Lummi Nation Wetland and Habitat Mitigation Bank

Mitigation Banking Instrument

Nooksack Delta Site Phase 1A



Lummi Natural Resources Department

May 24, 2012

MITIGATION BANKING INSTRUMENT

Lummi Nation Wetland and Habitat Mitigation Bank

This Mitigation Banking Instrument regarding the establishment, use, operation, and maintenance of the Lummi Nation Wetland and Habitat Mitigation Bank (hereinafter, the Bank) is made and entered into by and among the Lummi Nation Department of Natural Resources (hereinafter, the Sponsor) and the U.S. Army Corps of Engineers (the Corps), with reference to the following:

I. PREAMBLE

A. Purpose: The purpose of this Mitigation Banking Instrument (hereinafter, the Instrument) is to specify responsibilities for the establishment, use, operation, and maintenance of the Bank. It consists of this "Basic Agreement" establishing the central obligations assumed and consideration provided by each Party, as well as Appendices (hereinafter, the Appendices) that establish the detailed Bank implementation plan, including site-specific conditions, standards, and procedural requirements applicable to the Bank. The terms and provisions of the Appendices will be incorporated into the Instrument. The Bank will provide compensatory mitigation for unavoidable adverse impacts to "waters of the United States" and "Lummi Nation Waters," including wetlands, and to aquatic habitat including habitat for endangered and threatened species, that result from activities authorized by Federal, Tribal, State, and local authorities, when use of the Bank has been specifically approved by the appropriate regulatory agencies.

B. Location and Ownership of Parcel: Whereas, the Lummi Nation owns fee title to, or the United States holds in trust for the Lummi Nation's benefit, approximately 1,945 acres of land located near the City of Bellingham, on or adjacent to the Lummi Indian Reservation, within the boundaries of Whatcom County, Washington. The Sponsor intends to develop the Bank in phases as the Sponsor acquires all lands within each phase.

C. Project Description: Whereas, the Sponsor has expressed intent to preserve, restore, rehabilitate, and/or enhance approximately 1,945 acres of aquatic and associated upland habitat when all phases of the Bank are implemented according to the provisions of this Instrument, and shall then maintain each established phase of the Bank in accordance with the provisions of this Instrument. The Bank is projected to, among other purposes; provide the following aquatic habitat improvements as detailed in Appendix B: 379.9 acres of wetland enhancement during Phase 1A. Details on the establishment and other aspects of later phases of the Bank (Phase 1B, Phase 2, and Phase 3) will be provided in amendment(s) to this MBI as all of the property within the land area associated with each phase is acquired and restoration and enhancement plans are finalized.

The wetlands preserved and enhanced under Phases 1A and 1B will provide wildlife habitat, large wood inputs, and water quality improvement functions that will serve to sustain the fish habitat in the river channels and fish and wildlife foraging habitat in the Nooksack River estuary on the growing delta. Phase 2 will open and re-establish estuarine intertidal wetlands and provide additional fish and wildlife habitat improvements along Lummi Bay. Phase 3 will establish estuarine intertidal wetland functions as well as high-quality salmonid habitat in re-established tidal channels along Lummi Bay.

D. Bank Overview: As detailed in Appendix A, the Bank will be comprised of three separate sites known as the Nooksack Delta Site, the Blockhouse Site, and the Lummi Delta Site. When fully developed, the Bank will encompass a total area of approximately 1,945 acres. The Bank will be implemented in four phases. The Nooksack Delta Site contains 1,179 acres at the mouth of the Nooksack River and will be developed in two phases: Phase 1A and Phase 1B. Phase 1A is the first phase of the Bank that is being developed and is comprised of approximately 842 acres. The Blockhouse Site contains approximately 354 acres and includes two separate locations identified as "Area A" (located near the Lummi River) and "Area B" (located near the Kwina Road/Haxton Way intersection). The Blockhouse Site will be implemented as a single phase (Phase 2) and is anticipated to be the second phase of the Bank that will be developed. The Lummi Delta Site contains approximately 412 acres at the mouth of the Lummi River and will be developed as a single phase (Phase 3). The proposed sites are especially suitable for a mitigation bank because of their historic land cover, ecological value, landscape position, and large size. All property is located on or adjacent to the Lummi Indian Reservation.

E. Interagency Review Team. Whereas, in consideration of the establishment and maintenance of the Bank, the Interagency Review Team (IRT) is willing to award credits in accordance with the procedures outlined in this Instrument. These credits will be made available to serve as compensatory mitigation pursuant to applicable Federal, Tribal, and Washington State, and local government laws and regulations. The IRT is the group of Federal agencies that has reviewed and will advise the Chair regarding, the establishment and management of the Bank pursuant to the provisions of the Instrument. The IRT consists of:

1. Chair: U.S. Army Corps of Engineers, Seattle District (Corps).
2. Member: U.S. Environmental Protection Agency, Region 10 (EPA).

The Washington Department of Ecology does not have jurisdiction over the Bank or any authority over the Sponsor's land use activities, but is a member of the IRT so that the Bank could be certified to allow use, as determined on a case-by-case basis, of the Bank credits for impacting projects under state jurisdiction that desire to use credits from the Bank as a source of compensatory mitigation. The role of the Washington Department of Ecology is consistent with the provisions included in WAC 173-700-102.

NOW, THEREFORE, the Parties agree to the following:

II. LEGAL AUTHORITIES

A. Authorities: The establishment, use, operation, and maintenance of the Bank shall be carried out in accordance with the following principal authorities.

1. Federal:
   a. Clean Water Act (33 USC §§ 1251 et seq.)
   b. Rivers and Harbors Act of 1899 (33 USC § 403)
   c. Regulatory Programs of the Corps of Engineers, Final Rule (33 CFR Parts 320-332)
   d. U.S. Army Corps of Engineers Regulatory Guidance Letter No. 05-1, *Guidance on Use of Financial Assurances, and Suggested Language for Special Conditions for Department of the Army Permits Requiring Performance Bonds*, February 14, 2005
   e. U.S. Army Corps of Engineers – Seattle District Regulatory Guidance Letter, *Mitigation Monitoring Report Format*, October 10, 2008
   f. Guidelines for the Specification of Disposal Sites for Dredged and Fill Material ("404(b)(1) Guidelines," 40 CFR Part 230)
   g. National Environmental Policy Act (42 USC §§ 4321 et seq.)
   h. Council on Environmental Quality Procedures for Implementing the National Environmental Policy Act (40 CFR Parts 1500-1508)
   i. Executive Order 11990 (Protection of Wetlands)
   j. Executive Order 11988 (Protection of Floodplains)
   k. Executive Order 13112 (Invasive Species)
   l. Fish and Wildlife Coordination Act (16 USC §§ 661 et seq.)
   m. Fish and Wildlife Service Mitigation Policy (46 FR 7644-7663, 1981)
   n. Endangered Species Act (16 USC §§ 1531 et seq.)
   o. Magnuson-Stevens Fishery Conservation and Management Act (16 USC §§ 1801 et seq.)
   p. National Historic Preservation Act, as amended (16 USC § 470 et. seq.)

2. Tribal
   a. Natural Resources Code (LCL Title 10)
   b. Land Use, Zoning, and Development Code (LCL Title 15)
   c. Flood Damage Prevention Code (LCL Title 15A)
   d. Water Resources Protection Code (LCL Title 17)
   e. Solid Waste Control and Disposal Code (LCL Title 18)
   f. Tribal Employment Rights Ordinance (LCL Title 25)
   g. Administrative Code (LCL Title 27)
   h. Budget and Finance Code (LCL Title 28)
   i. Cultural Resources Preservation Code (LCL Title 40)
   j. Land Tenure Code (LCL Title 42)

3. The establishment, use, operation, and maintenance of the Bank will also be carried out in consideration of the following State authorities:
   a. Water Pollution Control Act (Chapter 90.48 RCW)

III. ESTABLISHMENT OF THE BANK

A. Permits. The Sponsor shall obtain all appropriate environmental documentation, permits, and other authorizations needed to establish and maintain the applicable phase of the Bank, prior to the award of any mitigation credits. Compliance with this Instrument does not fulfill the requirement, or substitute, for such authorization. The role of the Washington State Department of Ecology will be consistent with the provisions of WAC 173-700-102.

B. Bank Establishment. The Sponsor agrees to establish the Bank as described in Appendix B and to satisfactorily accomplish all performance standards reflected in Appendix C. In recognition thereof, credits will be awarded to the Sponsor in accordance with the procedures and schedules prescribed in the Appendices, particularly in Appendices C and D. In establishing the Bank, deviations from the prescribed Bank development plan and design, including deviations from any performance standards, may only be made with the prior approval of the Corps following consultation with the other members of the IRT. To propose modifications to the bank development plan, the Sponsor shall submit a written request to the Corps. Documentation of implemented modifications shall be made consistent with Article VI.C.2. of this Instrument. The Establishment Period of the Bank is defined in Article IV.K.

C. Financial Assurance Requirements: The Sponsor intends to satisfy its obligations under this Agreement by obtaining sufficient funding to carry out all its acquisition, design, development, monitoring, and maintenance responsibilities underlying the establishment and initial functionality of the Bank, as well as its Long-Term Management and Maintenance actions prescribed in Article IV.M.1. The Sponsor provides the following financial assurance for the work described in this Agreement. The Lummi Nation will appropriate funding through the Sponsor's Departmental Operating Account. To the extent, if any, that these funds are insufficient to fully and timely fund the Sponsor's obligations as delineated in this Agreement, the Sponsor shall include in its budget request for each fiscal period appropriations sufficient to cover the Sponsor's obligations under this Agreement for that fiscal period, and will use all reasonable and lawful means to fulfill its obligations hereunder. In the event the Lummi Indian Business Council does not provide funds in sufficient amounts to discharge these obligations, the Sponsor shall use its best efforts to procure funding in order to satisfy its obligations under this Agreement from any other source of funds legally available for this purpose. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the Lummi Indian Business Council where creating such an obligation would be inconsistent with the Constitution of the Lummi Nation. No mitigation credit sale revenue may be expended in execution of any of the Sponsor's obligations prescribed under this Instrument, to include without limitation Bank establishment, management, or remedial action activities. All Bank establishment and management activities shall be funded through the Nation's general appropriation process as directed by the Lummi Indian Business Council.

D. Real Estate Provisions:

1. All real property to be included within any phase of the Bank will be presently owned in fee simple status by the Lummi Nation or held in trust by the United States for the Lummi Nation's benefit at the commencement of the establishment period. All real property within Phase 1A of the Lummi Nation Wetland and Habitat Mitigation Bank is owned by the Lummi Nation or held in trust by the United States for the exclusive use of the Lummi Nation. The Sponsor is responsible for ensuring that the Lummi Nation burden the title to the Bank real property through the grant of a conservation easement, pursuant to the provisions of Section G.1.1 of Appendix G. The conservation easement must be approved, initiated, and recorded pursuant to Section G.1.1 of Appendix G, prior to the award of any Bank credits and before any construction or implementation activities may be conducted on-site during the establishment period of the Bank, as defined in Article IV.K. Any construction or implementation activities conducted on-site prior to the inception of the establishment period must cease as of the effective date of this Instrument pursuant to Article VI.C.1, until an approved conservation easement is recorded. The initial award of credits in recognition of accomplishment of the performance standards under Objective 1, pursuant to Section D.1.2.A. of Appendix D, will serve as the IRT's notification that construction and implementation activities are authorized to commence.

2. The Sponsor is further responsible for ensuring that, if the Northwest Indian Fisheries Commission holds as grantee a conservation easement underlying all or any portion of the Bank, the Lummi Nation shall recuse itself from any participation, to include voting and advocacy regarding, measures before the Northwest Indian Fisheries Commission pertaining to that conservation easement that affect or may affect the financial or other interests of the Lummi Nation.

E. Multiple Phase Banks: If future demand within the service area warrants, the Sponsor may request IRT approval to implement subsequent phases of the Bank. The IRT will authorize the implementation of subsequent Bank phases that have been specifically identified in Appendices A - G, provided that the appropriate amendments to the site establishment plan, financial assurances, and monitoring and maintenance plans are developed by the Sponsor, approved by the IRT, and executed by all Parties for incorporation into this Instrument. The sites for subsequent phases must be adjacent to the original Bank site and located within the service area of the Bank. Each subsequent phase must be capable of achieving the terms and conditions of the Instrument.

IV. OPERATION OF THE BANK

A. Service Area: The Bank is approved to provide compensatory mitigation for impacts to the Waters of the United States, Lummi Nation Waters, and waters of the State of Washington, including wetlands, within a portion of Water Resources Inventory Area 1 ("WRIA 1"), which is described as the Nooksack River watershed and certain adjacent

coastal stream systems, as shown in the Service Area Map, Figure E.1 of Appendix E and in the Resource Folder (Exhibit 12).

1. The Service Area: 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. In addition to all freshwater waters of the U.S./Lummi Nation, the service area includes tidally influenced waters down to the elevation of Mean Lower Low Water (MLLW) along the edge of WRIA 1 from the Canadian border south to the southern boundary of the Oyster Creek drainage. The service area of the Bank contains the following WRIA 1 drainages: South Fork Anderson, North Fork Anderson, Lower Anderson, Scott, Kamm, Fishtrap (U.S. portion), Bertrand (U.S. portion), Schneider, Fourmile, Tenmile, Deer, Fazon, Silver, Wiser Lake/Cougar Creek, North Fork Dakota, South Fork Dakota, Haynie, Lower Dakota, Blaine, Califomia, Semiahmoo, Point Roberts, Fingalson, Lake Terrell, Cherry Point, Sandy Point Jordan, Schell, Lummi River, Lummi River Delta, Lummi Peninsula West, Lummi Peninsula East, Portage Island, Lummi Island, Eliza Island, Nooksack River Channel, Nooksack River Delta, Fort Bellingham, Spring, Baker, McCormick, Upper Squalicum, Toad, Lower Squalicum, Whatcom, South Bellingham, Padden, Chuckanut, Fragrance Lake, Larrabee, and Oyster Creek. The Bank may be used to compensate for an impact that occurs within the Service Area if specifically approved by the regulatory agency(ies) that have jurisdiction over that impact, pursuant to the procedures and criteria prescribed in Appendix E.

2. In exceptional situations, the Bank may be used to compensate for an impact that occurs outside of the Service Area if specifically approved by the regulatory agency(ies) having jurisdiction over that impact and by the Corps following consultation with the IRT, pursuant to the procedures and criteria prescribed in Section E.1.1 of Appendix E. If the Corps determines that the Sponsor has sold, used, or transferred credits at any time to provide compensatory mitigation for loss of aquatic resources outside of the Service Area without prior approval, the Corps, in consultation with the other members of the IRT, may direct that the sale, use, or other transfer of credits immediately cease, and will determine, in consultation with the IRT, the Sponsor, and the appropriate regulatory authority, what remedial actions are necessary to correct the situation and will direct their performance prior to the award of any additional mitigation credits. Notwithstanding the fact that ceasing sale, use, or other transfer of credits may have been required, unless this Instrument is terminated pursuant to Article IV.J. or VI.C., the Sponsor shall remain responsible for the timely and effective achievement of all the Objectives and Performance Standards mandated in Appendix C.

B. Access to the Bank Site. The Sponsor will allow, or otherwise provide for, access to the Bank site by members of the IRT or their agents or designees, as reasonably necessary for the purpose of inspection, compliance monitoring, and remediation consistent with the terms and conditions of this Instrument and the Appendices, throughout the periods of

Bank establishment, operation, and long-term management and maintenance. Inspecting parties shall provide the Sponsor reasonable prior notice of a scheduled inspection, and shall not unreasonably disrupt or disturb activities on the property.

C. Availability and Sale, Transfer, or Use of Credits: Subject to the documentation and scheduling provisions of Section D.1.2 of Appendix D, the Sponsor may submit to the IRT written evidence that particular performance standards have been achieved. If the Corps, after consulting with the other members of the IRT and the Sponsor, concur that certain performance standards have been achieved in full, the Corps will respond in writing to the Sponsor that the credits associated with those performance standards are available for sale, transfer, or use by the Sponsor as compensatory mitigation for its own activities causing adverse impacts to the aquatic environment. Each instance of sale or any other transfer of credits to a third party shall be reflected in a transaction agreement. Each such transaction agreement must include the name, address, and telephone number of the purchaser or transferee. Each credit transaction agreement that is associated with a permit must indicate the permit number of the impacting project, the number of universal credits involved in the transaction, and must expressly specify that the Sponsor, and it successors and assigns, assume legal responsibility for accomplishment and maintenance of the transferee's compensatory mitigation requirements associated with the impacting project, upon completion of the credit transaction.

D. Credit Deficit or Fraudulent Transactions: If the Corps determines at any point that the Bank is operating without prior written approval at a deficit, or has engaged in fraudulent transactions in the sale, use, or other transfer of credits, the Corps will cease award of, and will direct the Sponsor to immediately cease sale, use, or other transfer of credits. The Corps will determine, in consultation with the IRT and the Sponsor, what remedial actions are necessary to correct the situation and will direct their performance prior to the award of any additional mitigation credits.

E. Provisions For Use of the Mitigation Bank Area: The Corps may consider the Sponsor as being in material default of a provision of this Instrument and proceed accordingly under Article IV.J., should the Corps, in consultation with the IRT and the Sponsor, determine that either of the following has occurred:

1. The grant of additional easements, rights of way, or any other property interest in the project areas without the written consent of the Corps.

2. The use or authorization of the use of any areas within the Bank for any purpose that is contrary to the provisions of this Instrument or the conservation easement, or which interferes with the conservation purposes of the Bank.

F. Maintenance Provisions: Following achievement of the performance standards, the Sponsor agrees to perform all necessary work to maintain those standards as prescribed in Section F.1.1.5. of Appendix F.

G. Monitoring Provisions: The Sponsor agrees to perform all necessary work, pursuant to Appendix F, to monitor the Bank during the establishment period to demonstrate compliance with the performance standards established in Appendix C.

H. Contingency Plans/Remedial Actions: In the event the Bank fails to achieve, within the specified time schedule, one or more of the performance standards as delineated in Appendix C, the Sponsor shall develop necessary contingency plans and implement appropriate remedial and monitoring actions for the Bank as specified in Section F.1.1.4. of Appendix F, to achieve those performance standards. Prior to implementing any remediation, monitoring, or other corrective measures, the Sponsor shall obtain written approval of the contingency plans from the Corps. The Corps shall consult with the IRT prior to approval of the plans. All appropriate environmental documentation, permits and other authorizations needed to implement the contingency plan or take remedial action shall be obtained by the Sponsor. In the event the Sponsor fails to implement necessary contingency actions within the prescribed period, the Corps, following consultation with the Sponsor and the IRT, will direct remedial, corrective, and/or sanctioning action in accordance with the procedures specified in Section F.1.1.4. of Appendix F.

I. Force Majeure: The Sponsor may request, pursuant to Article VI.C., and the Corps, may approve changes to the construction, operation, objectives, performance standards, timelines or credit generation and award schedule of the Bank, pursuant to the standards and procedures specified in Appendix F if all of the following occur: an act or event causes substantial damage such that it is determined to be a force majeure; such act or event has a significant adverse impact on the quality of the aquatic functions, native vegetation, or soils of the Bank site; and such act or event was beyond the reasonable control of the Sponsor, its agents, contractors, or consultants to prevent or mitigate.

1. The evaluation of the damage caused by a force majeure and the resulting changes to mitigation requirements involve a communicative process. If the Sponsor asserts a mitigation site has sustained significant adverse impacts due to an event or act which may be determined to be a force majeure, the Sponsor shall give written notice to the Corps and the IRT as soon as is reasonably practicable. After receiving written notice, the Corps, in consultation with the IRT and the Sponsor, shall evaluate whether the event qualifies as a force majeure. The Corps, in consultation with the IRT and the Sponsor, will then evaluate whether significant adverse impacts have occurred to the site. If a force majeure event is determined to have occurred and significant adverse impacts are found to have occurred to the site, the Corps, in consultation with the IRT and the Sponsor, will evaluate whether and to what extent changes to the Bank site will be in the best interest of the site and the aquatic environment, and may approve such changes as detailed above. The Corps retains sole discretion over the final determination of whether an act or event constitutes a force majeure, whether significant adverse impacts to the Bank site have occurred, and to what extent changes to the Bank site will be permitted.

2. Force majeure events include natural or human-caused catastrophic events or deliberate and unlawful acts by third parties.

    a. Examples of a natural catastrophic event include, but are not limited to: a flood equal to or greater in magnitude than the 100-year flood event; an earthquake of a force projected from an earthquake with a return period of 475 years; drought that is significantly longer than the periodic multi-year drought cycles that are typical of weather patterns in the Pacific Northwest; as well as events of the following type when they reach a substantially damaging nature: disease, wildfire, depredation, regional pest infestation, or significant fluviogeomorphic change.
    b. Examples of a human-caused catastrophic event include, but are not limited to substantial damage resulting from the following: war, insurrection, riot or other civil disorders, spill of a hazardous or toxic substance, or fire.
    c. Examples of a deliberate and unlawful act include, but are not limited to substantial damage resulting from the following: the dumping of a hazardous or toxic substance, as well as significant acts of vandalism or arson.

3. The consequences of any events of force majeure recognized as such by the Corps shall not affect the status of previously released credits, whether or not they have yet been sold, used, or transferred.

J. Default: Should the Corps, in consultation with the IRT, determine that the Sponsor is in material default of any provision of this Instrument, the Corps may cease award of mitigation credits, and may notify the Sponsor that the award, sale, and/or transfer of mitigation credits, or use by the Sponsor of Bank credits as compensatory mitigation for its own activities causing adverse impacts to the aquatic environment, are suspended until the delineated deficiencies are rectified. Upon written notification of suspension, the Sponsor agrees to immediately cease any sale or transfer transactions not yet finally completed, and/or to cease any use by the Sponsor of Bank credits as compensatory mitigation for its own activities causing adverse impacts to the aquatic environment where a Corps permit or authorization, as required, has not yet been issued, until informed by the Corps that award, sale, use or transfer of credits may be resumed. Should the Sponsor remain in default for a period of 90 days, the Corps, following consultation with the IRT, may terminate this Instrument and any subsequent banking operations. In the event such termination action is commenced, the Sponsor agrees to fulfill its pre-existing obligations to perform all establishment, monitoring, maintenance, management, and remediation responsibilities that arise directly from credits that have already been awarded, sold, used, or transferred at the time of termination. In the event of termination, no further sale or transfer of credits may occur, nor may any use be made by the Sponsor of Bank credits as compensatory mitigation for its own activities causing adverse impacts to the aquatic environment within the Service Area where a Corps permit or authorization, as required, has not yet been issued.

K. Establishment Period of the Bank: The establishment period of a particular phase of the Bank will commence on the date the Instrument takes effect pursuant to Article VI.C.1. Prior to termination of the establishment period of a particular phase of the Bank, the Corps following consultation with the IRT, will perform a final compliance inspection to evaluate whether all performance standards have been achieved. The establishment period for the Bank will terminate, and the period of long-term management and maintenance will commence, when the Corps determines, in consultation with the IRT and Sponsor, that the following conditions have been met:

1. All applicable performance standards prescribed in Appendix C for that phase have been achieved;
2. All available credits for that phase have been awarded, or the Corps, in consultation with the IRT, has approved the Sponsor's written request to permanently cease banking activities;
3. The Sponsor has prepared a Long-Term Management and Maintenance Plan that has been approved by the Corps, pursuant to Article IV.M.1. and Section G.1.2. of Appendix G;
4. The Sponsor has assumed responsibilities for accomplishing the Long-Term Management and Maintenance Plan as Long-Term Steward; and
5. The Bank has complied with the terms of this Instrument.

L. Operational Life of the Bank: The operational life of a particular phase of the Bank will commence on the date the Instrument takes effect pursuant to Article VI.C.1. Following the termination of the establishment period of a particular phase of the Bank, and (1) upon sale, transfer, or use by the Sponsor as compensatory mitigation for its own activities causing adverse impacts to the aquatic environment, of all credits, or (2) upon approval by the Corps, in consultation with the IRT, of the Sponsor's written request to permanently cease banking activities, the operational life of the Bank will terminate.

M. Long-Term Management and Maintenance:

1. The Sponsor shall develop a Long-Term Management and Maintenance (LTMM) Plan consistent with the guidelines and objectives specified in Section G.1.2 of Appendix G, and submit the Plan for approval by the Corps, in consultation with the other members of the IRT. The Sponsor is responsible, as Long-Term Steward, for execution of the approved LTMM Plan. The Sponsor may only deviate from the approved Plan upon written approval of the Corps, following consultation with the Sponsor and the IRT.

2. The Sponsor will not assign its long-term management and maintenance responsibilities to a third party assignee. The Sponsor will serve as the Long-Term Steward of the Bank.

N. Accomplishment of Sponsor Responsibilities; Transfer of Ownership of the Bank Site: The Sponsor shall remain responsible for complying with the provisions of this Instrument

throughout the operational life of the Bank, regardless of the ownership status of the underlying real property, unless those responsibilities have been assigned pursuant to the provisions of Article VI.D. of this Instrument. The Sponsor may transfer ownership of all or a portion of the Bank real property to another party provided the Corps, following consultation with the other members of the IRT, expressly approves the transfer in writing. The Sponsor shall provide written notice at least 60 days in advance of any transfer of fee title or any portion of ownership interest in all or a portion of the Bank real property to another party.

V. RESPONSIBILITIES OF THE CORPS

A. The Corps agrees to provide appropriate oversight in carrying out provisions of this Instrument.

B. The Corps agrees to review and provide comments on project plans, monitoring reports, contingency and remediation proposals, and similar submittals from the Sponsor in a timely manner. As the IRT Chair, the Corps will coordinate its review with the other members of the IRT.

C. The Corps agrees to review requests to modify the terms of this Instrument, transfer title or interest in the Bank, determine achievement of performance standards in order to evaluate the award of credits for each phase of the Bank, or approve the Long-Term Management and Maintenance Plan. As Chair, the Corps will coordinate review with the members of the IRT so that a decision is rendered or comments detailing deficiencies are provided in a timely manner. The Corps agrees to not unreasonably withhold or delay decisions on such requests.

D. The Corps agrees to act in good faith when rendering decisions about requiring corrective or remedial actions, requiring long-term management and maintenance actions, and awarding credits.

E. The Corps will periodically inspect the Bank site as necessary to evaluate, in consultation with the other members of the IRT, the achievement of performance standards, to assess the results of any corrective measures taken, to monitor implementation of the Long-Term Management and Maintenance Plan, and, in general, to verify the Sponsor's compliance with the provisions of this Instrument.

F. Upon satisfaction of the requirements of Article IV.K. for any Bank phase under this Instrument, the Corps will issue a letter certifying that the establishment period of that phase of the Bank has terminated, and that the period of long-term management and maintenance has begun, following consultation with the IRT. Upon satisfaction of the requirements of Article IV.L. of this Instrument, the Corps, will issue a letter certifying that the operational life of that phase of the Bank has terminated.

VI. GENERAL PROVISIONS

A. Waiver of Tribal Sovereign Immunity: By Lummi Indian Business Council Resolution 2011-036, dated April 19, 2011, the Sponsor waived any sovereign immunity that it may possess from any suit by the United States in an appropriate Federal Court related to the provisions, terms, and conditions contained in this Instrument. Further, such resolution authorized Merle Jefferson, Director of the Lummi Natural Resources Department, to include such a waiver as part of this Instrument. Accordingly, the Sponsor hereby waives any sovereign immunity that it may possess from suit by the United States in an appropriate Federal Court to (1) enforce the term and conditions of this Instrument; and (2) recover damages for any breach of the terms and conditions of this Instrument.

B. Decision Making by Consensus: The Corps will strive to achieve consensus among the IRT regarding issues that arise pertaining to the establishment, operation, maintenance, and management of the Bank. As Chair, the Corps will coordinate the review and oversight activities of the IRT so as to best facilitate opportunity to reach the desired consensus. Review and oversight decisions will take into account the views of the Sponsor to the maximum extent practicable. Where consensus cannot otherwise be reached within a reasonable timeframe, following full consideration of the comments of the members of the IRT and following consultation with the Sponsor, the Corps holds the responsibility and authority under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899, to make final decisions regarding the application of the terms of this Instrument.

C. Entry into Effect, Modification or Amendment, and Termination of the Instrument:

1. This Instrument, consisting of both this Basic Agreement and the Appendices, will enter into effect upon the signature by authorized representatives of each of the Corps and the Sponsor, as of the date of the last of these two signatures.

2. This Basic Agreement portion of the Instrument may be amended or modified only with the written approval of the Sponsor and the Seattle District Engineer on behalf of the Corps, or their designees. Any such modifications or amendments will take effect following consultation with the other members of the IRT. Amendment or modification of the provisions of the Appendices may be effectuated through an exchange of letters signed by the Sponsor and the Mitigation Banking Program Manager serving as the IRT Chair on behalf of the Corps following consultation with the other members of the IRT, provided the exchange of letters expresses mutual agreement as to the exact language to be deleted or modified, and the exact language to be inserted.

3. This Instrument may be terminated by the mutual agreement of the Sponsor and Corps, following consultation with the IRT, or may be terminated under the terms of Article IV.J. of this Instrument in the case of default by the Sponsor. In the event any termination action is commenced, the Sponsor agrees to fulfill its pre-existing

obligations to perform all establishment, monitoring, maintenance, management, and remediation responsibilities that arise directly from credits that have already been sold, used, or transferred at the time of termination.

4. Upon termination of the operational life of the Bank pursuant to Article IV.L., and certification to that effect pursuant to Article V.F., this Instrument shall terminate without further action by any Party. Thereafter, the Long-Term Management and Maintenance Plan developed, approved, and instituted in accordance with Article IV.M. shall govern the continuing obligations of the Sponsor.

D. Assignment of Obligations under this Instrument: The Sponsor may be permitted to assign its obligations, responsibilities, and entitlements under this Instrument to a third party. The Corps, following consultation with the IRT, must approve the identity of the assignee in order for any assignment to effectively relieve the Sponsor of those obligations. In evaluating a prospective assignee, the Corps may consider characteristics such as environmental mitigation expertise, wetlands mitigation project or analogous experience, and financial strength and stability. Approval of the identity of the assignee will not be unreasonably withheld. The assignee must execute a mitigation banking instrument with the Corps under terms identical, to the extent practicable, to the present Instrument. In the event of such assignment, applicable financial assurances must be initiated. The obligations, responsibilities, and entitlements under this Instrument may reside in only a single entity at any one time, and may not be severed or transferred piecemeal. However, the physical ownership of the Bank site real property and the obligations, responsibilities, and entitlements under this Instrument are separate and distinct; thus, ownership may be transferred, pursuant to the provisions of Article IV.N. independently of assignment of this Instrument. Once assignment has been properly accomplished, the Sponsor will be relieved of all its obligations and responsibilities under this Instrument.

E. Specific Language of this Basic Agreement Shall Be Controlling: To the extent that specific provisions of this Basic Agreement portion of the Instrument are inconsistent with any terms and conditions contained in the Appendices, or inconsistent with other documents that are incorporated into this Instrument by reference and that are not legally binding, the specific language within this Basic Agreement shall be controlling.

F. Notice: Any notice required or permitted hereunder shall be deemed to have been given either (i) when delivered by hand, or (ii) three (3) days following the date deposited in the United States mail, postage prepaid, by registered or certified mail, return receipt requested, or (iii) when sent by Federal Express or similar next-day nationwide delivery system, addressed as follows (or addressed in such other manner as the party being notified shall have requested by written notice to the other party):

Lummi Nation
Natural Resources Department Director

2616 Kwina Road
Bellingham, WA 98226
360-384-2225

U.S. Army Corps of Engineers, Seattle District
Mitigation Program Manager/Chair of the IRT
Regulatory Branch
Seattle District, Corps of Engineers
4735 E. Marginal Way South
P.O. Box 3755
Seattle, WA 98124-3755
206-764-3495

G. Entire Agreement: This Instrument, consisting of both this Basic Agreement and Appendices, constitutes the entire agreement between the parties concerning the subject matter hereof.

H. Invalid Provisions: In the event any one or more of the provisions contained in this Instrument are held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect any other provisions hereof, and this Instrument shall be construed as if such invalid, illegal or unenforceable provision had not been contained herein.

I. Effect of Agreement: This Instrument does not in any manner affect statutory authorities and responsibilities of the signatory Parties. This Instrument is not intended, nor may it be relied upon, to create any rights in third parties enforceable in litigation with the United States. This Instrument does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or other claim with respect to the Bank property, with the sole exception of the right on the part of the Corps to require the Sponsor to implement the provisions of this Instrument, including recording the conservation easement, required as a condition of the issuance of permits for discharges of dredged and fill material into waters of the United States associated with construction and operation and maintenance of the Bank.

J. Attorneys' Fees: If any action at law or equity, including any action for declaratory relief, is brought to enforce or interpret the provisions of this Instrument, each party to the litigation shall bear its own attorneys' fees and costs of litigation.

K. Availability of Funds: Implementation of this Instrument is subject to the requirements of the Anti-Deficiency Act, 32 U.S.C. § 1341, and the availability of appropriated funds. Nothing in this Instrument may be construed to require the obligation, appropriation, or expenditure of any money from the United States Treasury, in advance of an appropriation for that purpose.

L. Headings and Captions: Any paragraph heading or caption contained in this Instrument shall be for convenience of reference only and shall not affect the construction or interpretation of any provision of this Instrument.

M. Counterparts: This Instrument may be executed by the Parties in any combination, in one or more counterparts, all of which together shall constitute one and the same instrument.

N. Binding: This Instrument, consisting of both this Basic Agreement and the Appendices, shall be immediately, automatically, and irrevocably binding upon the Sponsor and its heirs, successors, assigns and legal representatives upon execution by the Sponsor and the Corps.

IN WITNESS WHEREOF, the Parties hereto have executed this Instrument on the date herein below last written.

PARTIES:

By the Sponsor:

Merle Jefferson
Executive Director
Lummi Natural Resources Department

6/20/12
Date

INTERAGENCY REVIEW TEAM

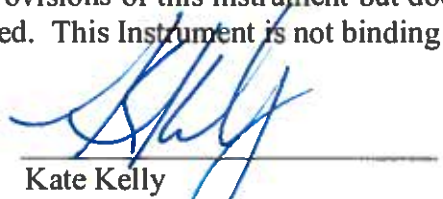
By the Corps:

Bruce A. Estok
Colonel, Corps of Engineers
Seattle District Engineer

6 JUL 2012
Date

OTHER IRT MEMBERS:

Signature by other IRT members indicates assent on the part of the represented organization to the provisions of this instrument but does not give rise to any affirmative obligations, express or implied. This Instrument is not binding on the other IRT members.



Kate Kelly
Environmental Protection Agency
Offices of Ecosystems, Tribal and Public Affairs
Director

7/2/12
Date

MITIGATION BANKING INSTRUMENT

APPENDICES

Lummi Nation Wetland and Habitat Mitigation Bank

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MITIGATION BANKING INSTRUMENT
APPENDIX A
GENERAL BANK INFORMATION

The Lummi Nation Wetland and Habitat Mitigation Bank (hereinafter, the "Bank" or the "Lummi Nation WHMB") will be comprised of three separate sites known as the Nooksack Delta Site, the Blockhouse Site, and the Lummi Delta Site. When fully developed, the Bank will encompass a total area of approximately 1,945 acres. The location of each of these sites on the Reservation is shown on Figure A.1, and the location of the Reservation and these sites with respect to the Nooksack River watershed is shown on Figure A.2.

The Bank will be implemented in four phases. The Nooksack Delta Site contains 1,179 acres at the mouth of the Nooksack River and will be developed in two phases: Phase 1A and Phase 1B. Phase 1A is the first phase of the Bank that is being developed and is comprised of approximately 842 acres. The Blockhouse Site contains approximately 354 acres and includes two separate locations identified as "Area A" (located near the Lummi River) and "Area B" (located near the Kwina Road/Haxton Way intersection). The Blockhouse Site will be implemented as a single phase (Phase 2) and is anticipated to be the second phase of the Bank that will be developed. The Lummi Delta Site contains approximately 412 acres at the mouth of the Lummi River and will be developed as a single phase (Phase 3). Information about Phase 1A is fully included in this document while specific details about the other (future) phases will be added as amendments to this document as each phase is developed. A brief overview of the future phases is provided below to provide context for the entire Bank. The entire Bank was described in the October 2008 prospectus, which was the subject of a public notice and comment period from December 15, 2008 through January 14, 2009 (Corps of Engineers Reference No. NWS-2008-1519-SO).

As shown in Figure A.1 and Figure A.2, all phases of the Bank are located in the Nooksack River estuary. The Nooksack River watershed comprises approximately 795 square miles in northwestern Washington State – largely within Whatcom County. The U.S. Geological Survey (USGS) identifies the Nooksack River watershed as Hydrologic Unit Code (HUC) 17110004. The Nooksack River watershed is within Water Resources Inventory Area No. 1 (WRIA 1) as defined by the State of Washington. The North, Middle, and South forks of the Nooksack River originate on federally managed lands in the Cascade mountain range near Mount Baker and collectively form the Nooksack River near the town of Deming, Washington. Near Deming the land use in the watershed transitions from forestry to agriculture, rural residential, and urban development. Associated with this land use change downstream from Deming is a reduction in what prior to 1925 were forests and forested wetlands that were converted to agricultural lands (through timber harvest, stump removal, and drainage activities) and an overall reduction in historic wetlands as residential and urban development occurred. In addition, the land use changes downstream from Deming are associated with an increase in flood protection projects and floodplain development that have isolated floodplain wetlands, degraded riparian conditions, and largely halted habitat formation along the mainstem Nooksack.

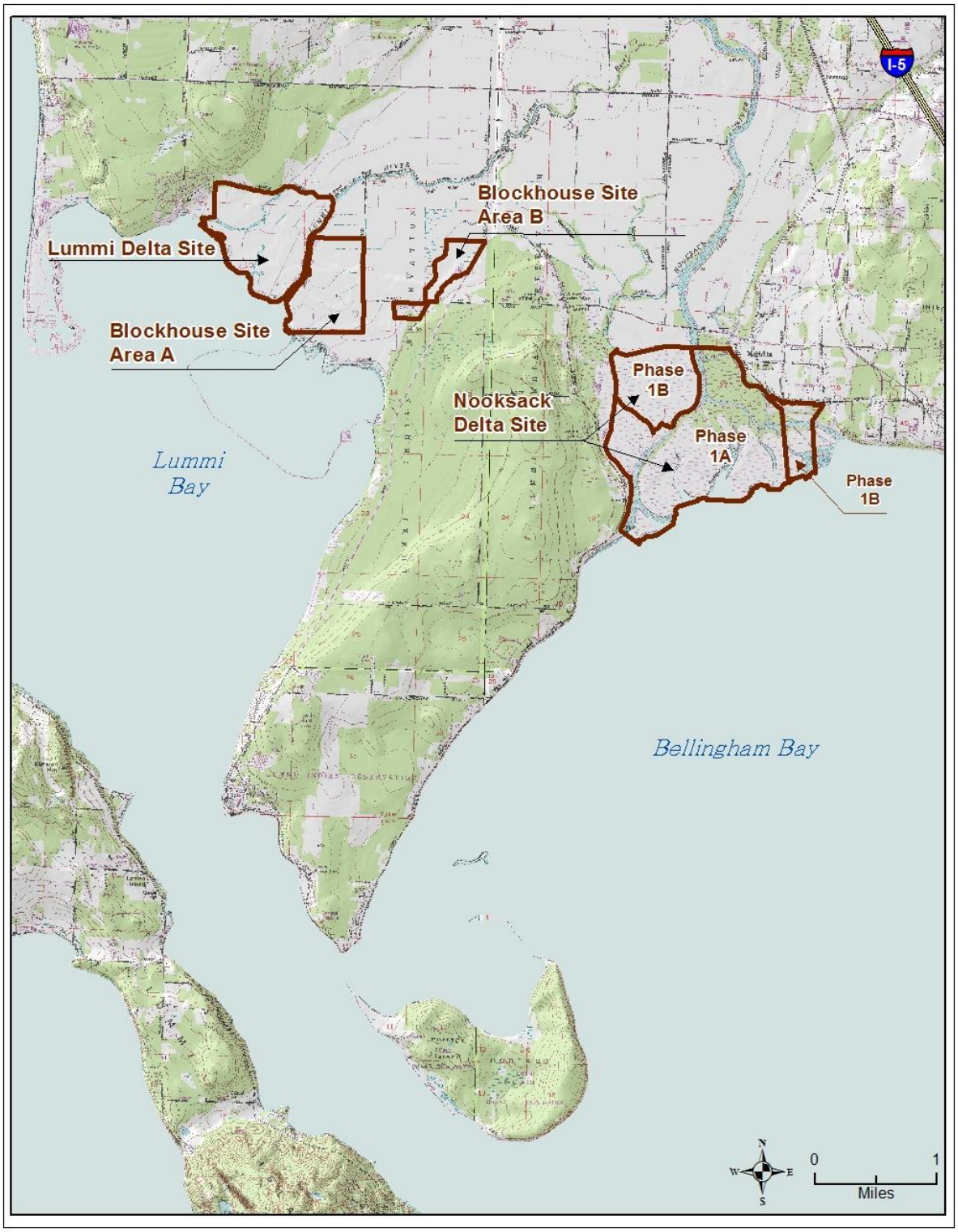


Figure A. 1. Lummi Nation Wetland and Habitat Mitigation Bank Sites

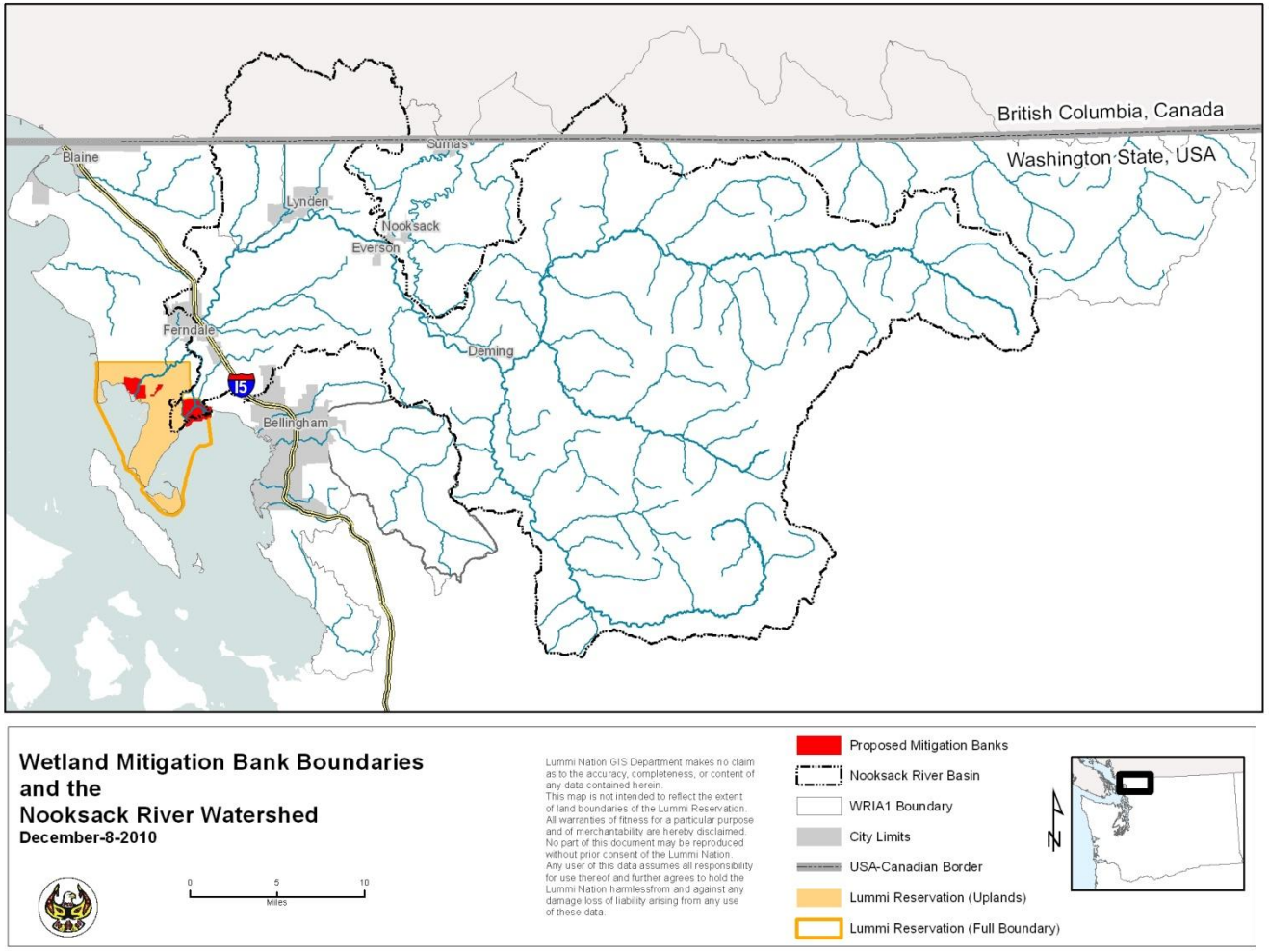


Figure A. 2. Location of the Lummi Nation Wetland and Habitat Mitigation Bank Within the Nooksack River Watershed

As shown in Figure A.3, in the late 1880s the Nooksack River had a broad delta that discharged water through distributary channels to both Lummi and Bellingham bays. The broad delta led to a mosaic of estuarine habitats and was associated with strong and diverse salmon runs. Subsequent diking and draining of the estuarine wetlands has greatly reduced the habitat. Figure A.3 shows the extent of the historic estuarine habitat in the 1880s as mapped by Bortleson et al. (1980) and also the subsequent levee and seawall construction in the Nooksack River estuary (shown as black dashed lines). The contemporary road network is shown in Figure A.3 for reference purposes. Figure A.3 also shows the Nooksack River outlet in Bellingham Bay in 1880, which is substantially upstream/landward than its current location.

