salt marsh ecosystems the following major points have been documented (Mitsch and Gosselink 1993):

- High annual gross and net primary productivity in much of the salt marsh. The high productivity is a result of subsidies in the form of tides, nutrient import, and abundance of water that offset the stresses of salinity, widely fluctuating temperatures, and alternative flooding and drying.
- Major detrital production for both the salt marsh system and the adjacent estuary. In some cases, detrital material exported from the salt marsh is more important to the estuary than is the phytoplankton-based production in the estuary. Detritus export and the shelter found along marsh edges make salt marshes important as nursery areas for many commercially important fish and shellfish.

- Leaves and stems of vegetation provide surface area for epiphytic algae and other epibiotic organisms. This enhances both the primary and secondary productivity of the marsh.
- Bacterial decomposition through the breakdown and transformation of indigestible plant cellulose provide a pathway of energy utilization in the salt marsh. Decomposers increase the protein content of the detritus and enhance its food value to consumers.
- Salt marshes have been shown at times to be nutrient sources and sinks, particularly for nitrogen.
- Remnant sloughs and distributary channels available for salmonid fish habitat.

The Nooksack River Delta Site contains a block of largely undisturbed wetlands covering an area of approximately 848 acres (Lynch 2001). Sediment deposits from the river have created additional land at the delta, which brings the current wetland area up to 1,079 acres. A recent timber evaluation estimated that there are 45 acres of harvestable timber on the Nooksack Delta site (IFC 2006). Other areas of the delta contain marketable timber but are not easily accessible or the timber is located in protected buffers along the river. Most of the harvestable timber is red alder and cottonwood, and smaller areas contain Sitka spruce and various willow species. Construction of access roads and harvesting of these trees would adversely impact ecological functions in this wetland system. The potential for repeated cycles of logging could have long-term impacts on the development of ecological functions on the site. Repeated disturbance can negatively affect wildlife habitat through loss of woody cover and invasive species introduction. The Nooksack River Delta Site was chosen to protect the area from timber harvest, to preserve and protect a well-functioning intact ecosystem, and to manage the spread of invasive species. Enhancing and preserving the area would prevent negative impacts from logging the marketable timber on the site.

The Lummi Nation WHMB is being pursued because the tribal government recognizes that mitigation banking is the most appropriate method to facilitate permitting of future tribal government and tribal member projects and because of the opportunity for fish and wildlife habitat improvements of regional significance. Following consultation with the U.S. Army Corps of Engineers and the Environmental Protection Agency, it was determined that the three sites described above are the most appropriate choices for sustainable and large-scale wetland restoration, enhancement and preservation on the Reservation. The three sites within the Lummi Nation WHMB provide the opportunity to restore, enhance, and preserve 1,840 acres of high value wetland areas located in an ecologically significant landscape position.

3. EXISTING CONDITIONS AND ECOLOGICAL BASELINE

This section describes the existing condition of the three sites that comprise the proposed Lummi Nation WHMB and includes descriptions of existing land ownership, site morphology, topography, soils, hydrology, wetlands, and site acreage as determined by wetland and habitat polygon mapping. Property boundaries, topography, and wetland resources of the Lummi Delta Site were previously characterized (LWRD 2003). Although summary information is presented below, for more detailed information about environmental conditions of the Lummi Delta Site, the reader is referred to the 2003 Lummi Water Resources Division Report, *Northern Lummi River Distributary Channel Area Wetland Mitigation Banking Assessment – Final Report.*

3.1 Existing Land Ownership

Land on most Indian reservations may generally be categorized as either "fee" or "trust". Fee land is held by the owner without any restrictions on sale (or on the broader legal term, "alienation"). "Trust land" is land that is subject to the trust responsibility of the United States to Indians and Indian tribes. Ownership of "trust land" is always subject to restrictions on alienation, imposed by the United States. However, the trust responsibility actually extends to the owners of the land, rather than to the land in the abstract, and only tribes or persons of Indian descent are the beneficiaries of that trust. Not all land owned by Indians is subject to restraints on alienation. It is possible for a tribal member to own both "fee" land and "trust" land on the same Reservation.

Historically, it has also been possible for a non-Indian to acquire a fractional, undivided fee interest in a parcel of "trust land". Typically this occurred through inheritance by a non-Indian spouse of deceased tribal member. The non-Indian owns his interest in unrestricted fee while his Indian co-owners hold restricted or "trust" interests.

The United States Code declares all land within the boundaries of an Indian Reservation to be "Indian Country", regardless of whether title to the land is held in "fee" or in "trust" (18 USC §1151). Tribes have civil jurisdiction over the activities of their members on all lands within their reservation, over all persons on lands that belong to the tribe itself, and over the activities of non-members even on fee lands owned by those non-members where the activity involved "threatens or has some direct effect on the political integrity, the economic security, or the health or welfare of the tribe." *Montana v. United States*, 450 U.S. 544, 566 (1981). States, and their political subdivisions, generally lack civil regulatory jurisdiction over Indians within a Reservation, regardless of the type of land ownership that is involved. *Gobin v. Snohomish County*, 304 F.3d 909 (9th Cir. 2002), *cert. denied*, 538 U.S. 908 (2003).

As detailed below, several parcels in each site have multiple landowners. When there are multiple owners of a parcel, it is difficult for a single owner or a group of owners to use any of the land. To address this development constraint, the Lummi Nation started a land ownership consolidation effort many years ago where the Lummi Nation either pays fair market value for the property with the proceeds from the sale distributed to affected individuals based on their ownership interest (i.e., percentage ownership) or trades a parcel of more readily developable land for one or more shares of land that may not be as developable due to site constraints or location.

To completely develop the Lummi Nation WHMB, it is understood that the Lummi government must acquire all of the land within the WHMB boundaries. Once acquired, consideration will be given to consolidating the lot lines of the mitigation bank but this step is not required for the mitigation bank to become operational.

Because the LIBC will need to purchase portions of both the Lummi Delta Site and the Nooksack Delta Site for inclusion in the bank, implementation and construction will be phased within a larger overall plan so that small portions of the project can begin as soon as possible. Once the remaining parcels have been purchased, construction of future phases will continue. The LIBC currently owns all of the Blockhouse Site, but the hydrological modifications associated with these sites will affect neighboring parcels. These neighboring parcels are currently under consideration for purchase by the Lummi Natural Resources Department Restoration Division.

3.1.1 Lummi Delta Site

Property boundaries were surveyed and a parcel map of the Lummi Delta Site was developed (LWRD 2003). The parcel map identifies the surveyed assignment/parcel boundaries in the study site, and includes a line table (located on the property boundary map) that shows the length and bearing of property boundaries. Table 4 lists parcel numbers, acreages, and ownership information for the Lummi Delta Site. Figure 4 depicts the ownership status of the parcels that comprise the Lummi Delta Site.

As indicated in Table 4, owners of several of the parcels in the Lummi Delta Site are deceased, and an estate probate process to determine new owners is underway. Parcels 11, 11A, and 5B are partially owned by the Lummi Indian Business Council. Parcel 4B was purchased by the Lummi Indian Business Council during 2004 for wetland mitigation banking. The total acreage of parcels in Table 4 is greater than the site because the boundaries of several parcels (6-A, 6-B, 6-C, 6-D, and 7-A) extend beyond the boundary of the Lummi Delta Site.

Table 4. Summary of Parcel Ownership within the Lummi Delta Site

BIA Parcel Assignment Number or Parcel Number	Ownership Status	Number of Non-Lummi Owners	Number of Owners	Whole Parcel on Site (Yes/No)	Size of Parcel in Acres (portion of parcel on site)
4-B	Tribal Trust	0	1 - T	Yes	40.0
6-A	Individual Native Trust	0	1	No	38.0 (13.1)
6-B	Individual Native Trust	0	1	No	37.2 (12.8)
6-C	Individual Native Trust	0	6	No	39.8 (17.2)
6-D	Individual Native Trust	0	6 - EP	No	42.6 (20.4)
7-A	Individual Native Trust	1	10 - EP	Yes	79.9 (17.9)
3-B	Individual Native Trust	2	18 - EP	Yes	33.4
11	Individual Native Trust	6	34 – EP, T	Yes	177.1
11-A	Individual Native Trust	6	34 – EP, T	Yes	8.6
5-B	Individual Native Trust	7	72 - T	Yes	33.0
Total Parcel Acreage within proposed bank site:			371*		
Total Parcel Acreage in Tribal trust ownership:			40		

Notes: EP – Designates that an estate probate is in process.
T – Designates the Lummi Nation as a partial owner or owner.
* – The total acreage number will be reconciled with the 407 acre number measured with GIS, following final lot line adjustments on the parcels that extend outside the bank boundaries.

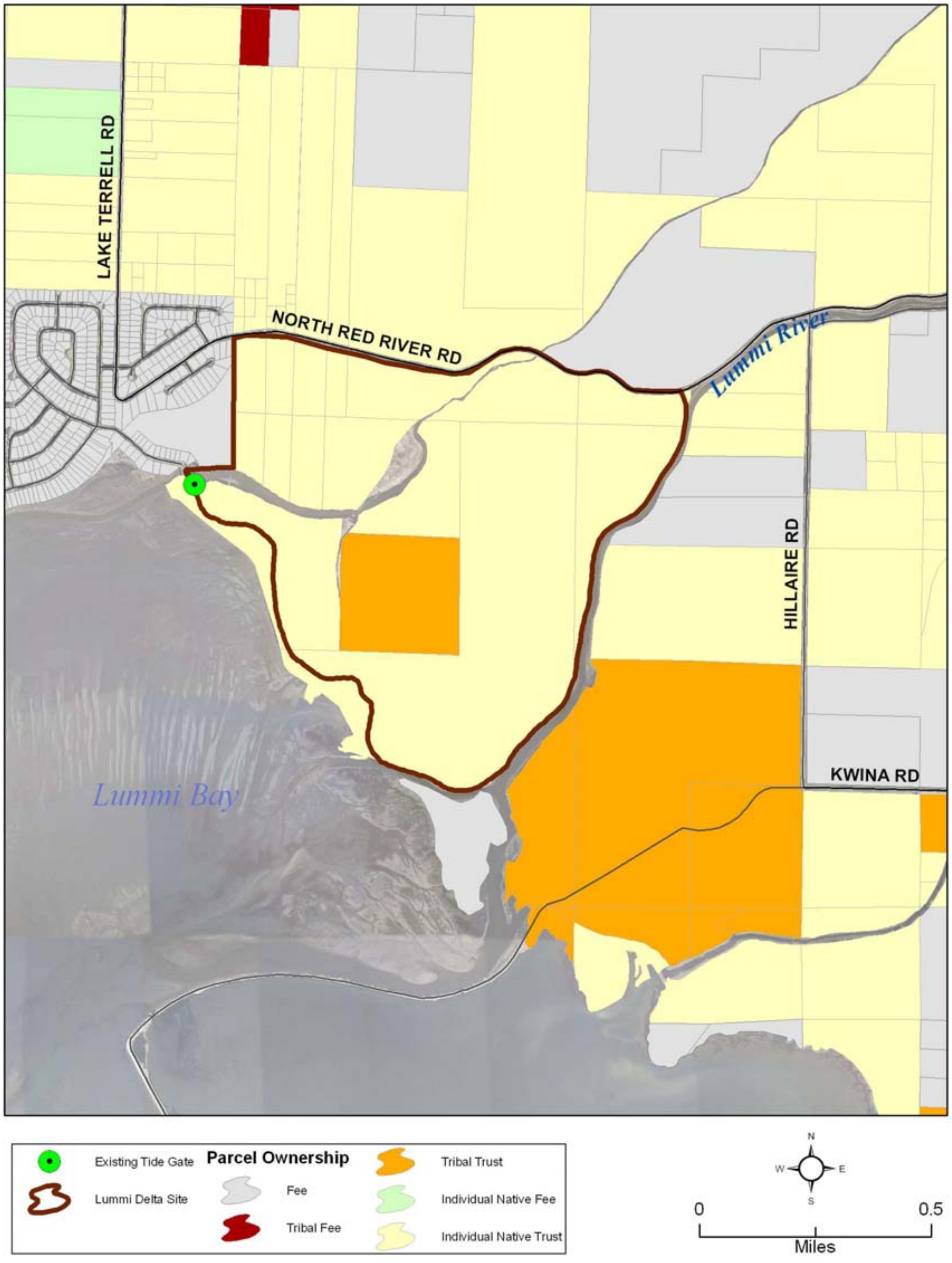

Figure 4. Land ownership status of the Lummi Delta Site

3.1.2 *Nooksack Delta Site*

Table 5 lists parcel numbers, acreages, and ownership information for the Nooksack Delta Site. All of the property in the proposed Nooksack Delta Site is in trust status. Because the Nooksack Delta has prograded seaward (new land formation as sediment is deposited at the head of the delta), there are approximately 408 acres of land that are not encompassed by current parcel boundaries but are in Tribal trust land ownership status. Therefore, the total acreage of the Nooksack Delta Site is 1,079 acres, including prograded lands. Figure 5 depicts the ownership status of the parcels that comprise the Nooksack Delta Site.

Table 5. Summary of Parcel Ownership within the Nooksack Delta Site

BIA Parcel Assignment Number or Parcel Number	Ownership Status	Number of Non-Lummi Owners	Number of Owners	Whole Parcel on Site (Yes/No)	Size of Parcel in Acres
380217999905	Tribal Trust	0	1	Yes	205.8
380217290290	Tribal Trust	0	1	Yes	95.0
380218420455	Tribal Trust	0	1	Yes	18.3
380218B	Tribal Trust	0	1	Yes	4.1
380219500360	Tribal Trust	0	1	Yes	13.2
380219C	Tribal Trust	0	1	Yes	35.1
380218345325/26-B	Individual Native Trust	0	26	Yes	23.0
380218420340/27-BA	Individual Native Trust	0	1	Yes	18.7
380218490400/25-B	Individual Native Trust	0	1	Yes	20.9
380218440280/27-BB	Individual Native Trust	0	1	Yes	17.1
380218426213/42-B	Individual Native Trust	0	20	Yes	119.8
380217060250/24-B	Individual Native Trust	0	43	Yes	43.0
380217060450/22-B	Individual Native Trust	0	21	Yes	32.3
380217060365/23-B	Individual Native Trust	0	1	Yes	20.7
380217140370/23-BA	Individual Native Trust	0	4	Yes	4.2
Total acreage of parcels within the proposed bank site (does not include newly prograded land at south end of delta):					671.2
Total acreage of parcels in Tribal Trust ownership:					371.5
Total acreage of prograded areas that are not included in parcel boundaries and are in Tribal Trust ownership status:					408.3
Total Acreage, including prograded areas that are not included within parcels:					1,079.5

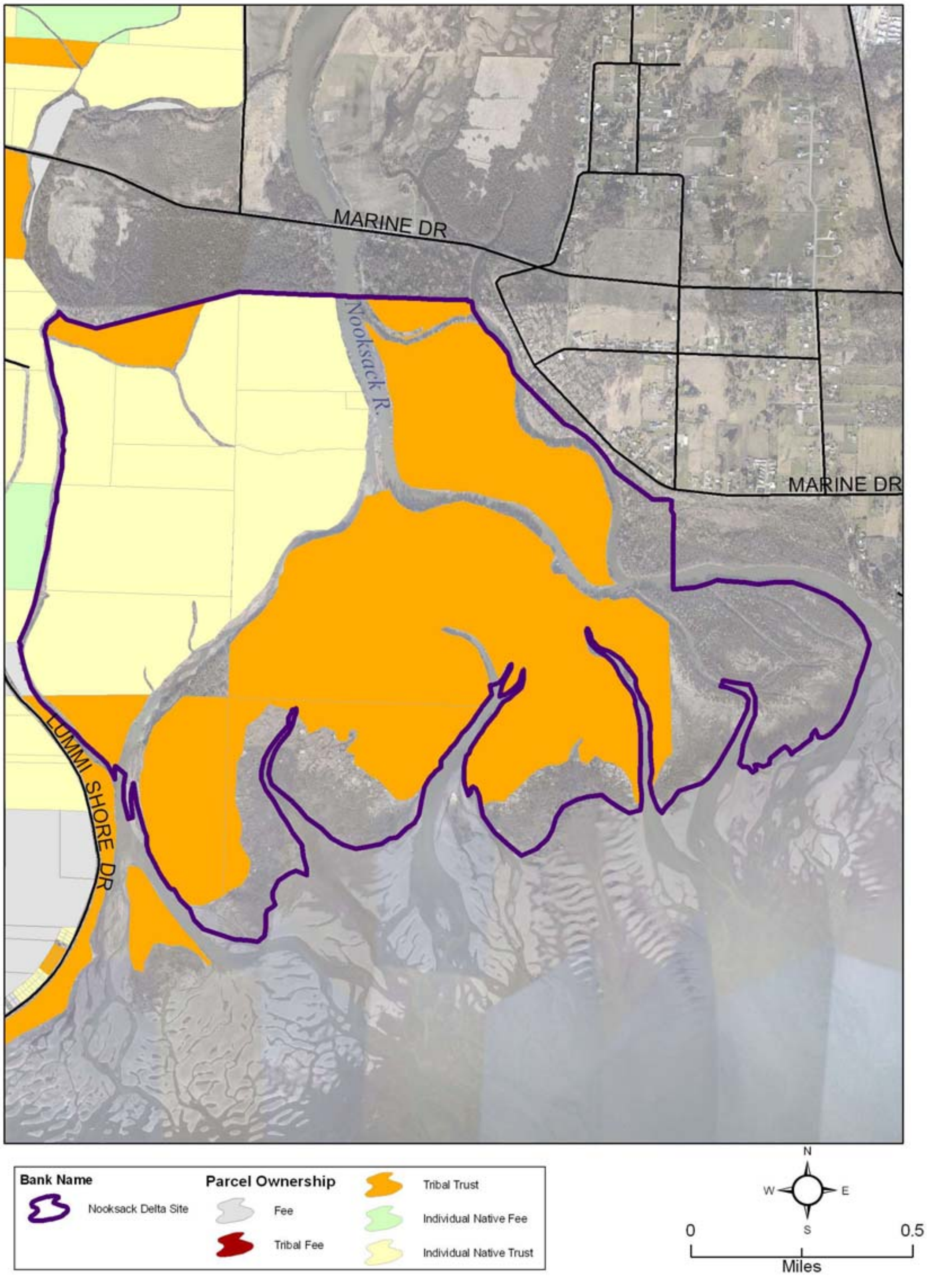

Figure 5. Land ownership status of the Nooksack Delta Site

3.1.3 Blockhouse Site

Table 6 lists parcel numbers, acreages, and ownership information for the Blockhouse Site. All of the property in the proposed Blockhouse Site is in trust status and the Lummi Indian Business Council owns 81 percent of the site. Figure 6 depicts the ownership status of the parcels that comprise the Blockhouse Site.