Although the Lummi River is currently largely a disconnected distributary of the Nooksack River, before 1860 it was the dominant Nooksack River distributary channel and Lummi Bay the dominant receiving water body (WSDC 1960, Deardorff 1992). In 1860 a log jam blocked the Nooksack River and diverted it to a small stream that flowed into Bellingham Bay (WSDC 1960). Since that year, due to the increased commercial value of the river that resulted from its proximity to sawmills and population centers along Bellingham Bay, considerable effort has been expended to keep the Nooksack River discharging into Bellingham Bay (Deardorff 1992). The stream remaining in the historic primary distributary channel has been called the Lummi or Red River (WSDC 1960).

In the 1920s, a reclamation project was initiated to both construct a dike to keep back the sea along the shore of Lummi Bay, and to construct a levee along the west side of the Nooksack River (Deardorff 1992). This project, which was started in 1926 and completed in 1934, initially resulted in the near complete separation of the Lummi River from the Nooksack River. However, when salt water intrusion onto the newly reclaimed farm lands and damage to the dam at the head of the Lummi River occurred during flooding, the dam was replaced with a dam and spillway structure (Deardorff 1992). This spillway structure was also damaged over the years during high flow conditions and was most recently replaced by a culvert structure that allows flow into the Lummi River only during flows greater than approximately 10,000 cfs. As shown in Figure A.3, levees were also constructed along the Lummi River to prevent salt water intrusion onto adjacent farmlands.

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 (subaerial wetlands) in the lower Lummi River watershed have decreased from approximately 5.3 square kilometers (2.0 mi^2) to 0.3 square kilometers (0.1 mi^2), or by approximately 95 percent. The loss of floodplain wetlands and distributary channels, coupled with the increase in agriculture and development in the watershed, has also affected other water quality parameters in the estuary. Water temperatures in channels not influenced by the Nooksack River attain lethal levels for salmonids during the summer months and dissolved oxygen is greatly reduced compared to connected distributaries.

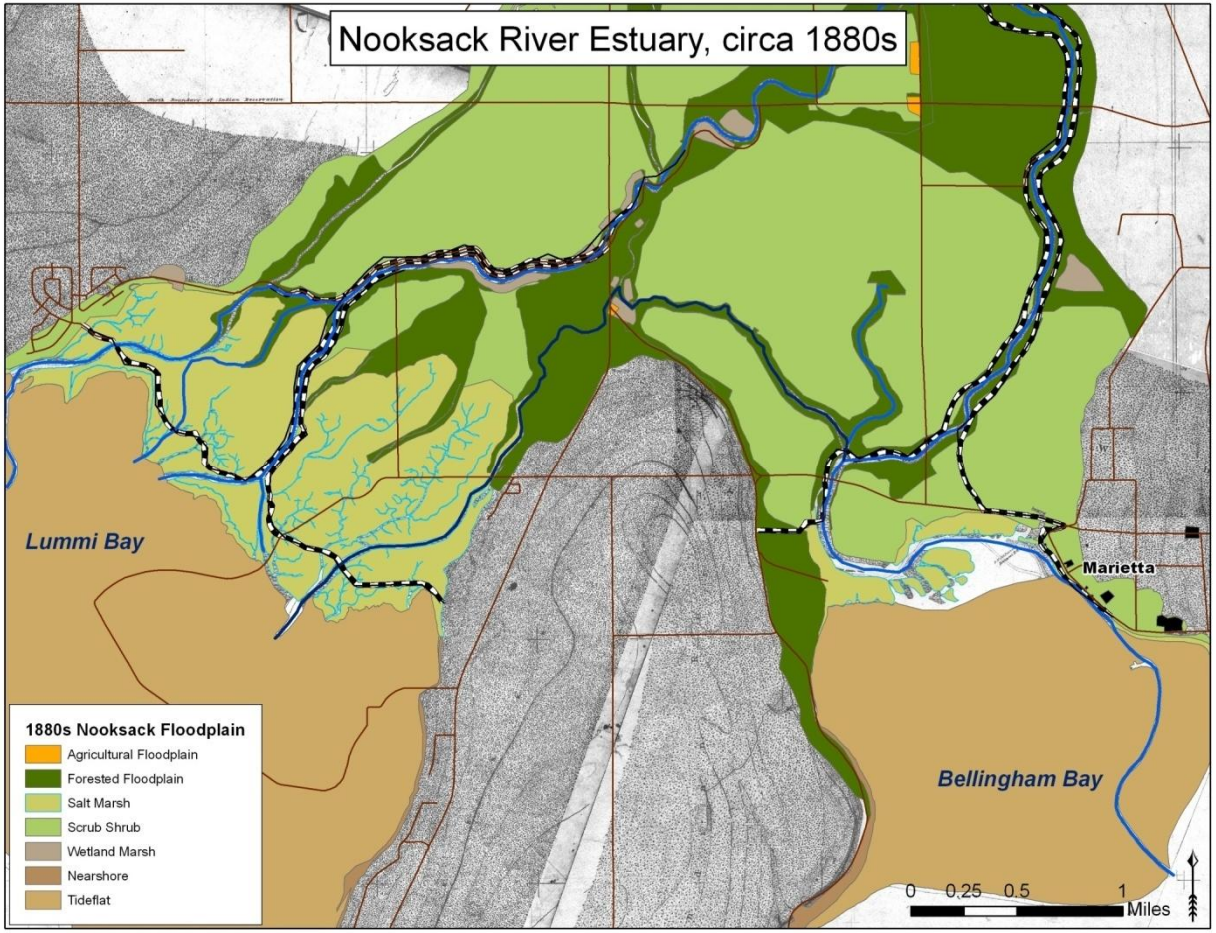


Figure A. 3. Nooksack River Estuary, circa 1880s (Bortleson et al. 1980).

The Nooksack River watershed hosts nine species of salmonids, including three listed under the Endangered Species Act (ESA): chinook, steelhead, and bull trout. The Nooksack salmon 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 salmon populations have declined substantially from historic levels and only 3 of 25 salmonid stocks identified in WRIA 1 by Washington State Salmonid Stock Inventories are currently considered healthy. Habitat degradation is considered the leading cause for the decline of WRIA 1 salmonid populations with current habitat conditions substantially less productive than historic conditions.

Restoring and enhancing estuarine habitat and distributary connectivity is believed to be an important step in the recovery of the salmon stocks in the Nooksack River basin. The loss of these habitats likely limits the area available for transitioning salmon smolts and returning adults. Data for the Nooksack River indicate that chinook smolts tend to leave the river and disperse to other marine areas rapidly rather than residing in an estuary "nursery". This rapid flush of out-migrating salmon is believed to be due in part to the loss of estuary habitats and nearshore eel grass beds in Bellingham Bay, the rapid progradation of the Nooksack Delta since 1860, and the loss of smolt access to Lummi Bay and the associated estuary and eel grass beds.

In response to declining Nooksack River salmon stocks, in 1998 the Lummi Indian Business Council (LIBC – the governing body of the Lummi Nation) passed Resolution No. 98-62 to authorize the Lummi Natural Resources Department (LNR) to evaluate the Nooksack Estuary Recovery Project. This action led to a public meeting on August 19, 1998 to present a conceptual plan for the project and to solicit public and agency input. Over 45 state, federal, tribal, and local government agency representatives and elected officials or their representatives attended the public meeting. Following from this, a Section 22 Planning Study was undertaken by the U.S. Army Corps of Engineers (Corps) and the LNR to evaluate restoration opportunities in the Nooksack River estuary. The Lummi Nation has continued to move forward with the Nooksack Estuary Recovery Project and has completed an estuary habitat assessment, developed a hydraulic model of the estuary, and developed a restoration/mitigation concept for Reservation lands in the flood plain (see Figure A.4). Figure A.4 shows the acquisition and use plan that was authorized by the LIBC through Resolution 2009-094. As shown in Figure A.4, the Bank is located adjacent to several restoration project sites. Figure A.5 shows the footprint of the restoration/mitigation bank concept with respect to the land cover in the Nooksack River estuary in the 1880s. As evident in Figure A.5, the Lummi Nation WHMB is a fundamental piece in a regionally significant and large-scale effort to restore and enhance estuarine habitat in the Nooksack River watershed for threatened and endangered salmon. Also evident in Figure A.5 is the progradation of the Nooksack River delta that has occurred since the 1880s – the entire Phase 1A Nooksack Delta Site is located on lands that have accreted on what were historically tribal tidelands at the mouth of the Nooksack River.

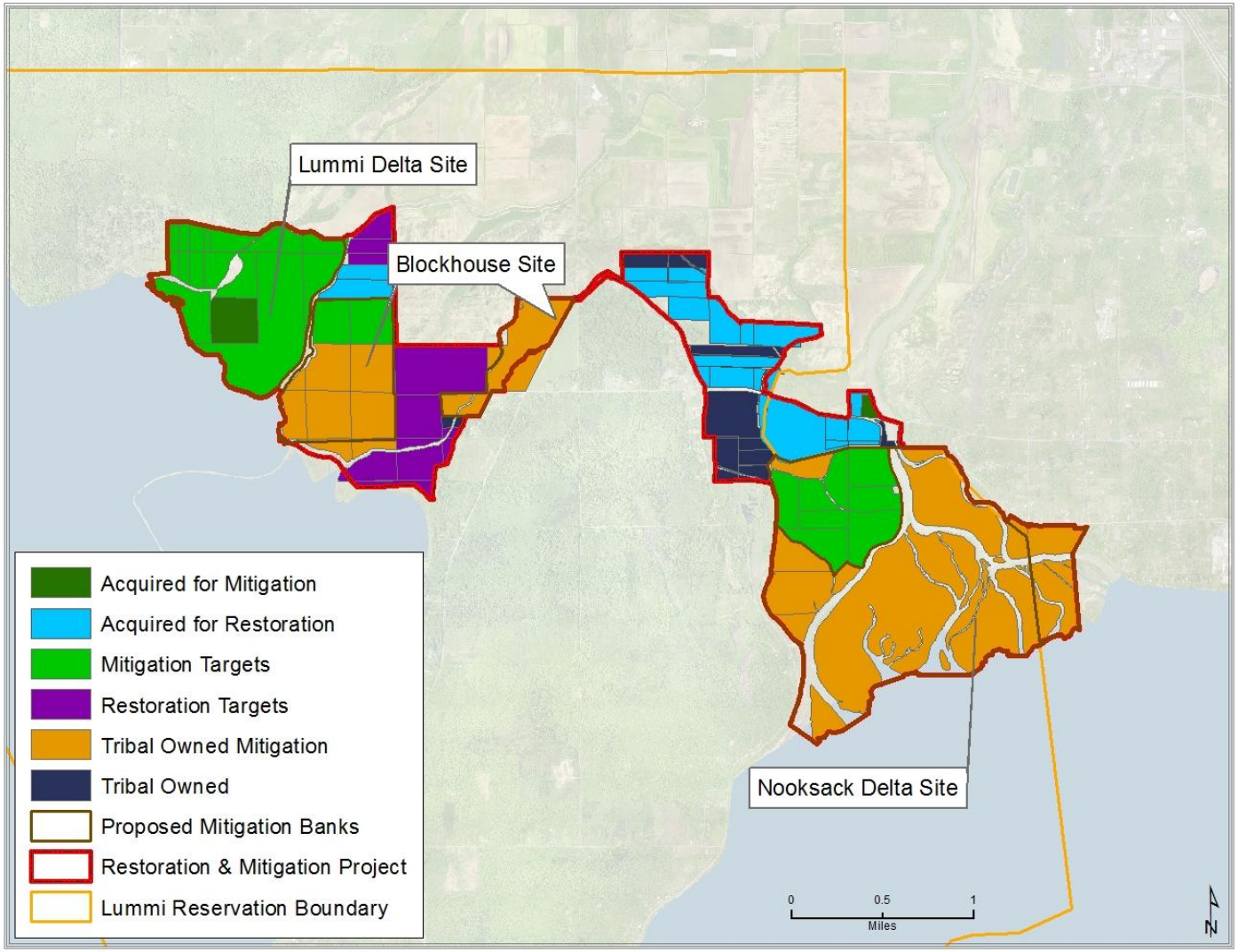


Figure A. 4. Acquisition and Use Plan for Reservation Lands in the Flood Plain (LIBC Resolution 2009-094**)**

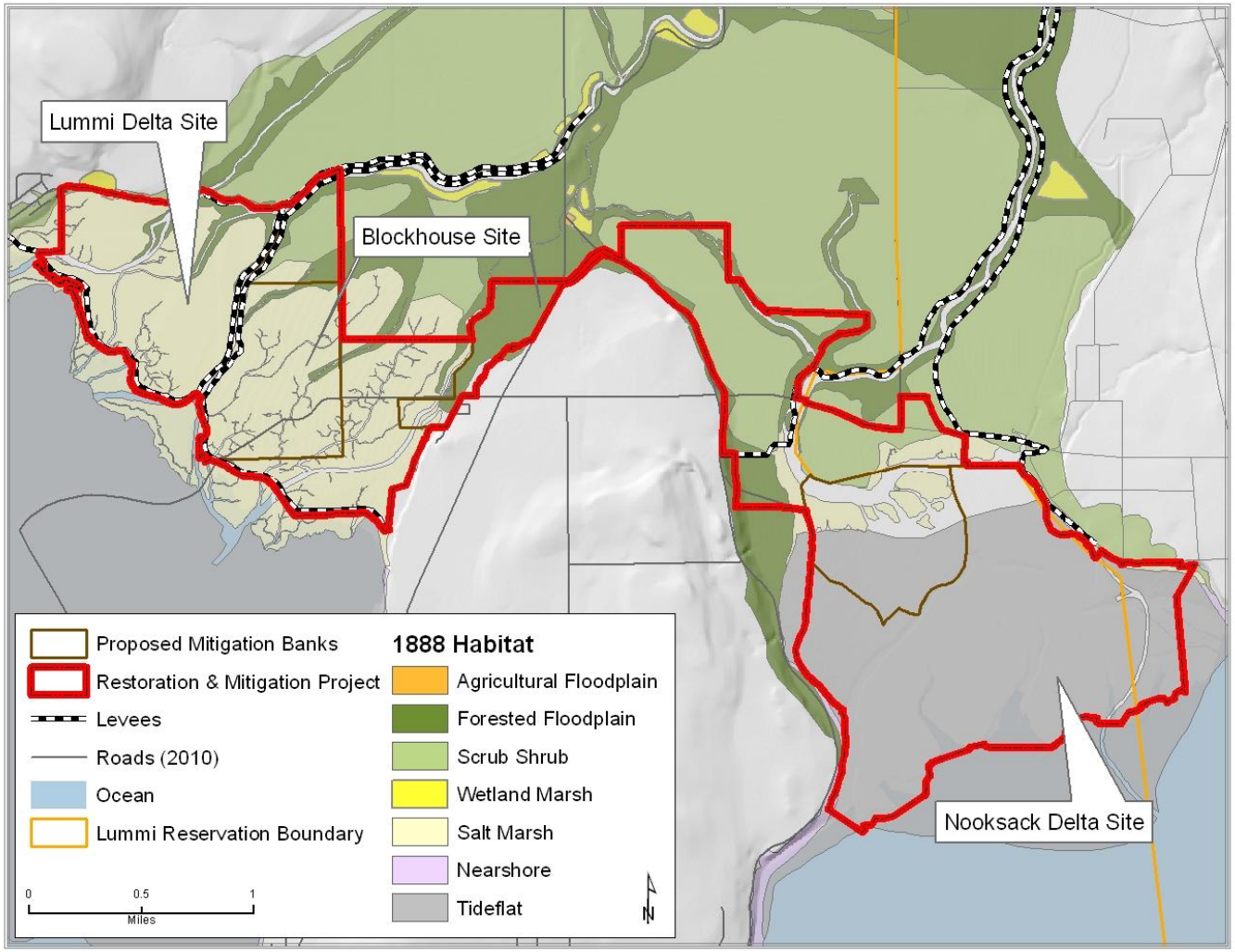


Figure A. 5. Restoration and Mitigation Bank Footprint and 1888 Land Cover

The anticipated ecological benefits of enhancing Phase 1A and Phase 1B of the Nooksack Delta Site include 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 will yield long-term and significant ecological benefits. As described below, index ratings such as habitat suitability for invertebrates, amphibians, and anadromous fish could be improved by removal of invasive species and increasing the ratio of interspersion between vegetation and open water areas. Native plant richness will be improved in the Nooksack Delta Site by underplanting with coniferous trees. When combined, these actions will result in increased habitat diversity and higher ecological function of the Nooksack River estuary in the near term. The anticipated ecological benefits of restoring the Lummi Delta Site and the Blockhouse 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.

APPENDIX A.1 (a): Phase 1A – Nooksack Delta Site

A.1.1. Business Purpose and Ecological Goals of Phase 1A

The overall purpose of the Bank is to generate credits to compensate for adverse impacts on the aquatic environment that occur as a result of permitted projects. Compensatory mitigation credits will be available for proposed projects after all practicable steps have been taken to avoid and minimize adverse impacts on the aquatic environment. The mitigation credits are intended to satisfy federal, tribal, state, or local government permit conditions or other regulatory requirements.

The primary ecological goals of the Nooksack Delta Site Phase 1A of the Bank are to enhance dynamic and self-maintaining aquatic, wetland, and associated upland buffer environments that provide breeding, feeding, rearing, and migration areas for fish and wildlife through invasive weed control and planting of native trees and shrubs. Achieving this goal takes advantage of a substantial opportunity to enhance the existing large-scale wetland system to a high level of ecological function.

A.1.2. Phase 1A Location and Legal Description

The Phase 1A Nooksack Delta Site consists of 842 acres of accreted land at the mouth of the Nooksack River where it discharges to Bellingham Bay. The Phase 1A site is located in the Nooksack River watershed (Hydrologic Unit Code 17110004), and is bound on the north by a forested parcel along Marine Drive and a portion of Phase 1B of the Bank, on the east by the town of Marietta and a second portion of Phase 1B, on the west by a distributary channel of the Nooksack River known as Kwina Slough, and on the south by Bellingham Bay (Figure A.6). The Nooksack River distributary channels flow through the site and discharge to the marine waters of Bellingham Bay. Phase 1A lies within Township 38N, Range 2E, Sections 16, 17, 18, 19, 20, and 21, W.M.

As detailed in the legal descriptions provided in the Resource Folder (Exhibit 1), the Phase 1A Nooksack Delta Site is located completely on the Lummi Indian Reservation. Prior to 2010, the most recent survey of the Lummi Indian Reservation within the delta at the mouth of the Nooksack River was completed in 1931. Extensive uplands have accredited in the Nooksack River delta since the 1931 survey. The extent of the lands held in trust by the United States for the exclusive use of the Lummi Nation on the previously unsurveyed lands within the delta at the mouth of the Nooksack River was established by the United States Bureau of Land Management (BLM) on May 3, 2010 in the form of an Amended Protraction Diagram (File 35, Unit 11). The Amended Protraction Diagram (APD), which is included in the Resource Folder (Exhibit 1), was prepared in strict conformity with Special Instructions bearing the date of February 10, 2010 and the Manual of Instructions for the Survey of the Public Lands of the United States (2009). The Bureau of Indian Affairs recorded the May 3, 2010 Amended Protraction Diagram on October 14, 2010 under BIA Document No. 107-2927. The total area encompassed by the APD is approximately 864 acres; Phase 1A of the Nooksack Delta Site is comprised of approximately 842 acres within the APD. Approximately 22 acres along the western side of the Nooksack River that are included in the APD will be developed as part of Phase 1B of the Nooksack Delta. This area was not included in Phase 1A so as to retain the right bank (looking downstream) of the Nooksack River as an easily distinguishable boundary of the Phase 1A site.

As shown in Figure A.7, the Phase 1A site is in an area zoned as Open Space. As described in the Lummi Land Use, Zoning, and Development Code (Lummi Code of Laws [LCL] Title 15), the Open Space district provides land for preservation, conservation, and restoration of environmentally and culturally sensitive areas and for low impact outdoor recreational uses (LCL 15.04.070). Permitted and accessory uses in the Open Space Zone include wildlife and natural resource management, parks and recreation facilities, culturally significant facilities, and wood products growing activities (LCL 15.04.070(a)). Conditional uses in the Open Space Zone include public facilities, educational/research facilities, and wood products harvesting (LCL 15.04.070(b)). The parcel located directly to the east of the Phase 1A site is zoned as Rural Residential by Whatcom County. As described in the Whatcom County Zoning Code (Title 20), the Whatcom County Rural Residential district (Chapter 20.32.05) provides for one single-family dwelling per lot, public parks and recreational facilities, agriculture, trails, trailheads, restrooms, and associated parking not to exceed 30 vehicles.

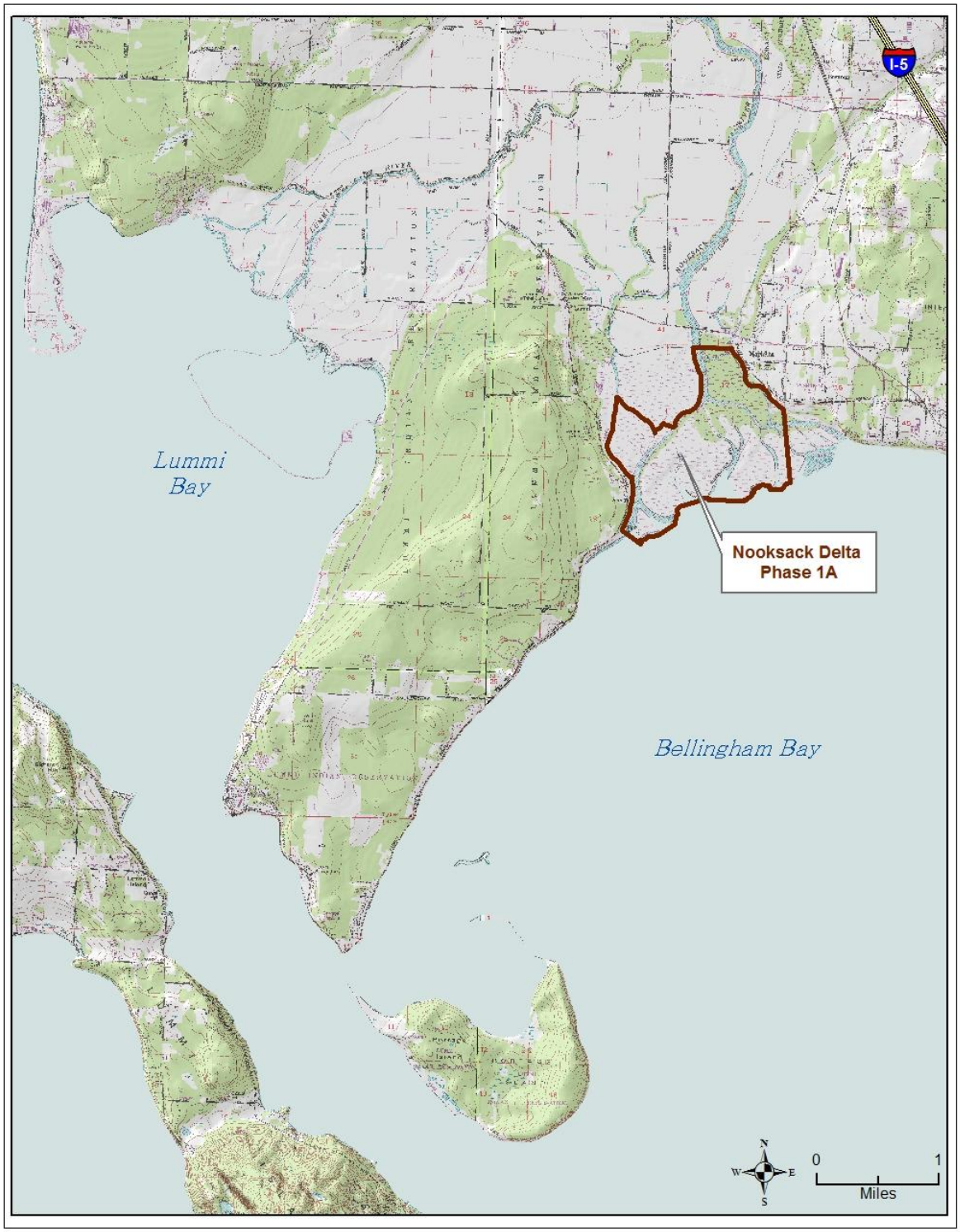


Figure A. 6. Vicinity Map – Nooksack Delta Site Phase 1A

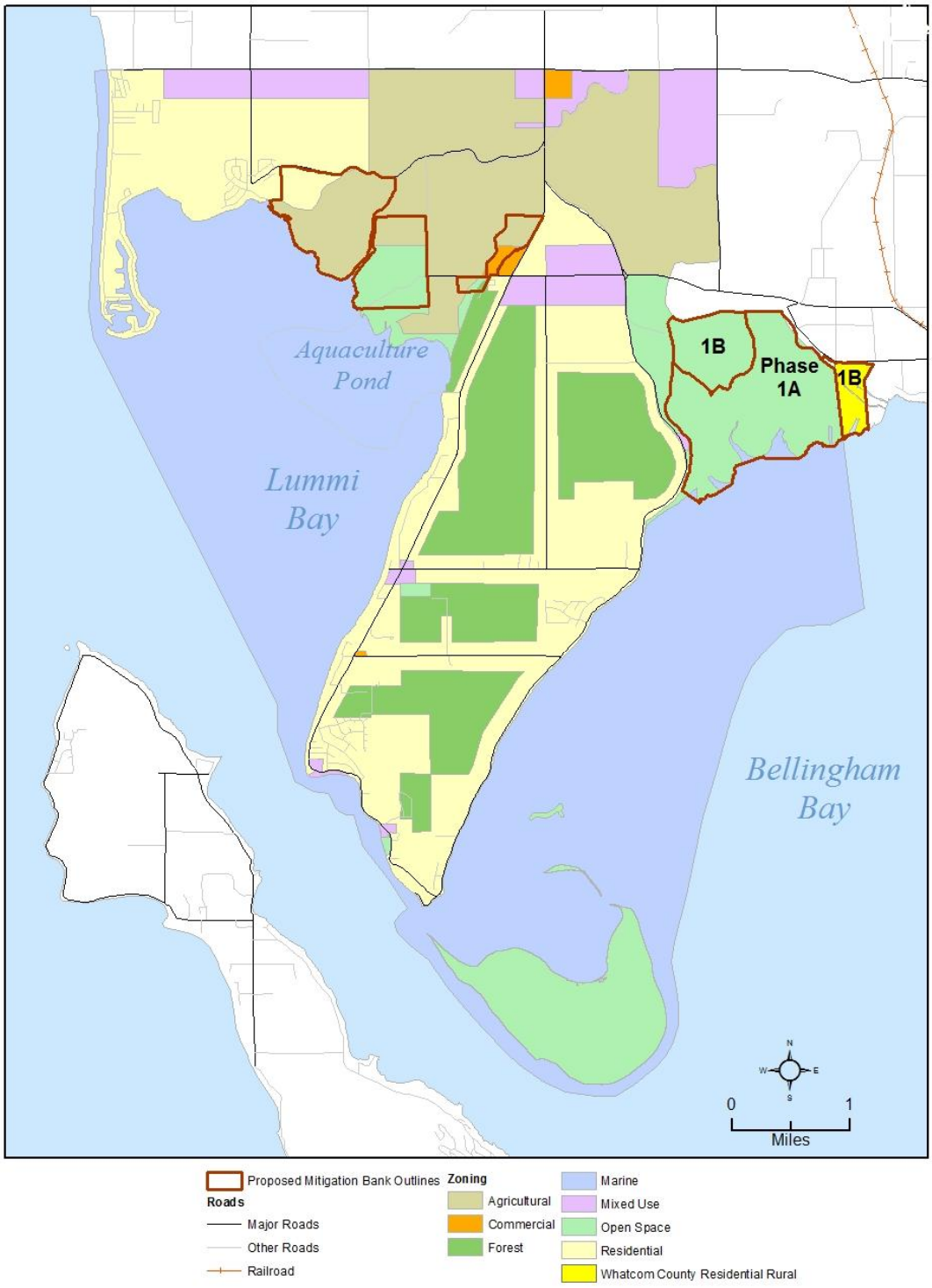


Figure A. 7. Land Use Zoning for the Phase 1A Nooksack Delta Site

All real property to be included within Phase 1A of the Bank site, as more completely described in the legal description included in the Resource Folder (Exhibit 1) to this Instrument, is held in trust status by the United States for the exclusive use of the Lummi Nation. As summarized above, the tribal property was dedicated through Lummi Indian Business Council (LIBC – the governing body of the Lummi Nation) Resolution No. 2009-094 for use in Phase 1A of the Bank in a manner consistent with this Instrument. Other than this designation and the granting of the Conservation Easement to the Northwest Indian Fisheries Commission as part of the Bank establishment, there are no liens, rights-of-way, easements, or other encumbrances associated with Phase 1A of the bank site.

The overall area of Phase 1A is 842 acres. The inclusion of the aforementioned property in the Bank and the granting of a conservation easement restricting future land uses for the benefit of the Bank shall not convey or establish any property interest on the part of any Party to this Instrument, nor convey or establish any interest in Bank credits. The Instrument does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or other claim with respect to the property, with the sole exception of the right on the part of the Corps of Engineers (Corps) to require the Sponsor to implement elements of this Instrument, including recording the conservation easement, required as a condition of a permit issued under Section 404 of the Clean Water Act for discharges of dredged and fill material into Waters of the United States and Lummi Nation Waters associated with construction, operation, and maintenance of the Bank. It is noted that no discharges of dredged and fill materials is anticipated as part of Phase 1A of the Bank.

A.1.3. Site Description and Baseline Site Conditions

A.1.3.1 Site Description:

The Phase 1A Nooksack Delta Site at the mouth of the Nooksack River slopes gradually to below sea level. The seaward boundary of the Phase 1A Nooksack Delta Site is the vegetation line as determined from high-resolution (6-inch resolution) aerial photographs taken in March 2004. Light Detection and Ranging (LiDAR) data with a vertical resolution of 15 centimeters were used to provide topographic data for the Nooksack Delta Site.

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).

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).

The Phase 1A Nooksack Delta Site is currently used primarily for commercial, ceremonial, and subsistence hunting, fishing, and gathering purposes. Because the actions planned at the Phase 1A Nooksack Delta Site include wetland enhancement activities such as removal of invasive plant species and planting native tree and shrub species, few if any 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.

As the Phase 1A site is located at the downstream extent of the Nooksack River watershed, present and potential future land uses adjacent to the Phase 1A site are expected to continue to affect the site. It is anticipated that the existing sediment load from the watershed will continue to expand the upland and tideland areas associated with the Phase 1A site and the areas of the site that currently have emergent–estuarine intertidal plant associations will transition first to emergent-freshwater plant associations, then to scrub-shrub plant associations, and then to forest. In addition, the large number of logs and other woody debris that originates in the watershed and currently flows into the delta is expected to continue along with the associated affects on channel formation and migration that currently characterizes the dynamic nature of the delta. Invasive species such as knotweed will continue to be discharged into the delta area and colonize along the river banks. The solid wastes from upstream land uses, disposal practices, and flood events will also continue to be discharged to the river delta. Land uses in the area immediately adjacent to the Phase 1A site are currently either low density residential, tribal tidelands in Bellingham

Bay, Phase 1B of the mitigation bank (currently forested), and the town of Marietta. Boat launches for the tribal fishers that harvest fish from the Nooksack River are located north of the Phase 1A site and near the western border of the site. The potential current and future impacts from the land uses immediately adjacent to the Phase 1A site are small relative to the impacts from the Nooksack River watershed and should be minimized by the 100-foot vegetative buffer that surrounds the site.

A 100-foot wide buffer comprised of wetlands, uplands, and water is located along the western, northern, and eastern boundary of the Phase 1A site. The southern boundary of the Phase 1A site is Bellingham Bay.

Wetland Delineation and Assessment

Wetlands within the entire Nooksack Delta Site (Phase 1A and Phase 1B) were delineated in 2004 based on data collected at more than 39 sample plots along five north-south transects. The results of the 2004 delineation showed that most of the area is wetland and that there are a few areas on the natural levees along some portions of the river channels that were upland. Twenty-six (26) additional data plots were established in the Nooksack Delta Site during 2010; twenty-three (23) of these additional data plots were established within the Phase 1A site to further describe wetland conditions within Phase 1A of the Nooksack Delta Site. The 2010 data plot locations were selected to provide information in areas that were not covered in 2004 and to update and confirm the description of the baseline site conditions. The methods used for recording data in 2010 follow the U.S. Army Corps of Engineers Regional Supplement to the Wetland Delineation Manual for Western Mountains, Valleys and Coastal Regions, Version 2.

Vegetation data were recorded at all of the data plot locations but wetland determinations were made at only a subset of the data plots. During August 2010, wetland determinations were made at data plots located in areas that appeared to be slightly higher in elevation (e.g., along natural river levees) or where soil appeared relatively well drained. The field forms for the 26 data plot locations visited during 2010 are included in the Resource Folder (Exhibit 2). The field forms and a location map for the 39 sample plots from 2004 are also included in the Resource Folder (Exhibit 3).

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 entire Nooksack Delta Site (Phase 1A and Phase 1B) during 2004. 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. As a result, during 2004 it was determined that assessment units A, B, and C were to be treated as separate units (Figure A.8). 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 since they 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 (see Resource Folder – Exhibit 3). Table A.1 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 the 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. 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.

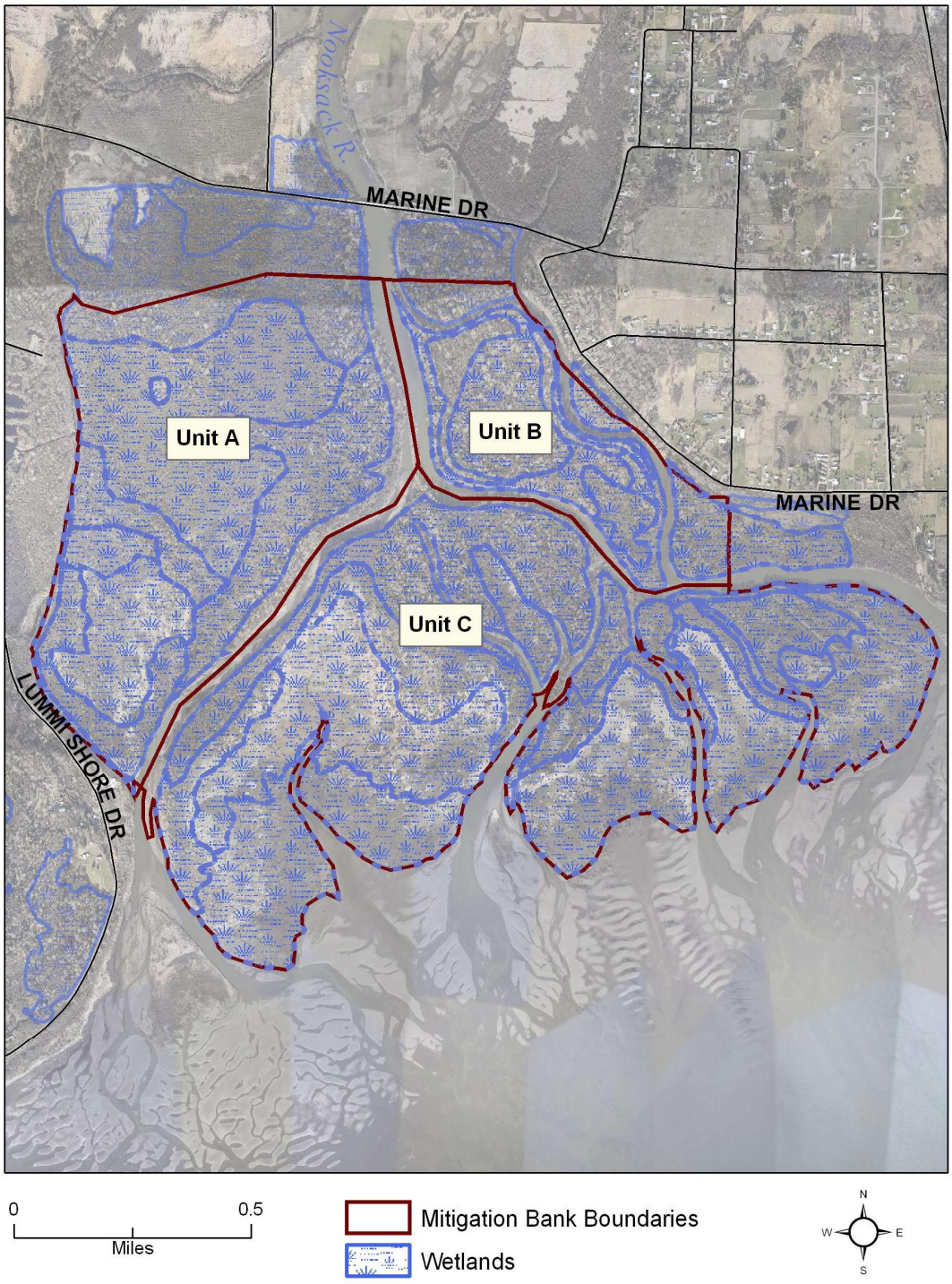


Figure A. 8. Function Assessment Units in the Nooksack Delta Site

Table A. 1. 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

Wetland classes for the Nooksack Delta Site Phase 1A area were also estimated using the field plot data and high resolution (6-inch) aerial photography. Using ArcGIS Version 8, a wetland classification map of the Nooksack Delta Site Phase 1A area was developed by superimposing wetland type over a 6-inch resolution 2004 aerial photograph (Figure A.9). Vegetation, hydrology, and soil data (wetland delineation plots) were recorded in the spring, summer, and fall of 2004 and also in August 2010. As summarized above, a function assessment of the wetlands was conducted in 2004 (Resource Folder – Exhibit 3).

Information on vegetation cover within the Nooksack Delta Site collected during the 2004 wetland delineation and during a 3-day site assessment of the Phase 1A and the eastern portion of the Phase 1B area in August 2010 was used to define plant associations. Twenty-six additional vegetation plots were established during August 2010 within what were judged based on aerial photographic interpretation to be distinctly different vegetation communities. High-resolution (6-inch resolution) aerial photographs show distinct differences in the vegetation cover, reflecting variation in plant composition and height. Vegetation plots were 10 meters in diameter. All plant species within the plots were identified and cover was estimated visually. A tabular summary table of the plant species and conditions observed at each of the 26 data plots (23 of these data plots were in the Phase 1A site) is presented in the Resource Folder (Exhibit 2). Photographs were taken at each of the data plots and representative photographs of the different plant associations are also presented in the Resource Folder (Exhibit 2). Additional information collected in areas outside of formal data plots was also used to delineate plant association boundaries.

The information collected during the 2004 delineation was also used to map wetland types based on the Cowardin classification system (Cowardin et al. 1979). The area associated with each of the identified wetland classes within the Nooksack Delta Site Phase 1A are summarized in Table A.2. The geographic locations and extent of the wetland classes is shown on Figure A.9. Data collected in 2010 confirmed the 2004 determination that most of the Nooksack Delta Site is wetland, with the exception of some natural levees along some of the river channels. The upland portions of the levees were on average 50 to 100 feet wide. Additional upland areas on the natural levees were identified in 2010 and were added to the wetland map shown in Figure A.9.

Table A. 2. Cowardin Wetland Classification Areas – Nooksack Delta Site Phase 1A

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Palustrine Forested	211	25
Palustrine Scrub-shrub	98	12
Palustrine Emergent	150	18
Estuarine Intertidal Emergent	179	21
Riverine and River Channel	140	17
Uplands (Forest)	13	1
Buffer (wetland, upland, water)	51	6
Total	**842**	**100**

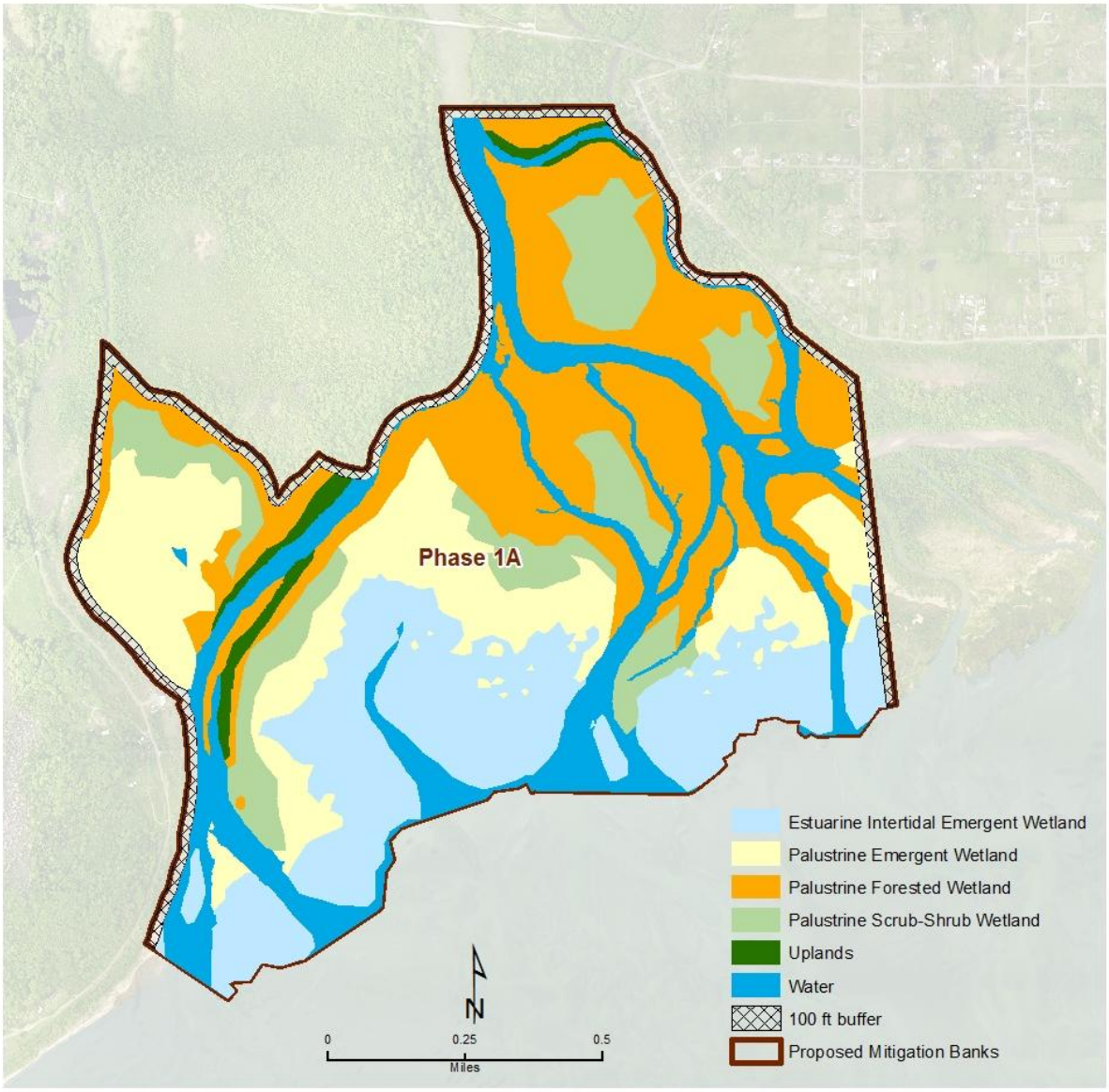


Figure A. 9. Wetlands Classes on the Nooksack Delta Site Phase 1A

A.1.3.2 Baseline Site Conditions:

The baseline site conditions for the Nooksack Delta Site Phase 1A area are detailed in the Resource Folder (see Exhibit 2 and Exhibit 3) and summarized below.

As described above, assessments of existing vegetation were conducted in 2004 (entire Nooksack Delta Site) and 2010 (Phase 1A and the eastern portion of Phase 1B of the Nooksack Delta Site). Species and cover information were collected at 39 sample plots during 2004 and at an additional 26 sample plots (23 of the sample plots within the Phase 1A site) during 2010. The information collected during these surveys was used to identify 19 plant associations based

primarily on species composition in the uppermost layer and age class. Plant associations include seven forest types, three shrub types, and nine emergent types (Table A.3). Figure A.10 shows a map of the plant associations and the location of the data plots established within the Phase 1A site during 2010. A larger scale map of the plant associations is included in the Resource Folder (Exhibit 12). As noted above, vegetation data collected at each data plot are summarized in tabular form in the Resource Folder (Exhibit 2); the locations of the 2004 data plots are also mapped and included in the Resource Folder (Exhibit 3).

Palustrine Forested Wetlands

The seven forested plant associations listed in Table A.3 cover approximately 224 acres of the site. Only a few conifers were observed and are limited to the far north and eastern ends of the site. The presence of only a few conifers in the palustrine forested (PFO) wetland area indicates that colonization by conifers is still in the early stages. Much of the area in the vicinity of the Nooksack Delta Site consists of open agricultural fields and residential development. It is likely that either seed sources are too distant to promote widespread conifer establishment or that conditions for seed germination or establishment are not sufficient. Because most of the wetland area is flooded by the river during a portion of the year, conifer seedlings may establish at a very slow rate. The depth and duration of flooding is related to the ground elevation. Conifers planted beneath the existing deciduous tree canopy at elevations similar to those where existing conifer trees are located are expected to survive and advance the development of a coniferous forest. Underplanting conifers will increase species diversity and habitat complexity of the existing deciduous forest. Conifers are generally longer-lived trees and decompose more slowly than black cottonwood and red alder, therefore a larger component of coniferous forest in the wetland would provide habitat features that are currently lacking. Non-native knotweed (*Polygonum cuspidatum*), reed canarygrass (*Phalaris arundinaceae*), Himalayan blackberry (*Rubus armeniacus*), Canada thistle (*Cirsium arvense*), giant hogweed (*Heracleum mantegazzianum*), policeman's helmut (*Impatiens glandulifera*), butterfly bush (*Buddleja davadii*), and English ivy (*Hedera helix*) were observed in the palustrine forested wetlands of the Nooksack Delta Site. The lands that comprise the Nooksack Delta Site have been deposited over the last 100 years on what historically were tidelands. Although plans were developed to harvest timber from this area as recently as 2004, due to the planned establishment of the mitigation bank, no commercial timber harvests have occurred on these lands.

Scrub-Shrub Wetlands

As shown in Table A.3, approximately 99 acres of the site is classified as palustrine scrub-shrub (PSS) wetland. The general locations of PSS wetlands are shown on Figure A.9. The PSS consists primarily of a dense layer of willow, salmonberry, Douglas spiraea (*Spiraea douglasii*), and twinberry (*Lonicera involucrata*). More than 30 native shrub and herbaceous plant species were observed in the Nooksack Delta PSS and PFO wetlands. Non-native yellow iris (*Iris pseudocorus*) and reed canarygrass are locally common in portions of the PSS where they have over 30 percent cover. Knotweed (*Polygonum* sp.) was observed in widely scattered patches in the PSS wetland.

Table A. 3. Wetland Plant Associations – Nooksack Delta Site Phase 1A

Wetland Plant Association	Approximate Area (acres)
Deciduous Forest	
black cottonwood / red alder	113.0
red alder / Pacific willow	90.8
Pacific willow	5.8
red alder	7.0
black cottonwood / red alder / conifers	5.0
red alder / Pacific willow / conifers	0.0
black cottonwood / red alder/ English ivy	2.1
Scrub-Shrub	
willow scrub – shrub	44.4
willow / red alder / reed canary grass	54.0
willows / spirea / slough sedge	0.0
Emergent – Freshwater	
reed canarygrass	73.7
cattail and driftwood logs	36.8
dead willows / reed canary grass	26.6
cattails	12.2
new wetlands: cattail and willow seedlings	0.8
bulrush	0
Emergent – Estuarine Intertidal	
Lyngbye's sedge / Baltic rush	104.0
tufted hairgrass / Pacific silverweed / Lyngbye's sedge	74.1
Other Habitat Types	
open water	140.1
buffer (primarily forest and open water)	50.9
knotweed	0.9

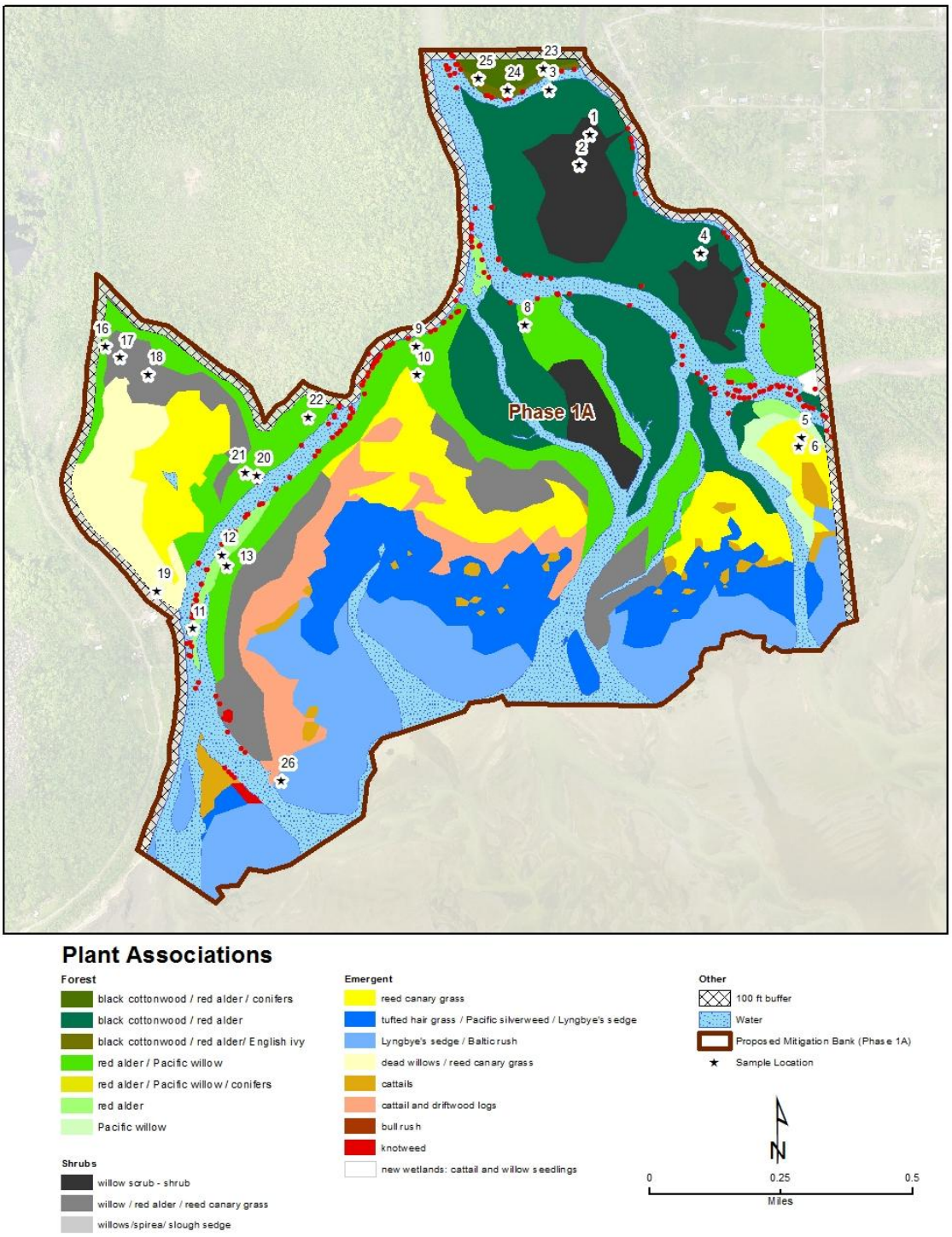


Figure A. 10. Plant Associations Map – Nooksack Delta Site Phase 1A

Emergent Wetlands

Most of the 150 acres of palustrine emergent freshwater wetland (PEM) areas in Phase 1A of the Nooksack Delta Site are dominated by invasive weed species. The area shown as reed canarygrass on Figure A.10 has between 90 and 100 percent cover of reed canarygrass. In some areas the invasive weed yellow iris is intermixed with the reed canarygrass. Small pockets of shrubs (primarily Pacific and Hooker's willow) occur in some areas with reed canarygrass (labeled willow/red alder/reed canarygrass on Figure A.10). Many of these shrubs are elevated above the grass layer because they established on large drift logs, some are re-sprouting from dead branches.

Estuarine Intertidal Wetlands

The area south of the freshwater PEM area dominated by reed canarygrass is a 178-acre estuarine intertidal emergent wetland. The vegetation consists of primarily native emergent species, with Lyngbye's sedge (*Carex lyngbyei*) being the species providing most of the cover. Other plant species that are common at higher elevations within the intertidal area include: tufted hairgrass (*Deschampsia cespitosa*), marsh cinquefoil (*Comarum palustre*), seaside arrowgrass (*Triglochin maritima*), and common cattail (*Typha latifolia*). Other native plants more infrequently seen include: Baltic rush (*Juncus arcticus*) and soft-stem bulrush (*Schoenoplectus tabernaemontani*). Only a few non-native plant species were observed in the intertidal area, and none of them provided dominant cover. Non-native plants observed include sweetclover (*Melilotus officinalis*), bird's-foot trefoil (*Lotus corniculatus*), and clover (*Trifolium* sp.).

Open Water

Open water habitat on the Nooksack Delta Site Phase 1A area is primarily river and tidal channels. Numerous log jams and dense overhanging trees and shrubs along the river channels and dense sedges along the tidal channels provide excellent cover and food sources for fish. One small open water area located within the reed canarygrass field on the west end of the site was mapped using aerial photographic interpretation. The total area of open water in the Phase 1A area was approximately 140 acres.

Buffers

As shown in Figure A.10, there is a 100 foot buffer along the perimeter of the Nooksack Delta Site Phase 1A area except for the boundary with Bellingham Bay. The buffer areas, which comprise approximately 51 acres within the site, are primarily forested and open water areas.

Invasive Plant Species

Invasive vegetation along the banks of the east and west channels of the Nooksack River was mapped in September 2004 and again in September 2009 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 (2004, 2009, and 2010) and by using high resolution aerial photography (6-inch resolution). Knotweed (*Polygonum cuspidatum*), reed canarygrass (*Phalaris arundinaceae*), yellow iris (*Iris pseudocorus)*, and English ivy (*Hedera helix*) were commonly observed in the Phase 1A area of the Nooksack Delta Site. Knotweed is very similar in growth form to two other commonly found invasive knotweeds: Bohemian

knotweed (*Polygonum x bohemicum*) and giant knotweed (*P. sachalinense*). There is a good chance that other species of knotweed may be on the site, therefore all of these species will be treated and they will be collectively referred to as knotweed in this document.

Figure A.10 shows the locations of the primary invasive plant species observed on the Nooksack Delta Site: reed canarygrass and knotweed. Knotweed occurrences are mainly along the riverbanks in small clumps with diameters typically less than 10 feet. Two larger stands of knotweed (<1/2 acre each) occur on the southwest corner of the site. Based on the September 21, 2009 survey of the Phase 1A Nooksack Delta Site where 168 knotweed patches were mapped using GPS equipment (see memorandum dated September 25, 2009 in the Resource Folder [Exhibit 12]), and an estimated average patch size of 50 square feet, plus the addition of two larger patches near the southern/downstream extent of the site that totaled to approximately 0.67 acres, knotweed is estimated to currently occupy approximately 0.9 acre of the Nooksack Delta Site Phase 1A area. Reed canarygrass is the dominant plant in the areas shown on Figure A.10 where it has from 90 percent to 100 percent cover. Within the reed canarygrass fields is a large amount of coarse woody debris (CWD), which are primarily logs deposited during flood events. Reed canarygrass does occur in other areas not shown on Figure A.10, but in those areas (mainly forested) the grass is scattered and does not provide dominant cover. Yellow flag iris occurs within some of the reed canarygrass fields.

APPENDIX A.1(b): Phase 1B – Nooksack Delta Site

The details for additional phases of the bank (including Phase 1B) will be developed in consultation with the IRT and included in the MBI as amendments to the document. This section provides a brief overview of this future phase to provide context for the entire mitigation bank as described in the October 2008 mitigation bank prospectus that was the subject of a public notice and comment period from December 15, 2008 through January 14, 2009 (Reference No. NWS-2008-1519-SO).

A.1.4. Business Purpose and Ecological Goals of Phase 1B

The overall purpose of the Bank is to generate credits to compensate for adverse impacts on the aquatic environment that occur as a result of permitted projects. Compensatory mitigation credits will be available for proposed projects after all practicable steps have been taken to avoid and minimize adverse impacts on the aquatic environment. The mitigation credits are intended to satisfy permit conditions or other regulatory requirements.

The primary ecological goals of the Nooksack Delta Site Phase 1B of the Bank are to enhance through invasive weed control and planting of native trees and shrubs dynamic and self-maintaining aquatic, wetland, and associated upland buffer environments that provide breeding, feeding, rearing, and migration areas for fish and wildlife. Achieving this goal takes advantage of a substantial opportunity to enhance the existing large-scale wetland system to a high level of ecological function.

A.1.5. Phase 1B Location and Legal Description

The Phase 1B Nooksack Delta Site is located near the seaward extent of the Nooksack River (WRIA 1), and is comprised of two parcels. Parcel 1 is located completely on the Lummi Indian Reservation and is bound on the north by a forested parcel along Marine Drive, on the east by the main channel of the Nooksack River, on the west by Kwina Slough, and on the south by Phase 1A of the Nooksack Delta Site (Figure A.11). Parcel 2 is located on Lummi Nation lands immediately adjacent to the eastern Reservation boundary. The Nooksack River distributary channels flow through the site and discharge to the marine waters of Bellingham Bay. Phase 1B lies within Township 38N, Range 2E, Sections 16, 17 18, and 21 W.M..

All real property to be included within Phase 1B of the Bank site is currently held, or the Lummi Nation is in the process of converting the property to be held, in trust status by the United States for the exclusive use of the Lummi Nation or its members and has been dedicated for acquisition of wetland mitigation banking purposes through Lummi Indian Business Council (LIBC – the governing body of the Lummi Nation) Resolution No. 2009-094 for use in Phase 1B of the Bank in a manner consistent with this Instrument. A formal legal description of the Nooksack Delta Site Phase 1B will be developed when this phase of the Bank is implemented and included in the Resource Folder as Exhibit 4.

Phase 1B encompasses approximately 337 acres. The inclusion of the aforementioned property in the Bank and the granting of a conservation easement restricting future land uses for the benefit of the Bank shall not convey or establish any property interest on the part of any Party to this Instrument, nor convey or establish any interest in Bank credits. The Instrument does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or

other claim with respect to the property, with the sole exception of the right on the part of the Corps to require the Sponsor to implement elements of this Instrument, including recording the conservation easement, required as a condition of a permit issued under Section 404 of the Clean Water Act for discharges of dredged and fill material into Waters of the United States and Lummi Nation Waters associated with construction, operation, and maintenance of the Bank.

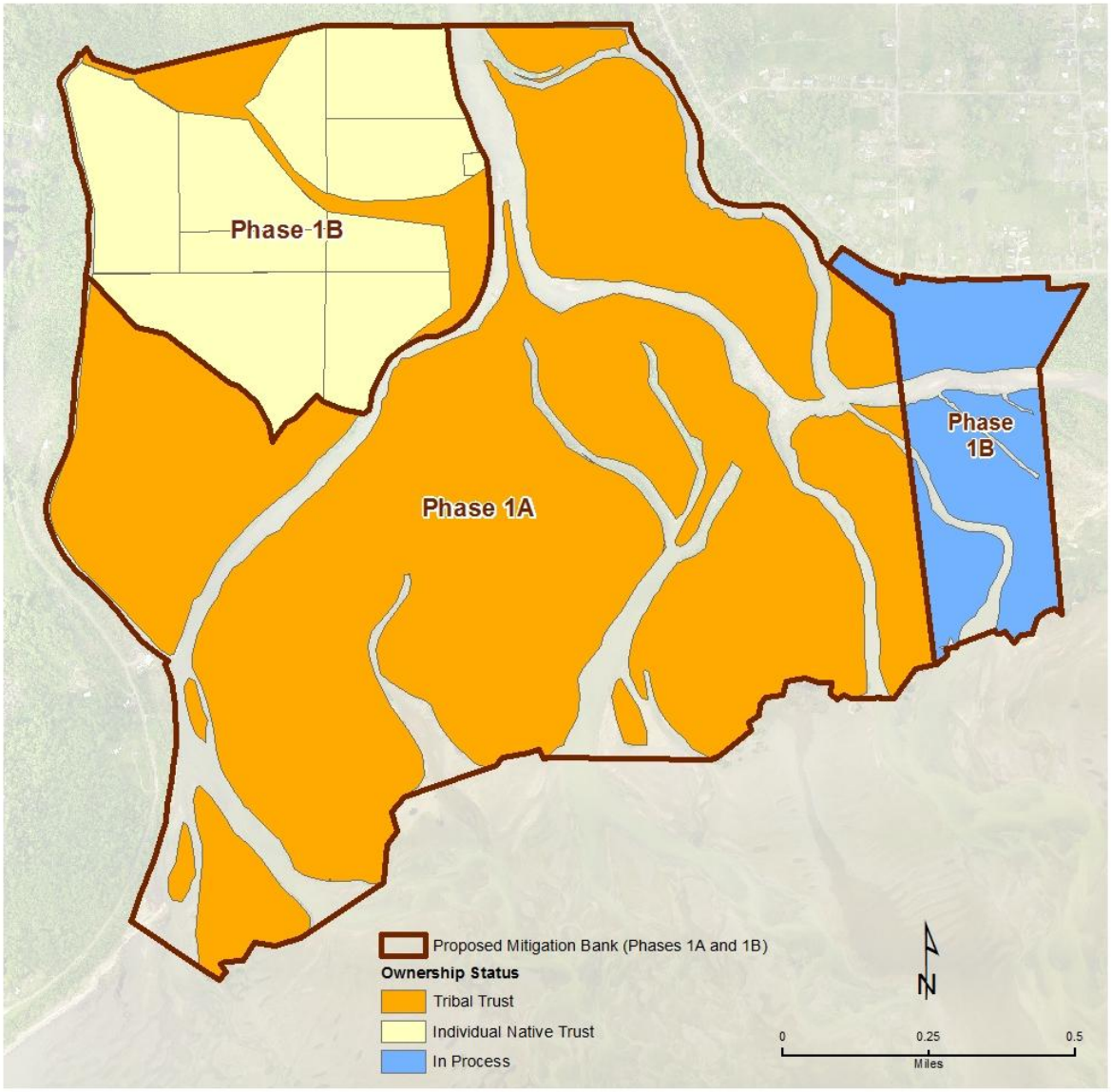


Figure A. 11. Nooksack Delta Site (Phase 1A and Phase 1B)

A.1.6. Site Description and Baseline Site Conditions

A.1.6.1 Site Description

The existing conditions in area Phase 1B of the Nooksack Delta Site are similar to those in Phase 1A. The sizes of specific wetland classes according to Cowardin classification (Cowardin et al. 1979) are shown in Table A.4. Vegetation, hydrology, and soil data (wetland delineation plots) were recorded in the spring, summer, and fall of 2004 (Resource Folder – Exhibit 3). As summarized above in Figure A.8 and Table A.1, a function assessment of the wetlands within the Phase 1B site was conducted in 2004 (Resource Folder – Exhibit 3).

Table A. 4. Cowardin Wetland Classification and Associated Area in Phase 1B of the Nooksack Delta Site

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Palustrine Forested	224	66
Palustrine Scrub-shrub	47	14
Palustrine emergent	18	5
Estuarine intertidal emergent	14	4
Riverine and River Channel	9	3
Uplands	12	4
Buffer (wetland, upland, water)	13	4
Total	337	100

A.1.6.2 Baseline Site Conditions

A detailed baseline conditions report for Phase 1B will be developed prior to implementation of this phase of the bank. This baseline conditions report will be similar to what was developed for Phase 1A of the Bank (see Resource Folder – Exhibit 2) and will be included in the Resource Folder as Exhibit 5.

APPENDIX A.2: Phase 2 – Blockhouse Site

The details for additional phases of the bank (including Phase 2) will be developed in consultation with the IRT and included in the MBI as amendments to the document. This section provides a brief overview of this future phase to provide context for the entire mitigation bank as described in the October 2008 mitigation bank prospectus that was the subject of a public notice and comment period from December 15, 2008 through January 14, 2009 (Reference No. NWS-2008-1519-SO).

A.2.1. Business Purpose and Ecological Goals of Phase 2

The overall purpose of the Bank is to generate credits to compensate for adverse impacts on the aquatic environment that occur as a result of permitted projects. Compensatory mitigation credits will be available for proposed projects after all practicable steps have been taken to avoid and minimize adverse impacts on the aquatic environment. The mitigation credits are intended to satisfy permit conditions or other regulatory requirements.

The primary ecological goals of Phase 2 (Blockhouse Site) of the Bank are to restore and enhance 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.

A.2.2. Phase 2 Location and Legal Description

The Blockhouse Site of the Bank is divided into two areas (Area A and Area B), which are located in the Lummi River delta. Area A of the Blockhouse Site is bound on the west by the Lummi River, the south by Lummi Bay and the Lummi Casino Project wetland mitigation site, and on east and north by properties targeted through LIBC Resolution No. 2009-094 for acquisition for salmon restoration project purposes. Area B of the Blockhouse Site is bound on the north and west by agricultural lands, the south by properties targeted through LIBC Resolution No. 2009-094 for acquisition for salmon restoration project purposes, and the east by Haxton Way. The Blockhouse Site (Area A and Area B) are within Township 38N, Range 1E, Sections 10, 11, and 12, W.M.

All real property to be included within Phase 2 of the Bank site is held in trust status by the United States for the exclusive use of the Lummi Nation or its members (see Figure A.12) and is either already under the direction of the Lummi Nation or has been dedicated for acquisition of wetland mitigation banking purposes through Lummi Indian Business Council (LIBC – the governing body of the Lummi Nation) Resolution No. 2009-094 for use in Phase 2 of the Bank in a manner consistent with this Instrument. A formal legal description of the Blockhouse Site will be developed when this phase of the Bank is implemented and included in the Resource Folder as Exhibit 6.

Phase 2 encompasses approximately 354 acres. The inclusion of the aforementioned property in the Bank and the granting of a conservation easement restricting future land uses for the benefit of the Bank shall not convey or establish any property interest on the part of any Party to this Instrument, nor convey or establish any interest in Bank credits. The Instrument does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or other claim with respect to the property, with the sole exception of the right on the part of the

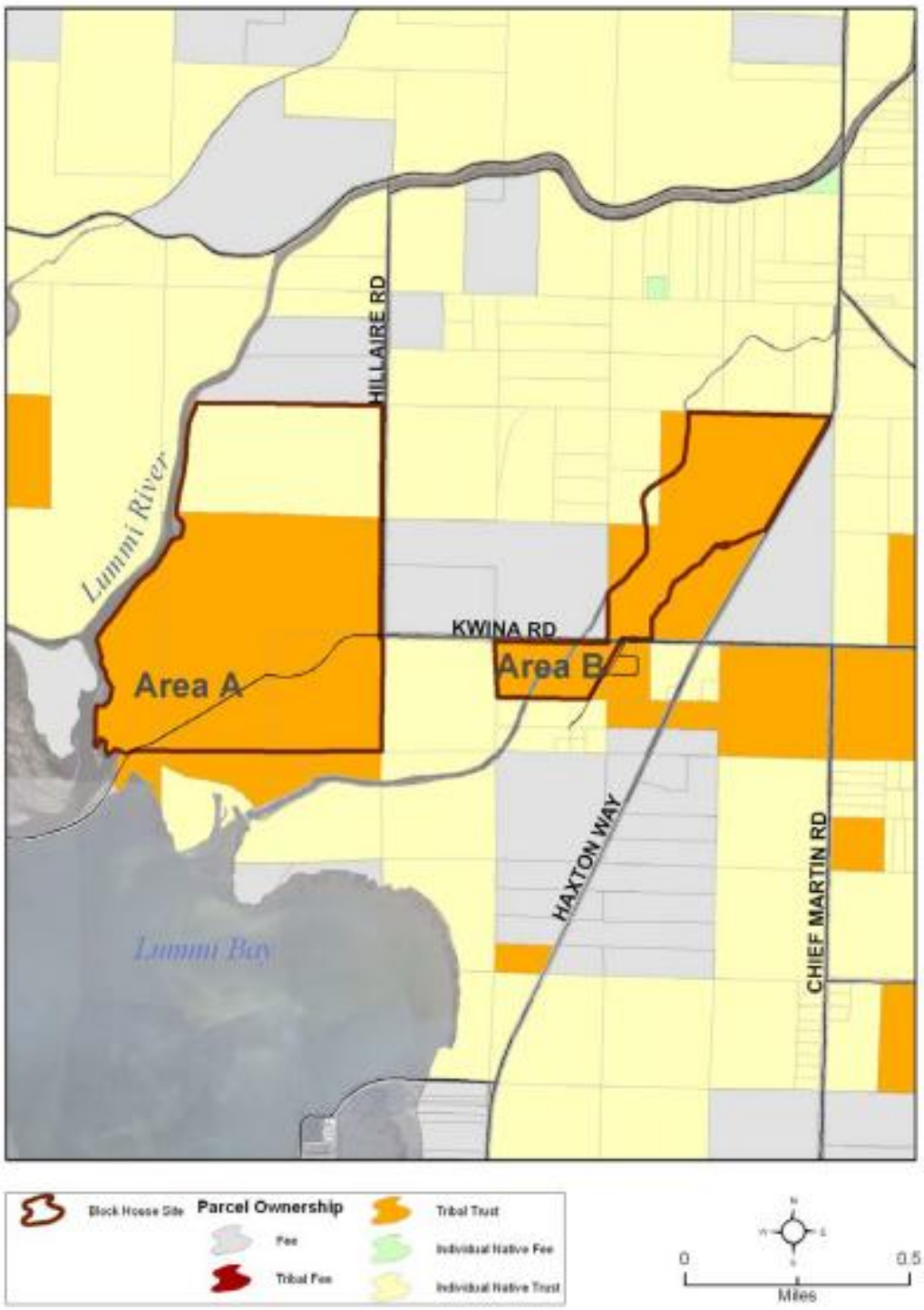


Figure A. 12. Blockhouse Site (Phase 2)

Corps to require the Sponsor to implement elements of this Instrument, including recording the conservation easement, required as a condition of a permit issued under Sections 404 of the Clean Water Act for discharges of dredged and fill material into Waters of the United States and Lummi Nation Waters associated with construction, operation, and maintenance of the Bank.

A.2.3. Site Description and Baseline Site Conditions

A.2.3.1 Site Description:

The Blockhouse Site near the Lummi River slopes gradually from approximately 10 feet above mean sea level to below sea level. Topographic data with a vertical resolution of 15 centimeters (LiDAR images) are available for the Blockhouse Site, but detailed topographic/land surveys have not been conducted. 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).

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).

Wetland Delineation and Assessment

The boundaries of delineated wetlands at the Blockhouse Site are shown on Figure A.13. Six wetlands in the area east of the Lummi River (Area A) were characterized and delineated in 2007 (LWRD 2007). Table A.5 lists the area of wetland and upland on both areas of the Blockhouse Sites. Vegetation, hydrology, and soil data (wetland delineation plots) were recorded in the spring, summer, and fall of 2004 and provided to the IRT under separate cover during January 2010. The data sheets will be included in the Resource Folder as Exhibit 7 when this phase of the Bank is implemented.

Table A. 5. Cowardin Wetland Classification and Associated Area in the Blockhouse Site – Phase 2

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

A function assessment of the Blockhouse Site wetlands was conducted in 2004 and 2008. 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 A.6.

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 A.13 and A.14). 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 A.14). 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.

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.

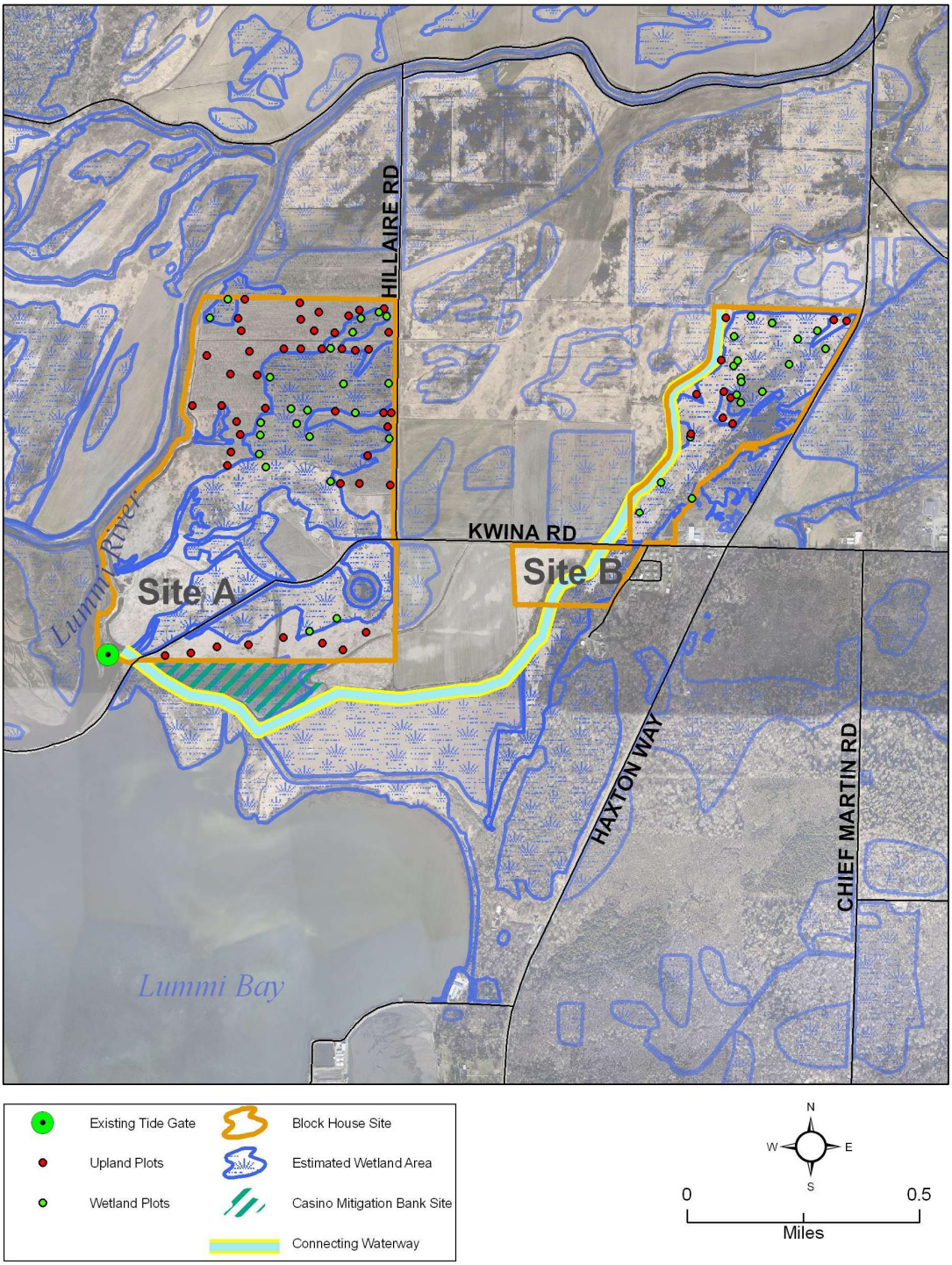


Figure A. 13. Wetlands and Plot Locations on the Blockhouse Site

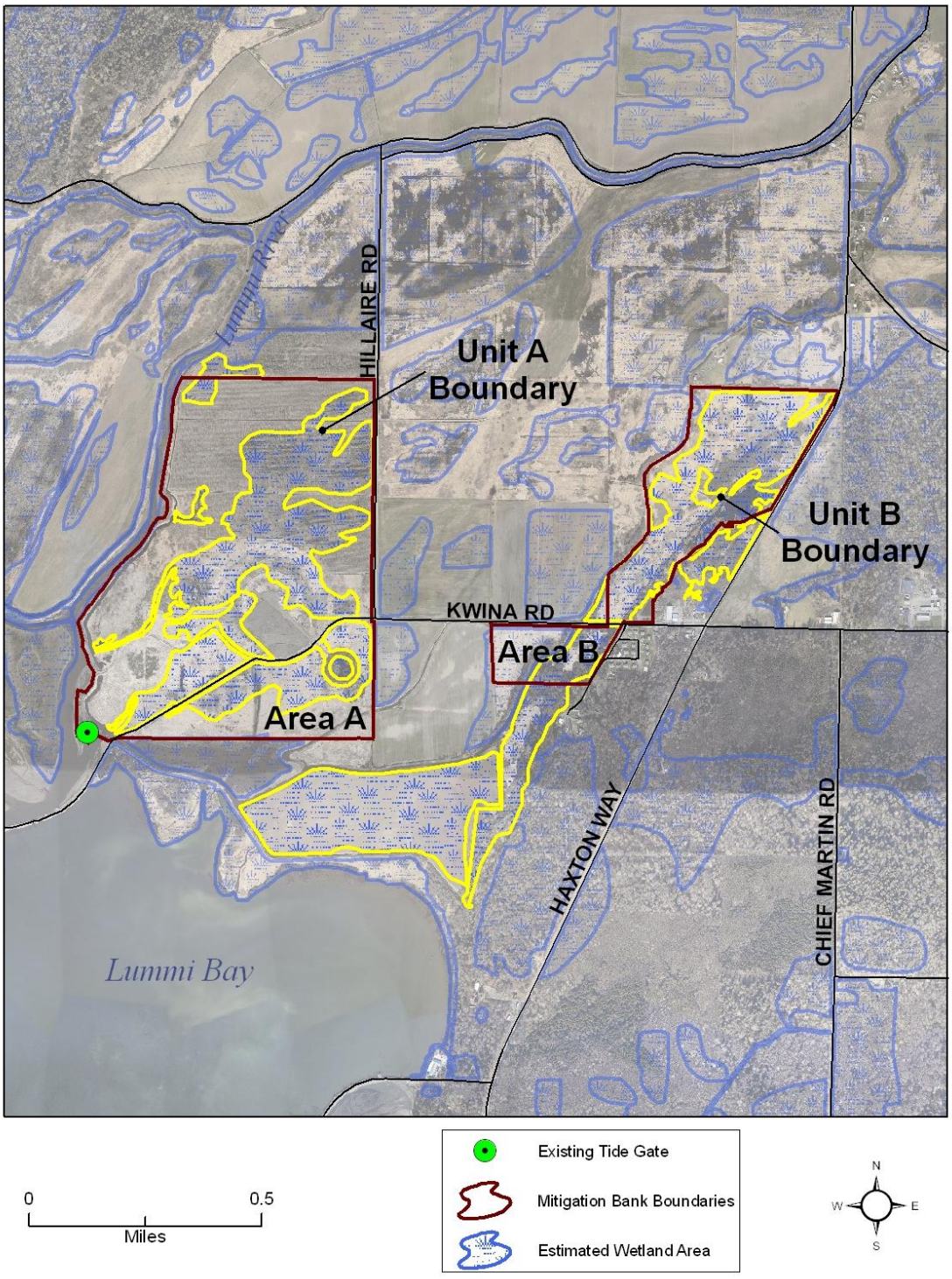


Figure A. 14. *Function Assessment Units in the Blockhouse Site*

Table A. 6. 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 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 area of emergent vegetation in Unit A was responsible for the high rating for primary production and export.

A.2.3.2 Baseline Site Conditions

Area A of the Blockhouse Site is primarily fallow agricultural land that is separated from Lummi Bay and the Lummi River by levees. 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. Several culverts with tide gates allow freshwater outflow from the site and prevent tidal inundation. Vegetation consists of primarily pasture grasses and small areas of shrubs and small trees. The abandoned sewage lagoon for the former Naval Security Group Marietta Radio Direction Finding Facility (RDFF) is located within Area A. The lagoon functioned as a municipal wastewater treatment and disposal facility serving the RDFF building, Navy barracks, and office administration buildings from 1953 through 1971. The lagoon is an engineered surface water impoundment structure that was constructed to retain sewage. The lagoon is approximately 240 feet in diameter and five feet deep below grade. It is surrounded by a 5 to 7 foot high vegetated berm. Following site investigations conducted over the 1997 through 2008 period including using the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, contaminated sediments from the lagoon were excavated and transported off-site during 2010. The September 7, 2010 Final Remedial Action Completion Report documented that the remedial action was completed and that the final action for the site allows for future unrestricted land use.

Area B of the Blockhouse Site has a variety of vegetation communities, including fallow agricultural land, scrub-shrub wetlands, and small areas of forested wetlands. A detailed baseline conditions report for Phase 2 will be developed prior to implementation of this phase of the bank. This baseline conditions report will be similar to what was developed for Phase 1A of the Bank (see Resource Folder – Exhibit 2) and will be included in the Resource Folder as Exhibit 8 as this phase is implemented.

APPENDIX A.3: Phase 3 – Lummi Delta Site

The details for additional phases of the bank (including Phase 3) will be developed in consultation with the IRT and included in the MBI as amendments to the document. This section provides a brief overview of this future phase to provide context for the entire mitigation bank as described in the October 2008 mitigation bank prospectus that was the subject of a public notice and comment period from December 15, 2008 through January 14, 2009 (Reference No. NWS-2008-1519-SO).

A.3.1. Business Purpose and Ecological Goals of Phase 3

The overall purpose of the Bank is to generate credits to compensate for adverse impacts on the aquatic environment that occur as a result of permitted projects. Compensatory mitigation credits will be available for proposed projects after all practicable steps have been taken to avoid and minimize adverse impacts on the aquatic environment. The mitigation credits are intended to satisfy permit conditions or other regulatory requirements.

The primary ecological goals of Phase 3 (Lummi Delta) of the Bank are to restore and enhance 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.