Table 6. Summary of Parcel Ownership within the Blockhouse Site

BIA Parcel Assignment Number or Parcel Number	Ownership Status	Number of Non-Lummi Owners	Number of Owners	Is Whole Parcel on Site (Yes/No)	Size of Parcel in Acres (portion of parcel on site)
Area A					
T-1004	Tribal Trust	0	1 - T	No	236 (195)
7AB	Individual Native Trust	1 - EP	5	Yes	69.8
Area B					
T-1017	Tribal Trust	0	1 - T	No	121 (87.5)
31-F	Individual Native Trust	0	1	No	8.3 (1.8)
Total Acreage of Parcels within the proposed bank site:					354.1
Total Acreage of Parcels in Tribal trust ownership:					296.9
Notes: EP – Designates that an estate probate is in process. T – Designates the Lummi Nation as a partial owner or owner.					

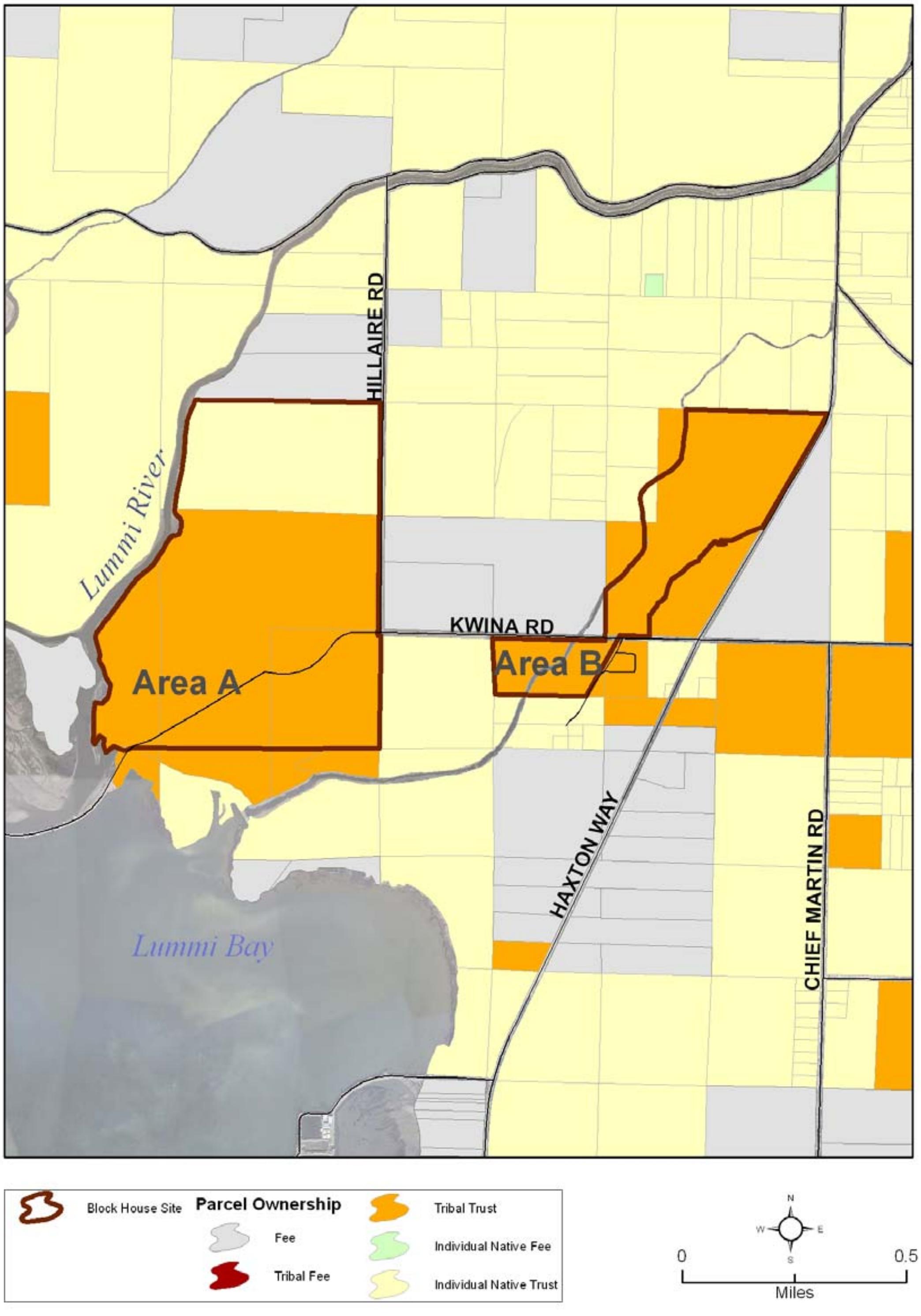

Figure 6. Land ownership status of the Blockhouse Site

3.2 Site Topography

The Lummi Delta Site, the Nooksack Delta Site, and the portion of the Blockhouse Site near the Lummi River slope gradually to below sea level. The topographic map of the Lummi Delta Site was developed based on a detailed topographic survey as part of an earlier wetland mitigation bank assessment (LWRD 2003). Topographic data with a vertical resolution of 15 centimeters (LIDAR images) are available for the Nooksack Delta Site and the Blockhouse Site, but detailed topographic/land surveys have not been conducted.

3.3 Soils

The United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS) identified and described 39 different soil map units on the Reservation (USDA 1992). Alluvial sediments of the Eliza-Tacoma soil unit underlie all sites that will comprise the Lummi Nation WHMB. These hydric soils consist of very deep, very poorly drained soil formed in alluvium. These soils are coarse-silty, mixed, acid, mesic Sulfic Fluvaquents (USDA 1970).

3.4 Hydrogeology

The hydrogeologic conditions on the Lummi Reservation have been described previously by the USGS and others (Washburn 1957, Cline 1974, Easterbrook 1973, Easterbrook 1976). In general, the Reservation is underlain by unconsolidated sediments deposited as glacial outwash, glaciomarine drift, glacial till, and floodplain or delta deposits of Quaternary age (Washburn 1957). The floodplains of the Lummi and Nooksack rivers are underlain with brackish ground water that is not suitable for potable use (Cline 1974).

3.5 Wetland Delineation and Assessment

3.5.1 Lummi Delta Site

Wetlands on the Lummi Delta Site were characterized and delineated in 2003 (LWRD 2003). As detailed in the 2003 assessment, eighteen wetlands were delineated within the site (Figure 7). Approximately 123 acres of wetlands are classified as palustrine according to the Cowardin classification system (Cowardin et al., 1979). Approximately 37 acres are classified under the Cowardin system as either estuarine intertidal emergent areas or estuarine subtidal emergent wetlands, depending on salinity levels. The remaining 247 acres in the north half of the Lummi Delta Site did not meet the definition of wetlands, but have hydric soil indicators and are believed to have been wetlands prior to construction of the levees and ditches in the early 1900s. Salinity has been known to vary in these areas because the tidegates at the terminus of the Northern Distributary Channel of the Lummi River do not function as designed or are sometimes blocked open by debris, allowing marine waters to move into the channels during higher tides. Table 7 lists the areas represented by the different Cowardin classification types in the Lummi Delta Site.

Table 7. Cowardin Wetland Classification and Associated Area in the Lummi Delta Site

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Palustrine emergent	111	27
Palustrine Scrub-shrub	4	1
Palustrine forested	8	2
Estuarine intertidal emergent or estuarine subtidal emergent	37	9
Uplands (drained wetlands)	247	61
Total	407	100

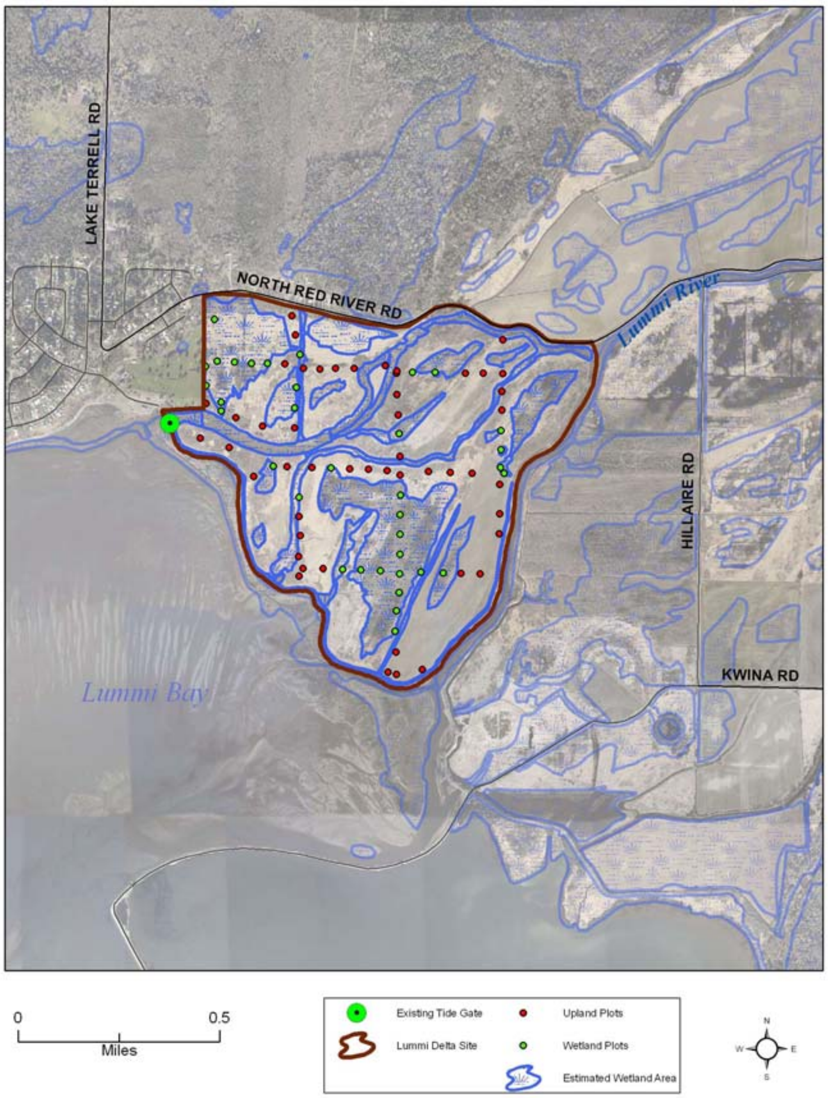

Figure 7. Existing Wetlands and Plot Locations on the Lummi Delta Site

3.5.2 Nooksack Delta Site

Wetlands in the Nooksack Delta Site were assessed during the spring, summer, and fall of 2004 and spring of 2007. Because of its large size and the difficulty in accessing this area, a jurisdictional delineation was not performed. Although delineation plot data were recorded from 49 plots within the Nooksack Delta Site, and approximately 93 percent of the site meets wetland criteria, wetland areas were estimated for this prospectus using a combination of wetland delineation plot data, GIS analysis, and aerial photograph interpretation (Figure 8). This characterization was necessary to describe the ecological value of the site, develop restoration plans, furnish units for mapping, document why this area may be at risk for development, and describe critical habitat for listed species under the Endangered Species Act. Table 8 lists the area represented by the different Cowardin classification types in the Nooksack Delta Site.

Table 8. Cowardin Wetland Classification and Associated Area in the Nooksack Delta Site

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Uplands	18	2
Palustrine emergent	161	15
Estuarine intertidal emergent or estuarine subtidal emergent (prograded lands)	258	24
Palustrine Forested	443	41
Palustrine Scrub-shrub	140	13
River Channel	59	5
Total	1,079	100

The areas characterized in the Nooksack Delta Site are approximately 69 percent palustrine wetlands according to the Cowardin classification system. Palustrine wetlands are nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is less than 0.5 parts per thousand (Cowardin et al. 1979). Several other wetland systems exist on the Nooksack Delta Site, including the riverine systems (those areas bounded on the landward side by upland, by the channel bank, or by other wetland types) and subsystems that are both tidal and not tidal. Most of the current and relict channels in the Nooksack Delta Site fall into one of the riverine subsystems. A large portion of land in the outer delta is classified as the estuarine system, which includes both subtidal and intertidal subsystems. The seaward boundary of the Nooksack Delta Site is the vegetation line as determined from high resolution (6-inch resolution) aerial photographs from March 2004.

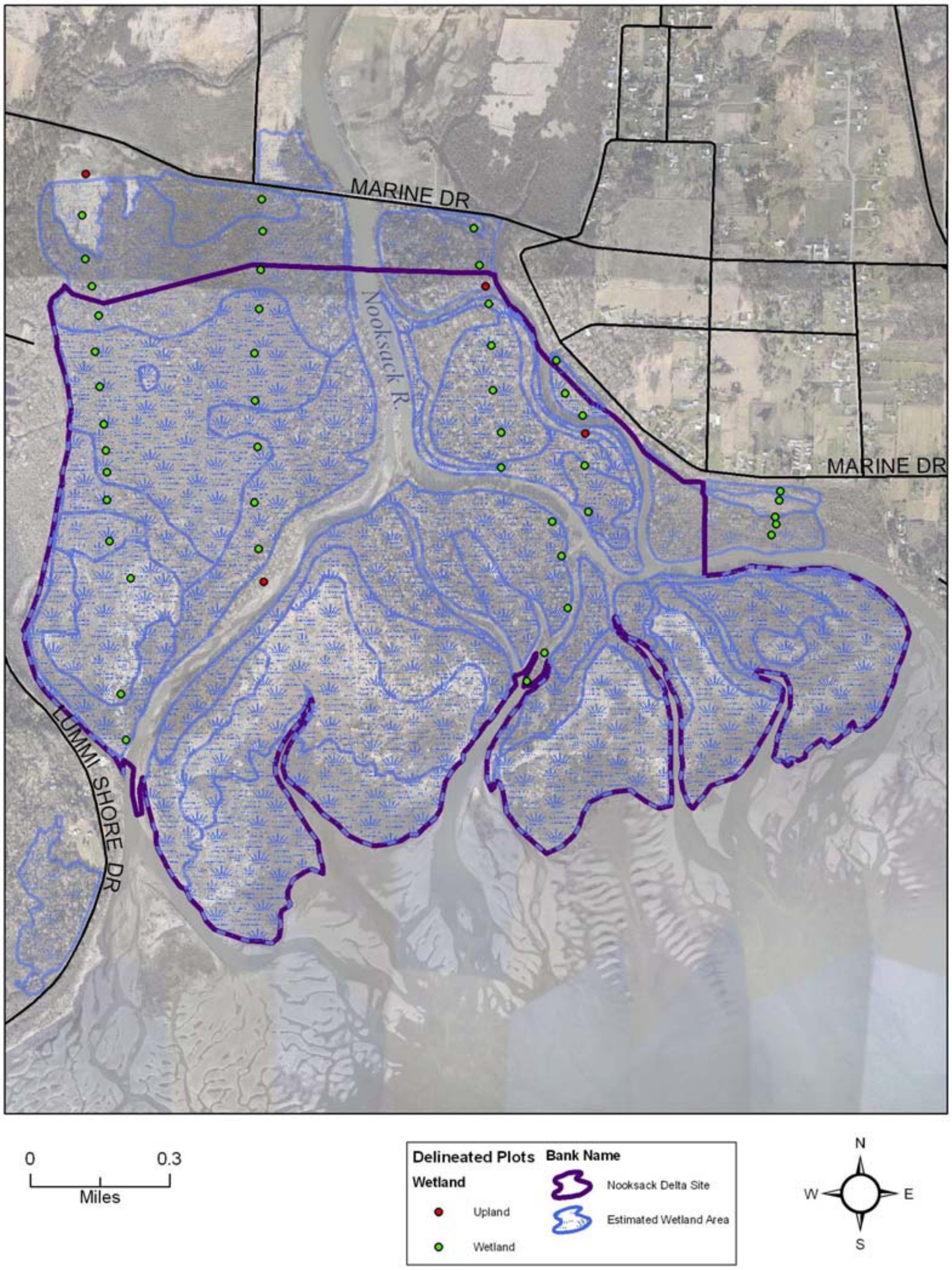

Figure 8. Existing Wetlands and Plot Locations on the Nooksack Delta Site

Riverine and estuarine areas are not mapped and characterized separately for this prospectus but are included in the area calculations. Acreage calculations for the potential mitigation bank site are based on parcel size, and only a very small percentage of the parcels within the site contain riverine habitat. The southern portion of the Nooksack Delta Site bordering Bellingham Bay is classified as an estuarine system. These areas will be included in the areas designated for preservation, but because habitat improvements are not planned in riverine and estuarine areas, they were not included in this description and mapping exercise.

Wetland classes (forested, scrub-shrub, and emergent) for the Nooksack Delta Site were estimated using a combination of plot data and aerial photography. Vegetation, hydrology, and soil data (wetland delineation plots) were recorded in the spring, summer, and fall of 2004 and a timber inventory was completed in August 2006 (IFC 2006). Using ArcGIS Version 8, a vegetation/wetland type map of the Nooksack Delta Site was generated by superimposing wetland type over a 6-inch resolution 2004 aerial photograph (Figure 5).

3.5.3 Blockhouse Site

The boundaries of delineated wetlands at the Blockhouse Site are shown on Figure 9. Six wetlands in the area east of the Lummi River (Area A) were characterized and delineated in 2007 (LWRD 2007). Approximately 126 acres of palustrine shrub-shrub and emergent wetlands were mapped within this portion of the site. The parcels near the intersection of Kwina Road and Haxton Way (Area B) contain a total of 66 acres of wetlands on the 89-acre site. Table 9 lists the area of wetland and upland on both areas of the Blockhouse Site.