A.3.2. Phase 3 Location and Legal Description

The Lummi Delta Site is located in the Lummi River Delta. The Lummi Delta Site is bound on the north by the a forested bluff that separates the site from North Red River Road and the Sandy Point Improvement Company golf course, on the west and south by Lummi Bay, and on the east by the Lummi River. The Lummi Delta Site is within Township 38N, Range 1E, Sections 2, 3, 10, and 11 W.M.

All real property to be included within Phase 3 of the Bank site is held in trust status by the United States for the exclusive use of the Lummi Nation or its members (see Figure A.15) and is either already under the direction of the Lummi Nation or has been dedicated for acquisition of wetland mitigation banking purposes through Lummi Indian Business Council (LIBC – the governing body of the Lummi Nation) Resolution No. 2009-094 for use in Phase 3 of the Bank in a manner consistent with this Instrument. A formal legal description of the Lummi Delta Site will be developed when this phase of the Bank is implemented and included in the Resource Folder as Exhibit 9.

Phase 3 encompasses approximately 412 acres. The inclusion of the aforementioned property in the Bank and the granting of a conservation easement restricting future land uses for the benefit of the Bank shall not convey or establish any property interest on the part of any Party to this Instrument, nor convey or establish any interest in Bank credits. The Instrument does not authorize, nor shall it be construed to permit, the establishment of any lien, encumbrance, or other claim with respect to the property, with the sole

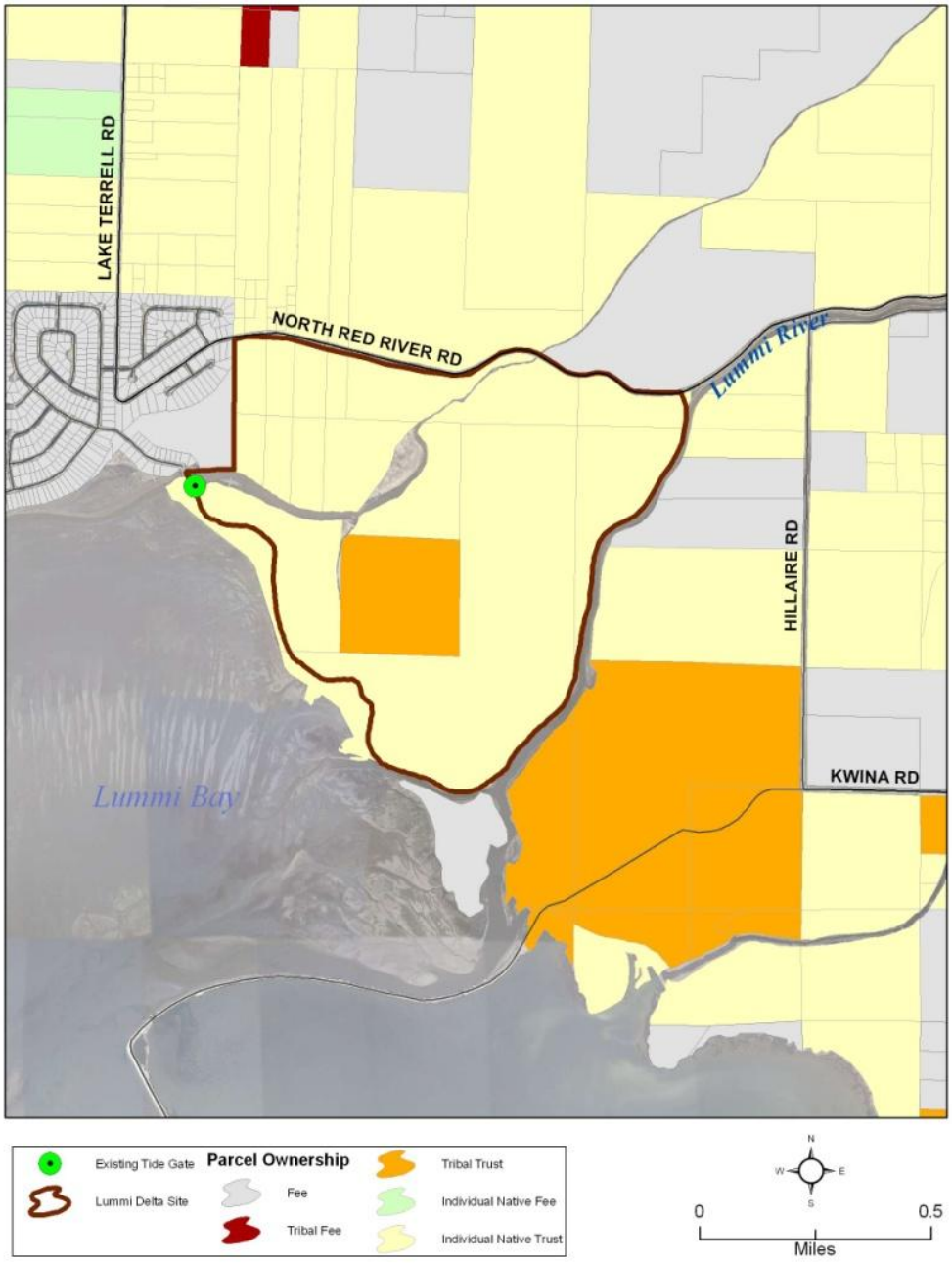


Figure A. 15. Lummi Delta Site (Phase 3)

exception of the right on the part of the Corps to require the Sponsor to implement elements of this Instrument, including recording the conservation easement, required as a condition of a permit issued under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 for discharges of dredged and fill material into Waters of the United States and Lummi Nation Waters associated with construction, operation, and maintenance of the Bank.

A.3.3. Site Description and Baseline Site Conditions

A.3.3.1 Site Description

The Lummi Delta Site near the Lummi River slopes gradually from approximately 10 feet above mean sea level 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). 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).

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).

Wetland Delineation and Assessment

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 A.16). Approximately 123 acres of wetlands are classified as palustrine according to the Cowardin classification system (Cowardin et al., 1979). Approximately 42 acres are classified as estuarine intertidal emergent wetlands. 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 A.7 lists the areas represented by the different Cowardin classification types in the Lummi Delta Site.

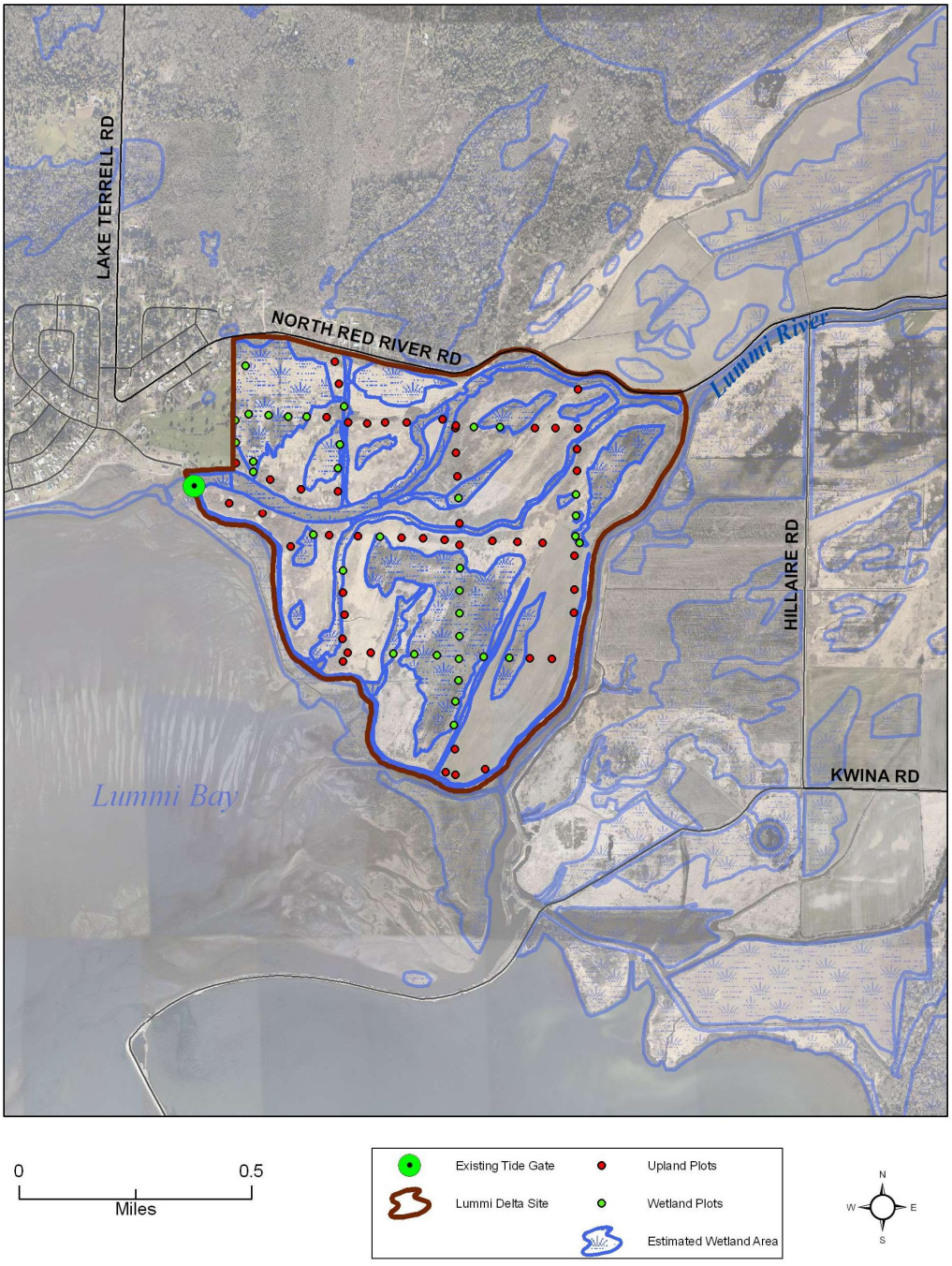


Figure A. 16. Existing Wetlands and Plot Locations on the Lummi Delta Site-Phase 3

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

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Palustrine forested	8	2
Palustrine Scrub-shrub	4	1
Palustrine emergent	111	27
Estuarine intertidal emergent	42	10
Uplands (drained wetlands)	247	60
Total	412	100

A function assessment of the wetlands was conducted in 2003 and previously provided to the IRT under separate cover. The data sheets and function assessment worksheets will be included in the Resource Folder as Exhibit 10 when this phase of the Bank is implemented. 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 A.17. Although large portions of Units A and B do not currently meet wetland hydrology criteria, Units A and B were treated as a wetland mosaic since the areas within the assessment units that currently do not meet wetland hydrology were previously drained and are interspersed with the wetland areas.

Field data were collected during the spring and summer of 2003 and used to run the WAFAM rating model. Table A.8 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 was 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.

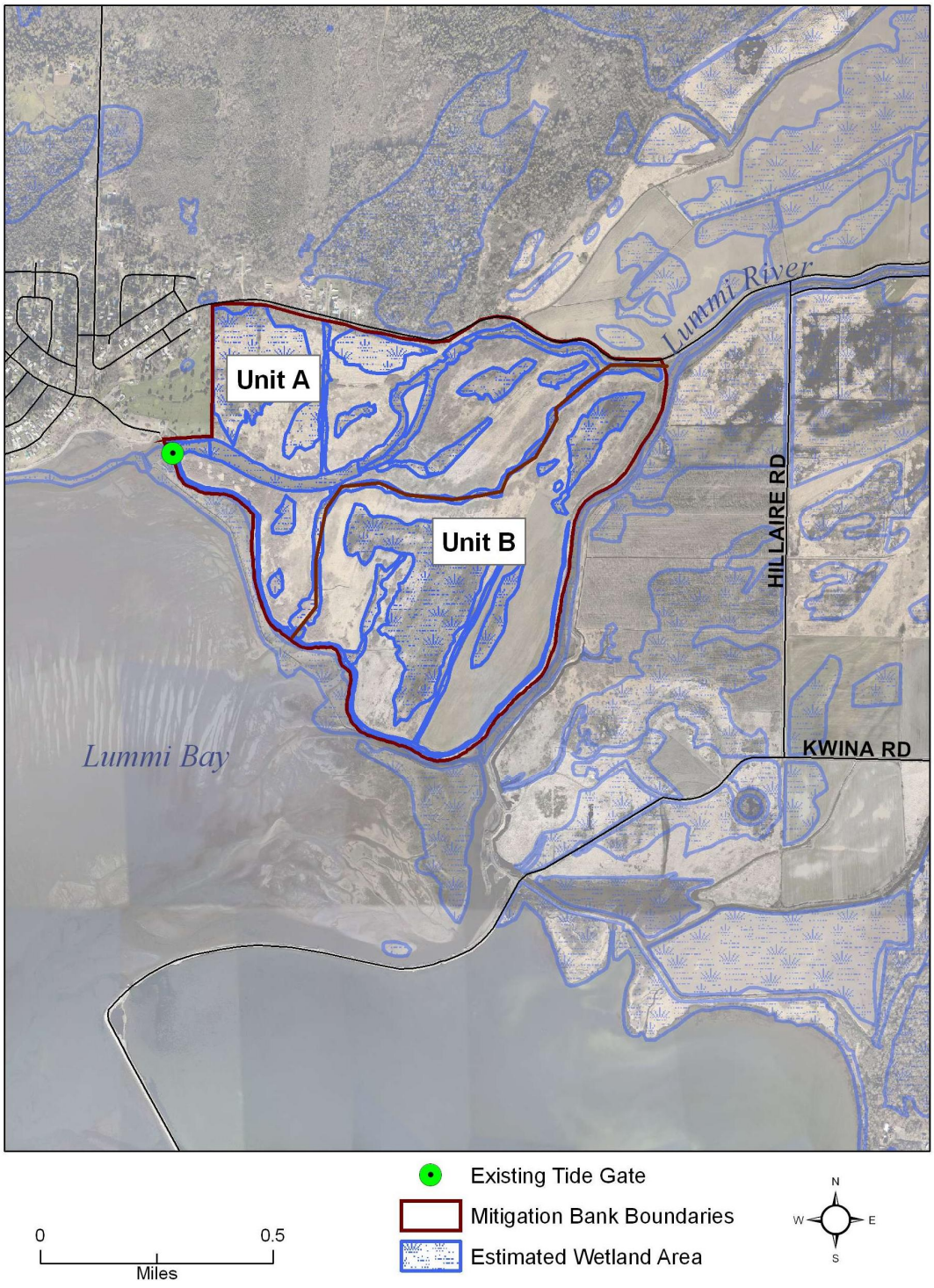


Figure A. 17. Function Assessment Units in the Lummi Delta Site

Table A. 8. 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.

A.3.3.2 Baseline Site Conditions

The Lummi Delta Site is primarily fallow agricultural land that is separated from Lummi Bay and the Lummi River by levees. 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. Several culverts with tide gates allow freshwater outflow from the site and prevent tidal inundation. A detailed baseline conditions report for Phase 3 will be developed prior to implementation of this phase of the bank. This baseline conditions report will be similar to what was developed for Phase 1A of the Bank (see Resource Folder – Exhibit 2) and will be included in the Resource Folder as Exhibit 11.

APPENDIX B
BANK DEVELOPMENT PLAN AND DESIGN

APPENDIX B.1 (a): Phase 1A – Nooksack Delta Site

B.1.1. Phase 1A Development Plan

Restoration activities for the Phase 1A Nooksack Delta Site will involve primarily planting of coniferous trees within the forested wetlands and invasive weed control followed by planting of trees and shrubs. Following the weed control effort and plantings, the primary work on the site will involve monitoring and maintenance, which is described in Appendix F of this MBI.

B.1.2 Phase 1A Design

The Nooksack Delta Site Phase 1A area 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 Washington State Wetland Function Assessment Method (WAFAM) results. Design efforts at the Phase 1A Nooksack Delta Site are focused on wetland enhancement through removing and managing invasive plant species and increasing native plant species richness through planting native shrubs and coniferous trees. Removing invasive species and/or increasing the ratio of interspersion between vegetation and open water areas is expected to improve wetland function index ratings such as habitat suitability for invertebrates, amphibians, and anadromous fish. Native plant richness will be improved at the Phase 1A Nooksack Delta Site by underplanting forested wetlands with coniferous trees. When combined, these actions will increase habitat diversity and produce greater ecological functions over time at a critical location in the watershed.

Summary of Nooksack Delta Site Phase 1A Design

The Nooksack Delta Site Phase 1A enhancement 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. Eradicate or control invasive species;
3. Plant native conifer species within the deciduous forests;
4. Monitor effectiveness of treatments and under plantings and repeat as needed to meet performance standards.

The areas designated for wetland enhancement are shown on Figure B.1. A larger scale version of Figure B.1 is also included in the Resource Folder as Exhibit 12. Specific design elements for the enhancement areas are summarized in Table B.1 and described below.

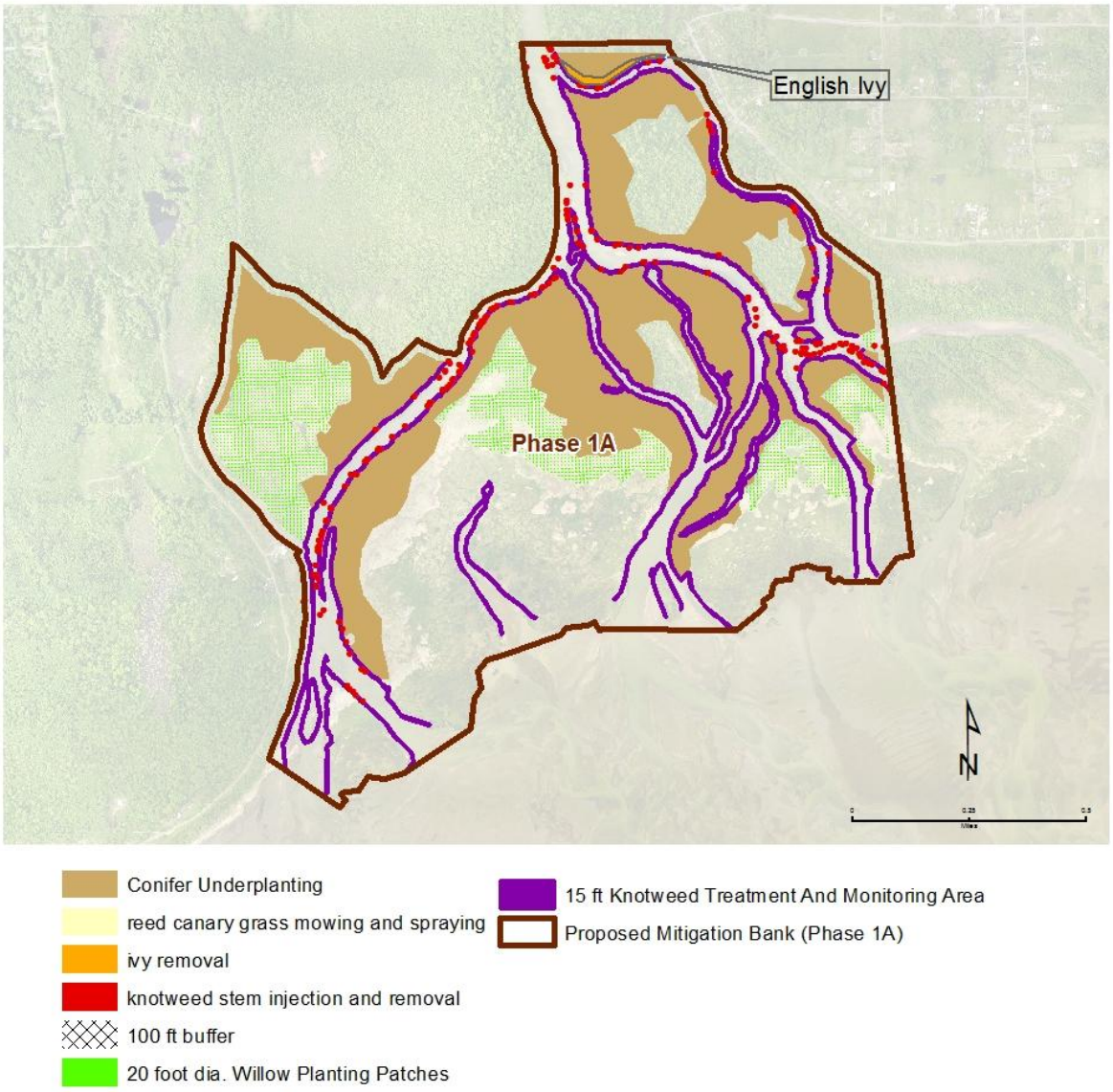


Figure B. 1. Wetland Enhancement Areas at the Nooksack Delta Site (Phase 1A)

Table B. 1. Enhancement Actions – Nooksack Delta Site Phase 1A

Type of Action	Approximate Area (acres)	Approximate Area (percent)
Wetland Enhancement (knotweed removal: treatment and monitoring area)	0.9	0.2
Wetland Enhancement (weed removal/willow planting: reed canarygrass, yellow flag iris)	101.2	26.6
Wetland Enhancement (weed removal: English ivy)	2.1	0.6
Wetland Enhancement (conifer underplanting)	275.7	72.6
Total Enhancement Area	379.9	100

B.1.2.1 Wetland Enhancement – Invasive Weed Management

Invasive weed populations will be reduced and/or eliminated from the Phase 1A Nooksack Delta Site. Four invasive weeds have been observed to have significant populations on the site: knotweed (*Polygonum* spp.), reed canarygrass (*Phalaris arundinacea*), yellow flag iris (*Iris pseudocaris*), and English ivy (*Hedera helix*). 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 knotweed and reed canarygrass will be more challenging and will take more time. Methods for removal and control of these invasive weeds are described below.

On the Phase 1A Nooksack Delta Site, initial invasive weed eradication efforts will focus on removal of reed canarygrass, yellow flag iris, and English ivy. Once progress has been made in eradicating these species, the knotweed control efforts will be undertaken. A total of 104.2 acres are targeted for weed removal and control efforts. Native willow species will be planted in the areas where reed canarygrass and yellow flag iris is removed/controlled to begin the process of re-establishing native plant communities. Targeted areas are shown on Figure B.1. Actions specific to each target weed species are described below. Methods for assessing the efficacy of weed control efforts are summarized in the next section and detailed in the Monitoring and Adaptive Management Plan (Appendix F) for the Lummi Nation WHMB.

Knotweed

Based on a September 21, 2009 survey of the Phase 1A Nooksack Delta Site where 159 knotweed "clumps" were mapped using GPS equipment (see memorandum dated September 25, 2009 in the Resource Folder [Exhibit 12]), and an average clump size of 50 square feet estimated by consensus of the three-person survey team, plus the addition of two larger clumps near the southern/downstream extent of the site that totaled to approximately 0.67 acres, knotweed is estimated to currently occupy approximately 0.9 acre of the Nooksack Delta Site Phase 1A area. Although the area estimated to be currently occupied by knotweed is 0.9 acres, the area particularly susceptible to knotweed infestation on the site is much larger. The area particularly

susceptible for knotweed establishment along the river channel was defined as a 15-feet wide swath along the river channel. This area susceptible to knotweed infestation totals to approximately 26.4 acres.

As with most 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 this species has not yet become established, the management focus will be to prevent establishment. 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 promise for controlling established knotweed patches in a single treatment (The Nature Conservancy 2004).

Most of the knotweed at the Phase 1A Nooksack Delta Site during 2009 occurred along the banks of the river channels in relatively small clumps (~50 square feet) that have established within the dense native shrub community (see typical detail sheet – Figure B.2). Manual/ mechanical removal or herbicide spraying of these occurrences could disturb the native shrub communities. These distinct occurrences will be treated by stem injection with herbicide (see typical detail sheet – Figure B.2). Stem injection methods will follow those developed by The Nature Conservancy (The Nature Conservancy 2006) and herbicide concentrations will follow manufacturer guidelines. The general method will be to poke a small hole through both sides of the stem below the first or second node on canes of sufficient size (>3/4 inch diameter). From 1 to 5 ml of glyphosate will then be injected into each stem using a syringe or injection gun similar to those supplied by JK International (http://www.jkinjectiontools.com/index.php).

During August or September 2012, the location of each occurrence (knotweed clump) will be mapped using a GPS to establish a new baseline and to allow comparison with the results with the similar mapping conducted during 2009. Specific clumps starting at the upstream end of the site will be treated as described above. The treated clumps will be marked in the field with a 4-foot stick of rebar or wood lathe with flagging tape and an identification number to facilitate repeated treatment and monitoring. Alternatively, flagging tape and the identification number will be affixed to an adjacent tree or other relatively immobile nearby object. The treatments will focus on knotweed clumps along the same channel and expand to other channels within the site as practicable each year.

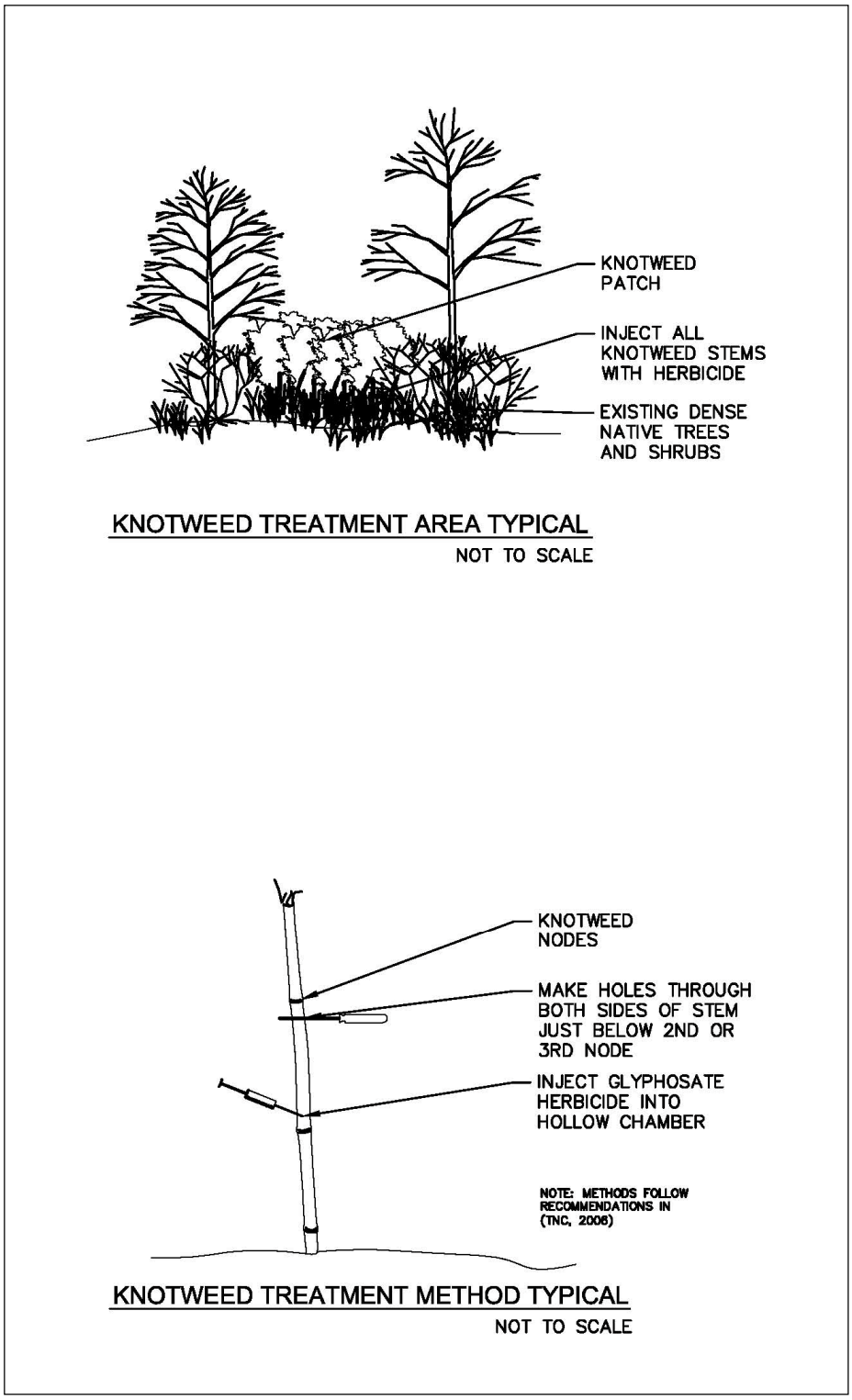


Figure B. 2. Wetland Enhancement Design Detail – Knotweed Treatment

Most of the knotweed occurrences are surrounded by dense growth of native shrubs and trees. Therefore, it is not anticipated that replanting will be necessary, or effective, in most areas. If areas of knotweed are discovered that do not have adequate native plant cover, willow stakes will be planted in a similar manner as described in the next section regarding reed canarygrass control. The spread of knotweed will be controlled by the methods described above in any portion of the Phase 1A site where it is found to occur. However, success will be monitored and measured in a limited area. This area is shown on Figure B.1 as "Knotweed Treatment and Monitoring Area". In general, the knotweed observed during 2004 and 2009 surveys occurred along the shoreline of the river within approximately 15 feet of the edge of water. Further description of the knotweed treatment and monitoring area is provided in the Performance Standards (MBI Appendix C) and in the Credit Ratios discussion (MBI Appendix D).

Reed Canarygrass

Dense stands of reed canarygrass on the Phase 1A Nooksack Delta Site were observed covering approximately 100.4 acres, primarily along the higher elevations north of the high salt marsh (tidal fringe area). In most of the other areas where reed canarygrass was observed, its cover dominance appears to be limited due to shading by overstory vegetation. Reed canarygrass cover will be reduced in the dense stands through active management and planting of native shrubs in this 100.4 acre area. In addition, infestation by reed canarygrass and other invasive species will be precluded in the newly emerging 0.8 acres of wetland area near the eastern extent of the site using the same management approach for a total of 101.2 acres. Managing reed canarygrass in this way will increase plant species numbers and diversity, and result in a variety of plant assemblages.

As with knotweed, there is no single treatment that produces an immediate conversion from a reed canarygrass infestation into a native plant community. Reed canarygrass is difficult to control because of a persistent rhizome system and the ability to reproduce below ground from the rhizome and from seed. The literature describes numerous reed canarygrass management methods including: digging, de-leveling, mowing, tilling, prescribed fire, solarization, grazing, chemical control, and competition (installing fast-growing shrubs or trees which create shade and reduce soil moisture through evapotranspiration). Although chemical treatment (e.g., spraying/application of approved aquatic herbicides such as *Rodeo* or *Accord*) may be used in some areas, a combination of mowing and competition will be the primary mechanism used to manage the dense reed canarygrass stands in the Phase 1A Nooksack Delta Site.

Due to the 100 percent cover of reed canarygrass throughout most of the treatment area and the large amount of drift logs, treatment of the entire 100.4 acre reed canarygrass stand and 0.8 acres of emergent wetlands in the former river channel (101.2 acres total) is not practicable during a single year. A multi-year/multi-stage approach to establish an evenly distributed pattern of treatment areas (shrub patches) will be used throughout the treatment area (See typical detail sheet – Figure B.3 and Plan Views – Figure B.4 through Figure B.6). Mowing of reed canarygrass in these shrub patches and planting the treated area densely with willow stakes is expected to have localized success at significantly reducing reed canarygrass cover. It is expected that over time the patches will enlarge by shading out reed canarygrass and establish native shrub cover in the area between patches.

As shown in Figure B.3 through Figure B.6, shrub patches will be approximately 20 feet in diameter and spaced approximately 40 feet on center. This approach will be initially applied throughout the entire 101.2 acre area over a four year period. A piece of wood lathe will be used to mark the center of each shrub patch and the location of the patch center will be surveyed with a resource mapping grade GPS unit to aid in monitoring efforts. Flagging will be attached to the wood lathe and the lathe numbered. The number and location of each patch center will be recorded using a Trimble GeoXT GPS unit. Initially, reed canarygrass will be mowed within the 20-foot patches just prior to planting the willow stakes using either a gas-powered brush cutter with a steel blade or hand tools. Depending on the results obtained during the initial two years, it is possible that for subsequent years the shrub patches will be marked, mowed, and sprayed with an approved aquatic herbicide during the summer prior to the spring planting of willow stakes. Willow stakes from a variety of willow species will be planted densely (2-3 feet on center) within the mowed and/or sprayed shrub patch areas. At least three willow species will be planted within the treatment area to provide additional species richness: Pacific (*Salix lasiandra*), Sitka (*S. sitchensis*), Hooker's (*S. hookeriana*). Species will be planted in areas with conditions that most closely match their specific growing requirements. For example, Hooker's willow will be planted in the lower elevation portions of the tidal fringe areas.

Based on local and regional experience, dense willow plantings are expected to grow relatively quickly and provide both enough shade and reduction in soil moisture to slow or stop the re-establishment of reed canarygrass in the treatment area. Because of the dense planting of willow stakes within the shrub patches, once planted either mowing or the application of approved aquatic herbicides within these shrub patches will not be possible without undue risk of damaging the willows. To support the establishment of the willow shrubs within the planted areas, reed canarygrass in the areas between the shrub patches may, if practicable, be mowed in the early summer and again in the later summer prior to seed set following establishment of the shrub patches. The application of approved aquatic herbicides (such as *Rodeo* or *Accord*) in the areas between the shrub patches may be used but will generally be avoided.

The shrub patches are expected to provide habitat and structural diversity within the reed canarygrass fields and are expected to expand in size over the long-term as native shrubs establish in the shade around the perimeter of the patches. As the shrub patches expand in size, the area covered by reed canarygrass is expected to decrease. Based on familiarity with the site conditions and the experience of Lummi Restoration Division staff members, it is expected that a three-person team can perform the site preparation and plant approximately 600 stakes per day. The number of stakes planted each year will depend on the number of planting crews deployed to perform the restoration/enhancement work and the number of available planting days. Initially, willow stakes will either be purchased from a nursery or harvested from off-site (i.e., not within the boundaries of the Phase 1A site) willow groves. If in the future willow stakes are proposed to be harvested from within the boundaries of any phase of the bank, the Lummi Nation will prepare a willow stake harvesting plan and will submit the harvesting plan to each member of the IRT for review and approval prior to commencing any willow stake harvests within the bank boundaries.

The number of available planting days each year will vary due to climate (cold/frozen weather) and riverine flooding conditions. However, it is anticipated that there will be a minimum of 35 planting days each year over the February through April period. Assuming that two planting

crews will be deployed each day for 35 planting days, approximately 42,000 willow stakes can be planted each year. Assuming an average planting density of 2.5 feet on center within each patch, 57 willow stakes will be planted in each patch. Planting at this density and planting rate equates to establishing and planting about 737 patches per year. The establishment of 20-foot diameter patches at 40-foot centers equates to approximately 25 patches per acre. As a result, if 737 patches are planted each year, approximately 29.5 acres of the reed canary grass infested area will be treated each year. Assuming that this planting rate will be achieved, all 101.2 acres of the reed canarygrass infested area will be planted within four years.

Approximate planting areas are shown on Figure B.1 and B.7, and more detailed plan view drawings are shown in Figure B.4 through Figure B.6. As noted above, at least three willow species will be planted within the treatment area to provide additional species richness: Pacific (*Salix lasiandra*), Sitka (*S. sitchensis*), Hooker's (*S. hookeriana*). Species will be planted in areas with conditions that most closely match their specific growing requirements. For example, Hooker's willow will be planted in the lower elevation portions of the tidal fringe areas.

Yellow Flag Iris

Yellow flag iris was observed in many areas of the Phase 1A area of the Nooksack Delta Site, primarily within the reed canarygrass fields. Because the two species are growing intertwined with each other, the same treatment methods will be used for both of the invasive species and monitoring and performance standards will also be combined.

Yellow flag iris produces a rhizome mat, which creates a habitat that is drier and results in 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.

Effective control requires 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. In areas that are accessible to mowing equipment and where mowing can be conducted without undue risk to damaging planted willow stakes, Yellow flag iris and reed canarygrass will be mowed in the early summer and again in the later summer prior to seed set. Similar to the reed canarygrass treatment areas, the 40-foot on center willow shrub patches will be planted densely (willow stakes at 2 to 3 feet on center) in yellow flag iris areas that do not have a tree canopy to provide shade. Several willow species will be planted to provide increased species richness: Pacific (*Salix lasiandra*), Sitka (*S. sitchensis*), Hooker's (*S. hookeriana*).

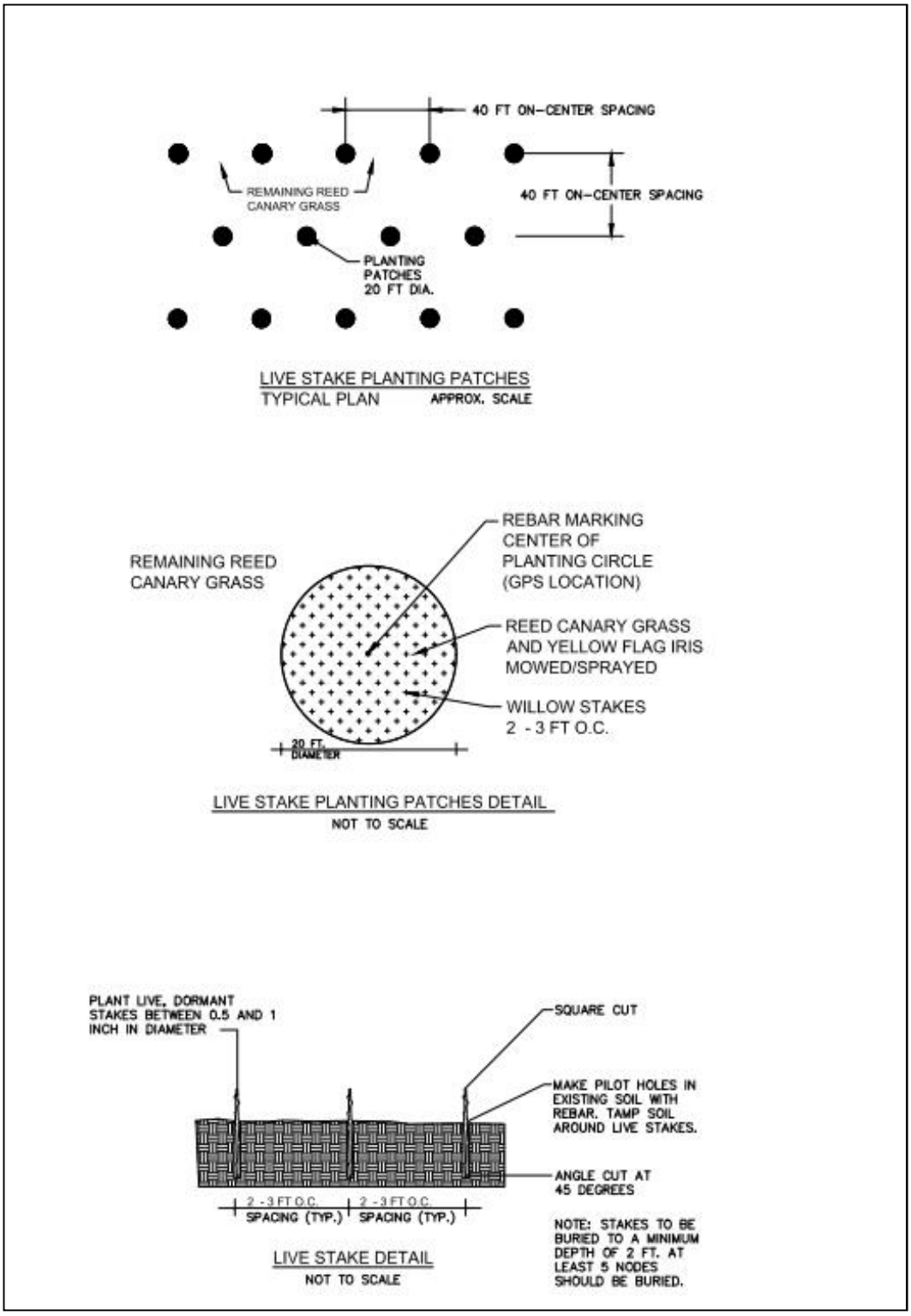


Figure B. 3. Wetland Enhancement Design Details – Reed Canary Grass and Yellow Flag Iris

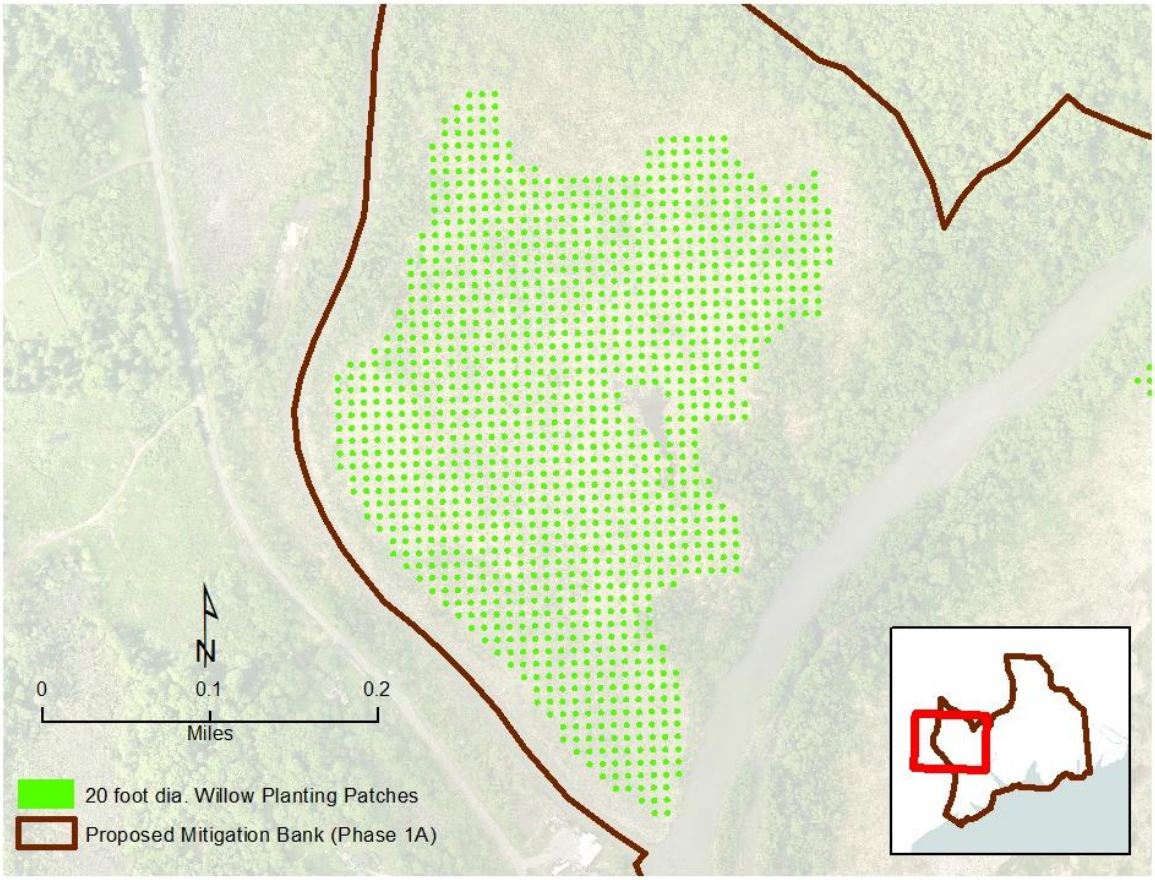


Figure B. 4. Wetland Enhancement Plan View – Reed Canary Grass and Yellow Flag Iris

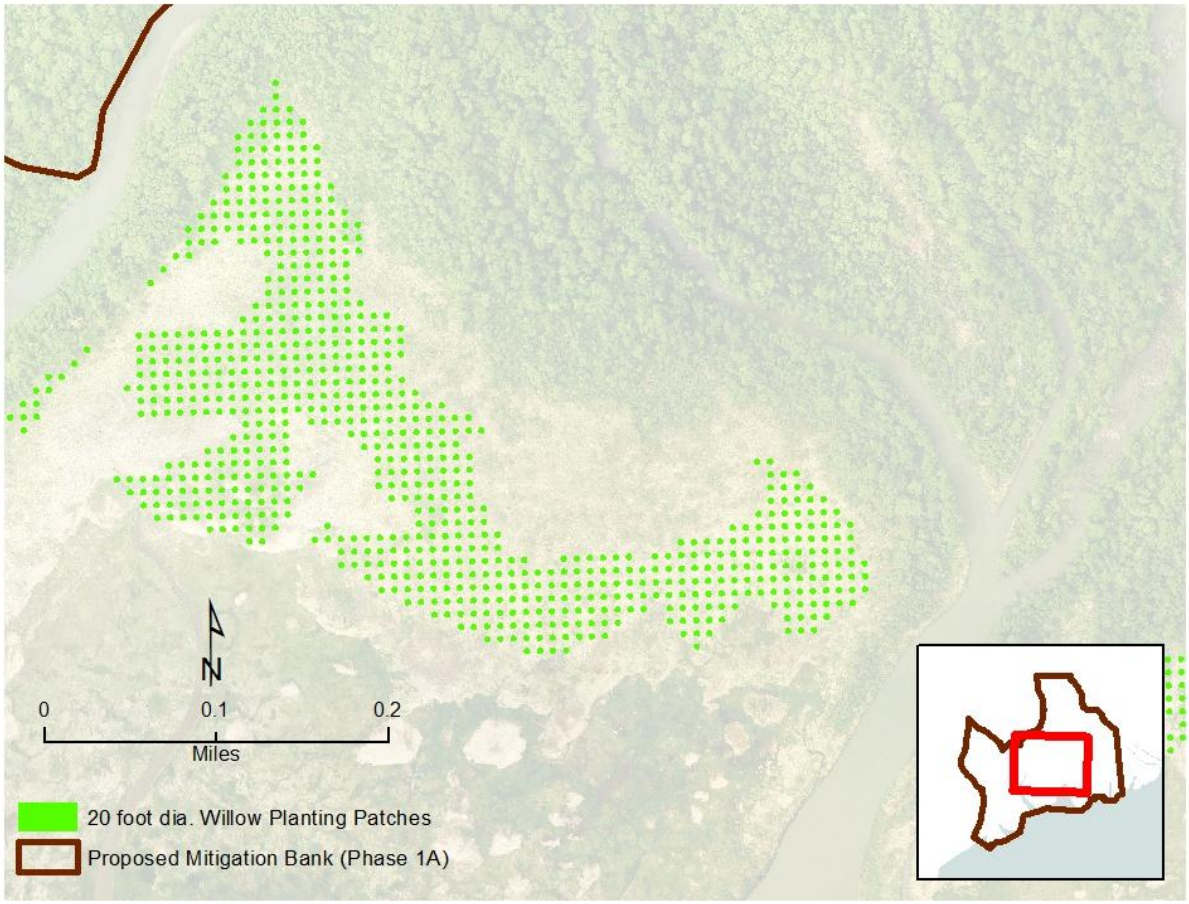


Figure B. 5. Wetland Enhancement Plan View – Reed Canary Grass and Yellow Flag Iris

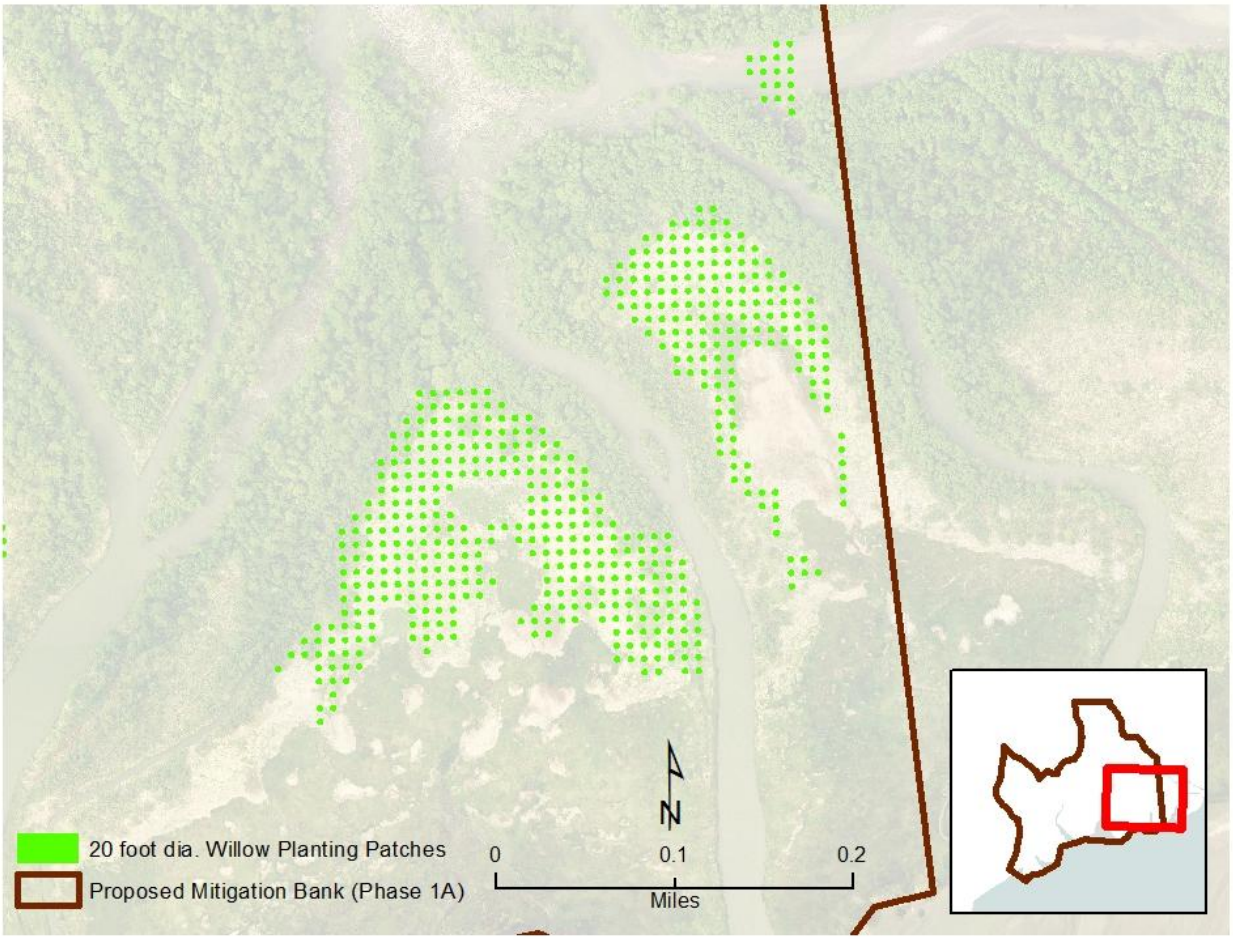


Figure B. 6. Wetland Enhancement Plan View – Reed Canary Grass and Yellow Flag Iris

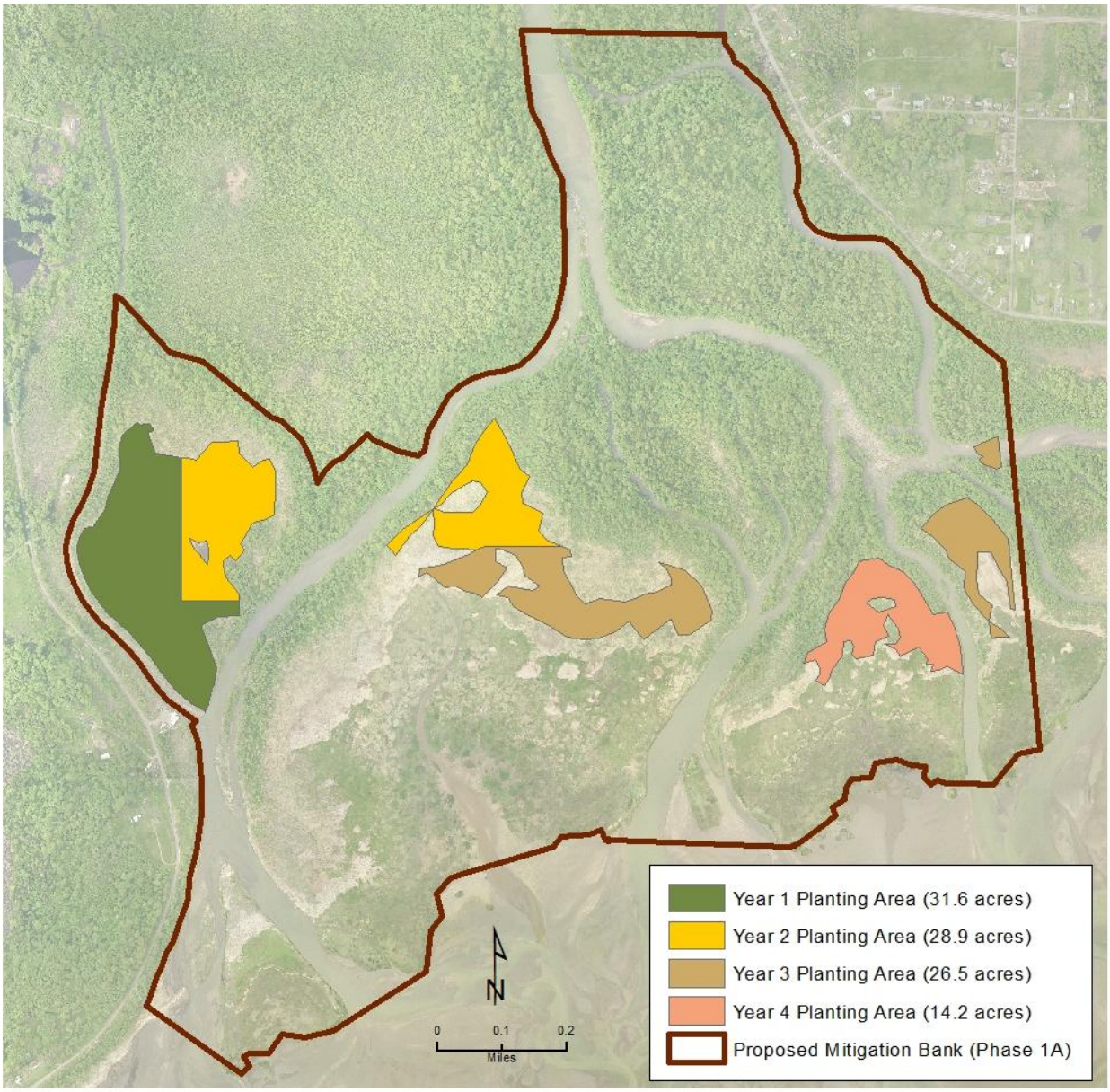


Figure B. 7. Reed Canary Grass and Yellow Flag Iris – Four Year Planting Plan

English Ivy

English ivy was observed in a few riparian areas and was especially prevalent in an approximately 2-acre upland area on natural levees in the north eastern portion of the Phase 1A Nooksack Delta Site (Figure B.1). The perimeter of the English Ivy infestation will be surveyed with GPS to aid with maintenance and monitoring. 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). Because the locations in the Nooksack Delta Site where ivy was observed contain substantial native vegetation and are adjacent to the river banks, cutting and root pulling with hand tools are expected to be the most effective methods. Ivy that is growing up trees will be cut and uprooted, but the above ground portions of the plants will not be pulled from trees. Pulling vines from the trees is an unnecessary safety hazard with limited benefit. The vines in the trees will die quickly after being separated from the roots. All uprooted material will be removed from the site and disposed of properly at an off-site location.

Because the ivy is growing beneath a dense forested canopy with a moderately dense layer of native shrubs, replanting of shrubs is not expected to be necessary in the English ivy treatment area. This area overlaps the conifer underplanting zone (described in Section B.1.2.3) and will be planted with conifer seedlings sufficient to achieve a target density of 175 conifer trees per acre. Annual monitoring, mechanical removal, and spraying of newly emerging English ivy vines will be conducted to ensure eradication of English ivy and the re-growth of the existing native shrubs and planted trees.

Other Weeds

Other noxious weeds that were not recorded in the vegetation plots but were observed in the Phase 1A Nooksack Delta Site include: Himalayan blackberry (*Rubus armeniacus*), Canada thistle (*Cirsium arvense*), giant hogweed (*Heracleum mantegazzianum*), policeman's helmut (*Impatiens glandulifera*), butterfly bush (*Buddleja davadii*) and perennial sowthistle (*Sonchus arvensus*). Occurrences of these weeds were not large or widespread and are not expected to spread on this site; which is primarily wetland. If areas containing monotypic stands of Himalayan blackberry (or other noxious weeds) are discovered, the initial treatment will be to mow the canes to reduce the above ground biomass. This treatment will reduce the photosynthetic capability of the plant and also reduce the amount of herbicide spraying needed. Newly emerging canes will be sprayed with approved aquatic herbicides (such as *Rodeo* or *Accord*) by a licensed applicator in spring or early summer before the canes are above knee height. Spraying will be repeated in late summer to treat canes that continue to grow. Spot spraying of newly emerging canes will be continued annually until few canes emerge in the spring.

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 establish on any of the Lummi Nation WHMB sites.

B.1.2.2 Erosion and Sediment Control

Erosion and sediment control is necessary in areas where weed removal efforts involve soil disturbance. Since the only soil disturbance planned for Phase 1A is associated with the limited soil disturbance associated with willow staking, invasive root removal (English ivy), and conifer underplanting, no specific erosion or sediment control activities are planned.

B.1.2.3 Wetland Enhancement – Conifer Underplanting

Conifer seedlings will be planted under the existing canopy to enhance portions of the existing deciduous forested wetlands (Figure B.1). It is anticipated that it will take four years to plant the entire 275.7 acres. Depending on the availability of conifer seedlings, the staggered planting scheme that will begin with Year 0 in 2011 is shown on Figure B.8. If adequate numbers of appropriately sized (i.e., Plug +1 or 1+1 stock from 201 or 202 seed zones approximately 12 to 18 inches tall) conifer seedlings can not be secured during 2011, the conifer planting crew will be redirected to the reed canarygrass and English Ivy control effort and Year 0 for the conifer underplanting effort will be 2012.

Typical planting areas are shown in Figure B.9 and typical planting details are shown in Figure B.10. To accomplish the objective of establishing mixed deciduous/coniferous forest, conifer seedlings will be planted in the portions of the wetland that are at an elevation expected to support the establishment of conifers. A method for determining the appropriate planting areas based on elevation is provided in the February 26, 2010 *Nooksack River Delta Suitability for Enhancement Measures* memorandum (Resource Folder – Exhibit 12). This memorandum included as an attachment a separate memorandum from the Lummi Nation Forest Manager regarding the viability of conifer underplanting in the Nooksack Delta that included planting guidelines. The planting guidelines, which are based on observations of tree species and visual observations of flood indicators within the Nooksack Delta Site and restoration projects in areas adjacent to the Nooksack Delta Site, is also summarized in a August 30, 2010 technical memorandum from the Lummi Nation Forest Manager (Resource Folder – Exhibit 12).

Conifer seedlings will be planted over a total area of approximately 277.8 acres. However, since 2.1 acres of the conifer underplanting area will also be treated to remove the invasive English ivy, the total conifer underplanting area that will generate mitigation credits is reduced to 275.7 acres. Conifer underplanting will occur within all seven of the forested plant associations and one of the scrub-shrub associations identified in the Baseline Vegetation Report (Resource Folder – Exhibit 2). Figure B.8 shows the expected schedule and locations for the conifer underplantings. Where not readily defined by a river channel, the perimeter of each planting area completed during a particular planting season will be marked with from four to eight rebar, wood lathe, PVC pipe, fence posts, or other semi-permanent marker (Figure B.9). The perimeter of the planted area each year will be surveyed using a resource-grade GPS unit (Trimble GeoXT or better).

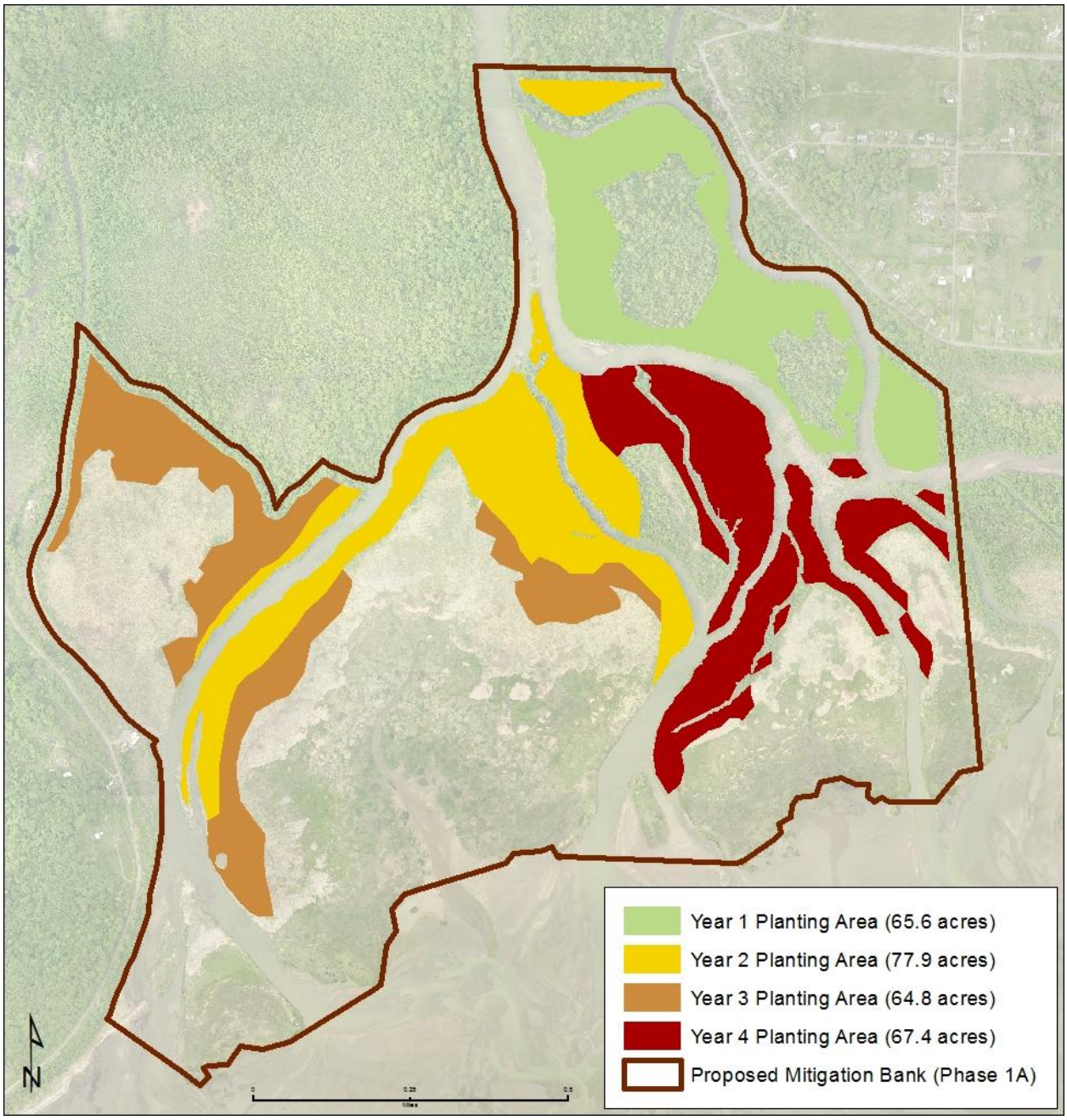


Figure B. 8. Wetland Enhancement Plan – Conifer Underplanting (four year planting plan)

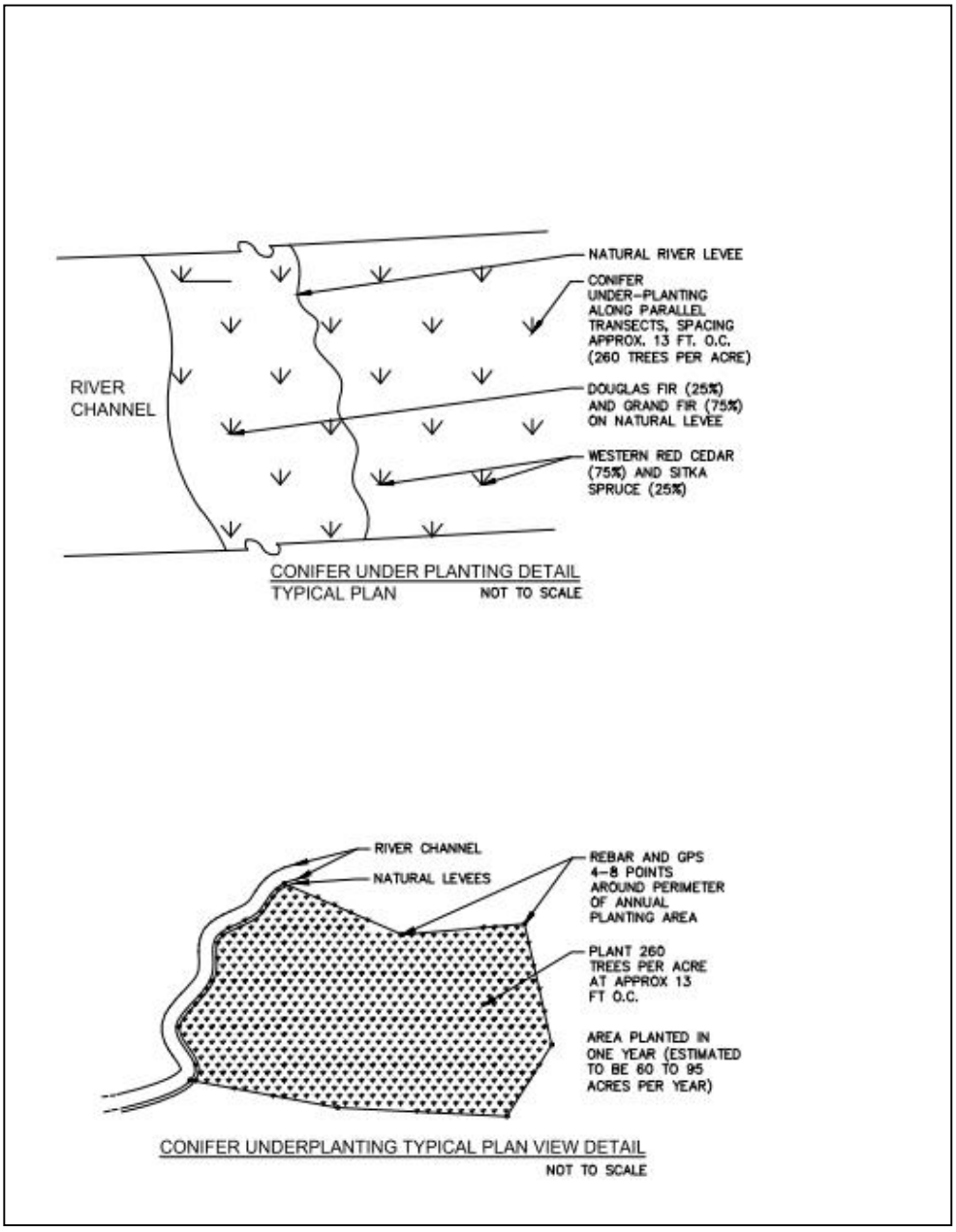


Figure B. 9. Wetland Enhancement Design Details – Typical Area Conifer Underplanting

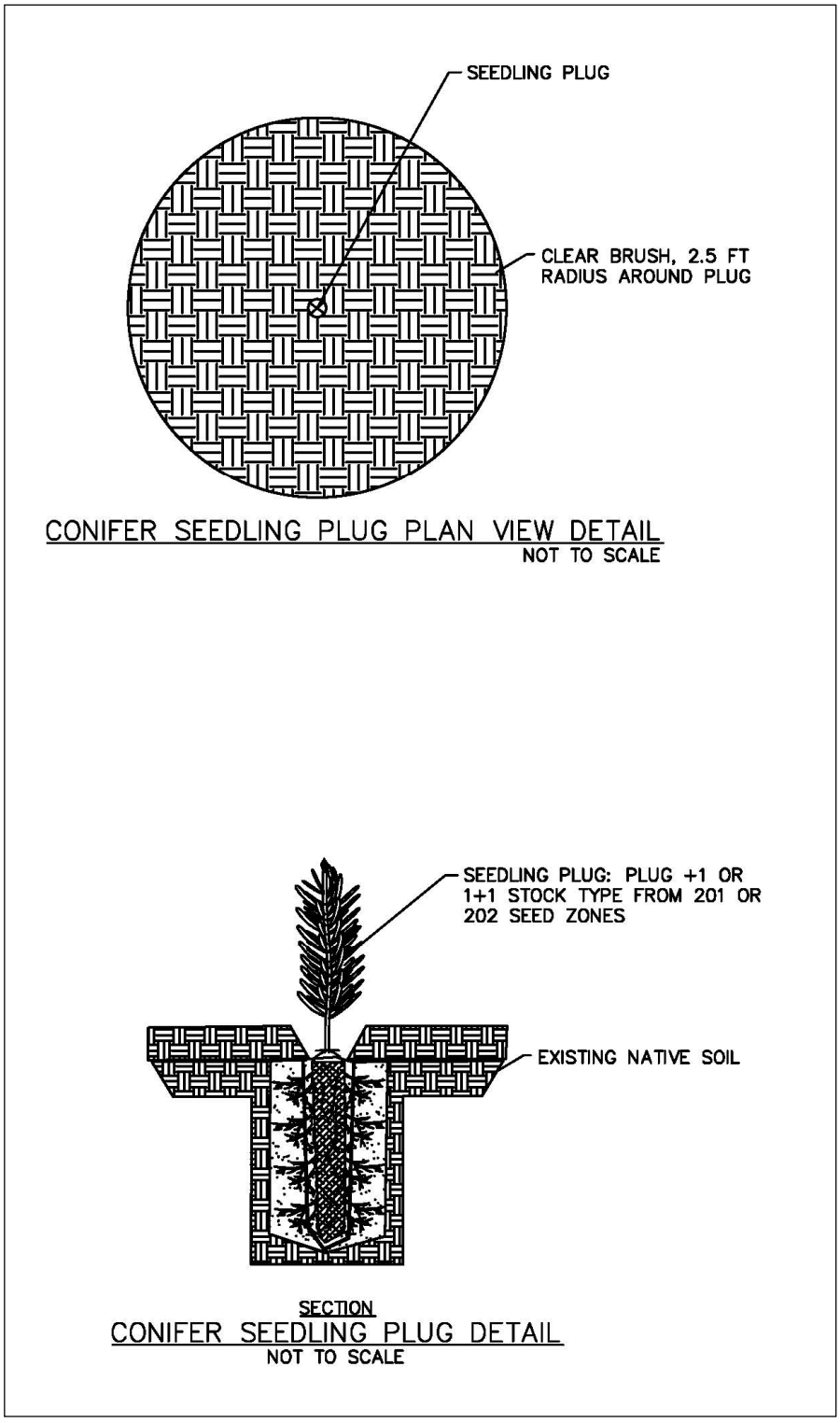


Figure B. 10. Wetland Enhancement Design Details – Conifer Seedling/Underplanting

The forested plant associations contain red alder and/or are at an elevation that appears to be suitable for conifer establishment. The presence of red alder was identified in the August 30, 2010 technical memorandum as an indicator of areas with appropriate growth requirements for conifers. The one deciduous forest type without alder (Pacific willow dominant) and the one scrub-shrub association (willow/alder/reed canarygrass) targeted for conifer underplanting appear to be at a suitable elevation for conifer establishment and the shrubs should provide enough cover within the reed canarygrass to offer protective shade for newly planted conifer seedlings. In some areas, cutting existing stumps and logs to expose fresh surfaces suitable for conifer seed germination and establishment will be the approach used. Within these microsites, seedlings of two common shade-tolerant conifers will be planted: western red cedar (*Thuja plicata*) and Sitka spruce (*Picea sitchenis*). Previous restoration efforts in this area have shown that western red cedar grows quickly; therefore 75 percent of the plantings will be red cedar and 25 percent Sitka spruce. To achieve a targeted density of 175 conifer trees per acre, trees will be planted along transect at an average spacing of 13 feet on center and an average density of 260 stems per acre. In areas with a dense understory shrub layer, shrubs will be cleared by machete in a 5-foot diameter circle around the planted conifer plugs to ensure adequate light reaches the trees (Figure B.10).

Small areas of upland were identified within the Phase 1A Nooksack Delta Site along some of the natural river levees. These areas total approximately 13 acres and are included in the conifer underplanting area above, and in the credit calculation for enhancement. Growing conditions appear to be similar to the forested wetlands and the enhancement plan will be similar, including conifer underplanting and knotweed removal. In portions of this upland area that appear to have sufficient growing conditions, additional coniferous tree species may be planted. For example, grand fir (*Abies grandis*) and Douglas fir (*Psuedotsuga menziesii*) will be planted in upland areas that appear to receive less frequent flooding. Since grand fir is expected to grow more quickly beneath the deciduous forest, the relative proportions will be 75 percent grand fir and 25 percent Douglas fir in these areas.

Trees will be primarily bare root stock (Plug +1 or 1+1 stock from 201 or 202 seed zones) purchased from local commercial tree suppliers. Small trees (12 to 18 inches tall) will be planted to promote higher survival rates. Conifers planted on the site are expected to establish quickly and grow well because of the partial shade provided by the existing deciduous forest, abundant coarse woody debris, and the undisturbed condition of the soil.

The addition of coniferous trees not currently common 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 an important 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).

B.1.2.4 Additional Wetland Areas

Portions of the Nooksack Delta Phase 1A site that do not currently need enhancement will be preserved to protect wetland functions. The additional wetland areas include approximately 178 acres of intertidal estuarine wetlands, 140 acres of river and tidal channels, 49 acres of palustrine freshwater emergent wetlands (primarily cattail, bulrush, and drift logs), 44 acres of palustrine scrub-shrub wetlands, and 51 acres that comprises the 100-foot buffer along the perimeter of the site (primarily forest and open water). This additional wetland area totals 462 acres and contributes to the ecological function of the Nooksack Delta site, but will not directly generate credits at this time. As the Nooksack River Delta continues to accrete, the areas that are currently inter-tidal estuarine wetlands, palustrine freshwater emergent wetlands, palustrine scrub-shrub wetlands, and Pacific willow forest may become suitable for enhancement through conifer underplanting or invasive weed control. If these conditions evolve, the sponsor may request the IRT to consider awarding additional mitigation credits for enhancement of these areas. If these conditions evolve, additional documentation (e.g., a baseline conditions report; an enhancement plan; objectives and performance standards; credit generation and award schedule; establishment period monitoring, reporting, maintenance, and remedial action; and a long-term protection and management plan) for what may become Phase 1C of the Nooksack Delta Site will need to be developed and approved by the IRT.

APPENDIX B.1 (b): Phase 1B – Nooksack Delta Site

A description of the Bank development and design plan for Phase 1B of the Nooksack Delta Site will be provided when this phase of the Bank is implemented.

APPENDIX B.2: Phase 2 – Blockhouse Site

A description of the Bank development and design plan for of the Blockhouse Site (Phase 2) will be provided when this phase of the Bank is implemented.

APPENDIX B.3: Phase 3 – Lummi Delta Site

A description of the Bank development and design plan for the Lummi Delta Site (Phase 3) will be provided when this phase of the Bank is implemented.

APPENDIX C
BANK OBJECTIVES AND PERFORMANCE STANDARDS

APPENDIX C.1: All Phases

C.1.1. Bank Objectives and Performance Standards for All Phases

Implementation of the Lummi Nation Wetland and Habitat Mitigation Bank is anticipated to create substantial gains in aquatic ecosystem functions as compared to current conditions, or conditions that would likely accrue on the site if the Bank were not constructed. The Bank's success will be measured by documenting progress toward the objectives identified below, each of which is subdivided into specific performance standards. The prescribed performance standards provide a gauge for measuring the success of the ecological restoration and enhancement efforts at the Bank.

Unless otherwise noted, all documentation required for demonstrating attainment of performance standards will be submitted to the IRT for review and approval as a condition of credit award/release. Documentation can typically be included in required monitoring reports. The IRT award of credits will be reflected in a letter issued using Corps letterhead and signed by the IRT Chair (i.e., the Corps of Engineers District Engineer or his/her designee).

Recreational, educational, and scientific activities that do not conflict with the use limitations or other provisions of the conservation easement, do not interfere with the delineated purposes and goals of the Bank, and do not adversely affect the ecological viability and functionality of the Bank may take place on the Bank site. These activities may include: bird watching, guided site tours, and water quality or quantity measurements. Ceremonial and subsistence fishing, hunting, or gathering by enrolled Lummi Nation tribal members and commercial fishing by licensed enrolled Lummi tribal members may also take place on the Bank site.

As described in the Conservation Easement (Resource Folder – Exhibit 13), Treaty-reserved fishing, hunting, and gathering for ceremonial and subsistence purposes and fishing for commercial purposes by enrolled Lummi Tribal members may take place on the Bank site so long as it is conducted in a manner that will not impair the development of an old growth forest on the Bank site and does not cause more than *de minimis* adverse impacts on the Conservation Values of the Bank. This fishing, hunting, and gathering activity by enrolled members of the Lummi Nation includes the right to erect temporary structures associated with fishing, hunting, and gathering activities for ceremonial, subsistence, and commercial purposes so long as the structures and any associated solid wastes are removed within one month following the end of the permitted activity. No commercial hunting is allowed. The term "commercial fishing" does not include commercially led fishing parties in the mitigation bank area. In this context, the term "commercial fishing" means fishing by individual tribal members who possess a valid Lummi Nation Treaty Indian Fishing Identification Card issued by the Lummi Natural Resources Department and who sell the caught fish to buyers licensed by the Lummi Nation who are required pursuant to a buyers agreement to report the sale on a fish ticket and to provide that fish ticket to the Lummi Natural Resources Department within 96 hours of the purchase.

APPENDIX C.2 (a): Phase 1A – Nooksack Delta Site

C.2.1. Bank Objectives and Performance Standards for Phase 1A

Objective 1. Permanently protect aquatic ecosystem functions of the Phase 1A – Nooksack Delta Site by instituting the MBI and implementing a conservation easement with permanent funding for site stewardship.

Each of the performance standards associated with this objective must be met before any Bank credits may be awarded, and before any construction or other implementation activities may be initiated pursuant to this Instrument. Any construction or implementation activities conducted on-site prior to the inception of the establishment period must cease as of the effective date of this Instrument pursuant to Article VI.C, until the Performance Standards 1A and 1B have been accomplished. The initial award of credits in recognition of accomplishment of these performance standards will serve as the IRT's notification that construction and implementation activities are authorized to commence.

Table C. 1. Objective 1 Performance Standards – Phase 1A

Performance Standard	Documentation
1A. Complete the development of an appropriate Mitigation Banking Instrument (MBI) and Appendices.	The Sponsor and the Corps have signed the Mitigation Banking Instrument. An original signed Instrument must be provided to each of the signatories.
1B. Protect ecosystem function by placing an IRT-approved conservation easement on the property.	Provide the IRT a copy of the signed, IRT-approved conservation easement and evidence that it has been legally recorded with the Lummi Nation Realty Office, with Whatcom County, and with the Bureau of Indian Affairs Title Plant and placed on the property title.

Objective 2. Enhance ecological function by removing and managing reed canarygrass and yellow flag iris and replanting with native shrubs.

Table C. 2. Objective 2 Performance Standards – Phase 1A

Performance Standard	Documentation*
2A. Treatment and planting of reed canarygrass and yellow flag iris areas (shrub patches) completed according to IRT approved plans. (Weed control and shrub planting is expected to take 4 years. The sequence of areas planted is shown in Figure B.7).	As-planted plan (one for each of four planting years/stages) showing completed planting approved, in writing, by the IRT. As-planted plans will include a species list, plant spacing and density, GPS map showing center of each planting patch, and final number of treated acres per year.
2B. Areal cover of native shrubs in treatment area (shrub patches) at least 10% by Year 1.	Monitoring report documenting visual estimates of plant cover within 5% of the treatment areas (shrub patches) and photographs of each patch sampled approved by the IRT.
2C. Areal cover of native shrubs in treatment area (shrub patches) at least 20% by Year 3.	Monitoring report documenting visual estimates of plant cover within 5% of the treatment areas (shrub patches) and photographs of each patch sampled approved by the IRT.
2D. Areal cover of native shrubs in treatment area (shrub patches) at least 40% by Year 5.	Monitoring report documenting visual estimates of plant cover within 5% of the treatment areas (shrub patches) and photographs of each patch sampled approved by the IRT.
2E. Areal cover of native shrubs in treatment area (shrub patches) at least 50% by Year 7.	Monitoring report documenting visual estimates of plant cover within 5% of the treatment areas (shrub patches) and photographs of each patch sampled approved by the IRT.
2F. Areal cover of native shrubs in treatment area (shrub patches) at least 60% by Year 10.	Monitoring report documenting visual estimates of plant cover within 5% of the treatment areas (shrub patches) and photographs of each patch sampled approved by the IRT.
2G. 25% of shrub patches will have an average diameter a minimum of 10% larger (typically 2 feet larger) than baseline by Year 7.	The same sample patches (5% of total) used for 2B – 2F will be used for 2G – 2H. The diameter of the sample shrub patches will be measured during the initial planting year to establish a baseline diameter. As described in Appendix F, the diameter of the sampled patches will be measured at three horizontal cross-sections of each patch and the average of these three measurements used to evaluate performance. Monitoring report documenting measurements of average diameter at Year 7 compared with the baseline measurements approved by the IRT.
2H. 50% of shrub patches will have an average diameter a minimum of 10% larger (typically 2 feet larger) than baseline by Year 10.	Monitoring report documenting the average diameter measurements at Year 10 as summarized above and compared with the baseline measurements approved by the IRT.

*See Appendix F for details on monitoring protocols. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, what an acceptable standard error is. Sample size, between-plot variability and/or sample plot configuration may be adjusted to achieve an acceptable standard error.

Objective 3. Enhance ecological function by removing and managing English ivy from a 2.1 acre forested area.

Table C. 3. Objective 3 Performance Standards – Phase 1A

Performance Standard	Documentation
3A. Cutting English ivy and root pulling with hand tools in treatment area. Ivy that is growing up trees will be cut and uprooted, but the above ground portions of the plants will not be pulled from trees. All uprooted material will be removed from the site and disposed of properly at an off-site location.	GPS map showing the perimeter of the treated area, photographs of removal operations.
3B. Areal cover of English ivy in treatment area reduced below 40% by Year 3.	Monitoring report documenting visual estimates of plant cover in permanent sample plots and line intercept transects set up within English ivy treatment area (GPS surveyed boundary of English Ivy in Year 0) approved by the IRT.
3C. Areal cover of English ivy in treatment area reduced below 30% by Year 5.	Monitoring report documenting visual estimates of plant cover in permanent sample plots and line intercept transects set up within English ivy treatment area approved by the IRT.
3D. Areal cover of English ivy in treatment area reduced below 20% by Year 7.	Monitoring report documenting visual estimates of plant cover in permanent sample plots and line intercept transects set up within English ivy treatment area approved by the IRT.
3E. Areal cover of English ivy in treatment area reduced below 10% by Year 10.	Monitoring report documenting visual estimates of plant cover in permanent sample plots and line intercept transects set up within English ivy treatment area approved by the IRT.

*See Appendix F for details on monitoring protocols. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, what an acceptable standard error is. Sample size, between-plot variability and/or sample plot configuration may be adjusted to achieve an acceptable standard error.

Objective 4. Enhance long-term forested wetland ecological functions and habitat for ESA-listed fish species (Chinook, steelhead, and bull trout) by planting conifers beneath deciduous trees in the existing forested areas and along the many stream channels.

Table C. 4. Objective 4 Performance Standards – Phase 1A

Performance Standard	Documentation
4A. Planting of conifers in the underplanting area completed according to IRT approved plans. (Planting is expected to take 4 years).	As-planted plan (one for each of four planting years/stage) showing completed planting approved, in writing, by the IRT. As-planted plans will include a species list, plant spacing and density, GPS map showing the perimeter of the planted area, and final number of treated acres per year.
4B. A minimum of 220 living trees per acre by August-September of Year 1.	Monitoring report approved by the IRT documenting tree density, which will be estimated by counting live trees within permanent "belt" transects. Sample size will include at least 5% of total area planted for each planting year.
4C. A minimum of 200 living trees per acre by August-September of Year 3.	Monitoring report approved by the IRT documenting tree density, which will be estimated by counting live trees within permanent "belt" transects. Sample size will include at least 5% of total area planted for each planting year.
4D. A minimum of 200 living trees per acre by August-September of Year 5.	Monitoring report approved by the IRT documenting tree density, which will be estimated by counting live trees within permanent "belt" transects. Sample size will include at least 5% of total area planted for each planting year.
4E. A minimum of 175 living trees per acre by August-September of Year 7.	Monitoring report approved by the IRT documenting tree density, which will be estimated by counting live trees within permanent "belt" transects. Sample size will include at least 5% of total area planted for each planting year.
4F. A minimum of 175 living trees per acre by August-September of Year 10.	Monitoring report approved by the IRT documenting tree density, which will be estimated by counting live trees within permanent "belt" transects. Sample size will include at least 5% of total area planted for each planting year.
4G. Average height at least 24 inches for surviving conifers at Year 5.	Monitoring report approved by the IRT documenting the height of all living trees, which will be measured and averaged for each planting area. The same "belt" transects (5% of total area) used for 4B – F will be used to sample average tree height (4G – 4I).
4H. Average height at least 30 inches for surviving conifers at Year 7.	Monitoring report approved by the IRT documenting the height of all living trees, which will be measured and averaged for each planting area.
4I. Average height at least 36 inches for surviving conifers at Year 10.	Monitoring report approved by the IRT documenting the height of all living trees, which will be measured and averaged for each planting area.