Table 9. Cowardin Wetland Classification and Associated Area in the Blockhouse Site

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Area A		
Palustrine scrub-shrub/emergent	126	36
Uplands (drained wetlands)	139	39
Area B		
Palustrine emergent/scrub-shrub/forested	66	19
Uplands (drained wetlands)	23	6
Total	354	100

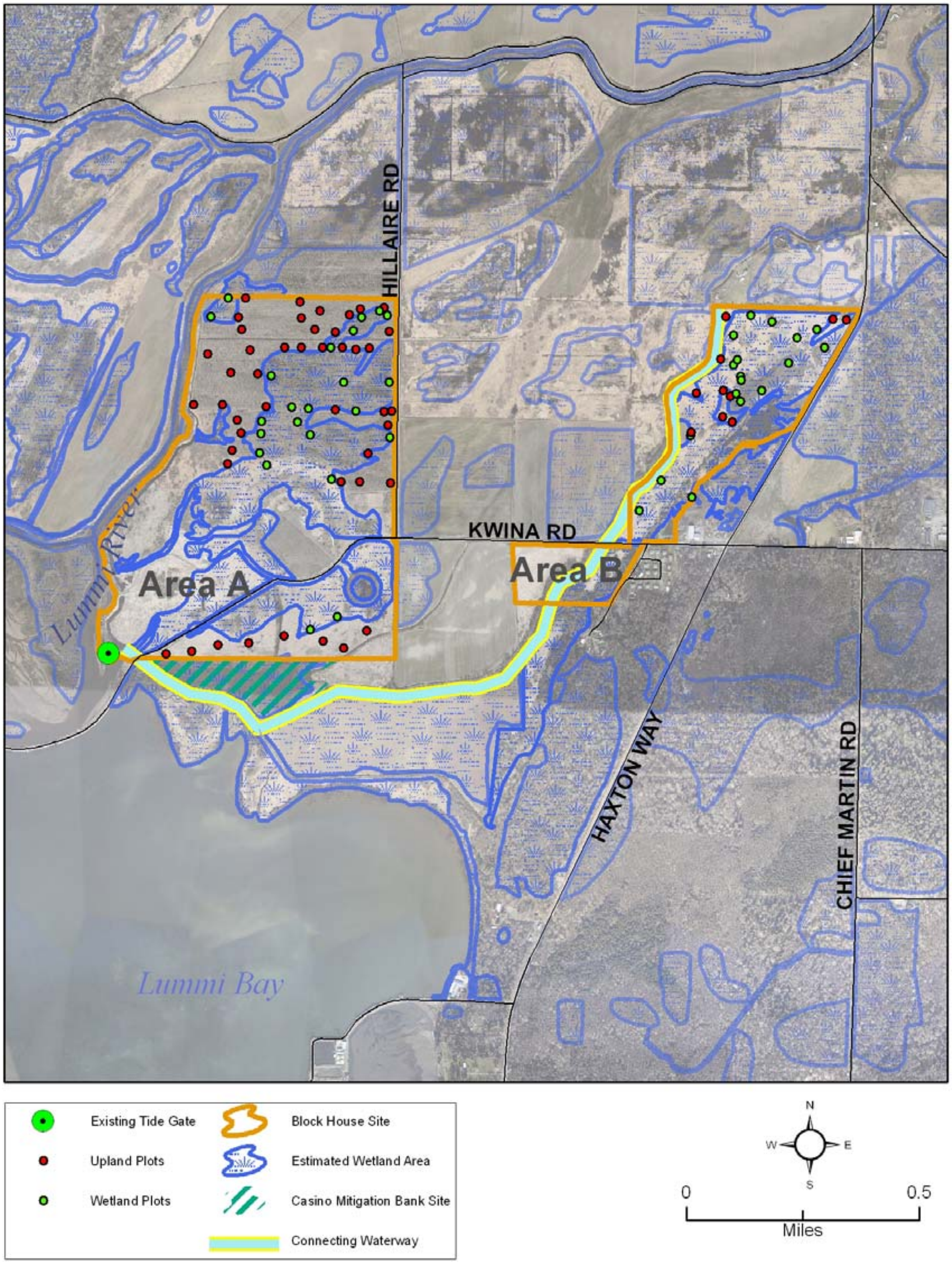

Figure 9. Existing Wetlands and Plot Locations on the Blockhouse Site

3.6 Wetland Function Assessment

This section explains how the three mitigation bank sites were divided into assessment units and presents the results of the ratings for each of the 15 functions assessed for the three sites. The *Methods for Assessing Wetland Functions, Volume 1*, by the Washington State Wetland Function Assessment Project (WAFAM) (Hruby et al. 1999) was used to evaluate wetland functions within the project sites.

3.6.1 Lummi Delta Site

The Lummi Delta Site was divided into two assessment units in accordance with the WAFAM guidance document (Hruby et al. 1999). The WAFAM specifies that differences in water regime, flow, or velocity are criteria under which wetlands should be divided into multiple assessment units. The northwestern quarter of the site was considered an individual assessment unit (Unit A) because ground water seeps along the northwestern boundary add to the hydrologic regime. The hydrologic regime for the main portion of the site (Unit B) is influenced primarily by ground water and the river. The areas encompassed by assessment Units A and B are depicted on Figure 10. Although large portions of Units A and B do not currently meet wetland hydrology criteria, these areas of drained wetland were evaluated with the existing wetland during the function assessment.

Field data were collected during the spring and summer of 2003 and used to run the WAFAM rating model. Table 10 summarizes the ratings for each of the 15 functions assessed for the two assessment units. The index range is 1 through 10 for each function with a rating of 1 being the lowest and 10 being the highest. Both assessment units had similar function assessment index ratings. The site as a whole rated average to below average for potential for removing sediment, nutrients, heavy metals, and for ground water recharge. However, because the site is disconnected from floodwaters, the opportunity to perform these functions is low. Unit B rated slightly higher in these functions because it contains more diverse vegetation, specifically a higher percentage of area that is forest or scrub-shrub. Because of their disconnection from floodwaters, both assessment units received a "N/A" rating for reducing peak flows and reducing downstream erosion.

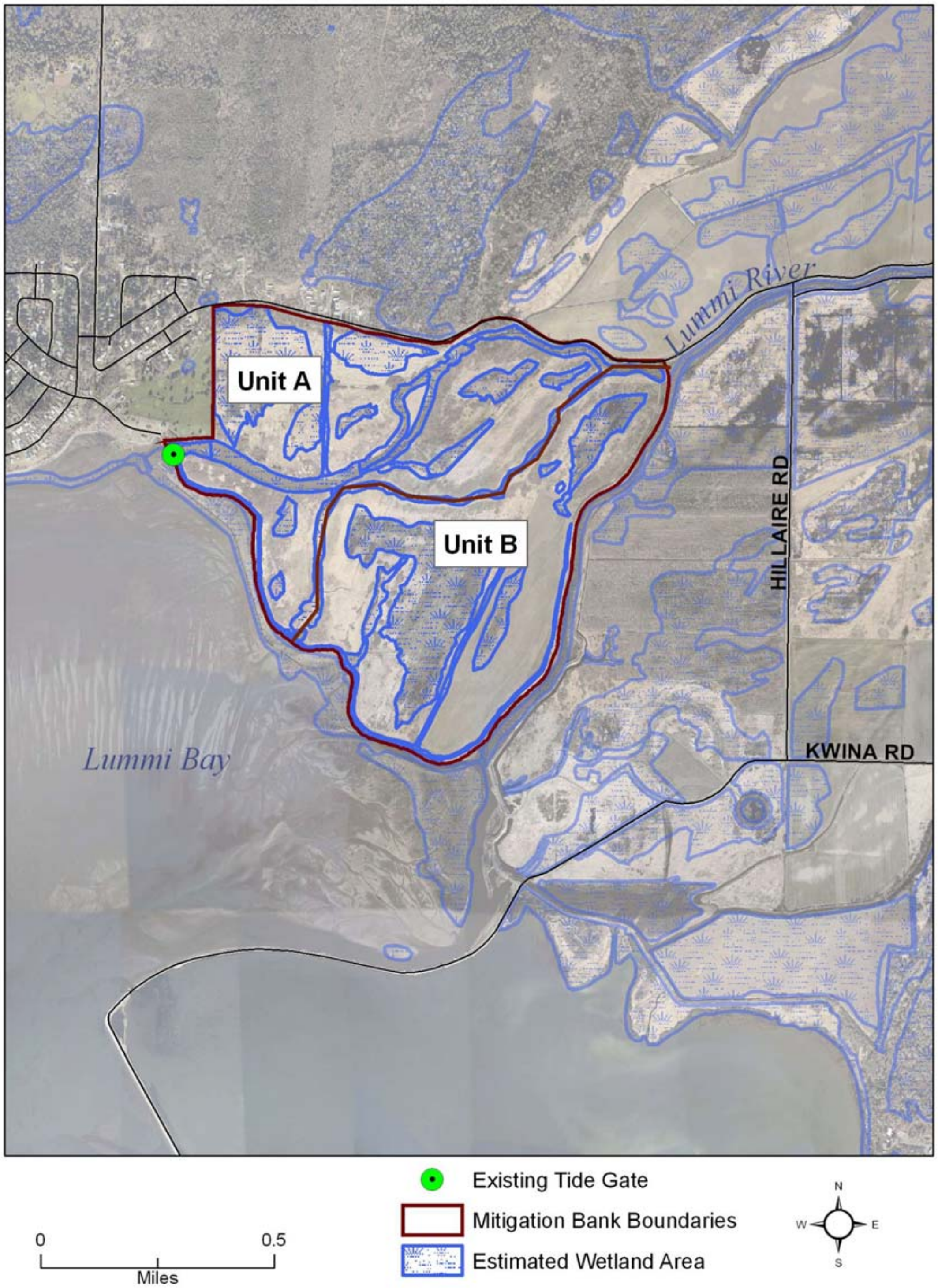

Figure 10. Function Assessment Units in the Lummi Delta Site

Table 10. Summary of Function Assessment Ratings – Lummi Delta Site

Function	Index Rating
Lummi Delta Site - Unit A	
Potential for Removing Sediment	6
Potential for Removing Nutrients	4
Potential for Removing Heavy Metals and Toxic Organics	4
Potential for Reducing Peak Flows	N/A
Potential for Reducing Downstream Erosion	N/A
Potential for Ground Water Recharge	3
General Habitat Suitability	4
Habitat Suitability for Invertebrates	5
Habitat Suitability for Amphibians	2
Habitat Suitability for Anadromous Fish	3
Habitat Suitability for Resident Fish	4
Habitat Suitability for Wetland Associated Birds	5
Habitat Suitability for Wetland Associated Mammals	5
Native Plant Richness	4
Primary Production and Export	6
Function	Index Rating
Lummi Delta Site - Unit B	
Potential for Removing Sediment	7
Potential for Removing Nutrients	6
Potential for Removing Heavy Metals and Toxic Organics	5
Potential for Reducing Peak Flows	N/A
Potential for Reducing Downstream Erosion	N/A
Potential for Ground Water Recharge	4
General Habitat Suitability	6
Habitat Suitability for Invertebrates	6
Habitat Suitability for Amphibians	3
Habitat Suitability for Anadromous Fish	3
Habitat Suitability for Resident Fish	5
Habitat Suitability for Wetland Associated Birds	6
Habitat Suitability for Wetland Associated Mammals	7
Native Plant Richness	5
Primary Production and Export	7

The index of suitability for habitat functions represents an assumption that the more habitat niches that are provided (heterogeneity), the higher the performance will be of the habitat functions. In the case of the models for wetland-associated bird and mammal habitat, a high index reflects the presence of habitat heterogeneity for those species. Both assessment units rated low to average for most of the habitat suitability functions.

The function assessment scores reflect the relatively high quality of adjacent buffers and relatively low number of vegetation strata, and relatively low vegetation interspersion/edge components. Unit B rated slightly higher in most of the habitat suitability functions because of the presence of a small area of mature forested area within this assessment unit.

Overall, the site rated average for species richness. A high percent coverage of invasive species was observed throughout the site, tempering the rating for species richness. A portion of the wetland buffer along North Red River Road is in very good condition, but buffers on the perimeter of Unit A are in poor condition. This is a low to average functioning wetland that has significant potential for improvement in all function categories following wetland re-creation and rehabilitation. The scores generated through the functions assessment may be useful in establishing an “accounting system,” following restoration at the site, in which the same assessment tool is employed over time to assess function changes.

3.6.2 Nooksack Delta Site

The Nooksack Delta Site was divided into three assessment units in accordance with the WAFAM guidance document (Hruby et al. 1999). The WAFAM specifies that when wetlands exist on both sides of a river wider than 50 feet, the wetlands on each side of the river are treated as separate assessment units. Therefore it was determined that assessment units A, B, and C were to be treated as separate units (Figure 11). These three units were determined to be riverine impounding wetlands according to the WAFAM guidance document. The areas to the south of Unit C were not rated as part of this project and were determined to be classified as tidal-fringe, a type of wetland which is not included in the WAFAM method.

Field data were collected during the spring, summer, and fall of 2004 and used in the WAFAM rating model. Table 11 summarizes the ratings for each of the 15 functions assessed for the three assessment units. The three units had similar function assessment ratings. In general, all three units rated average to below average for potential for removing sediment, nutrients, heavy metals, and ground water recharge. Unit A rated slightly higher for these functions and Unit C rated slightly lower because of a combination of factors including outlet constriction, percent of area that is seasonally inundated, and amount of herbaceous understory. Unlike the Lummi Delta Site, the Nooksack Delta Site has the opportunity to perform these functions because of its position in the landscape and because it is not surrounded by dikes and has therefore maintained connectivity.

Because of extensive natural buffers and forested riparian corridors to other habitat areas, the site rated high for general habitat suitability, and rated above average for habitat suitability for invertebrates, amphibians, anadromous fish, resident fish, and wetland associated birds. The site rated high for habitat suitability for wetland associated mammals. An opportunity exists for habitat improvements for invertebrates, amphibians, and anadromous fish especially in Unit B.

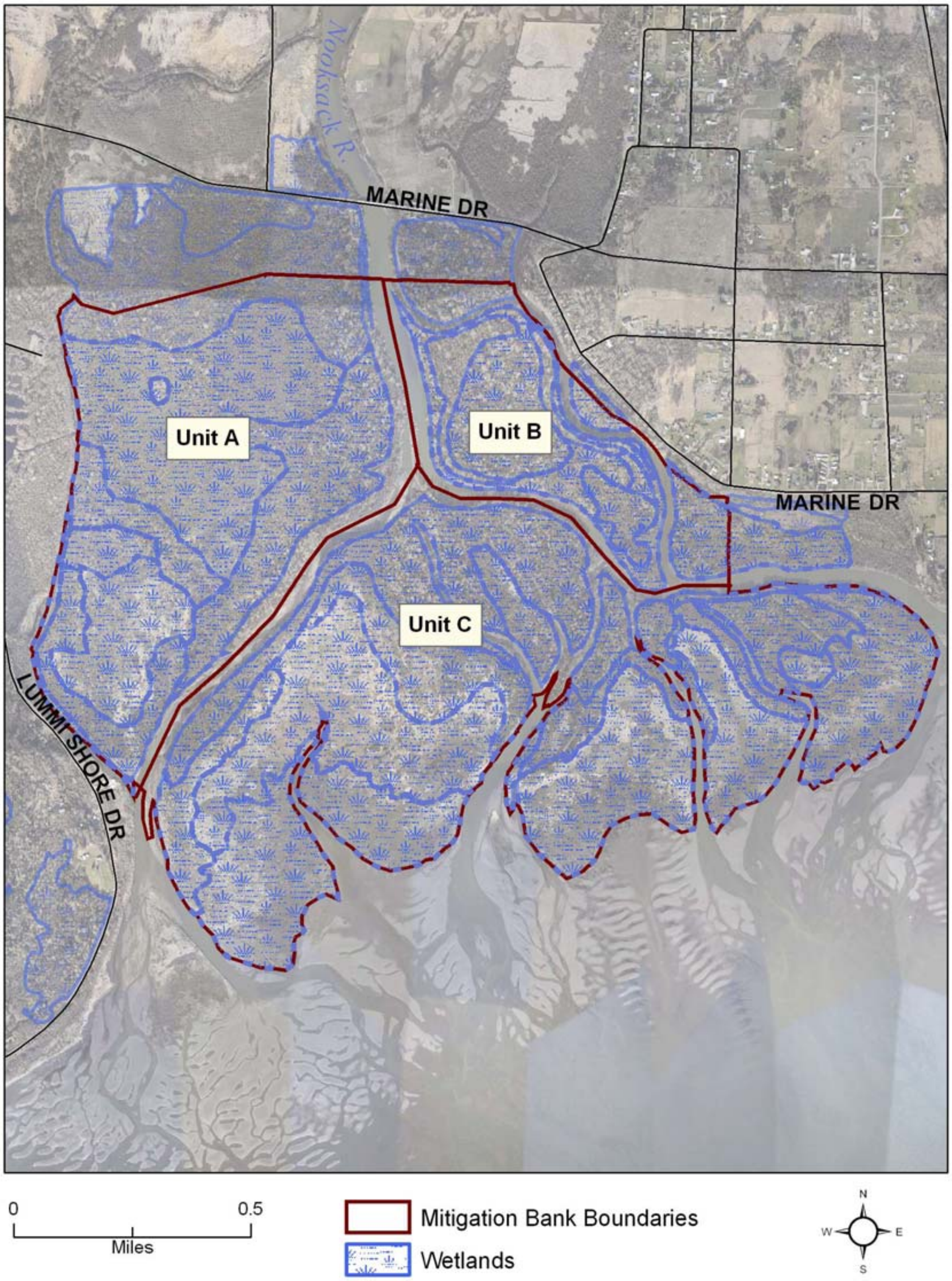

Figure 11. Function Assessment Units in the Nooksack Delta Site

Table 11. Summary of Function Assessment Ratings – Nooksack Delta Site

Function	Index Rating
Nooksack Delta Site - Unit A	
Potential for Removing Sediment	5
Potential for Removing Nutrients	6
Potential for Removing Heavy Metals and Toxic Organics	7
Potential for Reducing Peak Flows	6
Potential for Reducing Downstream Erosion	10
Potential for Ground Water Recharge	6
General Habitat Suitability	10
Habitat Suitability for Invertebrates	9
Habitat Suitability for Amphibians	8
Habitat Suitability for Anadromous Fish	8
Habitat Suitability for Resident Fish	9
Habitat Suitability for Wetland Associated Birds	8
Habitat Suitability for Wetland Associated Mammals	10
Native Plant Richness	9
Primary Production and Export	5
Nooksack Delta Site - Unit B	
Potential for Removing Sediment	5
Potential for Removing Nutrients	5
Potential for Removing Heavy Metals and Toxic Organics	5
Potential for Reducing Peak Flows	6
Potential for Reducing Downstream Erosion	10
Potential for Ground Water Recharge	6
General Habitat Suitability	9
Habitat Suitability for Invertebrates	7
Habitat Suitability for Amphibians	6
Habitat Suitability for Anadromous Fish	7
Habitat Suitability for Resident Fish	8
Habitat Suitability for Wetland Associated Birds	7
Habitat Suitability for Wetland Associated Mammals	9
Native Plant Richness	8
Primary Production and Export	7
Nooksack Delta Site – Unit C	
Potential for Removing Sediment	5
Potential for Removing Nutrients	3
Potential for Removing Heavy Metals and Toxic Organics	4
Potential for Reducing Peak Flows	6
Potential for Reducing Downstream Erosion	10
Potential for Ground Water Recharge	8
General Habitat Suitability	10
Habitat Suitability for Invertebrates	8
Habitat Suitability for Amphibians	6
Habitat Suitability for Anadromous Fish	8
Habitat Suitability for Resident Fish	8
Habitat Suitability for Wetland Associated Birds	8
Habitat Suitability for Wetland Associated Mammals	10
Native Plant Richness	8
Primary Production and Export	8

Unit B rated lower in this category than the other two units because, among other factors, it has lower interspersion between vegetation and open water, lower interspersion between Cowardin vegetation classes, and less permanent open water. Unit A had the highest rating for native plant richness because it had the highest diversity of native plant species and the lowest number of non-native species observed. Unit A had the lowest rating for primary production and export due primarily to the presence of a higher percentage of organic soils than in the other two units.

3.6.3 Blockhouse Site

The Blockhouse Site was divided into two assessment units (Unit A and Unit B) in accordance with the WAFAM guidance document (Hruby et al. 1999). The WAFAM specifies that differences in water regime, flow, or velocity are criteria under which wetlands should be divided into multiple assessment units. Unit B is associated with permanent water in Smugglers Slough where Unit A does not contain permanent surface water. Large upland pastures also separate the assessment units. A summary of the function assessment results is shown in Table 12.

Assessment Unit A is located in the portion of the Blockhouse Site near the mouth of the Lummi River and consists of six wetland areas (shown in Figures 9 and 12). The wetlands are remnants of the larger wetland that existed before construction of the levees along the Lummi River and Lummi Bay. Hydrologic inputs and outputs are similar for all six of these wetlands. The six wetlands were assessed together as one Depressional Outflow wetland unit. The total area of Unit A is approximately 116 acres.

Assessment Unit B is located near the intersection of Kwina Road and Haxton Way (Figure 12). Unit B was assessed as a Depressional Outflow wetland. The wetland is approximately 145 acres in size and extends outside of the proposed mitigation bank site boundaries. Approximately 63 acres of Assessment Unit B are within the proposed mitigation bank site boundaries and approximately 82 acres extend outside of the boundaries. Smugglers Slough is contained within Unit B and has permanent surface water but it does not flow on a regular basis. Flows are generally associated with receding floodwater and occasional tidal influence when the floodgates malfunction. Smugglers Slough has some characteristics of a Riverine system and of Tidal Fringe, but was lumped together with Depressional Outflow for this assessment because of the occasional nature of the hydrologic characteristics and the small area relative to the larger depressional wetland.

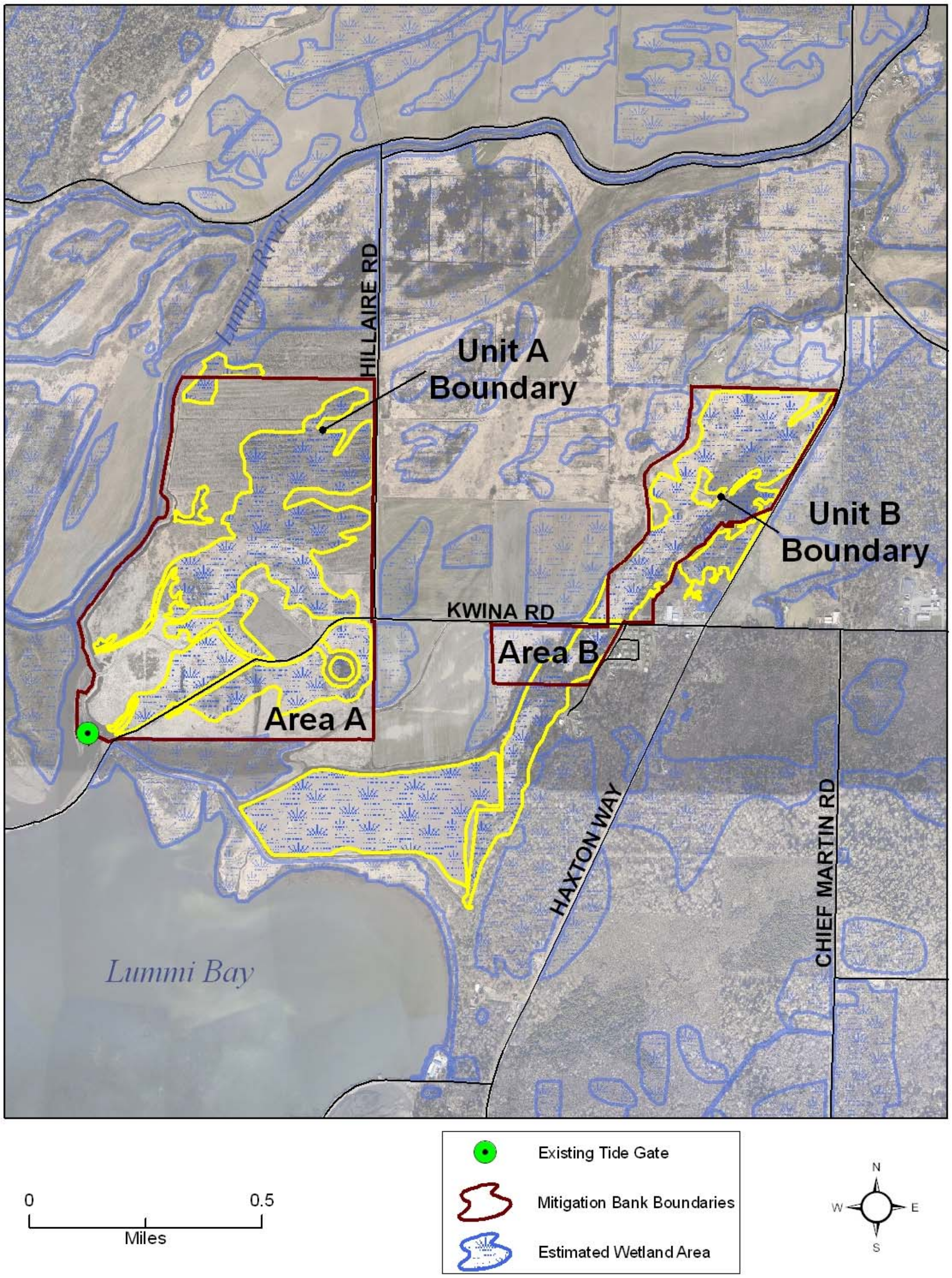

Figure 12. Function Assessment Units in the Blockhouse Site

Table 12. Summary of Function Assessment Ratings – Blockhouse Site

Function	Index Rating
Blockhouse Site - Unit A	
Potential for Removing Sediment	6
Potential for Removing Nutrients	3
Potential for Removing Heavy Metals and Toxic Organics	5
Potential for Reducing Peak Flows	4
Potential for Reducing Downstream Erosion	5
Potential for Ground Water Recharge	6
General Habitat Suitability	4
Habitat Suitability for Invertebrates	3
Habitat Suitability for Amphibians	4
Habitat Suitability for Anadromous Fish	2
Habitat Suitability for Resident Fish	3
Habitat Suitability for Wetland Associated Birds	4
Habitat Suitability for Wetland Associated Mammals	5
Native Plant Richness	3
Primary Production and Export	8
Function	Index Rating
Blockhouse Site - Unit B	
Potential for Removing Sediment	7
Potential for Removing Nutrients	6
Potential for Removing Heavy Metals and Toxic Organics	7
Potential for Reducing Peak Flows	6
Potential for Reducing Downstream Erosion	7
Potential for Ground Water Recharge	5
General Habitat Suitability	6
Habitat Suitability for Invertebrates	7
Habitat Suitability for Amphibians	7
Habitat Suitability for Anadromous Fish	7
Habitat Suitability for Resident Fish	5
Habitat Suitability for Wetland Associated Birds	8
Habitat Suitability for Wetland Associated Mammals	7
Native Plant Richness	4
Primary Production and Export	8

Unit B rated moderate to high for several hydrologic functions: removing sediment, removing heavy metals, and reducing downstream erosion. Moderate to high scores for these functions is primarily a result of moderate diversity of wetland types, vegetation structure, and hydrologic regimes. Ratings for removing nutrients, reducing peak flows, and ground water recharge are moderate for many of the same reasons, but there is less opportunity to perform these functions due to landscape position and surrounding land uses. Unit B also received moderately high ratings for habitat suitability for invertebrates, amphibians, anadromous fish, birds, and mammals. Diversity in vegetation structure, plant community composition, and hydrologic regimes was the primary reason for the moderately high habitat index ratings. Unit B has areas of permanent surface water (in Smugglers Slough) and forested plant communities that provide feeding and breeding habitat for a variety of animals. The high rating for anadromous fish habitat was a result of some appropriate habitat structure, although anadromous fish do not currently have access to the site. Although a moderately large number of native plants were observed at Unit B native plant richness rated low primarily because of a lack of mature forested cover and a low number of plant assemblages. Relatively complex vegetation structure including large areas of dense grasses and other emergent plants was primarily responsible for the high rating for primary production and export.

Unit A rated lower than Unit B for almost all functions assessed. Several hydrologic related functions rated moderate: reducing sediments, reducing heavy metals, reducing downstream erosion, and ground water recharge. Potential to remove nutrients and reduce peak flows rated low. The relatively simple hydrologic regime in Unit A is primarily responsible for the lower index ratings for hydrologic functions. Habitat index ratings for Unit A were significantly lower than in Unit B. Habitat functions rated low to moderate in large part because of relatively simple plant community composition, lack of structural complexity, and few hydrologic regimes. Native plant richness rated low because of a lack of structural and species diversity and the dominance of non-native grasses. Although dominated by non-native grasses, the large areas of emergent vegetation in Unit A was responsible for the high rating for primary production and export.

4. SITE DESIGN

This section describes preliminary designs for the three sites of the proposed Lummi Nation WHMB including the desired physical structure, topography, and hydrologic conditions for each site. The proposed actions at the three sites will be conducted in phases. Because the Lummi Nation already owns almost all of the Nooksack Delta Site, work can commence in the Nooksack Delta Site as soon as it is authorized. Phase 2 (Lummi Delta Site and Blockhouse Site) will begin after additional land is purchased and the necessary easements and permits have been obtained. All three sites will be protected in perpetuity through conservation easements.

The identified restoration, enhancement, and preservation actions are based on the concept of returning natural processes that create and maintain habitat (Frenkel and Morlan 1990). This approach is more likely to be effective over the long-term than attempting to replace a physical habitat structure, such as the anchoring of large woody debris in a stream. When wood is anchored in a stream it can dislodge during a flood, and habitat benefit can be lost. Restoring natural processes includes breaching a dike, which can result in side-channel formation, channel migration, wood recruitment, primary production and export, and improved edge habitat. The anticipated long-term benefit of such actions is a self-sustaining dynamic ecosystem.

4.1 Lummi Delta Site

4.1.1 Wetlands

The design of the Lummi Delta Site is based on restoring tidal hydrology to the area, which will re-establish and rehabilitate wetlands. Specifically, the project will restore daily tidal inundation and associated natural processes to the area that was disrupted by dike and sea wall construction in the 1920s. This will be accomplished by removing portions of the levees along the Lummi River and the sea wall/dike along Lummi Bay and removing the existing tide gate at the downstream end of the northern distributary channel. Removing sections of the dikes will rehabilitate the existing palustrine emergent wetlands by opening them to a direct tidal influence during higher tidal conditions (e.g., Mean High Water [MHW] or Mean Higher High Water [MHHW]) and convert the existing fresh/brackish wetlands to saline/brackish , tidally influenced wetlands. Direct tidal influence will also result in the re-establishment of wetlands in the areas that were formerly wetlands but that are now uplands. A conceptual plan view of tidally influenced wetland area resulting from dike breaching and tide gate removal is shown in Figure 13.

Figure 13. Expected Conditions after Restoration of the Lummi Delta Site

Tidal influence will convert large portions of the 407-acre area to a palustrine emergent-permanent tidal wetland, as classified under the Cowardin system. A range of vegetation community composition is expected to develop and change over time. This includes a functioning salt marsh community, which may resemble in species composition, structure, or function the extensive estuarine and riverine-tidal wetlands that were present when Lummi Bay was the primary outlet of the Nooksack River. Although there is substantial restoration potential on the site, the potential to fully return the site to historic conditions and functions is currently limited because the freshwater flow regime and associated disturbance factors are controlled by structures upstream where the Nooksack and Lummi River channels separate. The Lummi Natural Resources Department has been working to restore the connection between the Lummi River and Nooksack River channels since 1998 (Nooksack Estuary Recovery Project – LIBC Resolution 98-62) and it is possible that in the future this re-connection will occur. However, this prospectus does not rely on this re-connection and the associated restoration potential.

Although several of the remnant sloughs and distributary channels still exist, they are severely degraded, choked with sediment, and contain stagnant water. Following dike removal, these areas would be opened to unobstructed pulses of tidal action. There are currently 37 acres of estuarine intertidal and subtidal emergent wetlands within the site, and approximately 11,320 linear feet of disconnected and/or remnant tidal channels. When subject to daily tidal pulses, these sloughs and channels should gradually become deeper and narrower, expand in area, and develop new channels with increased sinuosity. As shown in Figure 13, some of the existing linear drainage ditches will be modified to increase sinuousity. The soil and other material from dike removal operations will be used to construct the levee around the existing golf course. If the levee along the east boundary of the site along the Lummi River channel is partially removed, the existing channel would have room to meander, allowing the enhancement of additional intertidal and subtidal emergent wetland habitats.

A hydraulic model was used to evaluate four restoration alternatives in the Lummi Bay area (Brown and Caldwell 2007). The restoration alternatives evaluated included combinations of breaching or removing the existing sea wall along Lummi Bay, breaching or removing the levees along the Lummi River, and adjustments of existing tide gates. The saltwater inundation analysis used historic tide data, high-resolution topography (± 6-inches) developed from light detection and ranging (LiDAR) data, and a fully dynamic hydraulic model to estimate the extent and duration of saltwater inundation associated with each of the four restoration alternatives (Brown and Caldwell 2007). The analysis found that each of the evaluated alternatives would produce extensive saltwater inundation of the Lummi Delta Site and all tidal waters would be contained by the existing embankment along North Red River Road. Alternative No. 3, which includes breaching the Lummi Bay seawall at two locations (50-feet wide breaches at each location), removing the existing tide gate along the sea wall while leaving the existing box culverts open to tidal and upland flow, installing a tide gate at Jordan’s Creek where it passes under North Red River Road, and breaching the right bank levee along the Lummi River downstream from the existing fill plug at four locations (50-feet wide breaches at each location) was identified as the preferred alternative. This alternative was selected as the preferred alternative because it requires the least amount of earthwork to produce the desired level of inundation (Brown and Caldwell 2007).

The fact that several salt-tolerant plant species are already present on the Lummi Delta Site is an indicator that salt marsh conversion is a highly likely outcome of this effort. Silverweed (*Potentilla pacifica*), saltgrass (*Distichlis spicata*), Baltic rush *(Juncus balticus),* and saltbush (*Atriplex subspicata)* are already present and will be important colonizers of a developing salt marsh community. The current existence of these species on the site will improve the efficiency of restoration efforts. After breaching and salt water inundation, it is expected that plant communities will change from pasture communities to colonizing salt marsh species on the outer fringes, with a gradual transition to a high salt/brackish marsh plant community in the interior areas of the site. It is expected that this colonization process will occur without any seeding or planting actions because salt marsh conversion is already underway and salt marsh species are present in the narrow band of salt marsh west of the site.

In the large wetland areas in the center of the site, the land surface is approximately two feet lower than the average elevation of the small band of salt marsh located west of the dike. This lower elevation may be a consequence of subsidence, caused by more than 70 years of hydrologic disruption from the dikes. Elevation largely controls salt marsh character, and it is possible that the elevation of this potentially subsided area may reach its former elevation once tidal inundation is restored. Although this elevation rebound could occur, this area will still be subject to tidal inundation similar to the adjacent areas that are now uplands and salt marsh vegetation can be expected to dominate.

As noted previously, re-establishing and rehabilitating salt marsh in the Lummi Delta Site is desirable because salt water marshes are among the most productive ecosystems in the world (Mitsch and Gosselink 1993). In a summary of studies on the function of salt marsh ecosystems the following major points have been documented (Mitsch and Gosselink 1993):

- High annual gross and net primary productivity in much of the salt marsh. The high productivity is a result of subsidies in the form of tides, nutrient import, and abundance of water that offset the stresses of salinity, widely fluctuating temperatures, and alternative flooding and drying.
- Major detrital production for both the salt marsh system and the adjacent estuary. In some cases, detrital material exported from the salt marsh is more important to the estuary than is the phytoplankton-based production in the estuary. Detritus export and the shelter found along marsh edges make salt marshes important as nursery areas for many commercially important fish and shellfish.
- Leaves and stems of vegetation provide surface area for epiphytic algae and other epibiotic organisms. This enhances both the primary and secondary productivity of the marsh.
- Bacterial decomposition through the breakdown and transformation of indigestible plant cellulose provide a pathway of energy utilization in the salt marsh. Decomposers increase the protein content of the detritus and enhance its food value to consumers.
- Salt marshes have been shown at times to be nutrient sources and sinks, particularly for nitrogen.

- Remnant sloughs and distributary channels available for salmonid fish habitat.

The primary intended functions of a restored salt marsh are those outlined above (i.e., act as an exporter of food to consumers in Lummi Bay and the adjacent estuary and provide salmonid fish habitat). There may be some risk of salmon entrapment in depressions/pools that may occur in the mitigation site, but the risk is believed to be minimal because of diurnal tidal fluctuations.

Dike breaching or removal will necessitate the construction of a new dike to protect the existing Sandy Point Improvement Company (SPIC) golf course from tidal inundation. Conceptual design of the dike (8 ft x 28 ft x 1,800 ft) shows that the "footprint" of the dike would cover an area of approximately 50,000 square feet. A portion of this area would be direct wetland fill, but a portion of this filled area of the adjacent slough will be replaced on-site with the sea wall and levee breaches (totaling 300 feet). Other wetland fills associated with the dike to protect the golf course will be avoided where practicable, minimized as possible, and mitigated for on-site if unavoidable impacts occur.

Although the removal or partial breaching of the existing dike/sea wall would increase the pace of site restoration and is a key feature of the site design, it would also eliminate an important recreational and educational opportunity. This dike is currently used by bird watchers and water fowl hunters as well as for walking. To maintain these recreational opportunities, pedestrian visitors will be redirected to an existing trail (old jeep road) along the south side of the river (shown on Figure 13).

4.1.2 Buffers

Buffers will be designated along the edges of portions of the Lummi Delta Site that are adjacent to residential, agricultural, or commercial land use. The buffer will be 100 feet wide, in accordance with Lummi Code of Laws (LCL 17.06.070). Because most of the Lummi Delta Site will revert to wetland following removal of the dikes, some of the designated buffer area will be restored salt marsh.

An intact, relatively diverse section of a mixed upland/wetland forest already exists within the 100-foot buffer along North Red River Road, which is the northern boundary of the Lummi Delta Site. This buffer exists along a hillslope with ground water seeps at the toe of the slope. A monotypic stand of reed canarygrass (*Phalaris arundinacea*) covers most of the area from the toe of the slope to the Northern Distributary Channel. This area is slightly higher in elevation and has experienced less subsidence than other areas of the site, and would be an ideal area for establishment a forested/shrub wetland transition zone. Ultimately, an area of riparian/coastal forest could develop here that would contribute large woody debris to the developing estuarine scrub-shrub habitat area and tidal channels. Planting conifer species in this buffer area would enhance wetland and buffer functions by increasing shade and wood recruitment to the Northern Distributary Channel over the long-term.

4.1.3 Summary of Lummi Delta Site Design

In summary, the Lummi Delta Site design will be comprised of the following elements listed in the general sequence that they will occur:

1. Complete purchase of lands within the site;
2. Permanently dedicate the land as a mitigation bank site;
3. Construct the dike around the Sandy Point Improvement Company golf course;
4. Install a tide gate where Jordan Creek passes under North Red River Road;
5. Modify the existing linear drainage channels to increase sinuousity;
6. Breach the Lummi Bay sea wall in two locations and the right bank levee along the Lummi River in four places;
7. Remove the existing tide gates at the downstream end of the Northern Distributary Channel;
8. Monitor the re-establishment of the salt marsh.

4.2 Nooksack Delta Site

The Nooksack Delta Site is not diked, remains in a relatively natural condition, and already has above average to high ecological function for most of the index ratings according to the WAFAM method results. Therefore, design efforts in the Nooksack Delta Site will focus on enhancement through removing and managing invasive plant species, increasing native plant species diversity, and preservation. Removing invasive species and/or increasing the ratio of interspersion between vegetation and open water areas could improve Index ratings such as habitat suitability for invertebrates, amphibians, and anadromous fish. Native plant richness will be improved in all three assessment units of the Nooksack Delta Site by underplanting with coniferous trees. When combined, these actions will increase habitat diversity and produce higher ecological function over time. The MBI will further detail these actions and include a schedule describing the order in which the actions will commence.