*See Appendix F for details on monitoring protocols. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, what an acceptable standard error is. Sample size, between-plot variability and/or sample plot configuration may be adjusted to achieve an acceptable standard error.

Objective 5. Enhance ecological function by removing and managing invasive plant species (knotweed).

Table C. 5. Objective 5 Performance Standards – Phase 1A

Performance Standard	Documentation*
5A. Number of knotweed clumps** within 15-feet of the stream bank expressed as the number of clumps per river mile will remain constant or reduce in number in Year 3 compared to mapping conducted during 2011.	Monitoring report documenting GPS/Laser Rangefinder survey of knotweed infestations within 15-feet of the stream bank*** approved by the IRT.
5B. Number of knotweed clumps** within 15-feet of the stream bank expressed as the number of clumps per river mile will be reduced in number by 30% in Year 5 compared to mapping conducted during 2011.	Monitoring report documenting GPS/Laser Rangefinder survey of knotweed infestations within 15-feet of the stream bank*** approved by the IRT.
5C. Number of knotweed clumps** expressed as the number of clumps per river mile within 15-feet of the stream bank will be reduced by 50% in Year 7 compared to mapping conducted during 2011.	Monitoring report documenting GPS/Laser Rangefinder survey of knotweed infestations within 15-feet of the stream bank*** approved by the IRT.
5D. Number of knotweed clumps** within 15-feet of the stream bank expressed as the number of clumps per river mile will be reduced by 90% in Year 10 compared to mapping conducted during 2011.	Monitoring report documenting GPS/Laser Rangefinder survey of knotweed infestations within 15-feet of the stream bank*** approved by the IRT.

*See Appendix F for details on monitoring protocols.

**A "clump" of knotweed is defined for the purposes of this enhancement plan as all stems within the equivalent of a 50 square foot area around a centrally located point. Most of the occurrences observed on the Nooksack Delta Site during 2004 and 2009 were relatively small and conform to this definition. Larger infestations will be inventoried as having multiple clumps. In later years of the weed removal activities, re-emerging canes within the footprint of a clump will be counted as the same clump.

***A limited area within 15-feet of the stream bank has been defined for surveys used to measure performance standards. The area is shown as "15 ft Knotweed Treatment and Monitoring Area" in Figure B.1.

APPENDIX C.2 (b): Phase 1B – Nooksack Delta Site

A description of the Bank objectives and performance standards for Phase 1B of the Nooksack Delta Site will be provided when this phase of the Bank is implemented.

APPENDIX C.3: Phase 2 – Blockhouse Site

A description of the Bank objectives and performance standards for the Blockhouse Site (Phase 2) will be provided when this phase of the Bank is implemented.

APPENDIX C.4: Phase 3 – Lummi Delta Site

A description of the Bank objectives and performance standards for the Lummi Delta Site (Phase 3) will be provided when this phase of the Bank is implemented.

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APPENDIX D
CREDIT GENERATION AND AWARD SCHEDULE

APPENDIX D.1: All Phases

D.1.1. Generation of Credits for all Phases

A. Credits will be established and awarded to the Bank upon the Sponsor's demonstration that the performance standards reflected in the tables of Appendix C have been achieved.

B. A credit is defined as a unit of measure representing the increase in the ecological value of the bank site. A credit for this Bank represents the increase in functions, values and areal extent of the wetland, riparian, upland and riverine systems on the project site. The increase in function results from the re-establishment, rehabilitation and enhancement of wetlands; re-establishment, rehabilitation and enhancement of riparian systems; and enhancement of uplands and riverine systems located on the Bank sites.

   The anticipated credits for Phase 1A of the Bank reflected in Table D.1 are determined based on the anticipation that the Bank will rate as a high functioning system at maturity. The wetland systems that will be enhanced through conifer underplantings, wetland and riparian invasive species control, shrub installation, and riparian enhancement within Phase 1A boundaries of the Bank include the following:

   - Hydrogeomorphic Classes
     - Riverine Impounding Wetlands
     - Riverine Flow-Through Wetlands
   - Cowardin System (Cowardin et al. 1979)
     - Palustrine
     - Riverine

   A credit is based on the water quality, water quantity, and habitat functions the Bank will provide as performance standards are met. For credit generation rationale and ratios refer to Section D.2.1 of Appendix D.

C. The precise number of credits actually generated by the Bank cannot be determined until the project is constructed and the success of restoration, enhancement, and preservation activities is assessed by the IRT. The final number of credits will be determined by the IRT and will be based on achievement of the performance standards.

   Credits generated by the Bank will be calculated as shown in Table D.1:

Table D. 1. Wetland Credit Generation for each Phase by Bank Development Activity

Bank Activity	Credit Ratio (Activity area: universal credit)	Phase 1A		Phase 1B[1]		Phase 2[1]		Phase 3[1]	
		Area (acre)	Number of Credits	Area (acre)	Number of Credits	Area (acre)	Number of Credits	Area (acre)	Number of Credits
Wetland Enhancement (reed canarygrass/ yellow flag iris removal)	3:1	101.2	33.7						
Wetland Enhancement (English ivy removal)	3:1	2.1	0.7						
Wetland Enhancement (Conifer Underplanting)	3:1	275.7	91.9						
Wetland Enhancement (Knotweed Control)	5:1	0.9	0.2						
Wetland Preservation	TBD	N/A	N/A						
Wetland Re-establishment	1:1	N/A	N/A						
Wetland Restoration	TBD	N/A	N/A						
ESA Fish Habitat Enhancement	TBD	N/A	N/A	TBD	TBD	TBD	TBD	TBD	TBD
TOTAL[1]	**N/A**	**379.9**[2]	**126.5**						

[1] Totals for Phase 1B, Phase 2, and Phase 3 to be added at a later date as these phases of the Bank are developed.

[2] The acreage shown is the area within Phase 1A that is expected to generate mitigation credits through the accomplishment of applicable performance standards. The total footprint of Phase 1A is approximately 842 acres – of this total area, 379.9 acres are expected to generate mitigation credits during the establishment period. The remaining approximately 462 acres contribute to the protection and preservation of the area that is generating mitigation credits. As described in Section D.2.1, the Nooksack Delta Site Phase 1A is located on a prograding river delta and the existing intertidal wetland areas can reasonably be expected to transition to shrub dominated and then to forest dominated over time. As the site evolves, the Sponsor reserves the right to seek additional enhancement credits for all or portions of the Phase 1A site and understands that the IRT would consider awarding additional mitigation credits for the accomplishment of additional affirmative enhancement efforts within other portions of Phase 1A of the bank. However, such a proposal will need to be reviewed on a case-by-case basis and will be dependent on the results of the enhancement activities in relation to the performance standards already established for Phase 1A of the bank.

D.1.2. Credit Award Schedule for all Phases

A. Credits will be awarded to the Sponsor for sale, use, or other transfer as the performance standards associated with those credits are achieved, with the following exception: (1) no credits may be awarded prior to meeting all of the performance standards associated with Objective 1, and (2) no credits associated with the Year 10 performance standards for a particular phase may be awarded until at least 60% of all possible credits associated with Years 0 through 9 for that phase have been awarded. Year 0 is the calendar year during which the as-built/as-planted drawings are approved in writing by the Corps, in consultation with the IRT. Year 1 is the first year of site monitoring after approval of the as-built/as-planted drawings.

B. The Corps, in consultation with the IRT, will typically approve the award of credits for each phase of the Bank once the performance standards defined in Appendix C are achieved, as applicable. The credit award schedule for Phase 1A of the Nooksack Delta Site is provided in Section D.2.2 and a similar credit release schedule will be developed for the other phases of the Bank as they are developed. Credits may not be awarded sooner than specified in Table D.2, except where otherwise noted or in extraordinary situations with the written approval of the Corps, in consultation with the other members of the IRT. Within each objective, approval of achievement of each performance standard must be obtained in the order prescribed. If the Bank is not able to meet a particular performance standard identified in Appendix C during the period indicated (e.g., a performance standard for a Year 3 Monitoring is not achieved until Year 4), the Sponsor may submit documentation of successful satisfaction of that performance standard during a subsequent year, and the IRT will give full consideration to the award of appropriate credits for sale, use, or transfer without reduction or other penalty. In the case of performance standards involving monitoring activities that are not timely completed, the interval between subsequent monitoring events must remain as prescribed (e.g., if a performance standard for a Year 3 Monitoring is not achieved until Year 4, the subsequent monitoring event may not occur before Year 6). The monitoring years shown in Table D.2 refer to time following approval of as-built/as-planted for a particular enhancement/treatment activity.

C. The Corps may, at its discretion, following consultation with the IRT, award partial credit for partial accomplishment of a performance standard. In the event a specific performance standard is not met but the IRT feels that the site is progressing satisfactorily, the Corps may at its discretion following consultation with the IRT, award credits.

D. Once a credit is awarded, the Sponsor may sell, use, or otherwise transfer that credit at any time, subject to the provisions of this Instrument.

E. If the institution of an adaptive management or remedial action plan as described in Section F.1.1.4 of Appendix F causes delay in the achievement of a performance standard, the timeline for achievement of each subsequent milestone for that performance standard will be deferred for a like interval, unless otherwise specifically approved by the Corps in consultation with the IRT. The Corps, in consultation with the IRT and the

Sponsor, will determine what remedial actions are necessary to correct the situation, pursuant to Article IV.H. and Section F.1.1.4 of Appendix F, and direct their performance prior to the award of any additional mitigation credits.

APPENDIX D.2 (a): Phase 1A – Nooksack Delta Site

D.2.1. Generation of Credits for Phase 1A (Nooksack Delta Site)

The 379.9 acres of enhancement area in Phase 1A Nooksack Delta Site are expected to generate a total of 126.5 credits. A total of 462 acres of the approximately 842 acre site (described in Appendix B.1.2.4) will not directly generate credits at this time. Enhancing functions of 275.7 acres of forested wetlands (underplanting conifers in forested wetlands) at a 3:1 ratio could provide 91.9 credits. Enhancement would also include removal/management of reed canarygrass and yellow flag iris and planting of native shrubs in 101.2 acres at a 3:1 ratio providing an additional 33.7 credits. Enhancement of 2.1 acres of forested area by removing English ivy would provide 0.7 credits using a 3:1 ratio. Enhancement of 0.9 acres of riparian areas by removing knotweed is expected to generate 0.2 more credits.

Rationale for Credit Ratios:

A credit ratio of 3:1 is being used for the conifer underplanting area, the reed canarygrass/yellow flag iris management area, and the English ivy control area because of the ecological benefits anticipated from the planned enhancement activities and also because of the proximity of these areas to approximately 462 acres of the site that do not directly generate credits. The additional 462 acres of area provides ecological benefits to the enhancement areas and vice versa. The enhancement of reed canarygrass dominated areas with a variety of native willows will provide a long-term seed source and is anticipated to prevent the reed carnarygrass from encroaching into adjacent areas. Large areas of forested, scrub-shrub, and emergent wetlands, natural river and tidal channels, and intertidal wetlands provide additional benefits such as water quality improvements, hydrologic connectivity, and expanded habitat area for fish, birds, mammals, and amphibians. For example, breeding or nesting habitat in one area is often supported by hunting or foraging habitat in another. Including these areas within the Bank boundaries provides permanent protection and therefore permanent functional support to the enhancement areas. The direct and indirect benefits of the non-credit generating 462 acres that are preserved and protected through the conservation easement are reflected in the 3:1 credit ratio.

The 3:1 credit ratio for the conifer underplanting area is also justified because of the high targeted survival density (175 stems per acre) of the conifers. The deciduous forest is currently largely devoid of conifers and planting at a high density is expected to provide a considerable functional lift in terms of habitat complexity and species diversity to the forested wetlands as the trees mature. The riparian forest will be restored overtime by improving forest structure in the short-term and providing for coarse woody debris over the long-term. Restoration of conifers to hardwood-dominated riparian forests is crucial to the creation of stream habitat favorable to anadromous salmonids. Riparian forests should contain a mixture of conifer and hardwood species to provide the diverse kinds of vegetative cover, leaf litter, and large wood input to rivers and streams that sustain complex aquatic and terrestrial food chains. Conifers provide the large logs necessary for complex stream habitat. These large logs are the key elements in debris jams, which foster the development of pools, the accumulation of gravel, hiding cover, and off-channel

habitat for fish during high flows. In addition, as the conifers mature, they will provide important nesting habitat for a variety of avian species.

A small portion of the mitigation credits (0.2 credits) will also be generated for enhancement of the river channels through knotweed removal and control efforts. The area within 15 feet of the riverbank was found to contain most of the knotweed that was surveyed in September 2009. An estimated 0.9 acres of the site is currently infested with knotweed and credits are only being sought to control this existing acreage. In the absence of knotweed control efforts it is expected that most, or all, of this area will be infested with knotweed within a few years. It is understood that removal of knotweed is a difficult task and may take many years and several control methods. Enhancement through knotweed removal is expected to generate 0.2 credits at a 5:1 ratio.

Future Credit Generation Potential in Phase 1A:

The Phase 1A Nooksack Delta Site is located on a prograding river delta. Based on historic sediment deposition levels and historic vegetation establishment and succession patterns, all or portions of the 462 acres of the site adjacent to the areas currently expected to generate wetland mitigation credits through the accomplishment of the applicable performance standards can reasonably be expected to change over time. In particular, the existing 178.1 acres of intertidal wetlands immediately "downstream" and adjacent to the reed canarygrass/yellow flag iris dominated areas can reasonably be expected to transition to shrub dominated and then to forest dominated over the coming decades. As the site evolves, the Sponsor reserves the right to seek additional enhancement credits for all or portions of the 462 acres of the site located adjacent to the current enhancement areas in recognition of the accomplishment of additional affirmative enhancement efforts. If these conditions evolve, additional documentation (e.g., a baseline conditions report; an enhancement plan; objectives and performance standards; credit generation and award schedule; establishment period monitoring, reporting, maintenance, and remedial action; and a long-term protection and management plan) for what may become Phase 1C of the Nooksack Delta Site will need to be developed and approved by the IRT.

D.2.2. Credit Award Schedule for Phase 1A Nooksack Delta Site

As described above, the Corps, in consultation with the IRT, will typically approve the award of credits to the Sponsor for sale, use, or other transfer once the performance standards described in Appendix C are achieved, as applicable. As detailed below, there are three general categories of activities that result in the award of credits: (A) initial release of administrative credits, (B) credit releases upon completion of specific treatment/enhancement measures, and (C) credit releases if monitoring activities document achievement of the performance standards detailed in Appendix C for Year 3, Year 5, Year 7, and Year 10 for each stage of the Phase 1A development. For convenience, these three types of credit releases are being called, "Administrative Credits", "Treatment Credits", and "Monitoring Credits" respectively. This nomenclature associated with credit award scheduling does not alter the definition of a "credit' presented in Appendix D.1.1.B.

A. As summarized in Table D.2, the number of "Administrative Credits" is equal to 15 percent of the total anticipated number of credits associated with Phase 1A of the Nooksack Delta Site (i.e., 126.5 credits). Once both of the performance standards associated with Objective 1 are achieved, the Corps, in consultation with the IRT, will release 19 "Administrative Credits" to the Sponsor.

B. As summarized in Table D.2, the number of "Treatment Credits" is equal to 20 percent of the total anticipated number of credits associated with Phase 1A of the Nooksack Delta Site. Once Performance Standards 2A (shrub patch establishment), 3A (English ivy removal), and 4A (conifer underplanting) are completed and approved, the Corps, in consultation with the IRT, will release an anticipated collective 25.3 "Treatment Credits" to the Sponsor.

   As shown in Table D.2 (tabulated along the right side), the number of potential credits associated with completing each of the performance standards is area-weighted. For example, since the wetland enhancement/treatment for the reed canarygrass/yellow flag iris areas represents 26.7 percent of the total treatment area in the Phase 1A site, 26.7 percent of the anticipated 25.3 "Treatment Credits", or 6.75 credits, are available for award upon the completion and approval of Performance Standard 2A. Similarly, since the conifer underplanting area represents 72.7 percent of the treatment area, 18.41 credits of the anticipated 25.3 collective "Treatment Credits" are available for award once Performance Standard 4A is achieved.

   Due to the large areal extent of the treatment areas in the Phase 1A Nooksack Delta Site, it is not practicable to complete all of the treatments associated with Performance Standards 2A, 3A, and 4A during a single year. As a result, the enhancement measures will be completed over multiple years or stages and treatment credits will be released annually based on the percentage of the total enhancement work completed. As summarized in Table D.2 (green shaded section), the Corps, in consultation with the IRT, will award "Treatment Credits" to the Sponsor annually based on the actual number of treated/enhanced acres associated with each performance standard that are completed, documented, and approved each year. For example, if during one year 31.5 acres of the 101.2 acres of reed canarygrass/yellow flag iris enhancement area is treated and the associated documentation submitted and approved, the Corps, in consultation with the

IRT, would release 2.11 credits ((31.6 acres ÷ 101.2 acres) x 6.75 credits) to the Sponsor that year. Similarly, if during one year 31.6 acres of reed canarygrass/yellow flag iris enhancements and 65.6 acres of conifer underplantings are completed and the associated documentation submitted and approved, the Corps, in consultation with the IRT, would release 6.49 credits ((31.6 acres ÷ 101.2 acres) x 6.75 credits + (65.6 acres ÷ 275.7 acres) x 18.41 credits) that year.

C. As summarized in Table D.2, the number of "Monitoring Credits" is equal to 65 percent of the total anticipated credits associated with Phase 1A of the Nooksack Delta Site. Once Performance Standards 2B through 2H, 3B through 3E, 4B through 4I, and 5A through 5D are completed and approved, the Corps, in consultation with the IRT, will release an anticipated collective 82.2 additional "Monitoring Credits" to the Sponsor.

   The "Monitoring Credits" are released based on performance standards defined for Year 3, Year 5, Year 7, and Year 10 of the bank establishment period (see Appendix C). As summarized in Table D.2, 20 percent of the "Monitoring Credits" will be released following completion of the Year 3 monitoring for each stage, 20 percent of the credits will be released following completion of the Year 5 monitoring for each stage, 15 percent of the credits will be released after the Year 7 monitoring for each stage, and 10 percent of the credits will be released after the Year 10 monitoring for each stage. Within each objective, approval of achievement of each performance standard must be obtained in the order prescribed.

   As shown in Table D.2 (tabulated along the right side), similar to the "Treatment Credits" the number of potential credits associated with completing the performance standards for each monitoring period (i.e., Year 3, Year 5, Year 7, Year 10) is area-weighted. For example, since the wetland enhancement/treatment for the reed canarygrass/yellow flag iris areas represents 26.7 percent of the total treatment area in the Phase 1A site, 26.7 percent of the anticipated 25.3 "Year 3 Monitoring Credits", or 6.75 credits, are available for award upon the completion of Performance Standard 2C. Similarly, since the conifer underplanting area represents 72.7 percent of the treatment area, and estimated 18.38 credits of the anticipated 25.3 "Year 3 Monitoring Credits" are available for award once Performance Standard 4C is achieved.

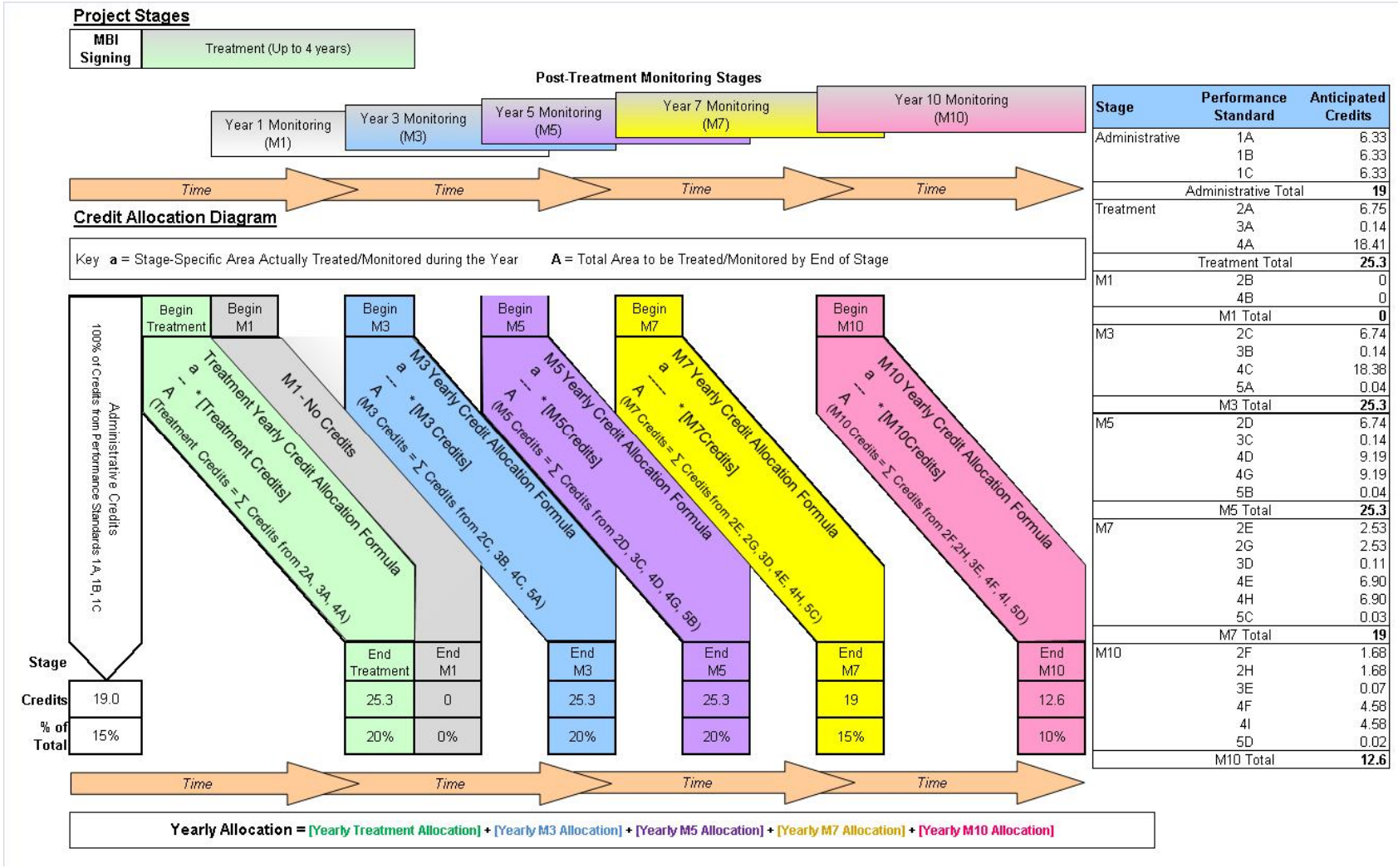
   As described above, Year 0 is the calendar year during which the as-built/as-planted drawings are approved in writing by the Corps, in consultation with the IRT. Year 1 is the first year of site monitoring after approval of the as-built/as-planted drawings and Year 3 is the third year of site monitoring. As noted above, due to the large areal extent of the treatment areas in the Phase 1A site, it is not practicable to complete all of the treatments associated with Performance Standards 2A, 3A, and 4A during a single year. As a result, the enhancement measures will be completed over multiple years or stages, which results in a different Year 0 and associated Year 3, Year 5, Year 7, and Year 10 for each stage of the bank development effort.

   Similar to the approach used to award "Treatment Credits", the Corps, in consultation with the IRT, will award "Monitoring Credits" to the Sponsor annually based on the actual number of acres that are approved as achieving the performance standard

applicable to a particular monitoring year. Because the treatments will occur in stages, the total number of credits released to the Sponsor during a given year by the Corps, in consultation with the IRT, is equal to the sum of the yearly "Treatment Credits" (if any remain) and any "Monitoring Credits" that are associated with performance standards that are completed, documented, and approved for the year.

Assuming that all of the treatments are completed within the first four years of bank establishment, the final monitoring credits will not be released before Year 14. As a result, under this assumption the establishment period for Phase 1A of the Nooksack Delta Site is expected to extend for at least 14 years. However, the establishment period could be longer or shorter depending on the planting schedule and the effectiveness of the treatments. The credit award schedule depicted in Table D.2 is intended to be flexible and to reflect the actual on-the-ground accomplishments each year.

Table D. 2. Credit Award Schedule for Phase 1A Nooksack Delta Site



Stage	Performance Standard	Anticipated Credits
Administrative	1A	6.33
	1B	6.33
	1C	6.33
	Administrative Total	**19**
Treatment	2A	6.75
	3A	0.14
	4A	18.41
	Treatment Total	**25.3**
M1	2B	0
	4B	0
	M1 Total	**0**
M3	2C	6.74
	3B	0.14
	4C	18.38
	5A	0.04
	M3 Total	**25.3**
M5	2D	6.74
	3C	0.14
	4D	9.19
	4G	9.19
	5B	0.04
	M5 Total	**25.3**
M7	2E	2.53
	2G	2.53
	3D	0.11
	4E	6.90
	4H	6.90
	5C	0.03
	M7 Total	**19**
M10	2F	1.68
	2H	1.68
	3E	0.07
	4F	4.58
	4I	4.58
	5D	0.02
	M10 Total	**12.6**

APPENDIX D.2 (b): Phase 1B – Nooksack Delta Site

A description of the credit generation, rationale, and credit award schedule for Phase 1B of the Nooksack Delta Site will be provided when this phase of the Bank is implemented.

APPENDIX D.3: Phase 2 – Blockhouse Site

A description of the credit generation, rationale, and credit award schedule for the Blockhouse Site (Phase 2) will be provided when this phase of the Bank is implemented.

APPENDIX D.4: Phase 3 – Lummi Delta Site

A description of the credit generation, rationale, and credit award schedule for the Lummi Delta Site (Phase 3) will be provided when this phase of the Bank is implemented.

APPENDIX E
PROCEDURES FOR USE OF MITIGATION BANK CREDITS AND DEBIT USE

APPENDIX E.1: All Phases

The Bank can be used to provide mitigation for wetland and buffer impacts within the Bank Service Area. The Bank can also provide mitigation for impacts to threatened or endangered species habitat in the Service Area if a habitat mitigation Bank feature is developed and approved by the IRT in the future. The procedures for providing mitigation credits for impacts to threatened or endangered species habitat are under development. Until these procedures are finalized and approved by the IRT in consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, mitigation credits from the Lummi Nation Wetland and Habitat Mitigation Bank will not be available for impacts to threatened or endangered species.

E.1.1. Service Area

A. The service area for the Bank is generally the Nooksack River watershed and certain coastal drainages in Watershed Resources Inventory Area 1 (WRIA 1) downstream from the confluence of the North Fork, Middle Fork, and South Fork Nooksack River (Figure E.1). A larger scale map showing the service area is included in the Resource Folder (Exhibit 12). 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. In addition to all freshwater waters of the U.S./Lummi Nation, the service area includes tidally influenced waters down to the elevation of Mean Lower Low Water (MLLW) along the edge of WRIA 1 from the Canadian border south to the southern boundary of the Oyster Creek drainage.

B. Service Area Rationale: The boundaries for this service area were drawn based on the Watershed Management Unit (WMU) drainage boundaries as shown in the 2005 WRIA 1 Watershed Management Plan (http://www.wria1project.whatcomcounty.org). The WRIA 1 Watershed Management Project developed and adopted a naming convention for delineating watersheds, the smallest size surface water delineation is called a “drainage”. The service area of the Bank contains the following WRIA 1 drainages: South Fork Anderson, North Fork Anderson, Lower Anderson, Scott, Kamm, Fishtrap (U.S. portion), Bertrand (U.S. portion), Schneider, Fourmile, Tenmile, Deer, Fazon, Silver, Wiser Lake/Cougar Creek, North Fork Dakota, South Fork Dakota, Haynie, Lower Dakota, Blaine, California, Semiahmoo, Point Roberts, Fingalson, Lake Terrell, Cherry Point, Sandy Point Jordan, Schell, Lummi River, Lummi River Delta, Lummi Peninsula West, Lummi Peninsula East, Portage Island, Lummi Island, Eliza Island, Nooksack River Channel, Nooksack River Delta, Fort Bellingham, Spring, Baker, McCormick, Upper Squalicum, Toad, Lower Squalicum, Whatcom, South Bellingham, Padden, Chuckanut, Fragrance Lake, Larrabee, and Oyster Creek.

The area defined by the lower elevation sub-basins in WRIA 1 was selected as the service area for the Lummi Nation Wetland and Habitat Mitigation Bank because it includes the landscape that drains to or is immediately adjacent to all three bank sites. Wildlife habitat and water quality improvement functions restored or enhanced by the Bank can offset losses of these functions that occur when wetlands are impacted in other parts of the watershed. Wildlife habitat restored or enhanced in the Lummi Nation WHMB will be available to many of the same bird and mammal species that inhabit wetlands upstream in the watershed and in the adjacent areas. 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 enhancement 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 influenced wetlands along the shoreline from the Canadian border south to near the mouth of the Skagit River are appropriately included in the Bank 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. 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 and adjacent watersheds.

C. The Bank may be used to compensate for permitted impacts outside of the approved service area if specifically approved by the appropriate agencies requiring mitigation and the Corps following consultation with the IRT, provided that the Corps, in consultation with the IRT, concludes that such mitigation would be practicable and environmentally preferable to other mitigation alternatives. As such, out-of-service-area impacts will only be allowed in special circumstances, which will be evaluated on a case-by-case basis (e.g., projects that span multiple basins such as transportation and utility corridors and pipelines, and settlement of enforcement actions).

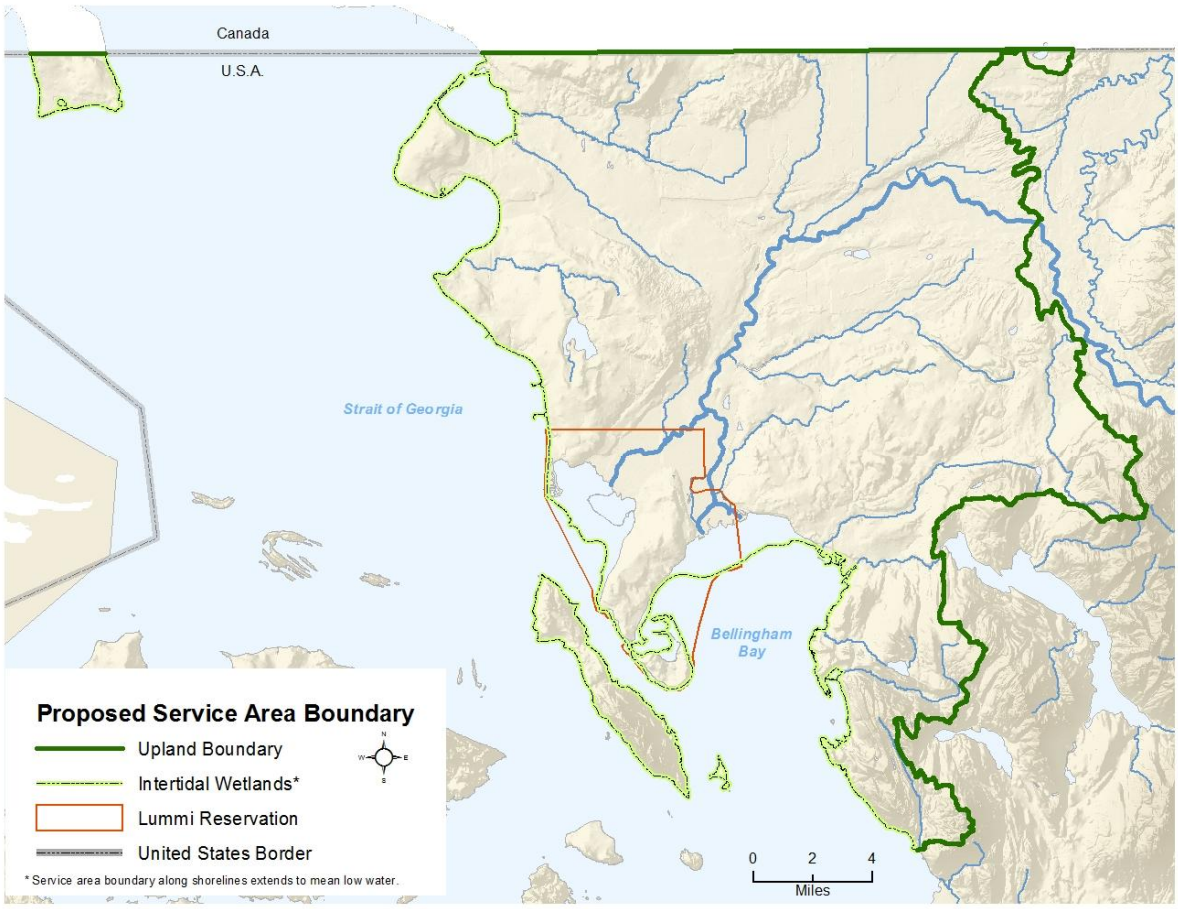


Figure E. 1. Service Area for the Lummi Nation WHMB

E.1.2. Credit-Debit Ratios

A. Bank credits may be used, subject to the approval of the regulatory agencies with jurisdiction over the impact projects to compensate for authorized permanent or temporary impacts, as well as to resolve enforcement or permit compliance actions such as replacing previously implemented project-specific mitigation that has partially or completely failed.

   Each credit transaction agreement that is associated with a permit must indicate the permit number of the impacting project, the number of universal credits transacted, and must expressly specify that the Sponsor, its successors and assigns assumes responsibility for accomplishment and maintenance of the transferee's compensatory mitigation requirements associated with the impacting project, upon completion of the credit transaction.

B. Table E.1 depicts the approximate number of Bank credits typically required by the IRT agencies to compensate for each unit of permanent loss of listed aquatic resource type and functional level. The actual number of Bank credits required to compensate for an adverse impact to aquatic resources in any particular situation depends on many factors

(e.g., whether the impact is permanent or temporary, size of the impact, location of the impacts, quality of the impacted aquatic resource) and will be determined on a case-by-case basis by the regulatory agencies authorizing the impact. Pursuant to the Lummi Administrative Regulation 17.06 (17 LAR 0.6), the wetland functional categories are based on the Washington State Wetland Rating System for Western Washington, revised (Ecology Publication No. 04-06-025). Units of loss are measured in acres for wetland and buffer impacts and may be measured in either acres or linear feet for stream and stream buffer impacts. Due to the variety and typically high level of functioning of Category I wetlands, compensation for impacts to these resources by Bank credits will be determined by the regulatory agencies on a case-by-case basis.

Table E. 1. Credit-Debit Ratios

Resource Impact	Bank Credits: Impact Acreage
Wetland, Category I	Case-by-Case
Wetland, Category II	1.2:1
Wetland, Category III	1:1
Wetland, Category IV	0.85:1

E.1.3. Procedures for Use of Mitigation Bank Credits

A. Use of Mitigation Bank Credits: Public and private proponents of activities regulated under Sections 401 and 404 of the Clean Water Act (33 U.S. Code §§ 1341, 1344), Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. Code § 403), the Lummi Water Resources Protection Code (Lummi Code of Laws Title 17), Washington State Water Pollution Control Act (Chapter 90.48, RCW), Shoreline Management Act (RCW 90.58), Growth Management Act (RCW 36.70A), Hydraulic Code (RCW 75.20), and other Federal, Tribal, State, and local authorities may be eligible to use the Bank as mitigation for unavoidable impacts. The Bank will be eligible to serve public and private end users by providing advance compensatory mitigation for authorized impacts to regulated areas that require mitigation and to settle enforcement claims.

B. An applicant seeking a permit for a project with adverse impacts to the aquatic environment and/or associated upland buffer within the service area must generally obtain the approval of each regulatory agency with jurisdiction over that project, in order to use the Bank as a source of compensatory mitigation. To receive approval to use the Bank, the applicant must demonstrate to the satisfaction of the pertinent regulatory agencies that the project complies with all applicable requirements related to alternatives and mitigation sequencing and that purchasing credits from the Bank for compensatory mitigation would be in the best interest of the environment. Specifically, a permit applicant must generally be able to demonstrate to the satisfaction of the involved regulatory agencies that:

- There is no practicable alternative to adversely impacting the water body, critical area, buffer, or other regulated area;

- All appropriate and practicable measures to minimize adverse impacts to the aquatic ecosystem have been considered and included in the project; and
- All appropriate and practicable on-site compensatory mitigation for unavoidable adverse impacts is included in the project.

It is solely the determination of the agencies permitting the project with adverse impacts as to whether a proposed use of Bank credits within the service area is appropriate and environmentally preferable to other mitigation alternatives.

C. Upon receiving permission to use credits from the Bank, the permittee must contact the Sponsor to ensure that credits are available. Upon completion of the transaction, the Sponsor will inform the permitting agencies of each completed transaction, via email or letter with an attached copy of the accounting ledger.

D. Other types of credit users may include, but are not necessarily limited to, purchases made that will not be associated with a particular project or impact (i.e., "good will" purchases), purchases made by natural resource stewards resulting from expenditures from in-lieu-fees (or similar type funds), and other conservation purposes.

E. The Sponsor may use the Bank site to provide compensatory mitigation to offset impacts to environmental elements other than aquatic resources. Such use shall result in no physical changes to the bank site unless approved by the Corps, in consultation with the IRT. The Sponsor must obtain approval from the Corps, following consultation with the IRT, prior to establishing currencies for any portion of the Bank other than the wetland mitigation credits that are established by Appendix D of this Instrument. Use of the Bank for compensatory mitigation for other environmental elements shall not conflict with the provisions of this Instrument.

E.1.4. Accounting Procedures

A. The Sponsor shall establish and maintain for inspection and reporting purposes a ledger of all credits that are awarded through the achievement of specified performance standards, as well as credits that are sold, used, or transferred. The Sponsor will record each credit withdrawal transaction that receives a permit with the Whatcom County Auditor, and submit a copy of the recorded transaction to the IRT within 30 days from the stamped registration date.

B. The ledger must follow the current ledger template approved by the Corps. The following information, at a minimum, will be recorded in the ledger for each transaction:
   (1) Date of transaction.
   (2) Number of credits transacted.
   (3) For credits awarded, reference the performance standard(s) to which the awarded credits correspond.
   (4) For credit sales/use/transfers, include the name, address, and telephone number of /purchaser/user/transferee; and include all of the following information that applies: permit number(s), permit issuance date, and name of the regulatory agencies issuing permits; location of the project for which the credits are being purchased/used/transferred; the size of the impact, and a brief description of the

project impacts requiring compensatory mitigation (e.g., nature, size, and quality of aquatic resources affected).

(5) For credits withdrawn from the ledger for reasons other than credit sale/use/transfer, include the specific reason for withdrawal.

(6) Bank credit balance after the award or transaction.

C. The Sponsor will provide an updated Bank ledger to the IRT each time credits are awarded, sold, used, transferred, or otherwise withdrawn. This must be provided within 30 days of any credit transaction. The Sponsor will also submit an annual ledger by February 1 of each year. The annual ledger must show a cumulative tabulation of all credit transactions at the Bank through December 31. This ledger will be submitted in conjunction with the monitoring reports until (1) all credits have been awarded and sold, used, or otherwise transferred; or (2) until the IRT has accepted the Sponsor's written certification that it has terminated all banking activity.

APPENDIX F
ESTABLISHMENT PERIOD MONITORING, REPORTING, MAINTENANCE, AND REMEDIAL ACTION

APPENDIX F.1: All Phases

F.1.1. Establishment Period Monitoring, Reporting, Maintenance, and Remedial Action

During the establishment period, the Sponsor shall monitor and report on the progress of the Bank toward achieving the goals, objectives, and performance standards established by these Appendices and take all actions directed by the Corps, following consultation with the IRT, to remediate any consideration that prevents a component of the Bank from achieving the goals, objectives, and performance standards of the Bank. In addition to the reporting requirements detailed below, the IRT may require regular construction update reports be submitted to document progression of the construction and any approved changes to project design. Specific monitoring and reporting methods for Phase 1A are presented below (Appendix F.2); specific monitoring and reporting methods for the subsequent/future phases of the Bank will be developed as part of the implementation of each phase and added to this Appendix.

F.1.1.1 As-Built Reports:

As-built reports (as-planted for Phase 1A) will be submitted to the IRT following completion of any construction activity and upon the completion of enhancement activities to verify planting and invasive weed control efforts. These reports will include a global positioning system (GPS) survey of enhancement areas, descriptions of planting, wetland and aquatic area boundaries, large woody debris placement, designated photo points, and other pertinent data to verify topography, hydrology, construction, invasive weed control measures, and plantings. Reports for Bank phases that include grading and/or hydrologic changes will also include a survey of constructed site topography, ground water monitoring well locations and water level results, staff gauges, and other pertinent data. As-built or as-planted reports will be submitted to each member of the IRT within 90 days of completing construction and/or enhancement activities for a given year, and must demonstrate compliance with Appendix B and any modifications to the Bank development plan and design, approved by the Corps prior to their construction or implementation, following consultation with the other members of the IRT. The as-built reports will also establish baseline conditions for future monitoring.

At a minimum, the following list of components should be included in the as-built/as-planted reports:

- Name and contact information for the parties responsible for the Bank construction site including the Bank Sponsor, engineers, and wetland professional on site during construction.
- Corps and Lummi Nation permit numbers, if applicable
- Dates when activities began and ended such as grading, removal of invasive plants, installing plants, and installing habitat features
- Photographs of the site as-built/as-planted conditions taken from photo stations (panoramic photographs are recommended)

- Description of any problems encountered and solutions implemented (with reasons for changes) during construction of the Bank site
- List of any follow-up actions needed with a schedule
- 11 x 17 maps of the Bank site showing:
    - Installed planting scheme – quantities, densities, sizes, approximate locations, and the sources of plant material
    - Locations of habitat features
    - Locations of permanent photo stations
    - Date when the maps were produced and, if applicable, when information was collected.

F.1.1.2 Establishment Period Monitoring Plan:

A performance monitoring program will be implemented to determine the degree of success of the mitigation effort during the establishment period. Monitoring will include periodic surveys and site evaluations to establish the foundation on which the Bank can demonstrate to the IRT that pertinent performance standards have been achieved and continue to be maintained. This plan describes the performance standards as certified in this mitigation bank instrument, the field methods and procedures that will track attainment of the performance standards, and the procedures for attaining quality assurance and quality control. The monitoring plan is designed to be as simple and quantitative as practicable. The monitoring efforts will evaluate and document the success of the performance standards – the performance standards dictate the data collection and analysis procedures defined in this plan. All monitoring will be conducted by qualified personnel. Specific monitoring plans will be developed and approved by the IRT for each phase of the bank development. The monitoring plan for Phase 1A is detailed in Appendix F.2.