Along the riverbanks of the Nooksack River estuary during the pre-Euro-American development period, the most common streamside tree was red alder. Small willow (*Salix* spp.), crabapple (*Malus fusca*), and red alder (*Alnus rubra*) dominated scrub-shrub estuarine wetlands, and Sitka spruce (*Picea sitchensis*) was the only large tree (Collins and Sheikh 2002). Western red cedar (*Thuja plicata*) was common in riverine-tidal wetlands and was the largest tree more distant from the riverbanks (Collins and Sheikh 2002). During the summer of 2004 when field data were collected in the Nooksack Delta Site, no Sitka spruce and very few red cedar were observed in any of the plots or transects. Very few Sitka spruce were observed during the August 2006 timber evaluation of harvestable areas within the Nooksack Delta Site (IFC 2006). Sweetgale (*Myrica gale*) plants were not observed throughout most of the area except for a few scattered plants in the southern tip of assessment Unit A.

The area near the southern tip of Assessment Unit A is primarily covered by thick stands of reed canarygrass and cattail (*Typha angustifolia*). Some evidence of beaver activity was observed here during the data collection phase of this study, and there are plentiful signs of beaver in the area. The vegetation could be managed in this area to favor sweetgale and other species, which would encourage further colonization by beavers and thereby improve habitat function as discussed above.

The Nooksack Delta Site is currently zoned as Open Space on the official Lummi Nation Zoning Map. Pursuant to Lummi Code of Laws Section 15.04.070, the Open Space zone provides land for preservation, conservation, and restoration of environmentally and culturally sensitive areas and for low-impact, outdoor recreational uses. However, permitted and accessory uses in the Open Space zone include wood product growing activities and conditional uses in the Open Space zone include wood product harvesting. Preservation of the wetlands within the Nooksack Delta Site will be achieved through securing a tribal resolution that prohibits wood products harvesting within the site boundaries and places the bank site in a conservation easement.

4.2.1 Invasive Species Control and Under Planting of Conifer Species

Invasive vegetation along the banks of the east and west channels of the Nooksack River was mapped in September 2004 using a Trimble GeoXT GPS unit with an attached laser range finder. Within the interior areas of the site that are difficult to access, the extent of invasive species was estimated by mapping invasive species information collected during the data collection/field plot phase of this study and by using high resolution aerial photography (6-inch resolution). Figure 14 shows the locations of invasive species (including GPS locations of Japanese knotweed (*Polygonum cuspidatum*)) in the Nooksack Delta Site in September 2004.

The following noxious weeds were commonly observed in the Nooksack Delta Site:

- Japanese knotweed
- Reed canarygrass
- Yellow flag iris (*Iris pseudacorus)*
- English ivy (*Hedera helix)*

The most damaging result of invasive weed infestations in the Nooksack Delta Site is the displacement of native plants in riparian areas and invasion in palustrine emergent wetlands. Where native species are reduced, banks, channels, and wetlands often become choked with aggressive invasive species that reduce diversity and habitat function.

In the Nooksack Delta Site, initial eradication efforts will focus on removal of Japanese knotweed and English ivy. Once progress has been made in eradicating these weeds in riparian areas, other weed control projects will be undertaken, and lessons learned will be applied to new projects. A total of 161 acres are targeted for weed removal and control efforts. Targeted areas are shown on Figure 15. A weed control and maintenance plan will be developed and detailed in a Monitoring and Adaptive Management Plan (MAMP) for the Lummi Nation WHMB. The weed control plan will include long-term control of knotweed beyond the 10-year monitoring period.

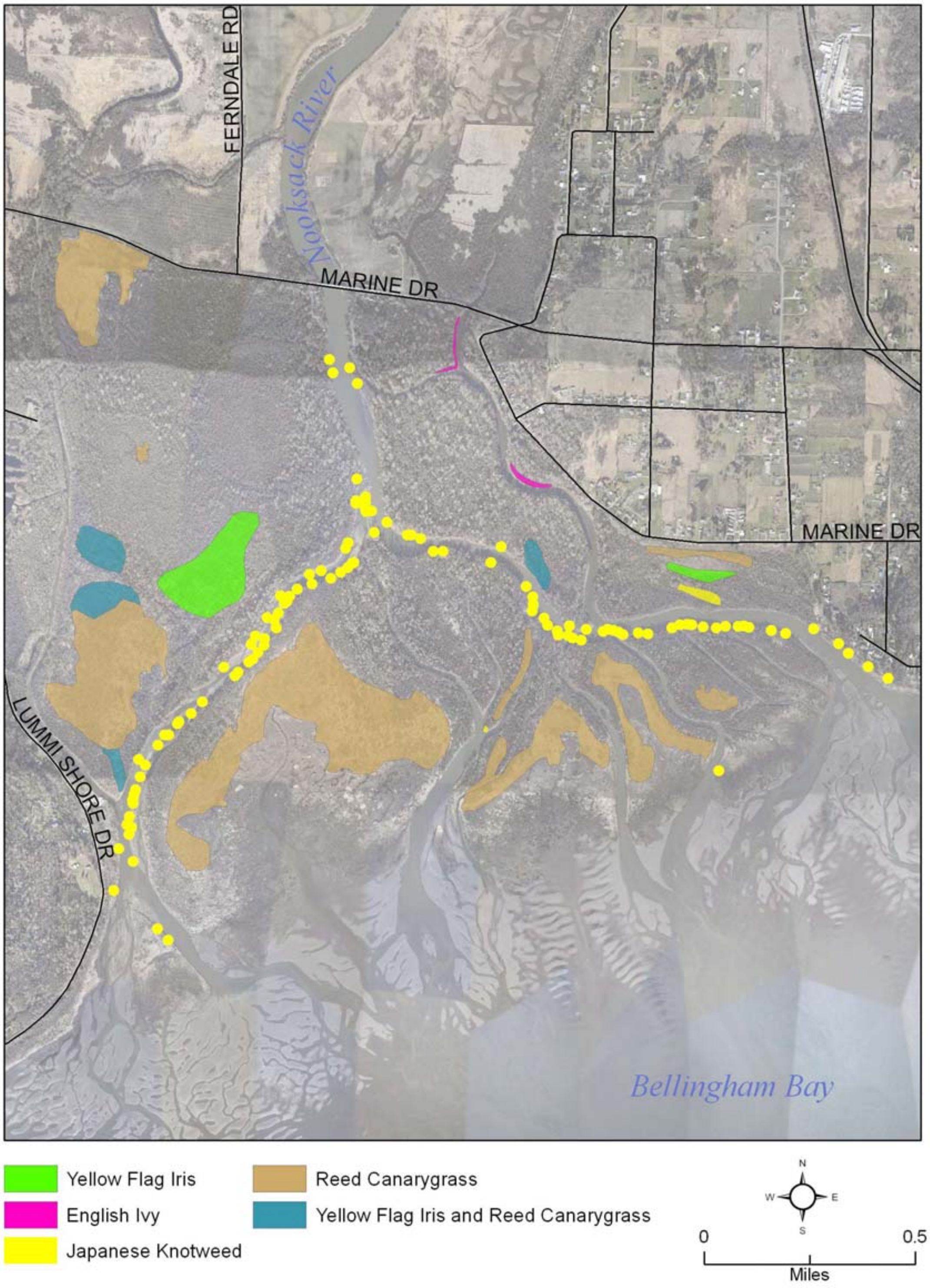

Figure 14. Invasive Species Infestations in the Nooksack Delta Site (Sept. 2004)

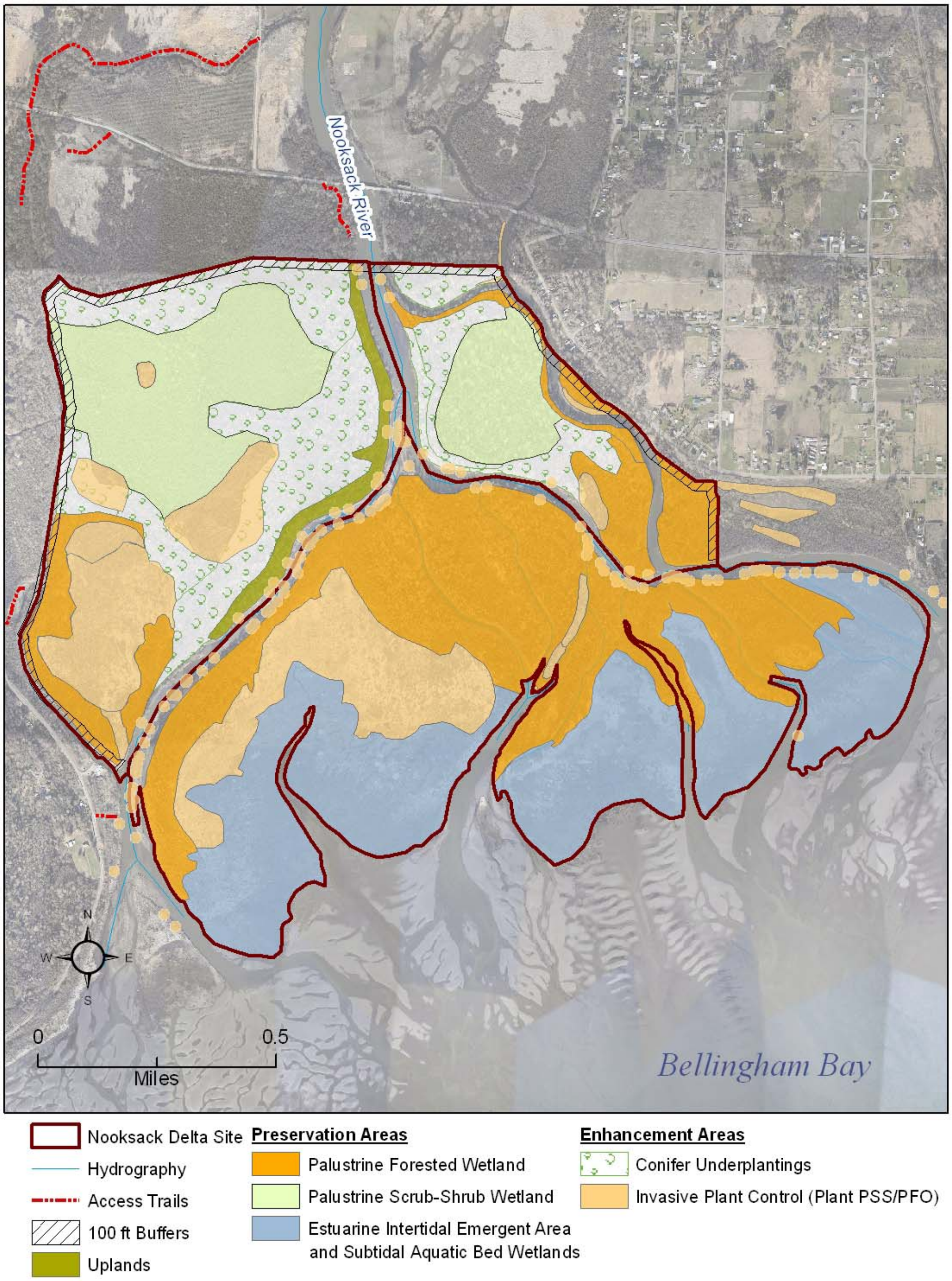

Figure 15. Expected Conditions After Enhancement of the Nooksack Delta Site

As for all invasive weeds, there is no single “best” control strategy for knotweed. Control of knotweed is especially difficult because it grows faster than most native plant species and because its root and stem fragments form new plant colonies. In areas where it has not yet become established, the focus of management should be to prevent establishment, especially in upstream portions of the watershed. In order to control established stands within the Nooksack Delta Site, integrated control methods will be used because they offer the most choices and provide flexibility. In the vast majority of cases, monthly cutting fails to eradicate even isolated and relatively small patches after several years, but successful control of knotweed patches after three consecutive years of uprooting the plants in August has been reported (Child and Wade 2000). Stem injection of herbicide shows great promise for controlling established knotweed patches in a single treatment (The Nature Conservancy 2004). A combination of these methods will be used at the Nooksack Delta Site.

Reed canarygrass was observed in many areas of the Nooksack Delta Site. It is most evident in the large freshwater swamp (southern portion of Assessment Unit A) and along the higher elevations of the high salt marsh (tidal fringe area). In most of the other areas where it was observed, its cover dominance appears to be limited due to shading by overstory vegetation. In the large freshwater swamp, it appears to have out competed desirable species that would increase habitat functions as well as provide potential beaver habitat. Reed canarygrass cover will be reduced through active management and planting of native shrubs in this area. Managing reed canarygrass in this way will increase plant species numbers and diversity, and result in a variety of plant assemblages.

As with Japanese knotweed, there is no immediate one-year fix to convert a reed canarygrass infestation back into a native plant community. It is difficult to control because of its persistent rhizome system and its ability to reproduce vegetatively and sexually. Management methods include digging, mowing, tillage, prescribed fire, solarization, grazing, chemical control, and competition (installing fast-growing shrubs or trees which create shade). In the Nooksack Delta Site, an initial control strategy followed by establishment of native trees and shrubs that will shade the reed canarygrass may be the most effective control method. As with control of Japanese knotweed, the best management practices for control of reed canarygrass will be site-specific, and will depend on the size, distribution and location of infestations, willingness to use herbicides, and available resources.

Yellow flag iris was observed in many areas of the Nooksack Delta Site, where it may have the opportunity to develop monotypic stands. Yellow flag iris produces a rhizome mat, which creates a habitat that is drier and with increased rates of siltation and sedimentation. As with all prolific invaders, the key to successful and cost-effective control is to prevent new infestations while populations are still small and manageable. If controlled during the early stages of invasion, the potential for successful management is high. The best control will likely occur with the use of an integrated management approach, where mechanical and chemical methods are combined, and the spread of iris is closely monitored to assess the effectiveness of treatment.

English ivy was observed in many riparian areas, and was especially prevalent along natural levees in the northern portion of the Nooksack Delta Site. It is an aggressive invader that threatens all vegetation levels of forested and open areas, but does not grow well in inundated areas. The dense growth and abundant leaves form a thick canopy just above the ground preventing sunlight from reaching other plants. Similarly, vines climbing up tree trunks spread out and surround branches and twigs, preventing sunlight from reaching the leaves of the host tree. Loss of host tree vigor, evident within a few years, is often followed a few years later by death. The added weight of vines also makes infested trees susceptible to blow-over during storms. The spread of English ivy along riparian corridors is problematic because of the potential of greatly reduced functions in riparian areas.

Control strategies for English ivy include manual cutting, mowing, and chemical control. Combining cutting with herbicide application has been shown to be effective (The Nature Conservancy 1995). Ivy does not tolerate wetland conditions and it is limited to natural levee areas in the Nooksack Delta Site, so control efforts will focus in upland areas along natural levees. Because the locations in the Nooksack Delta Site where it was observed contain substantial native vegetation and are adjacent to the river banks, cutting and root pulling with hand tools will probably be the most appropriate methods.

Other noxious weeds which were not recorded in the vegetation plots but were observed in the Nooksack Delta Site include: Himalayan blackberry (*Rubus discolor*), Canada thistle (*Cirsium arvense*), Butterfly bush (*Buddleja davadii*) and Perennial sowthistle (*Sonchus arvensus*). Control strategies will also be implemented to manage these species. Purple loosestrife (*Lythrum salicaria*) was not observed but may be present and is likely to occur as it is an invader of freshwater and brackish wetlands. Smooth cordgrass (*Spartina alterniflora*) was not observed. Since it is an aggressive invader of lower intertidal areas in the Pacific Northwest, regular observations will be made to ensure that it does not spread to the any of the Lummi Nation WHMB sites.

Many wetland and riparian complexes in the Pacific Northwest have indications of being historically forested, particularly by conifers. However, due to anthropogenic disturbance, the overstory has largely been removed and coniferous forests have been unable to regenerate in many of these wetlands and floodplain areas. As discussed previously, the current dominant overstory vegetation in the Nooksack River floodplain has changed from what existed during the pre-Euro-American settlement period. At present, the dominant species of the floodplain riparian forest in the Nooksack Delta Site are red alder, black cottonwood (*Populus balsamifera*), and pacific willow (*Salix lucida*). During the data collection phases of this study, very few Sitka spruce and red cedar were observed within the Nooksack Delta Site.

The shifts in environmental conditions that have resulted from the change in species diversity, such as alteration of the light regime, may facilitate invasion of weed species such as Japanese knotweed and reed canarygrass. One explanation for this shift in species diversity may be the lack of a sufficient seed bank and lack of suitable rooting substrate for conifer establishment. A pilot program of under planting conifers in forested wetland areas and introducing coarse woody debris (CWD) to serve as a rooting substrate will be initiated. This can be accomplished by cutting existing stumps in the wetland or riparian areas to expose fresh surfaces suitable for conifer seed germination and establishment. Within these microsites, seedlings of three common shade-tolerant conifers will be planted: western red cedar, Sitka spruce, and western hemlock (*Tsuga heterophylla*).

There are approximately 277 acres of forested wetlands and uplands in Assessment Units A and B of the Nooksack Delta Site that were identified during the data collection phase of this study. Approximately 209 acres of the forested areas are suitable for underplanting of conifer species (Figure 12). Upland (riparian) areas adjacent to the river are also suitable, and are included in this estimate. Areas of Assessment Unit C would be suitable, but because of the frequency and degree of environmental disturbance and difficult access to these areas, conifer underplanting is not currently proposed.

The addition of coniferous trees not currently found on the Nooksack Delta Site will increase species richness, which is important for supporting diverse fish and wildlife populations. As the trees grow they will add complexity to a multi-layered canopy that will provide thermal and disturbance cover for all species. Increased species richness will, over time, make a dramatic contribution to the food web because riparian areas are the dominant contributor to the aquatic food web (Cummins 1974). Streamside vegetation provides leaves, wood, insects, spores, and other materials that are transported or fall into the aquatic ecosystem and are the foundation of the aquatic food chain. Conifer species will also contribute to structural complexity within stream channels. Logs of decay-resistant species such as western red cedar and western hemlock are the most valuable because they form stable features that may persist in the streambed for over 100 years (Franklin et al. 1981).

A salinity survey of the Nooksack River Delta conducted by the Lummi Water Resources Division in September 2000 during relatively low stream flow and relatively high tide conditions to document the upstream extent of salt water in the delta demonstrated that the marine/salt water wedge does not migrate beyond lower extents of the channels. As a result, salinity levels are not expected to affect the success of the under planting efforts.

4.2.2 Buffers

Buffers will be designated along portions of the Nooksack Delta Site that are adjacent to residential, agricultural, or commercial land use, as shown on Figure 15. The buffer widths for Category I wetlands are 100 feet wide, in accordance with LCL 17.06.070. Because most of the Nooksack Delta Site is wetland, much of the designated buffer will be forested wetland. This forested buffer is expected to provide a high level of functions to the wetland as a whole.

4.2.3 Summary of Nooksack Delta Site Design

In summary, the Nooksack Delta Site design will be comprised of the following elements in the general sequence that they will occur:

1. Designate and protect the land within the site through a conservation easement;
2. Treat invasive species;
3. Conduct conifer under plantings
4. Monitor effectiveness of treatments and under plantings and repeat as needed to meet performance goals.

4.3 Blockhouse Site

The two areas that make up the Blockhouse Site (Area A is southeast of the mouth of the Lummi River and Area B is near the intersection of Kwina and Haxton Roads) are greater than 1,000 feet apart, but have a direct hydrologic connection through a large channel. Modifications to the existing tidegate that controls the outflow of the channel will affect the hydrologic regime of both areas. Restoring tidal flux to the Blockhouse Site is expected to rehabilitate 172 acres of disturbed wetlands and re-establish 140 acres of wetlands by returning wetland hydrology to areas that were historic wetlands.

4.3.1 Wetlands

The existing conditions on the portion of the Blockhouse Site that is near the mouth of the Lummi River (Area A) are similar to the conditions in the Lummi Delta Site, which are a result of construction of dikes and seawall in the 1920s. A patchwork of disturbed wetlands and abandoned agricultural fields (former wetlands) exists. Similar to the Lummi Delta Site, two forms of wetland restoration will be conducted on the site: re-establishment/restoration and rehabilitation. The restoration will be accomplished by managing the tide gates that prevent tidal flux into this area. Tide gate management will rehabilitate the existing palustrine emergent wetlands by opening them to a direct tidal influence during higher tidal conditions (e.g., Mean High Water [MHW] or Mean Higher High Water [MHHW]). Direct tidal influence will also result in the re-establishment of wetlands in the areas that were formerly wetlands. A conceptual plan view of tidally influenced wetland area resulting from tide gate removal is shown on Figure 16.

The existing tide gates will be managed to allow for tidal inundation of the Blockhouse Site, but also to allow unimpeded flows out of the area during the times of the year when riverine flooding (Nooksack River) is anticipated. Further details on the management of the tide gates will be included in the Mitigation Banking Instrument.

The portion of the Blockhouse Site near the intersection of Kwina and Haxton roads (Area B) will also receive tidal influence as a result of tide gate management. The morphology of the existing relict channel along the western portion of most of the site appears to reflect the combined elements of past floods of the Nooksack River, tidal influence prior to the installation of the new tide gates, and dredging. Currently the channel appears to function as a line sink, slowly draining the agricultural fields on both sides. The lack of slope and flow within the channel limits ground water discharge and negatively impacts water quality within the channel.

Although complete tide gate removal is preferable, it is not practicable in this situation due to the need to retain an emergency access corridor to the Lummi Peninsula during riverine (Nooksack River) flood events.

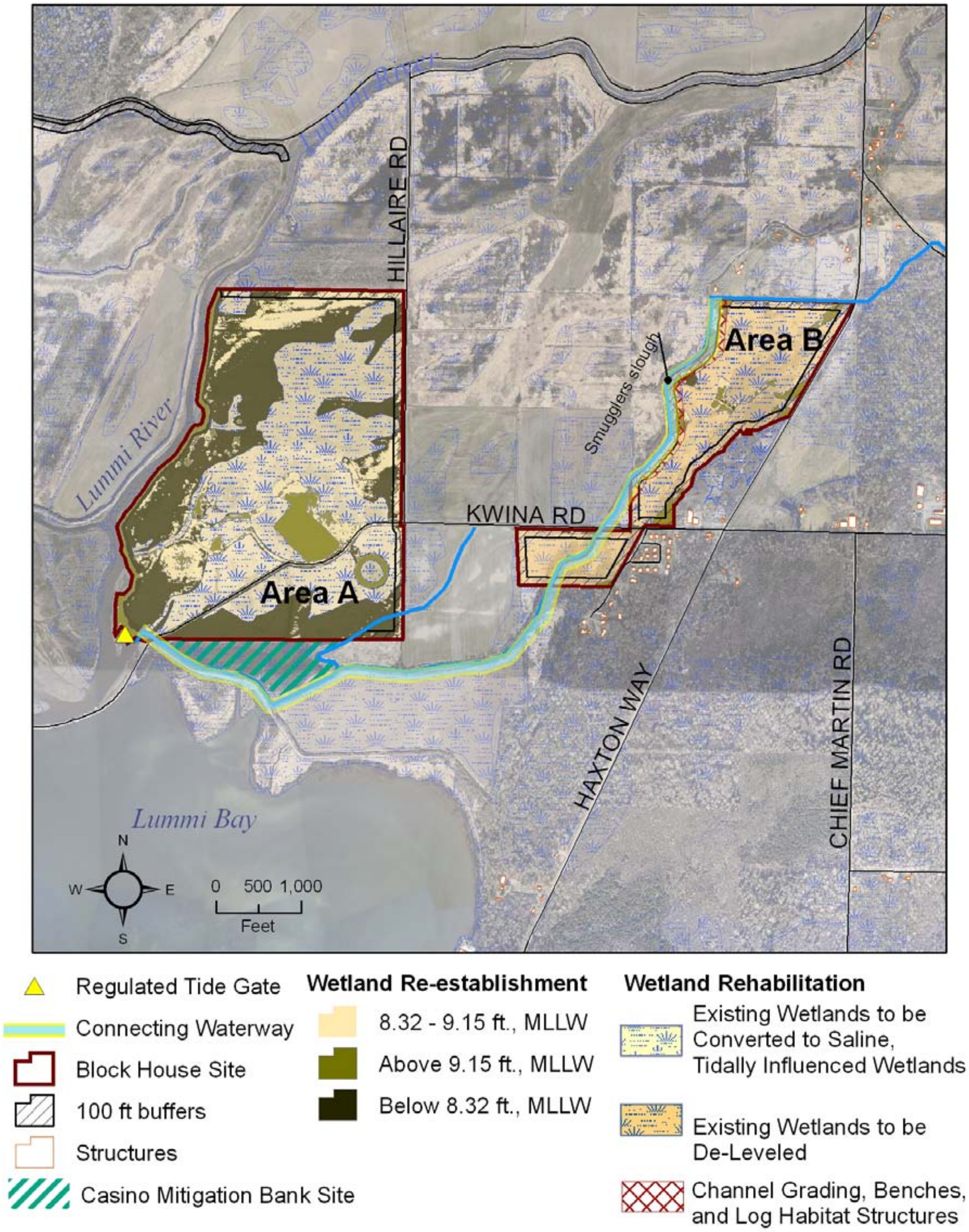

Figure 16. Expected Conditions After Restoration of the Blockhouse Site

The relict nature (e.g., minimal fluvial flow, no tidal flux) of the channel that flows near the western boundary of the site currently limits wetland functions. While stream channels typically provide longitudinal connections/corridors through ecosystems, the lack of flow through the channel, past dredging, and lack of riparian cover for much of the channel limit the benefit of this feature to the overall ecosystem. Rehabilitation at Area B will include introducing tidal flux to the channel by opening the tidegates, which would greatly improve the functions provided by this wetland. Managing the tidegates to allow regular tidal flux could potentially increase the ecosystem functioning of the existing downstream restoration site (Casino mitigation site) as well.

In addition to restoring tidal flux to the channel, grading along the eastern bank to remove historic dredge spoils will increase the cross-sectional area wherein tidal flux could occur. In addition, a "bench" feature will be installed which is typical of tidal channels. Further, log habitat structures will be installed to improve cover characteristics. Enhancement of the flat areas dominated by reedcanary grass within Area B will be conducted by creating micro-depressions and associated mounds approximately 18 inches above the current ground level.

Managing the tide gates would rehabilitate the existing disturbed wetland by changing site from a freshwater depressional hydrogeomorphic class to freshwater (or brackish) tidal class, which is typically regarded as more valuable due to its relative rarity. This change in hydrologic function would also improve habitat function by allowing for greater connectivity for aquatic species between the bank site and Lummi Bay.

4.3.2 Buffers

Buffers will be designated along the edges of portions of the Blockhouse Site that are adjacent to residential, agricultural, or commercial land use. As shown in Figure 13, the buffers will be 100 feet wide, in accordance with Lummi Code of Laws (LCL 17.06.070). Because most of the Blockhouse Site will revert to wetland following removal of the dikes, some of the designated buffer area will be restored salt marsh.

Non-native invasive weeds dominate much of this portion of the bank site creating a homogenous surface with only one vegetative stratum. Therefore, a major project element for this site will be to establish native emergent, shrub, and tree species. Long-term maintenance and adaptive management will be implemented to ensure the success of enhancement efforts.

The weed control effort will include the installation of focused 'islands' of native plants within the areas dominated by reed canarygrass. The development of shade is generally recognized as the best long-term approach to manage reed canarygrass, and these 'islands' will be spaced in a pattern to develop maximum shade, which can then be infilled with additional native plantings after canopy coverage is established.

4.3.3 Summary of Blockhouse Site Design

In summary, the Blockhouse Site design will be comprised of the following elements listed in the general sequence that they will occur:

1. Complete purchase of lands within the site;
2. Permanently dedicate the land as a mitigation bank site;
3. Delevel reedcanary grass areas within Area B;
4. Modify tide gate operations;
5. Monitor the re-establishment of the salt marsh.

5. POTENTIAL ECOLOGICAL BENEFITS

In this section, the ecological benefits that are anticipated from the restoration, enhancement, and preservation activities associated with the Lummi Nation WHMB are described.

5.1 Lummi Delta Site

The anticipated ecological benefits of restoring the Lummi Delta Site include anadromous salmonid habitat improvements and re-establishment and rehabilitation of estuarine scrub-shrub wetlands, inter-tidal emergent wetlands, and forested wetland/shrub wetlands along the wetland/upland transition zone.

5.1.1 Anadromous Salmonid Habitat and Inter-tidal Emergent Wetlands

The Catalog of Washington Streams and Salmon Utilization (Williams et al. 1975) lists "unknown salmon use" for most of the unnamed sloughs, streams, and ditches that are associated with or are former tributaries of the Lummi River. However, recent sampling conducted by the Lummi Natural Resources Department in the lower portions of the Lummi River document that juvenile chinook and coho salmon use these areas for feeding. Juvenile chinook, coho, and chum salmon have been caught in a beach seine in the Lummi River in areas adjacent to and immediately upstream of the Lummi Delta Site on several occasions in recent years (MacKay 2004). Chinook and chum juveniles have also been caught in a fyke net upstream of the mouth of the Lummi River near the Hillaire Road Bridge. Based on seine catch patterns of juvenile salmon at many sites in the Nooksack estuary in 2002-2004, and the presence of hatchery marks, it is likely that most of the chinook and coho salmon found in the Lummi River originated from hatchery releases in the Lummi and Nooksack delta areas. These observations indicate that the lower portions of the Lummi River provide a forage area for several species of juvenile salmon during early stages of their marine life history in the estuary.

Salmonid species that would benefit from habitat improvements associated with restoring tidal hydrology to the Lummi Delta Site include:

Chinook salmon	Oncorhynchus tshawytscha
Coho salmon	Oncorhynchus kisutch
Chum salmon	Oncorhynchus keta
Bull trout	Salvelinus confluentus

Currently, there is a tide gate on the seaward side of the Northern Distributary Channel that blocks fish access to this channel and Jordan Creek almost all the time. However, similar to many tide gates, they sometimes allow limited tidal exchange and occasionally become blocked open by wood or sediment, allowing temporary fish access. Removal of the tide gate and partial removal of the seawall and Lummi River levees in the Lummi Delta Site will allow anadromous fish access to the Northern Distributary Channel, Jordan Creek, and increased access from the Lummi River.

Because of the existing bed elevation and the poor maintenance and design of the culvert connecting the Nooksack River to the Lummi River, flows out of the mainstem rarely enter the Lummi River. Only when the Nooksack River flow exceeds approximately 9,000 cubic feet per second (less than 5 percent of the time) is it possible for a small number of juvenile chum or other species to travel from the Nooksack mainstem to the Lummi River (Deardorff 1992). Although it is possible for fish species to travel from the Nooksack mainstem to the Lummi River via this culvert, fish sampling events have not been conducted in this area and it is unknown whether fish passage occurs through the culvert (Brown 2004). As described previously, although the Lummi Natural Resources Department has been working to restore the connection between the Lummi River and Nooksack River channels since 1998 (Nooksack Estuary Recovery Project – LIBC Resolution 98-62) and it is possible that in the future this re-connection will occur, this prospectus does not rely on this re-connection and the associated restoration potential.

Adult salmonids have been found in the Lummi River area. In December 2003, 24 coho redds were found in Schell Creek (RM 4.204.0). Chinook carcasses have been found 4.3 miles above the mouth of the Lummi River. In 1997, four unspawned chinook carcasses were found between river miles 3.9 and 4.3 in the Lummi River (MacKay 2004).

Restoration of the Lummi Delta Site would create up to five miles of reconnected riverine and channel habitat for rearing chinook and other salmonids. Increasing the number of channels available for juvenile salmonids will directly benefit the survivability of several fish species. Increasing the amount of main and subsidiary channel habitat will increase the diversity and quantity of off-channel habitats for fish and other aquatic biota. It will also provide increased refugia from predator fish and provide increased production and access to more sources of detritus and macroinvertebrate prey species. The additional and deeper flow channels will provide more pool area and volume for both summer rearing conditions at low flow and for refugia at high flows in winter.

Following seawall breaching, large portions of the abandoned agricultural fields will be converted to palustrine emergent-permanent tidal wetlands. These inundated areas will provide habitat for amphibians, waterfowl, and mammals and will become major producers of detritus for the adjacent estuary by increasing the habitat value and food sources along the marsh edges. Additionally, leaf and stem surfaces in the tidal wetlands will serve as surface areas for epiphytic algae and other epibiotic organisms, further enhancing the primary and secondary productivity of the salt marsh.

The combination of new and restored subsidiary and blind channels will allow tidal flood flows into large areas and draw detritus in and out of the newly restored areas. In fringe areas of the site, newly formed shrub and forested communities will re-create physical connectivity and further increase nutrient export. By restoring hydrologic and physical connectivity between some of the previously diked lands and Lummi Bay, the productivity of the restored lands will be available for export to the surrounding area.

5.1.2 *Estuarine Scrub-Shrub Wetlands*

Shrub-dominated tidal marshes were historically very common, comprising 33 to 70 percent of estuarine tidal wetlands in other Puget Sound river delta areas (Collins 2000). The Skagit River system, which is south of the Nooksack River, historically produced Puget Sound's largest salmon runs (WDFW 1998). Because of the close proximity of the two rivers, and because the Skagit River delta is the site of Washington State's largest wetland habitat restoration project (Deepwater Slough), some aspects of restoration on the Skagit River are used for comparison in this section.

In the Lummi River estuary, estuarine scrub-shrub wetlands were extensive and were dominated by willow, crabapple, red alder, and Sitka spruce (Collins and Sheikh 2002). Today, because of the conversion of areas landward of dikes to agricultural or other uses, almost none of these plant assemblages remain in the Lummi Delta area. These losses are representative of other historically large estuarine marshes such as the Duwamish (Seattle), Puyallup (Tacoma), and Fraser (Vancouver BC) deltas (Collins 2000).

In the nearby Skagit Delta, marsh vegetation (from low to high elevation) consists primarily of American threesquare (*Scirpus americanus*), lyngby sedge (*Carex lyngbyei*), soft-stem bulrush (*S. validus*), cattail, sweetgale, willow, black twinberry (*Lonicera involucrata*), wild rose (*Rosa* spp.), and Sitka spruce (Hood 2004). Furthermore, shrub-dominated tidal marshes were historically very common, comprising 33 percent of the estuarine tidal wetlands in the Skagit Delta, 35 percent in the Stillaguamish, and 70 percent in the Snohomish (Skagit Watershed Council 2004). Today, less than 6 percent of this habitat remains in the Skagit Delta and virtually none remains in the Stillaguamish and Snohomish deltas (Skagit Watershed Council 2004).

A common estuarine shrub in the Skagit Delta is sweetgale, as well as willow species, black twinberry, and wild rose (Skagit Watershed Council 2004). Only a very limited number of sweetgale shrubs were observed in the Nooksack Delta Site in an area that was overgrown with reed canarygrass and cattail. No sweetgale shrubs and very few other shrubs common to estuarine areas were observed in the Lummi Delta Site. Sweetgale is unique among shrubs and other estuarine plants because of its ability to convert nitrogen into nitrate, an important plant nutrient. Because nitrogen-fixing plants contain relatively high concentrations of nitrogen in their tissues, they are a preferred food for herbivores. In addition, sweetgale may be a preferred food for insects that feed on the decomposing leaves. Thus, sweetgale probably plays an important role in the estuarine food chain.

In the Skagit estuary, sweetgale is found in a half-mile band between sedge and cattails at lower elevations and is associated with black twinberry, willow, wild rose, and spirea at higher elevations. At lower elevations, sweetgale cannot tolerate tidal flooding to the extent that sedges and cattail are able to. At higher elevations, taller shrubs often out-compete sweetgale for sunlight. The intertidal distribution of sweetgale would be very narrow without the presence of large logs in the intertidal marsh. A study in the Skagit River estuary by the Skagit Systems Cooperative (SSC) shows that in the low-elevation marsh sweetgale grows exclusively on logs (Skagit Watershed Council 2004). The absence of logs allows other woody species to colonize the marsh and compete with sweetgale. Logs are important in supporting estuarine shrub habitat and must come from outside the estuarine marsh – from coastal or riverine forests.

An ongoing study in the Skagit River estuary by SSC is showing that beaver are common in the Skagit River tidal marshes, and preliminary evidence indicates that beaver are associated with sweetgale plant assemblages and small tidal channels (Skagit Watershed Council 2004). The ongoing SSC study indicates that beavers build small dams (less than 2 feet tall) that pond water at low tide and flood during high tide. The apparent function of the dams is to pond sufficient water in the channels at low tide so that the beaver can swim in the channels. Without the dams these channels would be dry at low tide. These beaver ponds contain abundant small fish of varying species. Without the ponds, the fish would be forced into larger, wider, and deeper channels where they would become prey to more predators. Predators are not as abundant in the beaver ponds because they are kept out by dense sweetgale thickets that border and/or completely cover the channels (Skagit Watershed Council 2004).

Beaver presence is favorable to enhancement efforts in the Nooksack basin and to general floodplain restoration efforts for other reasons. Through their dam building and feeding activities, beaver act as a "keystone" species, affecting ecosystem structure and dynamics far beyond their immediate requirements for food and cover. Beaver engineering has been shown to increase plant diversity because patches of habitat created by beaver (beaver ponds and meadows) had a combination of conditions that were not present elsewhere, and some plants that lived in these beaver-modified habitats were not present in habitats unmodified by beaver (Wright et al. 2002).

Historical maps indicate that almost the entire Lummi Delta Site was comprised of subaerial wetland (tree-less salt-water or fresh-water marsh) prior to diking (Bortleson et al. 1980). These maps indicate that many small dendritic channels were present in portions of the area. While it is likely that the lower elevation areas (where subsidence is evident) in the Lummi Delta Site will convert to low salt/brackish marshes, the areas with slightly higher topography would be suitable areas for beaver reintroduction and establishment of sweetgale plant assemblages and other estuarine scrub-shrub wetland species as mentioned above. Although beaver foraging can cause a loss of woody riparian vegetation, beaver ponds increase the surface area of water several hundred times and thereby enhance the overall riparian habitat development (Olson and Hubert 1994). The presence of beaver is considered on the whole to be of great benefit to both water quality and salmon.