F.1.1.3 Reports:

The Sponsor will prepare and submit annual monitoring reports, by February 1 of the following year, to each member of the IRT to inform the IRT of the status of Bank establishment and operation. Monitoring reports will be based on the guidance provided in Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332, dated April 10, 2008) and conform to the October 10, 2008 Monitoring Regulatory Guidance Letter (RGL) issued by the Seattle District of the Corps of Engineers and any supplements or amendments to these requirements. The schedule for full monitoring reports for each phase of the Bank development will be reduced to every other year following Year 5 for a particular phase unless the IRT disagrees that conditions within the enhancement areas are on a positive trajectory toward establishment of native vegetation. Off-year monitoring reporting will consist of a memorandum with attached photographs to update the IRT about site conditions. These reports will document Bank conditions and provide the supporting information required to document the attainment of goals, objectives, and performance standards, as a basis for a decision whether to award credits.

Each monitoring report will contain the following information:

(1) An overview of the current ecological condition of the Bank, including a survey of the vegetative and wildlife communities, effectiveness of the restoration and enhancement activities accomplished to date, and progress of the Bank in achieving the specific performance standards of the Bank. To provide data for evaluating progress towards

achievement of performance standards, vegetation transects will be established at selected locations within each phase of the Bank. Standard IRT-approved vegetation measures and techniques will be used to demonstrate whether performance standards are being met. Experience in the field may indicate that other performance monitoring methods would provide more useful information; the Corps, in consultation with the IRT, must approve in advance any changes in the means of gathering or reporting performance data. All monitoring will be conducted by qualified personnel.

(2) A detailed discussion about the likely cause and impact of any setback or failure that occurred and recommendations for future actions and strategies that might resolve those problems.

(3) Pertinent additional information on such aspects of the Bank as hydrology, soils, vegetation, fish and wildlife use of the area, recreational and scientific use of the Bank, and natural events such as disease, wildfire, and flooding that occurred.

(4) Explanations of the need for any contingency or remedial measures, and detailed proposals for their implementation.

(5) Photographs of the Bank taken from permanent locations that are accurately identified on the as-built or as-planted drawings. The photographs are intended to document the progress of each component of the Bank, as well as the Bank in general, toward achieving the objectives and performance standards of the Bank. Such photo-monitoring will include general vantage points around the margin of the Bank, vantage points within the Bank, and at specific monitoring locations such as transects and/or sampling points.

(6) Map showing where Field Visit Total Assessment and Transect Intercept Sampling Methods have been applied on the site.

F.1.1.4 Remedial Action during the Establishment Period of the Bank:

In the event that one or more components of the Bank do not achieve performance standards or comply with any other requirement of this instrument, the following sequence of remedial actions will be taken.

(1) If the monitoring reports or inspection by representatives of the IRT agencies indicate persistent failure to achieve and maintain the prescribed performance standards, the Sponsor will propose adaptive management actions to correct the shortcomings. A thorough analysis of wetland monitoring data and/or stream channel assessments may result in the identification of other factors, not identified in the performance standards or monitoring data, causing the project to fall short of its objectives. The Corps, following consultation with the IRT and the Sponsor, may also direct adaptive management actions if the Corps identifies a need for corrective action and no adaptive management plan acceptable to the IRT has been submitted within a reasonable period of time. The adaptive management plan shall specify the nature of further examination of areas for potential causes of failure and/or corrective action to be conducted, the schedule of completion for those activities, and a monitoring plan for assessing the effectiveness of the corrective action. The objective of the adaptive management plan shall be to attain the originally prescribed project objectives, either through achieving the original performance standards or through new standards subsequently developed based on evaluation of the site as it matures and it is assessed. The Sponsor shall also implement all mitigation that the Corps, following

consultation with the IRT, determines is reasonably necessary to compensate for those authorized impacts to the aquatic environment that have not been successfully redressed by the Bank pursuant to the requirements of this Instrument. If modified or replacement performance standards are proposed, the Sponsor may not initiate activities designed to achieve those replacement standards until those performance standards are approved by the IRT. During the period that a specific component of the Bank is out of compliance, the Corps, following consultation with the IRT, may direct that credits generated by that Bank component may not be sold, used, or otherwise transferred.

(2) If remedial actions taken by the Sponsor under the provisions of the preceding paragraph do not bring that performance standard of the Bank into compliance with the requirements of this Instrument, including any approved changes to the Instrument, the Sponsor may request approval to discontinue efforts to achieve one or more performance standards for the Bank. If the Corps, following consultation with the IRT, approves of the proposal to discontinue efforts to achieve one or more performance standards, they need not be accomplished but no additional credits may be awarded for those performance standard(s). At the discretion of the Corps, following consultation with the IRT, the Sponsor may also be released from future maintenance and monitoring obligations for those performance standard(s), provided that releasing the Sponsor from those obligations does not adversely affect the remainder of the Bank, or affect credits already sold, used, or transferred to date.

(3) If the Corps, following consultation with the IRT, determines that the failure of one or more performance standards of the Bank to comply with the requirements of this Instrument adversely affects the ability of the Bank to achieve its goals or objectives, or if the Sponsor does not make a reasonable effort to bring the Bank into compliance with this Instrument, the Corps, after consulting with the IRT, may terminate this Instrument and the operation of the Bank pursuant to Article IV.J.

F.1.1.5 Maintenance during the Establishment Period of the Bank:

General maintenance will be performed throughout the year to address conditions that may limit the success of the Bank and attainment of performance standards and objectives. The Sponsor is responsible for all site maintenance activities throughout the establishment period of the Bank. Maintenance activities will include, but are not limited to: vegetative maintenance (including replanting, repair of any areas subject to erosion, weed control around plantings, mowing, control of invasive species, control and discouragement of voles, beaver, and deer foraging on plantings) and general maintenance (including road and trail maintenance as necessary, clean-out of culverts, monitoring of the water control structures, and clean-up of trash and illegal solid waste dump sites).

To support efforts to achieve the Bank objectives, signage will be installed for all Bank site areas that are directly and readily accessible to the general public. At a minimum, signage will be placed at all primary vehicle and pedestrian access points to notify the public of the existence of the mitigation bank and that no actions that are contrary to the Bank objectives are allowed. The Bank site areas that are directly and readily accessible by the general public will also be periodically patrolled by the Lummi Police Department for signs of trespass and vandalism.

Maintenance will include reasonable actions to deter trespass and repair any vandalized Bank features. The Bank site areas that are readily accessible by vehicle or the general public are encompassed within the footprints of Phase 2 and Phase 3. No signage is planned for Phase 1A since all but the easternmost points of this site are only accessible by boat and the easternmost site is not accessible by road. In addition, signage regarding the Phase 1A Bank site is expected to result in more rather than less intrusions into the site as people seek to satisfy their curiosity about actions that are occurring on the site.

Appendix F.2 (a): Phase 1A – Nooksack Delta Site

This Monitoring and Adaptive Management Plan (MAMP) provides details on the monitoring, assessment, and maintenance of the Phase 1A Nooksack Delta Site. The results of the monitoring will be used to determine if performance standards are achieved and whether corrective actions are necessary. The goals, objectives, and performance standards for Phase 1A are detailed in Appendix C of the MBI. Documentation of the development of Phase 1A of the Bank and the progress made toward achieving Performance Standards will be provided by the methods described in this Phase 1A monitoring plan.

F.2.1 Establishment Period Monitoring, Reporting, Maintenance, and Remedial Action

During the establishment period, which as described in Appendix B and Appendix D is anticipated to extend from Year 0 through Year 14 (but may be extended or compressed depending on the rate that enhancement activities are accomplished), the Sponsor shall monitor and report on the progress of Phase 1A toward achieving the goals, objectives, and performance standards established by the Mitigation Banking Instrument (MBI) and take all actions directed by the IRT to remediate any consideration that prevents a component of the Bank from achieving the goals, objectives, and performance standards of the Bank. Vegetation monitoring will be conducted in late summer (August or September) for shrub plantings and autumn (October or November) for conifer plantings. Some of the enhancement actions will be staggered over an expected 4-year period; therefore, as described above the 10-year establishment period may extend from the first action year through at least 14 years in order to include a full 10-year establishment period for the area that will be enhanced last. Because of the staggered planting schedule and the resultant multi-year/multi-stage development plan for the Phase 1A site described in Appendix B and Appendix D, and the desire to have a Long-Term Maintenance and Management Plan for the site that can be consistently and efficiently implemented, the establishment period monitoring described below will continue for each of the earlier Bank development stages until the 10-year establishment period for the last stage is completed. As a result, assuming that all of the enhancement activities such as the invasive weed control and conifer underplanting are completed within the first four years, the establishment period monitoring protocols for Phase 1A will occur over a 14-year period. Procedures for as-planted reports, monitoring reports, and remedial actions are described below.

F.2.2. As-Planted Reports

As-planted drawings and associated reports will be submitted to the IRT following completion of enhancement activities to verify planting and weed control efforts in Phase 1A. These reports will include a global positioning system (GPS) survey of enhancement areas (reed canarygrass management and conifer underplanting), descriptions of plantings (including number, species and density), wetland and aquatic area boundaries, designated photographic documentation points, and other pertinent data to verify invasive weed management/removal and planting activities. As-planted plans for the shrub patches will also include the average diameter measurements of each of the shrub patches (5% of total) chosen at random to be used as sample plots for future monitoring. Three measurements (north-south, east-west, and northwest-southeast) will be made by measuring through the center of the patch and to the outer overhanging branches. The three measurements will be averaged for each patch.

The as-planted reports will establish baseline conditions for future monitoring. It is anticipated that as-planted reports will be submitted within 90 days of completion of the planting for a given year. As described in Appendix C and Appendix D, credit release associated with Year 0 will not be approved until as-planted plans are submitted and approved by the IRT.

F.2.3. Quantitative Methods

F.2.3.1 Knotweed Control:

Knotweed occurrences along the banks of the river channels in the Phase 1A Nooksack Delta Site were mapped in 2009 using a GPS and laser rangefinder from a boat. The number of knotweed occurrences identified in 2009 totaled 168 clumps (45.4 clumps per river mile). This baseline mapping will be revised based on site conditions observed during weed treatment actions during 2011. The area defined for this survey is within 15-feet of the riverbank and is shown on Figure A.10 of Appendix A and Figure B.1 of Appendix B. The location of each occurrence (clump) will also be marked in the field with a 4-foot stick of rebar or wood lathe with flagging tape and an identification number and mapped using a GPS. Alternatively, flagging tape and the identification number will be affixed to an adjacent tree or other relatively immobile nearby object. A database will be developed to track the status and treatment of the knotweed clumps. All stems within the equivalent of a 50 square foot area around a centrally located point will be considered part of the same clump. A total count of the number of knotweed clumps from 2011 will be reported in the Year 0 as-built report and used to compare with counts in later years (Year 3, 5, 7, and 10). The relative change in the number of knotweed clumps per river mile will be used to determine if performance standards are achieved. Mapping using a resource-grade GPS unit (Trimble GeoXT or better) will be conducted in late spring or early summer prior to the resumption of weed removal efforts for that year.

F.2.3.2 Reed Canarygrass, Yellow Flag Iris Control and Native Shrub Plantings (willow stakes):

Monitoring of weed management/shrub planting patches will include: visual estimates of shrub cover within each patch, measurements of average patch diameter, and photographs of vegetation development. Monitoring will be conducted within the "shrub patches" in late summer during Year 1 and will be repeated in Years 3, 5, 7, and 10 for each stage of the bank development. Monitoring will be conducted in a minimum of 5 percent of the 20-foot-diameter treatment patches planted in a particular year. The monitored patches will be chosen at random during Year 0 using the as-planted plans and a random numbers table. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, the agreed-to acceptable standard error. Sample size, between-plot variability and/or sample plot configuration may be adjusted to achieve the acceptable standard error.

Shrub Cover: Visual estimates of percent cover of native shrubs will be conducted within the 20-foot diameter "shrub patches" by two observers. The observers will calibrate their estimates using at least 5 patches; the estimate of percent cover reported will be the consensus determination of the two observers. Sampling areas will include only the areas within the active invasive weed management areas: "shrub patches". Cover estimates for the entire 20-foot diameter patch will be made for each of the selected patches while standing in the center of the

patch during the earlier years and then from the exterior of the patch in future years if the patch center is not accessible due to shrub density.

Patch Expansion: Expansion of the patch size will be monitored by measuring the average diameter of the patches selected for monitoring performance. As with the Year 0 as-built measurements, three measurements (north-south, east-west, and northwest-southeast) will be made at each of the "shrub patches" chosen for monitoring by measuring through the center of the patch and to the outer overhanging branches. The three measurements will be averaged for each patch.

Site Photographs: Five photographs will be taken at each of the "shrub patches" chosen for monitoring. Unless precluded by dense shrub growth, photographs will be taken from the approximate center point of the patch, in each of the four cardinal directions. A fifth photo will be taken of the patch while standing near the north edge facing south.

F.2.3.3 English Ivy Control:

Visual estimates of percent cover of English ivy will be conducted at sample plots along 200 foot transects oriented perpendicular to the waters edge within the English ivy infested area during Year 0 (2011). Vegetation cover data will also be collected along transects using line intercept techniques. Vegetation monitoring will be conducted during late summer (August or September) and will be repeated in Years 1, 3, 5, 7, and 10.

A baseline transect will be established running close to and parallel with the river channel along this treatment area. Five sample transects will begin on the baseline and extend perpendicular from the baseline in a northerly direction for 200 feet. The start point for each sample transect will be established at random using a random numbers table. The location of each transect will be marked in the field with a 4-foot stick of rebar or wood lathe with flagging tape and an identification number and mapped using a GPS. Five sample plot locations will be chosen at random along each of the sample transects. Sample plots will be 20 feet in diameter and the center will be located ten feet to the west of the sample transect. A visual estimate of English ivy cover (and any other invasive weed) will be made for the entire area of the 20-foot diameter sample plot. In addition, line intercept methods will be used to measure percent English ivy cover along the entire 200 foot length of each of the sample transects. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, what an acceptable standard error is. Sample size, between-plot variability and/or sample plot configuration may be adjusted to achieve an acceptable standard error.

F.2.3.4 Conifer Underplanting:

Monitoring of conifer underplanting areas will be conducted in the fall season (October or November) when deciduous shrubs have begun to drop leaves, which should aid visibility in the understory of the forest and obtaining satellite signals for the GPS unit. Observations along permanent transects will be used to monitor the density, health, and height of the conifers planted in the existing forested areas.

Baseline transects will be established in each of the planting areas running near to and parallel with the nearest river channel or edge of planting area. The baseline transects will be surveyed with a GPS and the endpoints marked in the field with PVC pipe or wood lathe and flagging tape. Sample transects will be established at random start locations using a random numbers table along the baseline transect, and extend perpendicular to the baseline across the entire planting area. The length of transects will vary from 100 to 1,000 feet depending on the width of the planting area. The alignment of the transects will be surveyed with a GPS, and start and end points will be marked with PVC pipe or wood lathe and flagging tape. The locations of the transects or plots may change if the landscape changes due to flood events. Any such changes will be identified in the annual monitoring reports and new transects or plots established nearby.

"Belt" transects six feet wide will be established along each transect line. As described previously, due to the areal extent of the treatment area, it is not practicable to perform the conifer underplanting treatment throughout the entire site in one year. It is anticipated the four years will be required to complete the underplanting effort. The number of sample transects established in each area will be sufficient to sample a minimum of 5 percent of the area planted during a given year. For example, an estimated 65.6 acres of the 275.7-acre conifer underplanting area will be planted in the first year, therefore 3.3 acres of sample belt transects (23,958 linear feet) would be established to monitor the area planted the first year. The variability in the data will be calculated during initial monitoring and submitted to the IRT for review. An acceptable standard error will be negotiated between the IRT and the Lummi Nation. The Corps, in consultation with the IRT, will approve, in writing, what an acceptable standard error is. Sample size, between-plot variability and/or sample plot configuration or shape may be adjusted to achieve an acceptable standard error as part of the negotiation between the IRT and the Lummi Nation.

Within the belt transect (3 feet on both sides of the sample transect line) all living conifers will be counted and measured for height (rounded up to the nearest 1\4 foot). Notes will also be taken on the general health and vigor of each tree. Sampling will be conducted in Years 1, 3, 5, 7, and 10 to obtain a measure of tree density and average height. Density and average height will be calculated for each transect and for the overall planting area. The overall planting area density and average height will be compared with performance standards. Photographs will be taken looking down transects from the baseline, and permanent photopoints will be established for representative trees so that inter-annual comparisons of the conditions of representative trees can be made.

F.2.4. Qualitative Methods

Photographic documentation points ("photopoints") will be established throughout the wetland enhancement areas to document changes in vegetation cover over time. Locations for photopoints will be surveyed with a resource grade GPS unit (Trimble GeoXT or better) and will be shown on as-planted drawings developed during Year 0 for each stage of the site development effort. For the purposes of enhancement areas in Phase 1A, as-planted drawings will be plan view sketches based on GPS mapping of enhancement areas. Notes will be taken on areas outside of the sample plots and transects regarding general invasive weed cover estimates, native plantings cover, and observed wildlife use.

High-resolution aerial photographs will be taken of the native shrub planting areas in the final Year 10 (expected to be the year 2025 due to the staggered planting stages) and compared to existing conditions aerial photographs taken in 2010. The photographs will be used to verify vegetation establishment on a larger scale.

F.2.5. Monitoring Reports

As described in Section F.1.1.3, monitoring results will be reported in annual monitoring reports provided to each member of the IRT by February 1 of the following year. The monitoring and reporting schedule for Phase 1A – Nooksack Delta Site is summarized in Table F.1.

Table F. 1. Phase 1A Monitoring and Reporting Schedule

Action	Year[1]										
	0	1	2	3	4	5	6	7	8	9	10
Monitor Reed Canarygrass and Yellow Flag Iris and Shrub Plantings	x[2]	x		x		x		x			x
English Ivy	x[2]	x		x		x		x			x
Monitor Knotweed	x[2]	x	x	x	x	x	x	x	x	x	x
Monitor Conifer Underplantings	x[2]	x		x		x		x			x
Monitoring Reports	As-planted report[2]	x	x	x	x	x		x			x

[1] Monitoring and reporting will be conducted for 10 years for each stage of the Bank development beginning with Year 0 for each treatment area completed. Treatment in all areas is expected to take 4 years, therefore the overall schedule will extend for at least 14 years. As described below, monitoring reports for the earlier stages of the Phase 1A site development will continue beyond Year 10 until Year 10 is reached for the latest planting stage.

[2] Documentation of enhancement actions.

F.2.6. Corrective Actions

F.2.6.1 Invasive Weed Control Areas:

If invasive weed cover estimates do not meet the performance standards identified in Appendix C.2 (a) in any given monitoring year, a biologist and/or plant ecologist will conduct a site assessment to attempt to determine the cause for the deficiency. The assessment team will review the methods used and consider other methods for invasive weed control. A revised weed control plan will be developed and must be approved by the Corps, in consultation with the IRT, and implemented in the areas that do not meet performance standards.

F.2.6.2 Low Plant Survival in Conifer Underplanting Areas:

If plant survival in the conifer underplanting area does not meet performance standards, a biologist and/or plant ecologist will conduct a site assessment to determine the cause of the deficiency. If the cause is determined to be due to inferior planting materials, additional plantings will be conducted within the same planting area. If it is determined that low survival was due to other factors such as planting technique, weather conditions, or flood events following planting, or inferior planting medium, a revised planting plan will be developed and

must be approved by the Corps, in consultation with the IRT. The revised planting plan will include actions to account for the conditions suspected to being the cause of the low plant survival and ensure planting success. The species, location, and specific planting methods will be established based on information gathered during the site assessment.

F.2.7 General Site Maintenance

Solid waste management in the Phase 1A Nooksack Delta Site bank is a challenge since almost all garbage thrown into the Nooksack River or that flows into the river during flood events from its headwaters, its tributaries, and all locations downstream ends up flowing into the delta. Similarly, garbage that makes its way into Bellingham Bay can also be deposited within the Phase 1A site. It is noted that the boat launch sites located on both sides of the Nooksack River are subject to illegal solid waste dumping and resultant regular solid waste clean-up activities. Signs have been posted discouraging illegal dumping at these locations and gates have also been installed. These two areas are not within the boundaries of the Phase 1A site but, just like the rest of the river, are upstream from the site so that illegal dumping at these locations can easily result in the dumped material flowing into the Phase 1A site. However, since almost the entire Phase 1A site is not accessible by land and there is no vehicle access, illegal dumping within the site itself is not believed to be a major challenge. The primary solid waste dumping within the site boundaries occurs during the fishing season. Within 30 days following the closure of the river fishing season each year, the river channels will be patrolled and derelict fishing gear and other solid wastes will be removed and transported for disposal at nearby transfer stations. Efforts will be made to conduct this clean-up patrol prior to a flood event but it is possible that a flood event could occur before the close of the riverine fishing areas. The weight tickets from the transfer station will be maintained on file and the quantity of solid wastes removed documented in the annual monitoring report.

APPENDIX F.2 (b): Phase 1B – Nooksack Delta Site

The Monitoring and Adaptive Management Plan (MAMP) that will provide details on the monitoring, assessment, and maintenance of Phase 1B of the Nooksack Delta Site will be provided when this phase of the Bank is implemented.

APPENDIX F.3: Phase 2 – Blockhouse Site

The Monitoring and Adaptive Management Plan (MAMP) that will provide details on the monitoring, assessment, and maintenance of the Blockhouse Site (Phase 2) will be provided when this phase of the Bank is implemented.

APPENDIX F.4: Phase 3 – Lummi Delta Site

The Monitoring and Adaptive Management Plan (MAMP) that will provide details on the monitoring, assessment, and maintenance of the Lummi Delta Site (Phase 3) will be provided when this phase of the Bank is implemented.

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APPENDIX G
LONG-TERM PROTECTION AND MANAGEMENT

APPENDIX G.1: All Phases

A perpetual conservation easement will be established with a disinterested third party for each phase of the Bank. The Conservation Easement for the Phase 1A Nooksack Delta Site is included as Exhibit 13 in the Resource Folder.

G.1.1. Conservation Easement

A. The Sponsor will ensure, pursuant to Article III.D. of this Instrument, that an appropriate conservation easement is granted and recorded dedicating in perpetuity the property constituting the Bank. The conservation easement included in the Resource Folder (Exhibit 13) will dedicate in perpetuity the property constituting the Nooksack Delta Site Phase 1A. A similar conservation easement will be developed for each phase of the Bank that is to be created, restored, or enhanced for credit. The conservation easement(s) must be approved by the Corps, in consultation with the IRT, and shall be recorded with the Lummi Nation Realty Division, with Whatcom County, and with and the United States Department of Interior Title Plant. A copy of the recorded conservation easement shall be provided to all members of the IRT. The conservation easement shall reflect that it may not be removed, modified, or transferred without written approval of the Corps, in consultation with the IRT. The Corps may consider any alteration or rescission of any conservation easement a default of the Sponsor's obligation under this Instrument and may institute appropriate action pursuant to Article IV.J. Although the Sponsor has no intention of transferring title or any portion of ownership interest in the Bank real property to another party. If these conditions change in the future, the Sponsor shall provide no less than a 60-day written notice to the IRT of any transfer of fee title or any portion of the ownership interest in the Bank real property to another party. Conveyance of any interest in the property shall be subject to this conservation easement. Use prohibitions reflected in the easement will preclude the site from being used for activities that would be incompatible with the establishment and operation of the Bank. All restrictions shall be granted in perpetuity without encumbrances or other reservations, except those encumbrances or reservations (e.g., retention of recreation and privileges by the landowners and their guests) approved by the Corps, in consultation with the IRT, and not adversely affecting the ecological viability of the Bank. Any portion of the site not encumbered by the conservation easement will not be credited for use in the Bank.

B. The conservation easement shall provide that all structures, facilities, and improvements within the Bank, including roads, trails and fences, that are merely incidental to the functionality of the mitigation site but are necessary to the Bank management and maintenance activities, shall be maintained by the site owner for as long as it is necessary to serve the needs of long-term management and maintenance. All structures, facilities, and improvements that directly and substantially contribute to the functionality of the mitigation site will be included within the responsibilities delineated in the Long-Term Management and Maintenance Plan.

G.1.2. Long-Term Management and Maintenance Plan

A. The Sponsor is responsible for ensuring that a Long-Term Management and Maintenance Plan is developed and implemented to protect and maintain in perpetuity the aquatic functions and values of the Bank site. The plan must be approved by the Corps, following consultation with the IRT, prior to the termination of the establishment period of the Bank. Once the establishment period of the Bank has terminated pursuant to Article IV.K. of this Instrument, the Sponsor will assume responsibility for implementing the Long-Term Management and Maintenance Plan, as provided in Article IV.M. of this Instrument.

B. To gain IRT approval, the Long-Term Management and Maintenance Plan will consist of enumerated objectives. The Bank will document that it is achieving each guideline or objective by submitting status reports to the IRT on a schedule approved by the IRT. A primary goal of the Bank is to create a self-sustaining natural aquatic system that achieves the intended level of aquatic ecosystem functionality with minimal human intervention, including long-term site maintenance. As such, natural changes to the vegetative community, other than changes caused by noxious weeds, that occur after all Bank performance standards have been met are not expected to require remediation.

C. The Long-Term Management and Maintenance Plan will include those elements necessary to provide long-term protection for the aquatic ecosystem and habitat resources of the Bank site. The specific elements of the Plan must be tailored to meet the specific protection needs of the site. At minimum, the IRT will likely find the following core elements to be necessary for inclusion in the Long-Term Management and Maintenance Plan. The particular characteristics of the Bank site at the end of the establishment period may necessitate including other elements not specified below, that are needed to protect the ecosystem resources present at the Bank.
   (1) Periodically patrol the Bank site for signs of trespass and vandalism. Maintenance will include reasonable actions to deter trespass and repair vandalized Bank features.
   (2) Monitor the condition of structural elements and facilities of the Bank site such as signage, fencing, roads, and trails. It is noted that no signage, fencing, or roads are anticipated to be included in the Nooksack Delta Phase 1A site. The Long-Term Management and Maintenance Plan will include provisions to maintain and repair these improvements as necessary to achieve the objectives and functional performance goals of the Bank and comply with the provisions of the conservation easement. Improvements that are no longer needed to facilitate or protect the ecological function of the Bank site may be removed or abandoned if consistent with the terms and conditions of the conservation easement.
   (3) Inspect the Bank site at least twice annually to locate any recurrence of knotweed, purple loosestrife, and English ivy. Any plant of these species, designated in the areas depicted on Figure B.1, discovered on the Bank site will be eradicated. The IRT anticipates that this long-term control will involve identifying and eradicating a relatively small number of recurrences each year. In the event the Corps, in consultation with the IRT, determines that the watershed within which the Bank is located becomes infested with these species in the future, so that their effective

control on the Bank site is either no longer practicable or unreasonably expensive, the IRT will consider appropriate changes to the Long-Term Maintenance and Management Plan.

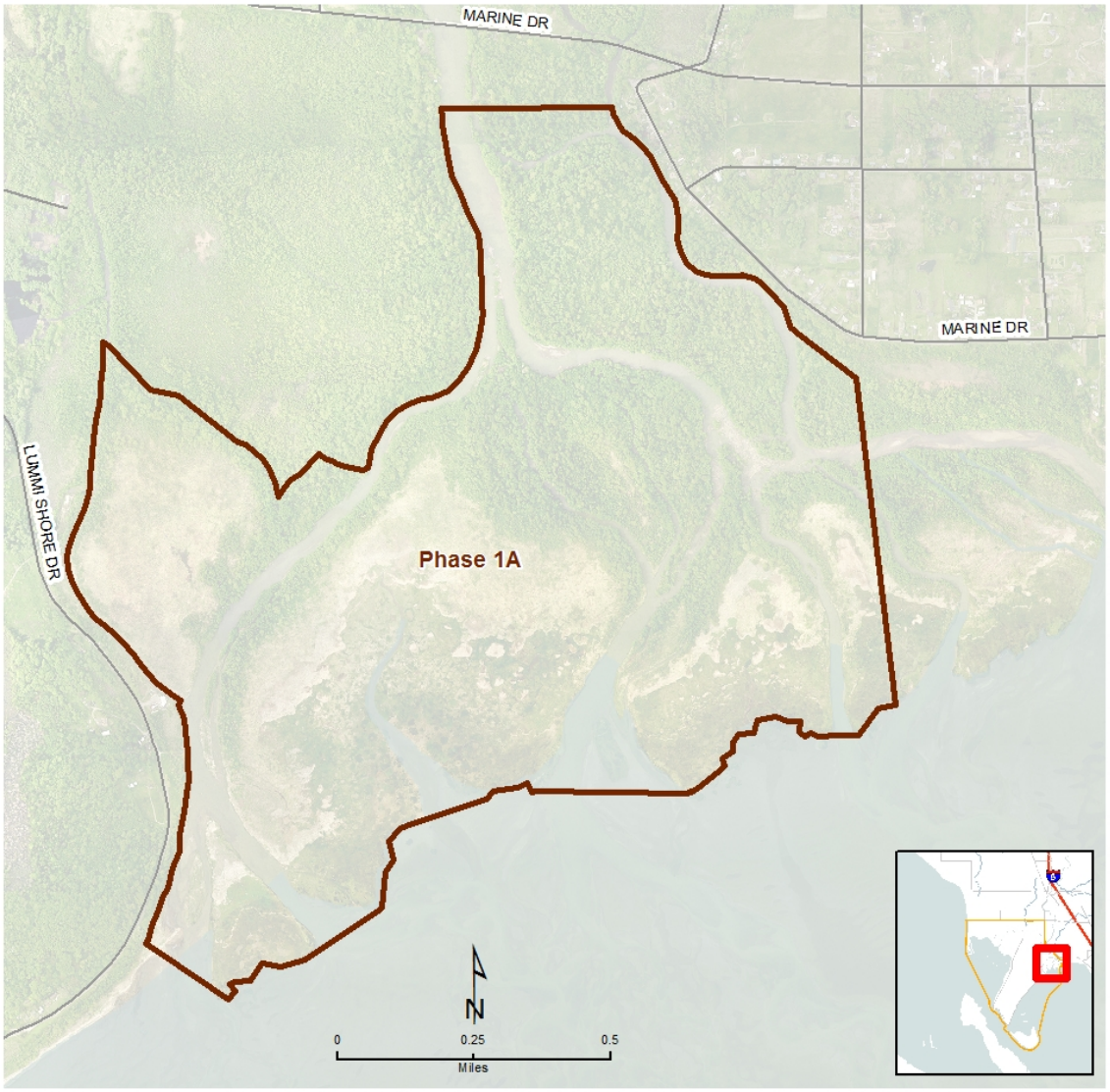
D. The Sponsor or assignee, as the owner of the Bank, will retain responsibility for controlling noxious weeds pursuant to all applicable requirements in force at that time. These obligations are imposed on the owner of the Bank site independently of this Instrument, and are not subject to oversight and verification by the IRT. Noxious weed control measures may include mechanical vegetation control, herbicide treatments, temporary plantings, and water regime control.

Exhibit 1

Legal Description – Nooksack Delta Site Phase 1A

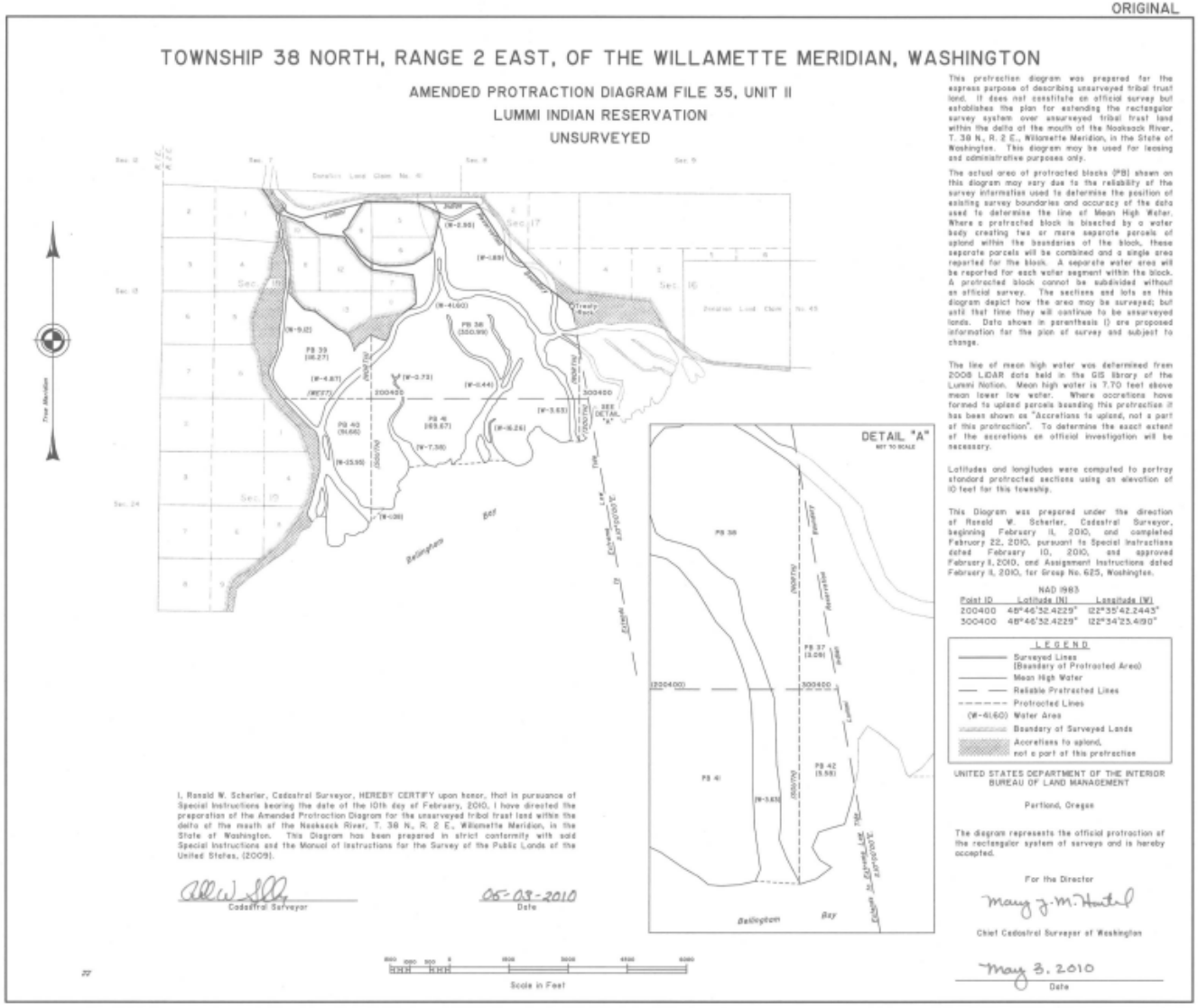
EXHIBIT 1. Legal Description – Nooksack Delta Site Phase 1A

The legal description of the protected property is set forth below in the form of a Title Status Report prepared by the Bureau of Indian Affairs based on an Amended Protraction Diagram prepared by the Bureau of Land Management. The Phase 1A site of the Lummi Nation Wetland and Habitat Mitigation Bank is wholly contained within the Amended Protraction Diagram. However, the Phase 1A site does not include portions of the Amended Protraction Diagram located in the northwest quarter of Section 17 (Protraction Block 38) on the west side of the Nooksack River or portions of the Amended Protraction Diagram located in the northeast quarter of Section 18 (Protraction Block 39). These two excluded areas comprise approximately 22 acres.



Lummi Nation Wetland and Habitat Mitigation Bank Phase 1A

ORIGINAL

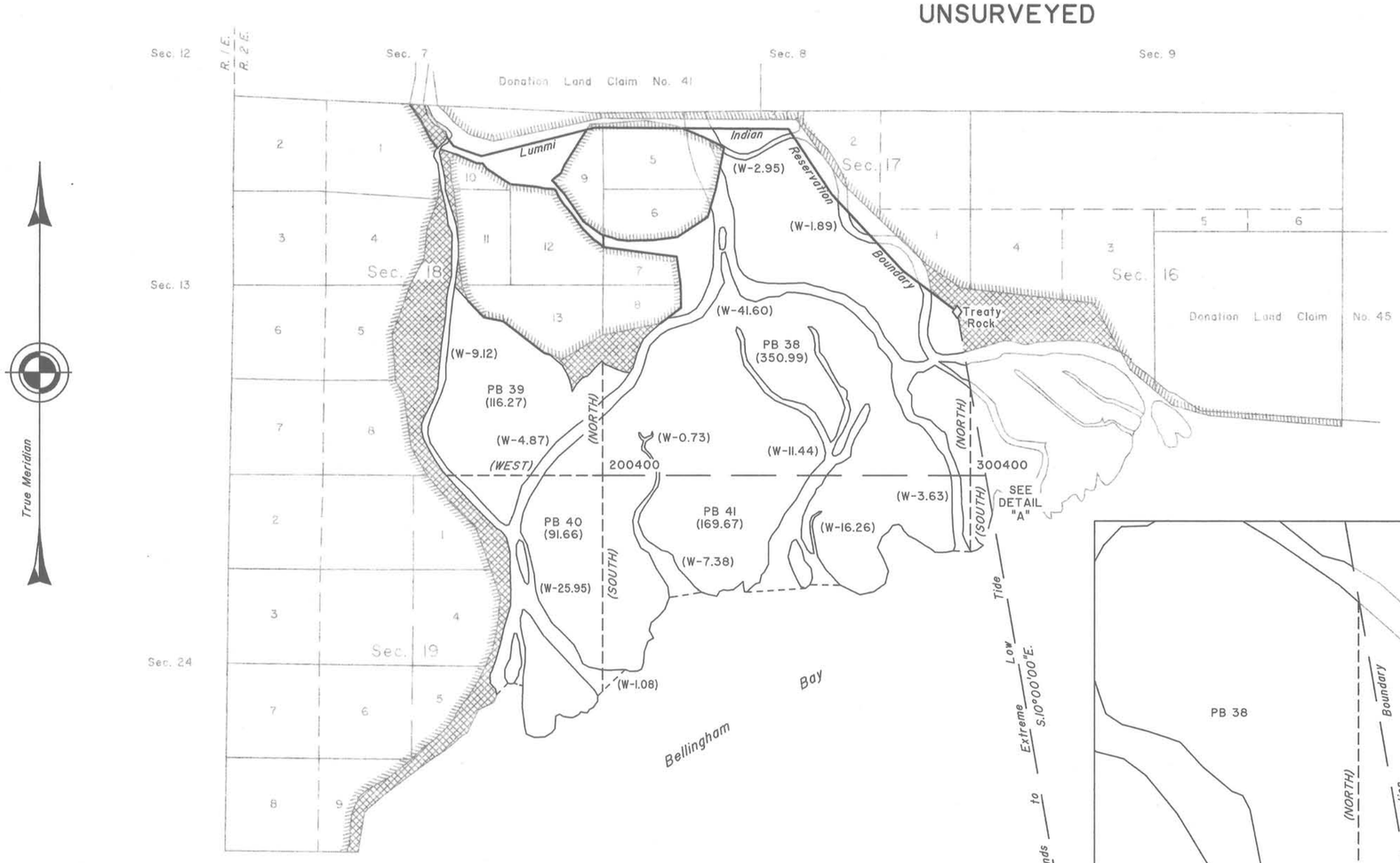


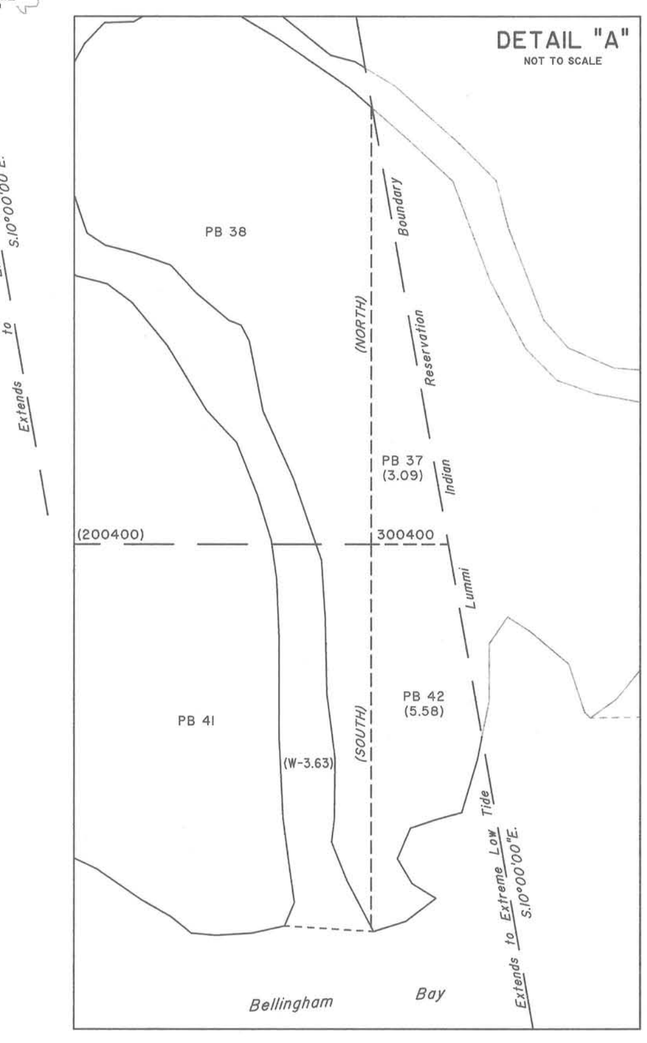
Amended Protraction Diagram (please see enlarged version in pocket)

ORIGINAL

TOWNSHIP 38 NORTH, RANGE 2 EAST, OF THE WILLAMETTE MERIDIAN, WASHINGTON

AMENDED PROTRACTION DIAGRAM FILE 35, UNIT II
LUMMI INDIAN RESERVATION
UNSURVEYED





This protraction diagram was prepared for the express purpose of describing unsurveyed tribal trust land. It does not constitute an official survey but establishes the plan for extending the rectangular survey system over unsurveyed tribal trust land within the delta at the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This diagram may be used for leasing and administrative purposes only.

The actual area of protracted blocks (PB) shown on this diagram may vary due to the reliability of the survey information used to determine the position of existing survey boundaries and accuracy of the data used to determine the line of Mean High Water. Where a protracted block is bisected by a water body creating two or more separate parcels of upland within the boundaries of the block, these separate parcels will be combined and a single area reported for the block. A separate water area will be reported for each water segment within the block. A protracted block cannot be subdivided without an official survey. The sections and lots on this diagram depict how the area may be surveyed; but until that time they will continue to be unsurveyed lands. Data shown in parenthesis () are proposed information for the plan of survey and subject to change.