5.2 Nooksack Delta Site

The anticipated ecological benefits of preserving and enhancing the Nooksack Delta Site include protecting existing forested wetlands, reducing invasive species cover, and increasing native plant species diversity. Although the Nooksack Delta Site remains in a relatively natural state of primarily forested and scrub-shrub wetlands, substantial habitat improvements could be made that would yield long-term ecological benefits. As described previously, index ratings such as habitat suitability for invertebrates, amphibians, and anadromous fish could be improved by removal of invasive species and/or increasing the ratio of interspersion between vegetation and open water areas. Native plant richness will be improved in all three assessment units of the

Nooksack Delta Site by underplanting with coniferous trees. When combined, these actions will result in increased habitat diversity and higher ecological function over time.

5.3 Blockhouse Site

Ecological benefits at the Blockhouse Site near the mouth of the Lummi River are expected to be similar to the benefits described for the Lummi Delta Site in Section 5.1. Re-establishment and rehabilitation of inter-tidal emergent and estuarine scrub-shrub wetlands is expected to greatly improve salmonid and wildlife habitat.

Juvenile salmonids have been observed below the tidegates that drain the borrow ditches between the Lummi River and the Lummi Aquaculture Pond and the Lummi Casino Wetland Mitigation Site. Although this salt marsh is connected to tidal waters through a set of culverts and tidegates, the tidegates often do not close completely, allowing limited tidal exchange and limited fish access into the marsh. It is likely that the Lummi Casino Wetland Mitigation Site is beginning to export organic debris and/or provide other habitat for near-shore fish rearing. If fish are utilizing this area, it is probable that fish will use similar wetland habitats that will be restored in the Blockhouse Site by managing or removing the tidegates.

On the parcels near the intersection of Kwina Road and Haxton Way the ecological benefits are expected to be slightly different because only a portion of the wetlands on-site will receive tidally influenced inundation. The relict nature (e.g., minimal fluvial flow, no tidal flux) of the channel that flows near the western boundary of the site currently limits the functions of the site. While stream channels typically provide longitudinal connections/corridors through ecosystems, the lack of flow through the channel, past dredging, and lack of riparian cover for much of the channel limit the benefit of this feature to the overall ecosystem and negatively impacts water quality. Introducing tidal flux to the channel by opening the tidegates at the downstream Blockhouse Site would greatly improve the functions provided by this wetland. Managing the tidegates to allow regular tidal flux could potentially increase the ecosystem functioning of the existing downstream Lummi Casino Mitigation Site as well.

Managing the tidegates would rehabilitate the existing disturbed wetland by changing the site from a freshwater depressional hydrogeomorphic class to freshwater (or brackish) tidal class, which is typically regarded as more valuable due to its relative rarity. This change in hydrologic function would also improve habitat functioning by allowing for greater connectivity for both water and aquatic species between the bank site and Lummi Bay.

5.4 Summary of Ecological Benefits

In summary, it is expected that the described restoration (re-establishment and rehabilitation) of wetlands in the Lummi Delta Site will provide numerous ecological benefits including:

- Conversion of agricultural fields to palustrine emergent permanent tidal wetlands, which will result in increased wetland functions especially organic debris export to near-shore fish rearing habitats.

- Anadromous fish access will be returned to the Northern Lummi Distributary Channel and potentially to Jordan Creek from the Lummi River. These areas have been largely blocked to fish for over 75 years. Tidegate installation may be necessary where Jordan's Creek flows under North Red River Road to limit saltwater influence on upstream agricultural areas.
- Up to five miles of riverine and channel habitat will be made accessible to salmon for rearing and refugia.
- Restoration of estuarine shrub-dominated tidal marshes, forested communities, and enhancement of upland buffers along wetland fringe will increase productivity of restored lands and result in increased benefit in the Lummi Delta system as a whole.

It is expected that enhancement and preservation of wetlands in the Nooksack Delta Site will provide ecological benefits including:

- Protection in perpetuity of a regionally and ecologically significant river delta area.
- Removal, management, and monitoring of invasive species will increase biodiversity and species richness, ultimately resulting in wide ranging habitat benefits.
- Adding an expanded conifer component to the forests in the Nooksack Delta Site will increase species richness, which is important to supporting diverse fish and wildlife populations. Conifer species will add structural complexity to a multi-layered canopy, which will provide thermal and disturbance cover for all species.

It is expected that the described restoration (re-establishment and rehabilitation) and enhancement of wetlands in the Blockhouse Site will provide numerous ecological benefits including:

- Returning tidal influence to a disturbed scrub-shrub and emergent wetland.
- Removal, management, and monitoring of invasive species will result in increased biodiversity and species richness, ultimately resulting in wide ranging habitat benefits.
- Improved water quality in the lowland channels of the delta.

6. EFFECTS ON ADJACENT LAND USES

This section describes the types of impacts on surrounding properties that are expected to occur following the proposed restoration, enhancement, and preservation actions. The expected impacts of adjacent land uses on the mitigation bank sites are also described.

6.1 Lummi Delta Site

Because a ring dike will be constructed around the southern and eastern sides of the Sandy Point Improvement Company golf course, the planned actions will have relatively little impact on the lands surrounding the Lummi Delta Site. Neighboring properties may increase in value because of the assurance that this project site will perpetually remain in an undeveloped condition.

Although it is possible that restoring tidal hydrology to this area may increase salinity levels in the agricultural fields adjacent to the site, ground water in this area is already brackish (Cline 1974). However, because of this possibility, salinity monitoring of the shallow ground water in adjacent areas will be evaluated for 1-2 years prior to dike removal so that salinity baseline levels can be recorded prior to dike removal actions. Impacts to agricultural fields along Jordan's Creek may result in the placement of a tide gate at the existing culvert under the North Red River Road. However, placement of a tide gate will only occur following specific evaluation of alternatives.

The current land use zoning for the areas adjacent to the Lummi Delta Site is shown in Figure 17. It is anticipated that the dike around the Sandy Point Improvement Company golf course will help protect the mitigation banks from pollutants originating from this adjacent land use.

6.2 Nooksack Delta Site

Because the actions planned at the Nooksack Delta Site include preservation, removal of invasive plant species, and planting native tree species, very few impacts to surrounding properties are anticipated. If active management of invasive species and conifer underplanting is performed in riparian areas, it is possible that increased recruitment of wood will occur over time. Increased wood in the system may result in the formation of new log structures and a more dynamic river system. However, because the site is located in the lower river delta area, and a large volume of debris already accumulates in this area due to actions and processes upstream in the watershed, these changes would have minimal impacts to adjacent lands.

6.3 Blockhouse Site

It is possible that restoring tidal hydrology to this area may increase salinity levels in the agricultural fields north and east of the Blockhouse Site near the mouth of the Lummi River. Because of this possibility, salinity monitoring of the shallow ground water will be evaluated for 1-2 years prior to dike removal so that salinity baseline levels can be recorded prior to dike removal actions. It is noted that the ground water in this area is already brackish (Cline 1974).

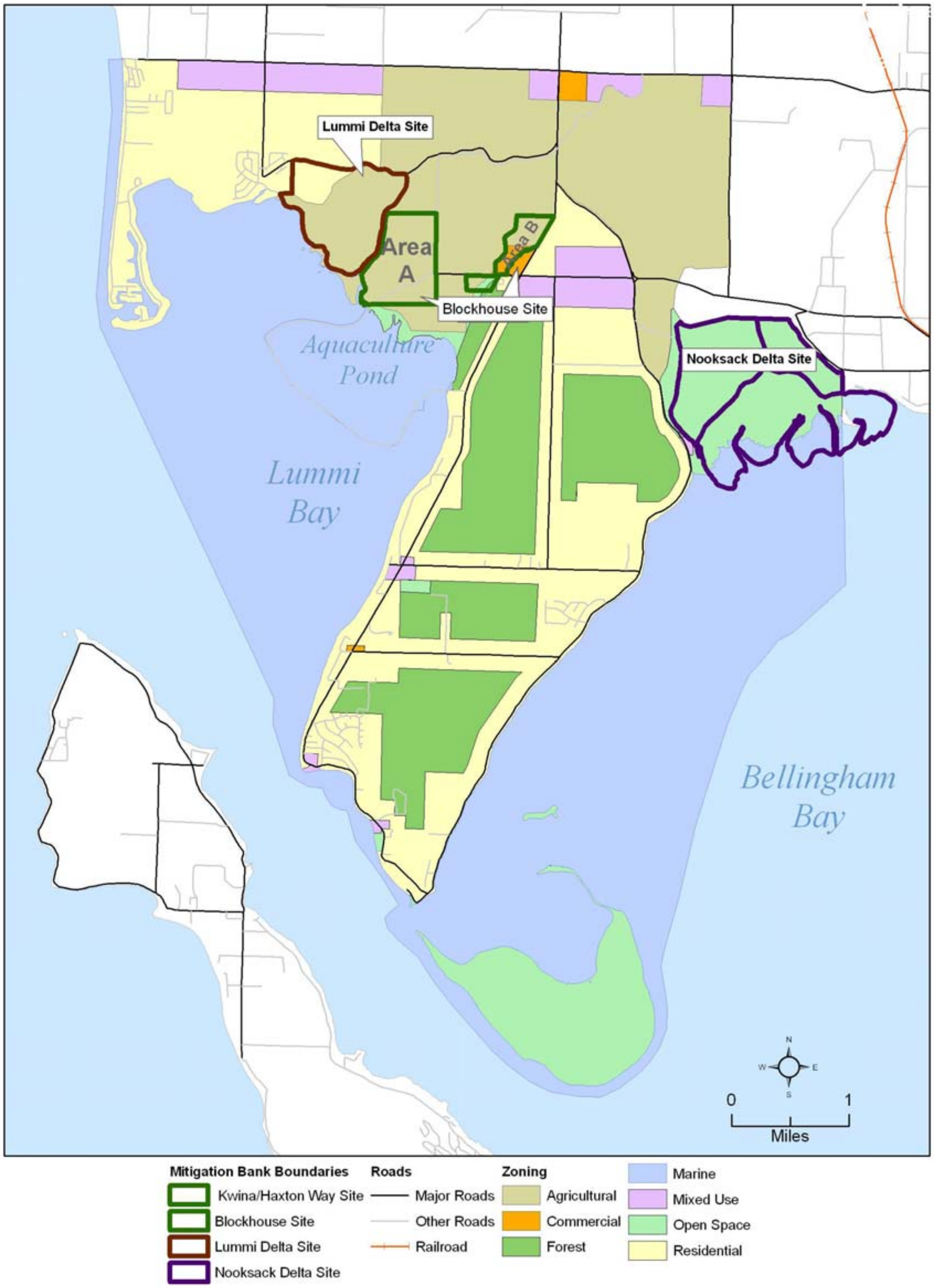

Figure 17. Current Lummi Indian Reservation Zoning and WHMB Site Locations

The portion of the Blockhouse Site near the intersection of Kwina Road and Haxton Way (Area B) is bounded by agricultural parcels to the west and south. The existing tide gates to the south are designed to limit flooding only during circumstances when the Nooksack River is in full flood stage and has breached the levees along the river. In these circumstances, Nooksack River floodwaters discharge/drain to Lummi Bay. Operational tide gates are important in these conditions to prevent marine water from flowing into the already flooded areas, which cause both a backwater effect and increase the volume of water that needs to drain from flooded areas. Therefore it appears that a management regime for the tide gates could be employed that would both allow for up-gradient tidal flux to the site, and provide flood protection to adjacent properties in the relatively rare situations when necessary.

7. REGULATIONS AND PERMITS

This section outlines pertinent regulations and permits that apply to the proposed Lummi Nation WHMB project. The Lummi Nation will obtain any necessary Federal and tribal permits for construction prior to initiating wetland restoration, enhancement, and preservation activities. Early coordination with Federal agencies will assist the Lummi Nation in identifying potential design issues and any additional design elements.

On the Lummi Delta and Blockhouse sites, dike removal and tidegate management will be performed in a manner that will avoid and/or minimize both temporary and permanent effects on the environment to the greatest extent practicable. Impacts to small areas of existing low value wetlands may be required for simple control structures and/or hydrologic barriers. Any actions, such as construction of a ring dike on the Lummi Delta Site, that involve dredging or filling of Lummi Nation Waters and/or waters of the United States (such as removal of dikes on the Lummi Delta Site) will require authorization under Title 17 of the Lummi Code of Laws and Sections 401 and 404 of the Federal Clean Water Act (CWA). Because the primary purpose of this project is ecological preservation, enhancement, and restoration, the work will most likely be authorized under a Clean Water Act Section 404 Nationwide Permit (NWP) No. 27 for stream and wetland restoration activities. Nationwide Permit No. 27 covers activities in waters of the United States, including tidal and non-tidal wetlands and riparian areas, and the creation and/or restoration of tidal and non-tidal wetlands. Compensatory mitigation is not required for activities authorized by this NWP. General Condition 13(b) (Notification) applies, and General Condition 25(b) (Designated Critical Resources Waters) may apply.

Pre-approved Endangered Species Act (ESA) compliance may apply. If not, coordination under Section 7 of the ESA will be conducted once the nature and extent of the planned site development activities are finalize during the Mitigation Banking Instrument development phase of the project.

An archaeological assessment has already been conducted for a portion of the Blockhouse Site and additional cultural resource management related assessments will be conducted once the nature and extent of the planned site development activities are finalized during the Mitigation Banking Instrument development. These cultural resources evaluations are required to comply with both Title 40 of the Lummi Code of Laws and Section 106 of the National Historic Preservation Act.

Because the planned actions on the Nooksack Delta Site involve preservation and control of invasive species and planting trees for diversity, it is unlikely that any Federal permits will be necessary. Pursuant to Title 15 of the Lummi Code of Laws, a Lummi Land Use permit from the Lummi Planning Department will be required for all of the sites.

8. SERVICE AREA

This section describes the geographical area to be served by the three sites that will comprise the Lummi Nation WHMB. The Lummi Nation is interested in providing the largest service area practicable for which the banking sites can provide comparable replacement of impacted wetland area and function. The appropriate extent of the service area for a bank varies depending on the nature of the impact being mitigated for and the type of functions provided. This section first describes which functions and wetland types can be most appropriately mitigated for by the three sites. The proposed service area for the Lummi Nation WHMB is then described along with the rationale for this service area.

8.1 Applicable Wetland Types and Functions

In the Lummi Delta Site, there are 18 separate palustrine emergent wetland areas (144 acres) within the 407-acre site. Most of the site (excluding the channels) will convert to palustrine emergent-permanent tidal wetlands when the sea walls are breached. Palustrine scrub-shrub wetlands with smaller areas of palustrine forested wetlands will eventually form along the site fringe. Therefore, the types of wetlands and habitats that the Lummi Delta Site could mitigate impacts for include low-quality agricultural wetlands, riparian and forested wetlands, and estuarine/riverine tidal wetlands down to the elevation of Mean Low water. The primary wetland functions that this bank site will perform include general habitat suitability, habitat suitability for anadromous fish, and primary production and export, based on the wetland types that are expected to develop.

Conversely, the Nooksack Delta Site currently supports relatively high functioning wetlands that will be preserved and enhanced. The types of wetlands and habitats that the Nooksack Delta Site could mitigate impacts for include a variety of classes of palustrine and riverine wetlands. This site will best mitigate impacts to the functions listed in Table 11 in Section 3.6.2 of this prospectus (e.g. potential for removing heavy metals and toxic organics, general habitat suitability, and native plant richness).

The Blockhouse Site has 192 acres of palustrine emergent, scrub-shrub, and forested wetlands, which are primarily disturbed from past land uses. Most of this wetland area and drained wetlands would be converted to palustrine tidal wetlands if the tide gate were managed or removed to allow tidal flux into and out of the site. Weed removal, deleveling, and planting of native trees and shrubs in the portion of the site near the intersection of Kwina Road and Haxton Way (Area B) will result in greater areas of scrub-shrub and forested wetland classes. The types of wetlands and habitat that the Blockhouse Site could mitigate impacts for include low-quality agricultural wetlands, riparian and forested wetlands, and riverine tidal wetlands.

8.2 Service Area Rationale and Selection

The proposed service area for the Lummi Nation WHMB is generally the portions of Watershed Resources Inventory Area 1 (WRIA 1) downstream from the confluence of the North Fork, Middle Fork, and South Fork Nooksack River. The WRIA 1 sub-basins at the headwaters of streams in the Cascade Mountains and areas that cross the international boundary and/or discharge to the Fraser River system are not included in the Lummi Nation WHMB service area. Included in the service area are tidally influence shoreline wetlands down to the elevation of Mean Lower Low Water (MLLW) along the edge of WRIA 1 from the Canadian border south to the mouth of the Skagit River. The boundaries for this service area were drawn based on the Watershed Management Unit (WMU) boundaries as shown in the WRIA 1 Watershed Management Plan (http://www.wria1project.wsu.edu/watershedplan.htm). Sub-basins contained within the service area include: Samish Bay, Lummi/Eliza Islands, Lake Whatcom, Lummi Peninsula/Portage Island, Lummi Bay, Silver/Nooksack Channel and Delta, Squalicum, Ten Mile, Lower Mainstem Nooksack, Birch Bay, Drayton Harbor, Lynden North, and Point Roberts. Figure 18 depicts the proposed service area for the Lummi Nation WHMB.

The area defined by the lower elevation sub-basins in WRIA 1 is the most practicable choice for a service area because it includes the landscape that drains to all three bank sites. Wildlife habitat and water quality improvement functions restored in the bank can offset losses of these functions that occur when wetlands are impacted in other parts of the watershed. Wildlife habitat restored in the Lummi Nation WHMB will be available to many of the same bird and mammal species that inhabit wetlands upstream in the watershed. The restoration of the wetlands in the bank will also increase water quality improvement functions, which benefit wildlife populations (shellfish, birds, others) in the intertidal and nearshore habitats downstream of the bank site. Impacts to wetlands upstream in the watershed often have negative impacts on local and downstream water quality.

The restoration and preservation of regionally significant intertidal wetlands will have wildlife and water quality benefits beyond the watershed (WRIA 1) and will help to offset the loss of near-shore fish habitat in the region. The tidally influence wetlands along the shoreline from the Canadian border south to the mouth of the Skagit River are appropriately included in the service area because of the regional ecological benefits this restored habitat will have for fish and other aquatic wildlife populations.

The fish habitat improvements resulting from restoration and enhancement at the Lummi Nation WHMB will have beneficial results for fish populations extending from coastal watersheds along Georgia Strait and the Nooksack River watershed through the Skagit River watershed. Numerous efforts are underway to analyze the causes of declines in salmon populations in Puget Sound and there are many restoration plans and activities that focus on improving habitat conditions to restore viable salmon populations. Most of these restoration efforts focus on the need for a broad perspective approach to the salmon recovery challenge. The geographic extent of the evolutionarily significant unit (ESU) of chinook salmon extends from the Elwha River along the Strait of Juan de Fuca to the Nooksack River in the north (Myers et al 1998). Under the Endangered Species Act, the National Oceanic and Atmospheric Administration (NOAA) Fisheries agency is charged with protection and recovery of chinook salmon on an ESU-wide basis and is establishing recovery goals accordingly. On this basis, activities that benefit chinook salmon and bull trout in the Nooksack River could mitigate for impacts to chinook salmon and bull trout within at least the Nooksack River, Whatcom Creek, and Skagit River watersheds.

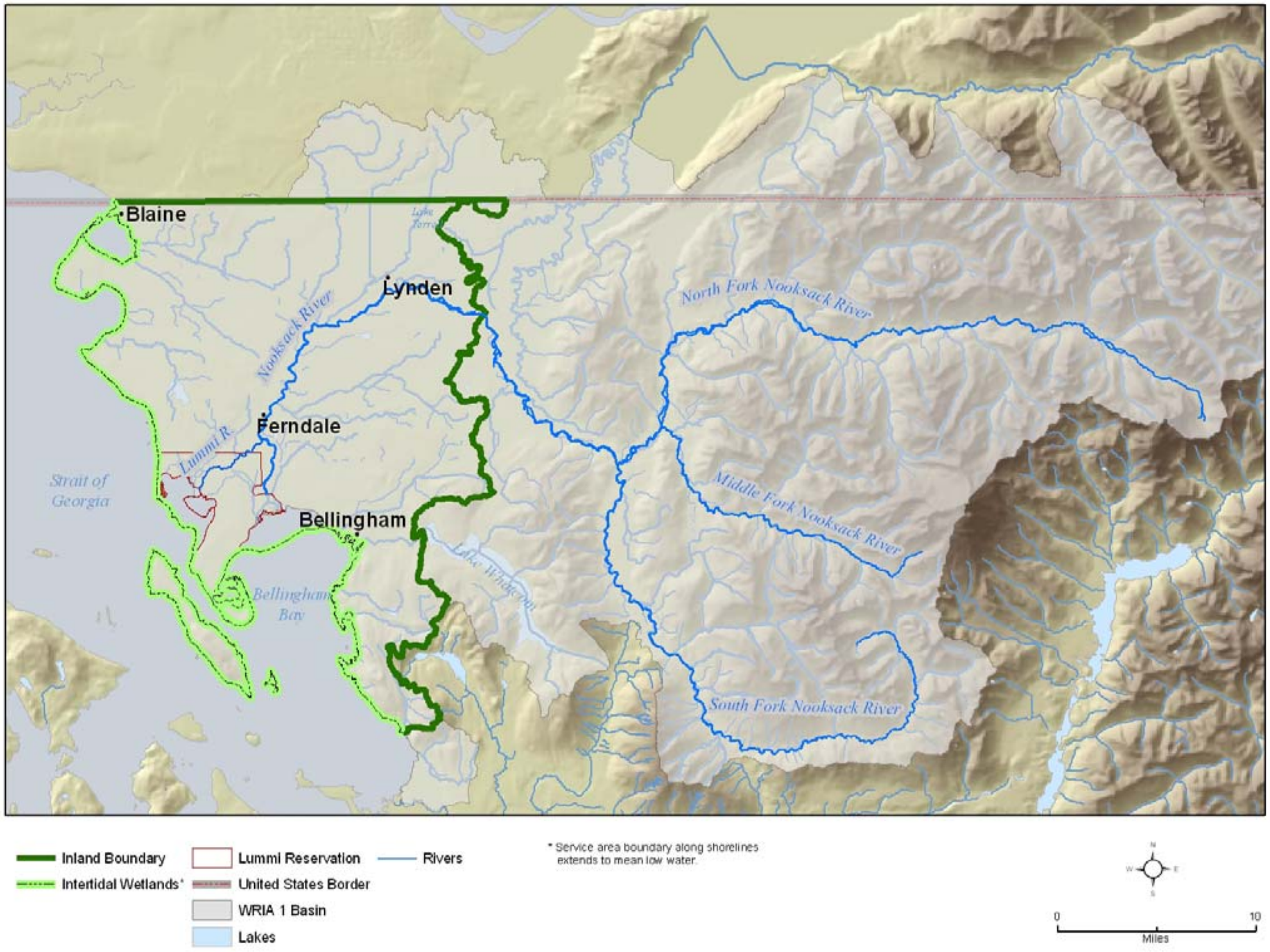

Figure 18. Service Area for the Lummi Nation WHMB

The Lummi Nation WHMB could provide mitigation for wetland (riparian, low-quality agricultural wetlands, forested, and isolated) and buffer impacts for the Lummi Indian Reservation, coastal drainages to Georgia Strait and Bellingham Bay, and the lowland portions of the Nooksack River drainage. The Lummi Nation WHMB could also provide mitigation for impacts to threatened or endangered species habitat in these same areas. Tribal and local ordinances and regulations (county and city) require maintenance of buffers of existing riparian areas along streams and wetlands and often require mitigation when these buffers are altered to allow reasonable use of property. Because of the functions that wetland buffers perform (e.g., water quality protection, shading, leaf litter fall, large woody debris) there is good rationale for using the Lummi Nation WHMB to replace impacted buffers, as well as impacted wetlands and threatened or endangered fish habitat, throughout the service area.

9. CREDIT DEVELOPMENT AND FINANCIAL ASSURANCES

This section on mitigation credit development and financial assurances is provided draft prospectus for discussion purposes. It is understood that these issues will be negotiated and resolved during the Mitigation Banking Instrument (MBI) development effort. This section describes the anticipated wetland and habitat replacement ratios and the guarantees that will be provided to the regulatory agencies that the Lummi Nation WHMB will be completed and maintained as planned and approved. It provides information about the financial capability to fund the required activities including contingencies in the event of a failure. Financial assurances will be in the form of escrow accounts, trust funds, security bonds, proof of stable revenue sources, dedicated accounts, letters of credit, endowments, or other similar instruments.

Wetland credit conversion ratios used in this prospectus are based on personal communication with the United States Army Corps of Engineers (Corps) (Walker 1999) and are within the ranges for mitigation ratios identified in the multi-agency policies and guidance for wetland mitigation in Washington State (Ecology 2006).

Typical replacement ratios are:

Establishment (creation)	1:1
Re-establishment	1:1
Rehabilitation	1.5:1
Enhancement	6:1
Preservation	10:1

Using these typical ratios as a guide, rehabilitation of 1.5 acres of wetland in the bank will generate one acre of mitigation credit. Six acres of enhanced wetland or 10 acres of wetland preservation, respectively, will be required to generate one mitigation credit. Preliminary acreage and credit calculations for the three sites are presented in Table 13. During development of the MBI, discussions with the MBRT will be conducted regarding what portions of the enhanced upland areas and designated buffer areas will be available for credits. Portions of the designated buffer areas will be re-established wetlands. When tidal hydrology is returned to these buffer areas the ecological functional lift will be considerable. These areas will be an integral part of the wildlife habitat and water quality improvement provided by the wetland. It is proposed here, but not included in the credit calculations in Table 13, that restored wetland areas that are designated as buffer will be credited at a 4:1 ratio. Enhanced upland areas (not within the designated buffers) should also be credited at a 4:1 ratio.

The bank sponsor shall secure funds to cover the anticipated costs associated with long-term management of the bank. Those funds shall remain with the management entity designated in the MBI, or the permanent protection mechanism of the bank if ownership of the bank property is transferred. For future land protection, the bank sponsor shall secure real estate arrangements that will permanently protect the property on which the bank is located. The real estate arrangements shall transfer with the property.

Credits and debits for mitigation activity will be released subject to the terms of the Mitigation Banking Instrument (MBI), and in accordance with established guidelines, monitoring, and reporting requirements determined by the MBRT. The credit release schedule will be a phased release of credits beginning with the signing of the MBI and progressing over several years as specified milestones are reached and/or performance standards met. A preliminary credit release schedule is proposed below. The MBI should provide some level of flexibility in the event that performance standards are achieved at either an accelerated of slower than anticipated pace.

Percentage of total credits released.

10% - released at signing of MBI and financial assurance

30% - documented wetland hydrologic conditions at Lummi Delta Site in accordance with performance standards.

10% - Year 1 performance standards met.

10% - Year 2 performance standards met.

10% - Year 3 performance standards met.

10% - Year 4 performance standards met.

10% - Year 5 performance standards met.

10% - Year 10 success standards met.

9.1 Lummi Delta Site

Re-establishing wetlands in 247 acres of uplands (drained and diked wetlands) within the Lummi Delta Site at a 1:1 ratio will provide 247 credits. Rehabilitating the 144 acres of low to average functioning wetlands at the site at a 1.5:1 ratio will provide an additional 96 credits. In total, the Lummi Delta Site could provide 343 credits to be used as compensatory mitigation for wetland impacts within the service area.

9.2 Nooksack Delta Site

Within the Nooksack Delta Site, enhancing functions of 145 acres of forested wetlands (underplanting conifers in forested wetlands) at a 6:1 ratio could provide 24 credits. Enhancement would also include removal/management of invasive species and planting of native trees and shrubs in 146 acres along riparian areas and in one emergent wetland area, at a 6:1 ratio providing an additional 24 credits. Preservation of 676 acres at a 10:1 ratio could provide 68 credits. In total, the Nooksack Delta Site could provide 116 credits.

9.3 Blockhouse Site

Wetland re-establishment (140 acres) at the Blockhouse Site at a 1:1 ratio will provide 140 credits and rehabilitation of 172 acres at a 1.5:1 ratio will provide an additional 115 credits. A total of 255 credits could be provided at the Blockhouse Site.

All three sites combined could provide 714 credits to be used to compensate for unavoidable wetland impacts at replacement ratios appropriate for the specific impact site and local Critical Area Regulations.

Table 13. Proposed Credit Development

Type of Action	Acreage	Ratio	Credits
Lummi Delta Site (407 acres)			
Wetland Re-establishment (drained wetlands)	247	1:1	247
Wetland Rehabilitation (existing wetlands)	144	1.5:1	96
Buffer	16	-	-
Subtotal			343
Nooksack Delta Site (1,079 acres)			
Wetland Enhancement - conifer underplanting	145	6:1	24
Wetland Enhancement - invasive plant removal	146	6:1	24
Preservation	676	10:1	68
Buffer	35	-	-
Subtotal			116
Blockhouse Site (354 acres)			
Wetland Re-establishment (drained wetlands)	140	1:1	140
Wetland Rehabilitation (existing wetlands)	172	1.5:1	115
Buffer	42	-	-
Subtotal			255
Total Credits Possible from all three sites:			714

Note: Designated buffers include some existing wetland areas; therefore wetland areas in this table are less than the total wetland areas reported in earlier sections.

The Lummi Nation proposes to perform a Boundary Line Adjustment to consolidate the lots according to the project phases after it has received signatures on the Mitigation Banking Instrument, obtained the necessary permits to perform construction, and posted the agreed to financial assurances. Conservation easements will be established to provide permanent protection of the bank sites. This will allow the Lummi Nation to continue its existing on-site operations during the earlier phases provided that such activities do not interfere, or adversely affect, phases under construction or previously constructed. Provisions will be added to the conservation easements that will allow the Lummi Nation to implement the approved construction activities and the adaptive and long-term management approaches related to the mitigation-banking project, as approved by the MBI.

It is anticipated that financial assurances will be more fully developed after the MBRT has approved the basic plan presented in this Prospectus. An estimate of the cost of the bank construction and obtaining a performance bond or escrow agreement will be developed at that time. Other cost estimates that will be needed include those for detailed site design, land purchase, planting, replanting contingency, eradication and control of invasive species, preparation of as-built surveys, environmental monitoring, and permitting.

The Lummi Nation WHMB will increase and greatly improve salmonid habitat in the Nooksack watershed, therefore it is expected that the bank will also be used for Endangered Species Act Section 7 violations (relating to threatened and endangered species issues affecting Puget Sound salmonids) or as mitigation for projects within the service area that negatively impact the habitat of listed salmonid species. Restoration of the Lummi Delta Site would create up to five miles of reconnected riverine and channel habitat for rearing Chinook and other salmonids, and the Nooksack Delta Site and the Blockhouse Site will improve functions within salmonid habitat.

Although the number of habitat credits available in the Lummi Nation WHMB will be negotiated with the United States Fish and Wildlife Service (USFWS) and NOAA Fisheries, it is anticipated that the credit calculation will be based upon habitat assessment methods similar to those developed for the Duwamish Waterway (Iadanza 2001) and the Blue Heron Site on the Snohomish Estuary (NMFS 2007). The value of available fish habitat created within the bank would vary based on habitat characteristics such as tidal elevation and vegetation cover. For example four tidal elevation ranges would be defined: deep subtidal, shallow subtidal, low intertidal, high intertidal. Different values would be associated with each of these tidal elevations depending on the vegetation cover and the relative usefulness of the habitat to anadromous fish.

Due to the relatively rare habitat types and important functions for all life stages of salmonids that will be re-established, rehabilitated, enhanced, or protected through the development of the Lummi Nation WHMB, it is anticipated that use of the habitat credits will be based on 1:1 ratio. Each unit of habitat value in the bank (credit) would mitigate for an equivalent unit of habitat value in the impact area. The methods used to calculate available habitat value credits will be developed with input from the agencies and will be detailed in a technical report included in the MBI.

10. ENVIRONMENTAL MONITORING, LONG-TERM PROTECTION, AND ADAPTIVE MANAGEMENT

This section describes environmental monitoring, reporting, long-term protection assurances, and adaptive management strategies that will be provided to ensure the success of the Lummi Nation WHMB. This section is provided in this prospectus for discussion purposes. It is understood that these issues will be negotiated and resolved during the Mitigation Banking Instrument (MBI) development effort.

Monitoring requirements and interim performance standards developed in conjunction with the MBRT will be incorporated into the Mitigation Banking Instrument. Monitoring activities will include measurement, observation, and photo documentation of site hydrology, channel evolution, plant community and habitat changes, and other features that define wetland habitat development. The Methods for Assessing Wetland Functions (Hruby et al. 1999) will also be used at regular intervals to monitor and document habitat changes and development.

After the approval of this prospectus, the Lummi Nation will prepare a Monitoring and Adaptive Management Plan (MAMP) for the Lummi Nation WHMB in consultation with the MBRT. The MAMP will include guidance and criteria for the future management of the three sites and will include performance standards that are observable or measurable benchmarks for particular objectives against which the mitigation project can be compared. The MAMP will also be used to measure the bank's success, and will include a description of corrective procedures, if needed, to address any area of the site that fails to meet project goals. Project criteria, design process, and construction guidelines will be outlined in the MAMP to ensure that clear instructions are provided for adaptive management of the site.

The MAMP will be based on the functional parameters that are needed to support the achievement of the mitigation bank's goals and mitigation credit criteria. Because the desired outcome of the wetland mitigation bank is to create dynamic systems, a certain amount of flexibility will be needed in order to evaluate benchmarks for project success. For example, the success of the proposed design for the Lummi Delta Site and the Blockhouse Site relies on the relationship between the Lummi River, relict channel zones, and associated salt marsh wetlands that will be created as part of this project. The multitude of habitat benefits that will result from this project requires variability and complexity that can only be created by forces of nature. For the Lummi Delta Site, several hundred linear feet of dike will be removed or breached for the project. Once the dike alterations have occurred, tidal waters will inundate most of the project area. Additional work may be needed to make the hydraulic connections that will be necessary to restore hydraulic connectivity between Lummi Bay and the abandoned agricultural fields. The openings will be excavated to an appropriate elevation so that tidal waters will inundate the fields. This type of project does not afford the opportunity to rely on a static condition to measure project success. Changes to the approved design or maintenance measures will be reviewed and be approved in writing by the MBRT prior to implementation of the changes. The MAMP will outline requirements for reporting and communication of proposed adaptive management measures with the MBRT.

11. SUMMARY

Creation of the Lummi Nation WHMB on the Lummi Indian Reservation represents a regionally significant opportunity to make fish and wildlife habitat improvements to large, ecologically vital wetland systems, including a regionally significant river delta area. The goal of the mitigation bank will be to restore, enhance, preserve, and/or protect dynamic and self-maintaining wetlands and associated habitats that will provide excellent habitat for fish and wildlife. The probability of successful implementation on all three bank sites is high. The bank will be used for compensatory mitigation of unavoidable impacts to Lummi Nation Waters and waters of the United States, including wetlands, which result from activities authorized under Section 401 and Section 404 of the Clean Water Act. In addition, the bank will be used for compensatory mitigation of Section 7 of the Endangered Species Act violations and for unavoidable impacts to the habitat of threatened or endangered salmonid species within the service area.

Using preliminary replacement ratios discussed in Section 9, a combination of restoration and enhancement activities in the Lummi Delta Site could provide 343 credits. Within the Nooksack Delta Site, a combination of enhancement and preservation activities could provide 116 credits. Restoration at the Blockhouse Site would generate 255 credits. All three sites combined could provide 714 credits to be used as compensatory mitigation for unavoidable wetland impacts within the service area. It is understood that these mitigation credit computations are for discussion purposes and that the actual mitigation credit ratios will be finalized during the development of the Mitigation Banking Instrument.

The Lummi Nation is interested in providing the largest service area practicable for which the banking sites can provide comparable replacement of impacted wetland area and function. The three bank sites could mitigate impacts to low-quality agricultural wetlands; riparian and forested wetlands; and other freshwater, riverine, and estuarine wetlands. The service area for the Lummi Nation WHMB will be all of Watershed Resources Inventory Area 1 (WRIA 1) downstream from the confluence of the Nooksack River forks except for areas that cross the international boundary and/or discharge to the Fraser River system. Included in the service area are tidally influence wetlands down to the elevation of Mean Lower Low Water along the shoreline of WRIA 1 from the Canadian border south to the mouth of the Skagit River.

Financial assurances will be developed after the MBRT has approved the basic plan presented in this prospectus. An estimate of the construction costs and costs of obtaining a performance bond or escrow agreement will be developed and included in the MBI. Other necessary cost estimates are those for detailed site design, land purchase, planting, replanting contingency, eradication and control of invasive species, preparation of as-built surveys, environmental monitoring, and permitting.

The steps needed to proceed with the development of the Lummi Nation WHMB include, but are not limited to:

- Upon receipt of this prospectus, in coordination with the Lummi Nation, the Corps of Engineers and the Environmental Protection Agency (EPA) will reconvene the members of the MBRT and convene its next meeting.
- During a series of meetings, the MBRT will review, evaluate, and provide comments on the prospectus, which will be incorporated for use by the Lummi Nation in the MBI.
- Following approval of the final prospectus, the Corps of Engineers and the EPA will provide public notice and invite comments on the final draft of the Prospectus.
- The Lummi Nation will address comments received during the public comment period and a draft MBI with all appropriate materials and documentation for the appendices and resource folder will be submitted to members of the MBRT for approval.
- Once all necessary conservation easements and financial assurances are received, and the MBI is finalized and signed, some initial credits can be released and the bank construction can begin.

Because federal agency representation on the MBRT is required, and the availability of agency staff is unknown, it is difficult to reliably estimate the schedule for developing the MBI. However, it is anticipated that efforts to acquire land will continue and the MBI will be developed during 2008 and implemented over the next three years.

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