The line of mean high water was determined from 2008 LiDAR data held in the GIS library of the Lummi Nation. Mean high water is 7.70 feet above mean lower low water. Where accretions have formed to upland parcels bounding this protraction it has been shown as "Accretions to upland, not a part of this protraction". To determine the exact extent of the accretions an official investigation will be necessary.

Latitudes and longitudes were computed to portray standard protracted sections using an elevation of 10 feet for this township.

This Diagram was prepared under the direction of Ronald W. Scherler, Cadastral Surveyor, beginning February 11, 2010, and completed February 22, 2010, pursuant to Special Instructions dated February 10, 2010, and approved February 11, 2010, and Assignment Instructions dated February 11, 2010, for Group No. 625, Washington.

NAD 1983

Point ID	Latitude (N)	Longitude (W)
200400	48°46'32.4229"	122°35'42.2443"
300400	48°46'32.4229"	122°34'23.4190"

LEGEND

- Surveyed Lines (Boundary of Protracted Area)
- Mean High Water
- Reliable Protracted Lines
- Protracted Lines
- (W-41.60) Water Area
- Boundary of Surveyed Lands
- Accretions to upland, not a part of this protraction

I, Ronald W. Scherler, Cadastral Surveyor, HEREBY CERTIFY upon honor, that in pursuance of Special Instructions bearing the date of the 10th day of February, 2010, I have directed the preparation of the Amended Protraction Diagram for the unsurveyed tribal trust land within the delta at the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This Diagram has been prepared in strict conformity with said Special Instructions and the Manual of Instructions for the Survey of the Public Lands of the United States, (2009).

Ronald W. Scherler
Cadastral Surveyor

05-03-2010
Date

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Portland, Oregon

The diagram represents the official protraction of the rectangular system of surveys and is hereby accepted.

For the Director

Mary J. M. Hunthal

Chief Cadastral Surveyor of Washington

May 3, 2010
Date

1500 1000 500 0 1500 3000 4500 6000
Scale in Feet

JJ

OFFICIALLY FILED:

Exhibit 2

Baseline Vegetation Conditions
Nooksack Delta Site Phase 1A

Lummi Nation Wetland and Habitat Mitigation Bank

Baseline Vegetation Conditions
Nooksack Delta Site Phase 1A

December 2010

Prepared by



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1.0. Introduction

The Lummi Nation is in the process of establishing a wetland and habitat mitigation bank on the Lummi Indian Reservation (Reservation). The Lummi Wetland and Habitat Mitigation Bank (WHMB) will be implemented in four phases. The first phase (Phase 1A) is located on the Nooksack Delta Site and consists of 942 acres of accreted land at the mouth of the Nooksack River where it meets Bellingham Bay. The site is bound on the north by a forested parcel along Marine Drive and Phase 1B of the Lummi WHMB, on the east by the town of Marietta, on the west by a distributary channel of the Nooksack River known as Kwina Slough, and on the south by Bellingham Bay (Figure 1). The Nooksack River distributary channels flow through the site and discharge to the marine waters of Bellingham Bay. Phase 1A lies within Township 38N, Range 2E, Sections 17, 18, 19, and 20, W.M. Additional details on the site boundaries and legal description can be found in the Mitigation Bank Instrument (MBI).

The purpose of this baseline conditions report is to describe existing conditions on the site by defining plant associations and refining the wetland determination conducted in 2004. Knowledge of existing site conditions will be used to inform the enhancement design and as a tool to evaluate the performance of wetland mitigation actions on the site. Enhancement will include underplanting with conifers and weed removal and control. An improved understanding of existing conditions will help to direct the underplanting and weed control efforts to the most appropriate areas.

2.0. Methods

Wetlands within the entire Nooksack Delta Site (Phase 1A and Phase 1B) were delineated in 2004 based on data collected at more than 39 sample plots along five north-south transects. The results of the 2004 delineation showed that most of the area is wetland and that there are a few areas on the natural levees along some portions of the river channels that were upland. Twenty-six (26) additional data plots were established in 2010 to further describe wetland conditions within Phase 1A of the Nooksack Delta Site. The 2010 data plot locations were chosen to provide information in areas that were not covered in 2004 and to update and confirm the description of the baseline site conditions. The methods used for recording data in 2010 follow the U.S. Army Corps of Engineers Regional Supplement to the Wetland Delineation Manual for Western Mountains, Valleys and Coastal Regions, Version 2 (Appendix A).

Vegetation data were recorded at all of the data plot locations but wetland determinations were made at only a subset of the data plots. During August 2010, wetland determinations were made at data plots located in areas that appeared to be slightly higher in elevation (e.g., along natural river levees) or where soil appeared relatively well drained. Field forms for the 26 data plot locations visited during 2010 are included in Appendix A. The field forms and location maps for the 39 sample plots established during 2004 are included as Exhibit 3 of the MBI.

Wetland classes for the Nooksack Delta Site Phase 1A area were estimated using the field plot data and high resolution (6-inch) aerial photography. Using ArcGIS Version 8, a wetland classification map of the Nooksack Delta Site Phase 1A area was developed by superimposing wetland type over a 6-inch resolution 2004 aerial photograph (Figure 2). Vegetation, hydrology, and soil data (wetland delineation plots) were recorded in the spring, summer, and fall of 2004 and also in August 2010. A function assessment of the wetlands was conducted in 2004 and the results of this assessment are summarized in Appendix A of the MBI. The function assessment work sheets are included as Exhibit 3 of the MBI.

Information on vegetation cover within the Nooksack Delta Site collected during the 2004 wetland delineation and during a 3-day site assessment of the Phase 1A area in August 2010 was used to define plant associations. Twenty-six additional vegetation plots were established during August 2010 within what were judged based on aerial photographic interpretation to be distinctly different vegetation communities. High-resolution (6-inch resolution) aerial photographs show distinct differences in the vegetation cover, reflecting variation in plant composition and height. Vegetation plots were 10 meters in diameter. The completed field forms are included in Appendix A and the results summarized in tabular form in Appendix B. All plant species within the plots were identified and cover was estimated visually. Photographs were taken at each of the data plots and representative photographs of the different plant associations are presented in Appendix C. Additional information collected in areas outside of formal data plots was also used to delineate plant association boundaries.

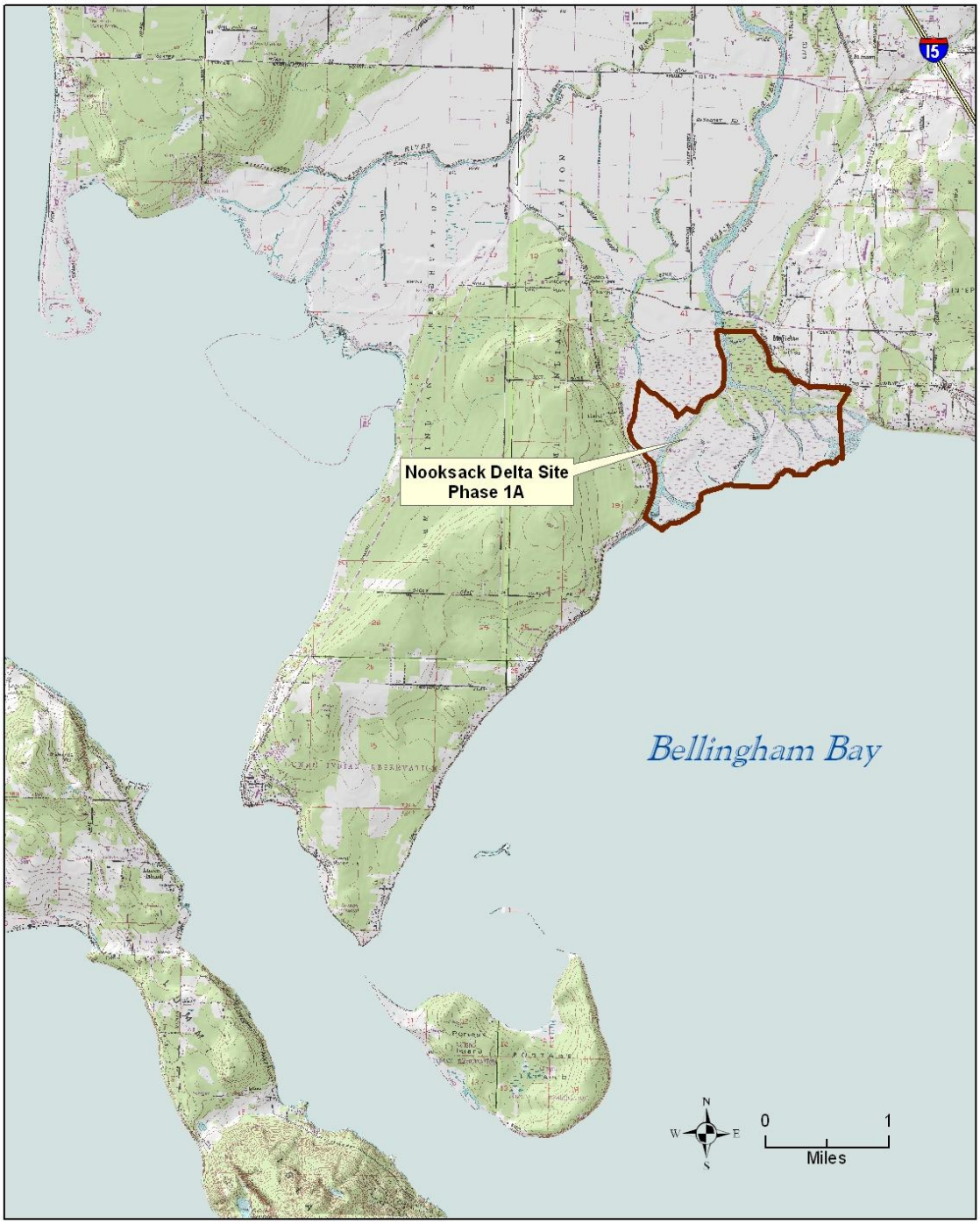


Figure 1. Vicinity Map – Nooksack Delta Site Phase 1A

3.0. Results

3.1. Wetland Delineation and Assessment

The information collected during the 2004 delineation was previously used to map wetland types based on the Cowardin classification system (Cowardin et al. 1979). The areas of the identified wetland classes within the Nooksack Delta Site Phase 1A are summarized in Table 1. The geographic locations and extent of the wetland classes is shown on Figure 2. Data collected in 2010 confirmed the 2004 determination that most of the Nooksack Delta Site is wetland, with the exception of some natural levees along some of the river channels. The upland portions of the levees were on average 50 to 100 feet wide. Additional upland areas on the natural levees were identified in 2010 and were added to the wetland map shown in Figure 2. The completed Wetland Determination Data Forms are presented in Appendix A. A tabular summary table of the plant species and conditions observed at each of the 26 data plots is presented in Appendix B.

Table 1. Cowardin Wetland Classification Areas – Nooksack Delta Site Phase 1A

Wetland Classification	Approximate Area (acres)	Approximate Area (percent)
Palustrine Forested	255	27
Palustrine Scrub-shrub	110	12
Palustrine Emergent	166	18
Estuarine Intertidal Emergent	194	20
Riverine and River Channel	147	16
Uplands (Forest)	14	1
Buffer (wetland, upland, water)	56	6
Total	**942**	**100**

3.2. Baseline Vegetation Conditions

Assessments of existing vegetation were conducted in 2004 (entire Nooksack Delta Site) and 2010 (Phase 1A of the Nooksack Delta Site). Species and cover information were collected at 39 sample plots during 2004 and at an additional 26 sample plots during 2010. The information collected during these surveys was used to identify 19 plant associations based primarily on species composition in the uppermost layer and age class. Plant associations include seven forest types, three shrub types, and nine emergent types (Table 2). Figure 3 shows a map of the plant associations and the location of the data

plots established in 2010. As noted above, vegetation data collected at each data plot are summarized in tabular form in Appendix B.

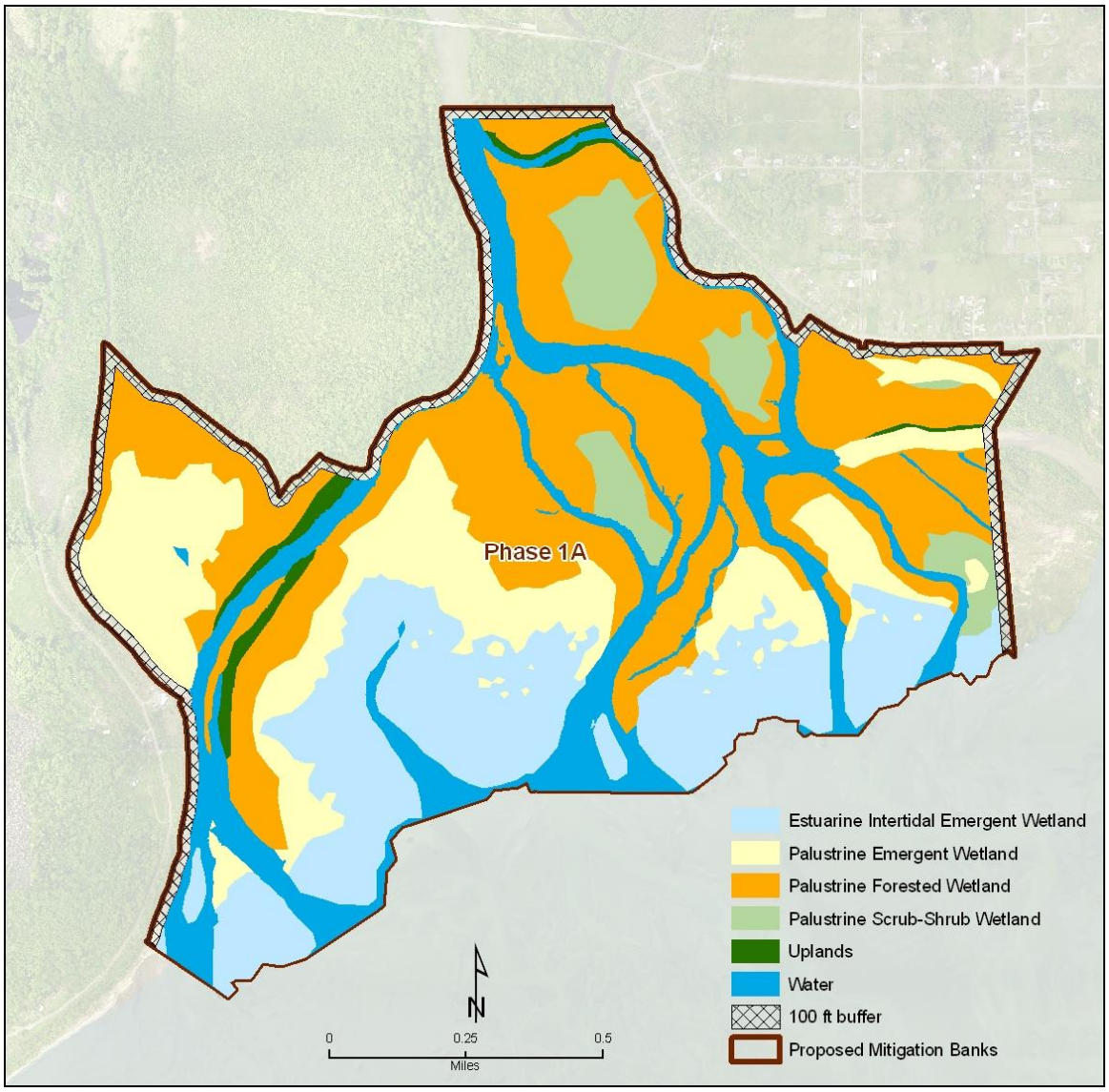


Figure 2. Wetlands Classes on the Nooksack Delta Site Phase 1A

Table 2. Wetland Plant Associations – Nooksack Delta Site Phase 1A

Wetland Plant Association	Approximate Area (acres)
Deciduous Forest	
black cottonwood / red alder	133.7
red alder / Pacific willow	105.6
Pacific willow	12.9
red alder	7.0
black cottonwood / red alder / conifers	5.0
red alder / Pacific willow / conifers	2.3
black cottonwood / red alder/ English ivy	2.1
Scrub-Shrub	
willow scrub – shrub	52.6
willow / red alder / reed canary grass	56.4
willows / spirea / slough sedge	0.7
Emergent – Freshwater	
reed canarygrass	78.3
cattail and driftwood logs	36.8
dead willows / reed canary grass	26.6
cattails	13.9
new wetlands: cattail and willow seedlings	6.5
bulrush	4.1
Emergent – Estuarine Intertidal	
Lyngbye's sedge / Baltic rush	120.0
tufted hairgrass / Pacific silverweed / Lyngbye's sedge	74.1
Other Habitat Types	
open water	147.2
buffer (primarily forest and open water)	55.6
knotweed	29.2[1]

[1] Knotweed is co-located with the other vegetation types vegetation types.

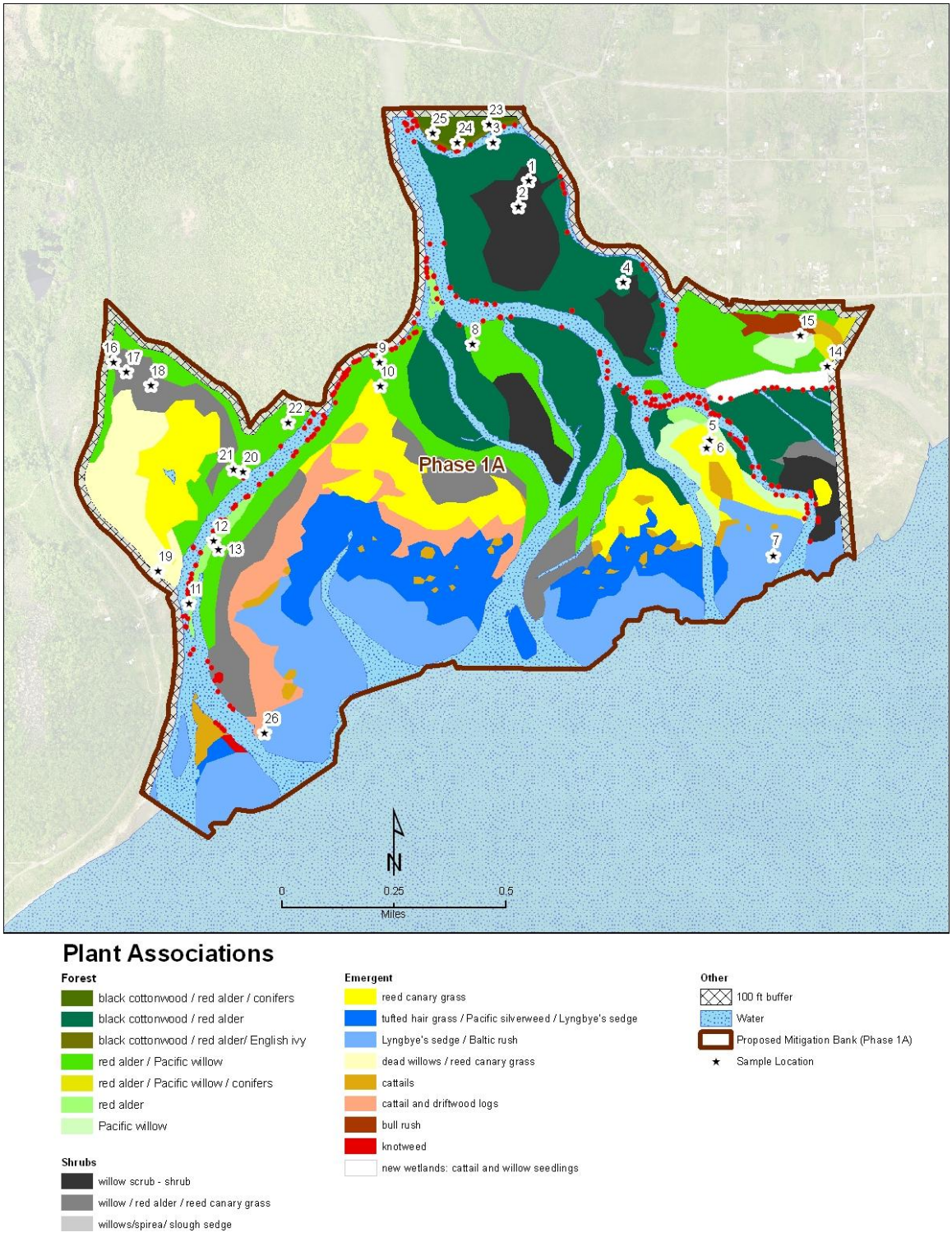


Figure 3. Plant Associations Map – Nooksack Delta Site Phase 1A

3.2.1. Deciduous Forest Plant Associations

Forest cover comprises approximately 269 acres in Phase 1A. Deciduous trees form a canopy of approximately 80 to 100 percent cover, are generally 50 to 80 feet tall, and are approximately 12 to 25 inches in diameter at breast height (dbh). Snags and large downed logs are common throughout the forests.

3.2.1.1. Black Cottonwood / Red Alder Forest

The largest forested plant association (approximately 134 acres) has a dense canopy consisting of mature black cottonwood (*Populus balsamifera*) and red alder (*Alnus rubra*) trees. Many of the cottonwood trees exceed 36 inches dbh and many of the red alder exceed 25 inches dbh. Mature Pacific willow (*Salix lucida*) also contribute to the canopy but are widely scattered within this plant association. (See Figure C.2 through Figure C.4 in Appendix C.)

Beneath the deciduous tree canopy is a dense shrub layer consisting primarily of red-stemmed dogwood (*Cornus sericea*), black twinberry (*Lonicera involucrata*), salmonberry (*Rubus spectabilis*), Scouler's willow (*Salix scouleriana*), and Pacific willow. Beneath the shrub layer is a relatively sparse herbaceous layer but herbs and sedges are locally abundant in some areas. Common herbaceous plants include slough sedge (*Carex obnupta*), ladyfern (*Athyrium filix-femina*), and skunk cabbage (*Lysichitum americanum*). A portion of this plant association near Plot 4 (see Figure 3 and Figure C.21 in Appendix C) has a dense ground cover of slough sedge.

This forest association has a relatively high degree of structural diversity with a nearly closed canopy, a subcanopy of 20 to 40 foot tall shrubs and trees, a dense understory shrub layer, and locally dense herbaceous layer. Snags and downed wood occur in many size and age classes. Along the southern edge of the forest large downed wood is abundant due to drift logs coming in with floodwaters and high tides.

The primary invasive plant species identified within the black cottonwood / red alder plant association is Japanese knotweed (*Polygonum cuspidatum*). Knotweed is very similar in growth form to two other commonly found invasive knotweeds: Bohemian knotweed (*Polygonum x bohemicum*) and giant knotweed (*P. sachalinense*). There is a good chance that the other species of knotweed may be on the site and were mapped, therefore all of these species will be collectively referred to as knotweed for the remainder of this document.

Knotweed was observed primarily as small patches on the natural levees along river channels. A few larger patches were also identified near the south end of the site. Knotweed along the river banks was mapped with a Trimble GeoXT GPS unit with an attached laser range finder in 2004 and 2009; the knotweed locations are shown on Figure 3.

Small amounts of reed canarygrass (*Phalaris arundinacea*) occur along the edges of some of the forested areas. Reed canarygrass is locally abundant (up to 50% cover) in some areas where the forest abuts large reed canarygrass fields at the south end of the site, but within 50 feet of the edge of forest the reed canarygrass falls out and dense native shrub cover dominates.

Other invasive weeds observed within this plant association include a limited amount of and scattered occurrences of giant hogweed (*Heracleum mantegazzianum*), policeman's helmut (*Impatiens glandulifera*), Himalayan blackberry (*Rubus armeniacus*), and jewelweed (*Impatiens noli-tangere*). These occurrences consist of a few stems along an informal footpath through the forest.

3.2.1.2. Red Alder / Pacific Willow Forest

The second most common forest plant association is mixed forest consisting of primarily mature Pacific willow and red alder covering approximately 106 acres. Black cottonwood also occurs in this association but is widely scattered. Pacific willow and red alder are relatively mature; tree diameters were measured at between 15 and 25 inches dbh and the age of some of the trees was estimated to be greater than 40 years (based on cores taken with an increment borer). The understory shrub layer is dense and consists of red-stemmed dogwood, salmonberry, and black twinberry. Snowberry (*Symphoricarpos albus*) also occurs but is less common than the other shrubs. (See Figure C.5 and Figure C.6 in Appendix C.)

3.2.1.3. Pacific Willow Forest

The third most common forest plant association primarily consists of Pacific willow trees, which covers approximately 13 acres. A few black cottonwood and red alder occur but do not provide much cover. The willows are relatively large trees with a wide canopy and trunk diameter greater than 20 inches dbh. The understory vegetation is a dense shrub layer of salmonberry and red-stemmed dogwood. This plant association was identified in only a few locations near the east side of the site. (See Figure C.7 and Figure C.8 in Appendix C.)

3.2.1.4. Black Cottonwood / Red Alder / Conifer

The black cottonwood / red alder/ conifer plant association, which occupies approximately 5 acres in the Phase 1A area, is similar in structure and species composition to the black cottonwood / red alder association described above, with the exception that this association includes conifers. Conifers are limited to a few small areas and consist of Sitka spruce (*Picea sitchensis*), western red cedar (*Thuja plicata*), and Douglas fir (*Psuedotsuga menziesii*). Douglas fir is located at a slightly higher elevation on the natural levees along the riverbank. All of the conifers observed during field studies were relatively mature trees, with diameters of 12 inches to 24 inches dbh. No conifer seedlings were observed during any of the site surveys. (See Figure C.9 through Figure C.12 in Appendix C.)

3.2.1.5. Red Alder Forest

The red alder forest plant association, which occupies approximately 7 acres in the Phase 1A area, occurs primarily on newly formed sand bars along the edges of the river channels. The alder trees are generally 2 to 6 inches in diameter and grow in dense stands that block out much of the sunlight. Very little understory vegetation occurs under the densest stands. In some of the more open stands knotweed occurs (See Figure C.13 through Figure C.15 in Appendix C.)

3.2.1.6. Red Alder / Pacific Willow / Conifer

The red alder / Pacific willow / conifer plant association occupies approximately 2 acres of the Phase 1A area and is very similar to the red alder / Pacific willow association, with the exception that a few large conifers occur in the tree canopy. Western red cedar and Douglas fir trees with diameters between 5 and 19 inches dbh were observed. The association was identified in only one location, in the far northeastern corner of the site. The species association appears to continue off-site to the east. (See Figure C.16 and Figure C.17 in Appendix C.)

3.2.1.7. Black Cottonwood / Red Alder / English Ivy

The black cottonwood / red alder / English ivy plant association is similar in structure and species composition to the black cottonwood / red alder association described above. It was separated as a unique association because of the abundance of English ivy (*Hedera helix*) in a relatively defined area (see Figure 3). Within this approximately 2-acre area the English ivy covers most of the ground surface and extends up into the canopy of dozens of trees (See Figure C.18 and Figure C.19 in Appendix C.)

3.2.2. Scrub-Shrub Plant Associations

The shrub dominated areas are the least common plant associations covering approximately 110 acres at the Nooksack Delta Site Phase 1A area.

3.2.2.1. Willow Scrub-Shrub

The willow scrub-shrub plant association is the largest shrub dominated community (53 acres) and consists primarily of a dense layer of salmonberry, Sitka willow, Scouler's willow, Douglas spirea (*Spiraea douglasii*), and black twinberry. A few scattered trees (Pacific willow and black cottonwood) occur throughout this plant association but do not provide enough cover to be classified as forest. Yellow iris (*Iris psuedocaris*) and reed canarygrass are locally common in some areas. Knotweed was observed in widely scattered patches where the plant association nears the river channels. (See Figure C.20 through Figure C.22 in Appendix C.)

3.2.2.2. Willow / Red Alder / Reed Canarygrass

The willow / red alder / reed canarygrass plant association occurs along the transition between the forested areas and the reed carnarygrass fields to the south, and covers approximately 56 acres. Pacific willow, Hooker's willow, and small alder trees are the dominant woody vegetation in this area and provide between 10 and 40 percent cover. Reed canarygrass provides between 80 and 100 percent cover. Many of the willow in this area have dead branches, but have live branches sprouting from the roots. (See Figure C.23 through Figure C.25 in Appendix C.)

3.2.2.3. Willow / Spirea / Slough Sedge

The willow / spirea / slough sedge plant association was found in only one small area (approximately 1 acre) of the Phase 1A site, around the edges of the bulrush marsh near the eastern end of the site. Dominant plants include Douglas spirea, Sitka willow, Pacific

willow, small black cottonwood trees, and slough sedge. Small amounts of reed canarygrass and yellow flag iris were also present. The vegetation cover in this area is very dense, with overlapping shrub layers providing 100 percent cover and slough sedge beneath with greater than 80 percent cover. (See Figure C.26 and Figure C.27 in Appendix C.)

3.2.3. Emergent Plant Associations - Freshwater

The emergent plant associations consist of palustrine emergent wetland (PEM) and intertidal emergent wetlands. The PEM plant associations cover approximately 166 acres of the Nooksack Delta Site Phase 1A area and are almost entirely dominated by invasive weed species. Native plants provide most of the cover within the intertidal wetlands.

3.2.3.1. Reed Canarygrass

The 78 acres shown on Figure 3 as reed canarygrass has 100 percent cover of the invasive grass. The reed canarygrass has well established root mat and only a few other plants occur in this area. Yellow flag iris (another invasive weed) is intermixed with the reed canarygrass in some areas. Small pockets of shrubs (primarily willow and alder) occur in portions of the areas mapped as reed canarygrass. Many of these shrubs are elevated above the grass layer because they established on large drift logs. (See Figure C.28 and Figure C.29 in Appendix C.)

3.2.3.2. Drift Logs / Cattail

The drift logs / cattail plant association is characterized by the large amount of drift logs that cover from 80 to 100 percent of the ground surface. The aerial photograph of this area (see Figure C.30 in Appendix C) shows the coverage of drift logs in a portion of this site. Cattail and reed canarygrass are common along the perimeter of these areas, which covers approximately 37 acres. (See Figure C.30 in Appendix C.)

3.2.3.3. Reed Canarygrass / Dead Willow

The reed canarygrass / dead willow plant association occupies a 27-acre area near the west end of the Nooksack Delta Site Phase 1A area. Similar to the reed canarygrass association, this plant association has 100 percent cover of reed canarygrass, and differs by having a large number of dead, and partially dead, willow trees. Cores taken from the willow trees show that many were greater than 40 years old when they died. Many of the trees have new growth, which appears to be re-sprouting from live roots. The cause of the die-off is unknown, but a discussion of potential causes is included in the August 3, 2010 Nooksack Delta Site Visit Memorandum (Zach Dewees, 8-30-2010), found in the MBI Resource Folder. Other species observed in small numbers in this area include black twinberry, salmonberry, yellow flag iris, hawthorn (*Crataegus monogyna*), and Himalayan blackberry. (See Figure C.31 and Figure C.32 in Appendix C.)

3.2.3.4. Cattail

Cattail (*Typha latifolia* and *T. angustifolia*) occurs in large patches between the lower elevation of the reed canarygrass fields and the intertidal estuary. This plant association is estimated to cover approximately 14 acres. The patches of cattail appear to be located in

shallow depressions and cattail provides 100 percent cover within the patches. Cattail also occurs in small patches along the shoreline of the river channels. (See Figure C.33 and Figure C.34 in Appendix C.)

3.2.3.5. Newly Emerging Wetland

A large log jam in the central eastern portion of the site (see Figure C.49 and Figure C.50 in Appendix C) altered stream flows through the site in recent years to such a degree that the primary distributary channel on the east end of the site is almost entirely blocked up with silt. Wetland vegetation is establishing on the silt plug. This newly forming wetland area is estimated to be seven acres in size. Dominant plants include cattail, willow saplings, and numerous herbaceous weeds. A small number of knotweed stems were also observed at this site. (See Figure C.35 and Figure C.36 in Appendix C.)

3.2.3.6. Bulrush

Soft-stem bulrush (*Schoenoplectus tabernaemontani*) occurs in small patches at about the same tidal elevation as the cattail. The largest patch of bulrush (approximately 4 acres) occurs in a small marsh located on the far east end of the site. Cattail also occurs in the marsh, which is ringed by scrub-shrub wetland and deciduous forest. (See Figure C.37 in Appendix C.)

3.2.4. Estuarine Intertidal Emergent Plant Associations

The area south of the reed canarygrass fields is an estuarine intertidal emergent wetland, which covers approximately 194 acres. The Delta is continuing to advance southward with aggregation of sediment, therefore this estuarine intertidal wetland is actively advancing southward and likely increasing in size. Two plant associations were defined and mapped in the intertidal wetland. The mapping of these two associations is a rough approximation, since the two associations intermix to form a patchy matrix, and other smaller plant associations also likely occur.

3.2.4.1. Lyngbye's Sedge / Baltic Rush

The vegetation in one of the two intertidal emergent plant associations consists primarily of native emergent species, with Lyngbye's sedge (*Carex lyngbyei*) being the plant providing most of the cover in an area estimated to be 120 acres. Baltic rush (*Juncus balticus*) is also common. Other species found at this lower tidal elevation include seaside arrowgrass (*Triglochin maritima*) and tall fescue (*Festuca arundincea*). Tall fescue is locally common in patches along some of the tidal channels. Drift logs occur in this area, and are widely scattered. The primary non-native plant species observed was sweetclover (*Melilotus officinalis*). (See Figure C.38 through Figure C.40 in Appendix C.)

3.2.4.2. Tufted Hairgrass / Pacific Silverweed / Lyngbye's Sedge

The tufted hairgrass / Pacific silverweed / Lyngbye's sedge plant association occupies approximately 74 acres and includes Lyngbye's sedge, which is co-dominant with two other species: tufted hairgrass (*Deschampsia cespitosa*) and Pacific silverweed (*Potentilla anserina*). Other species found at this tidal elevation include seaside

arrowgrass, marsh clover (*Trifolium wormskjoldii*), common cattail (*Typha latifolia*), Baltic rush, seaside arrowgrass, and soft-stem bulrush. Drift logs also occur in this area, and are widely scattered. Large piles of drift logs occur along the upper elevations, where the cattail is dominant. Small shrubs (Pacific and Hooker's willow) occur within the plant association and are widely scattered. (See Figure C.41 through Figure C.45 in Appendix C.)

Non-native plant species were observed in this plant association including sweetclover, bird's-foot trefoil (*Lotus corniculatus*), dock (*Rumex* sp.), and hedge bindweed (*Convolvulus sepium*). None of the non-native species form monotypic stands and do not appear to be excluding native species.

3.2.5. Other Habitat Types

3.2.5.1. Open Water

Open water habitat on the Nooksack Delta Site Phase 1A area is primarily river and tidal channels. Numerous log jams and dense overhanging trees and shrubs along the river channels and dense sedges along the tidal channels provide excellent cover and food sources for fish. One small open water area located within the reed canarygrass field on the west end of the site was mapped using aerial photographic interpretation. (See Figure C.46 through Figure C.50 in Appendix C.). The total area of open water in the Phase 1A area is estimated to be 147 acres.

3.2.5.2 Knotweed

Knotweed is most commonly found at the Nooksack Delta Site Phase 1A area along the river banks. Point locations where knotweed was mapped by GPS in 2004 and 2009 are shown on Figure 3. Most of the occurrences are small (less than 10 feet in diameter) and are surrounded by dense layers of native shrubs. Two larger knotweed patches were identified and are shown mapped on the south end of the site (Figure 3). The total area covered by these two knotweed patches is estimated to be less than 1 acre. (See Figure C.51 and Figure C.52 in Appendix C.) The acreage of knotweed within the site was estimated as a 15-foot wide swath shoreward of any of the river channels.

APPENDIX A: DATA SHEETS

APPENDIX B: SUMMARY VEGETATION DATA TABLE

APPENDIX C: SITE PHOTOGRAPHS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta 1A City/County: _____ Sampling Date: 8/2/10

Applicant/Owner: _____ State: WA Sampling Point: EP1

Investigator(s): MJM FL GG Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft. diam)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: _____)			
1. COSE	50	Y	FACW
2. MAFU	25	N	
3. SY AL	5	N	
4. RUSP (Seedling)	<1	N	
5. SALA (seedling)	<1	N	
ALRU (seedlings)	<1	N	
	= Total Cover		

Herb Stratum (Plot size: 2m)	133		
1. EQAR	<2	Y	FAC
2. VEAM	<1		
3. Jewel weed	<1		
4. weed 1 (yellow flw)	<2	Y	NL
5. EPWA	<1		
6. ATFI (on log)	<1		
7.			
8.			
9.			
10.			
11.			
	= Total Cover		

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 95%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/2		10YR 4/6	10%				silt loam.
11-20	10YR 4/1	60	10YR 4/6	20%				
	+10YR 4/2	40						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

F3 Depleted matrix

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1) – 3
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Moist soil only.

2 primary + 1 secondary indicator

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

8/2/10

Project/Site: Nooksack Delta 1A City/County: _____ Sampling Date: ~~8/2/10~~

Applicant/Owner: Lummi Nation State: _____ Sampling Point: SP3

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. POBA	60%	Y	FAC
2.			
3.			
4.			
	60 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. RUSP	90	Y	FACW
2. COSE	10		
3. SARA	5		
4. RIDI	2		
5.			
	157 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2							fine sa. loam Compacted
0-20	10YR 4/2							~~fine~~ sa loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks: Dry to 20"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3) w 6" shrub
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: higher in elev. than PSS

~7' higher in elev. than others

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP8

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lucida	80	D	FACW
2. Populus balsamifera	10		
3. Alnus rubra	10		
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus spectabilis	100	D	FAC
2. Cornus sericea	20		
3.			
4.			
5.			
	120	= Total Cover	
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 4/1		10YR 5/6	2			fine sandy loam	
	10YR 5/1						f.s.l.	pockets

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 3" drift deposits, dry soils to 18"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 9

Investigator(s): mm Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	90	D	FAC
2. Salix lucida	20		
3.			
4.			
	110	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Cornus sericea	70		
2. Rubus spectabilis	100	D	FAC
3. Symphoricarpos albus	10		
4. Oemleria cerasiformus	<1		
5.			
	120	= Total Cover	
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 4/1		10YR 5/6	2			fine sandy loam	
	10YR 5/1						f.s.l.	pockets

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 12" drift deposits

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP12

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	D	FAC
2.			
3.			
4.			
	60	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix sitchensis	40	D	FACW
2. Rubus spectabilis	15	D	FAC
3. Polygonum cuspidatum	30	D	FACU
4.			
5.			
	55	= Total Cover	
Herb Stratum (Plot size: _____)			
1. Equisetum arvense	15	D	FAC
2. Equisetum hyemale	2		
3. Phalaris arundinacea	10	D	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	17	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum 83

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR4/1	98		2			silty sand / compacted	redox present
3-16	10YR4/1	100					fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 12" drift deposits

SOIL

Sampling Point: SP 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/1						compacted silty sand	
3-16	10YR 4/1						fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks: This area appears to flood frequently so it is expected that this area without hydric soil indicators is small.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 12" drift deposits

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 13

Investigator(s): mm Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lucida	60	D	FACW
2. Alnus rubra	30	D	FAC
3.			
4.			
	90 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Lonicera involucrata	60	D	FAC
2. Symphoricapos albus	30	D	FACU
3. Rosa nutkana	2		
4.			
5.			
	92 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 14

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	80	D	FAC
2. Salix lucida	15		
3.			
4.			
	95	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Rosa nutkana	60	D	FAC
2. Cornus sericea	10		
3. Rubus spectabilis	10		
4. Lonicera involucrata	10		
5. Symphoricarpos albus	10		
	100	= Total Cover	
Herb Stratum (Plot size: _____)			
1. Athyrium filix-femina	5	D	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	5	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 95

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100						faint redox
	10YR 3/1							

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ___ No ✓

Remarks: Borderline soils, area without redox small.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 12" water marks

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/3/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 15

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus balsamifera	20	D	FAC
2. Salix lucida	20	D	FACW
3.			
4.			
	40 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix sitchensis	40	D	FACW
2. Spirea douglasii	10	D	FAC
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Carex obnupta	80	D	OBL
2. Iris pseudocarus	5		
3. Phalaris arundinacea	5		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1		7.5Y 4/6				silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

moist on surface, 2' water marks

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi State: WA Sampling Point: SP 16

Investigator(s): mm Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No ✓	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	70	D	FAC
2. Populus balsamifera			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rosa nutkana	60	D	FAC
2. Symphoricarpos albus	40	D	FACU
3. Rubus spectabilis	20		
4. Lonicera involucrata	5		
5.			
	= Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	= Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR4/1	100						
8-16	10YR4/1	40	10YR4/6	60			fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: sediment deposits, 2' drift lines on trees

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 17

Investigator(s): mm Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	10	D	FAC
2. Salix lucida	TR		
3.			
4.			
	10 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix sitchensis	75	D	FACW
2. Cornus sericea	5		
3.			
4.			
5.			
	80 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 100

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 5/1		10YR 4/6					
8-16	10YR 4/1	40	10YR 4/6	60			fine sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ✓ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 10" sediment deposits, 35" drift lines

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 18

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. Alnus rubra	5	D	FAC
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Salix scouleriana	30	D	FAC
2. Spiraea douglasii	5		
3.			
4.			
5.			
	35	= Total Cover	
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	100	D	FACW
2. Iris pseudocorus	4		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	104	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 18

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/1							
10-18	5Y 4/1		7.5YR 5/8					

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 16"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 14"

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Seepage 14", free water at 16" to 26" below surface

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 19

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. Salix lucida	15	D	FACW
2.			
3.			
4.			
	15 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Lonicera involucrata	20	D	FAC
2. Rubus spectabilis	5		
3. Crataegus monogyna	1		
4.			
5.			
	26 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Phalaris arundinacea	100	D	FACW
2. Iris pseudacorus	1		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	101 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. Rubus armeniacus	1	D	FACU
2.			
	1 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 19

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 4/2	100						
9-16	10YR 4/1							redox present

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks: Borderline, but meets depleted matrix

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 20

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 23" water marks, seepage at 20"

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 20

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	95	D	FAC
2.			
3.			
4.			
	95 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus spectabilis	60	D	FAC
2. Symphoricarpos albus	10		
3. Oeleria cesaformus	10		
4. Physocarpus capitaetus	10		
5. Cornus sericea	4		
	99 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 2-0

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/2						fine sandy loam	few redox, 1 oxidized root channel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: water stained leaves, 6" sediment deposits

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 21

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	70	D	FAC
2. Salix lucida	5		
3.			
4.			
	75 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus spectabilis	80	D	FAC
2. Cornus sericea	15		
3. Physocarpus capitatus	10		
4.			
5.			
	105 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 100

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 21

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2							
6-16	2.5Y 4/1	90	2.5Y 6/8	10			silt loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 12" watermarks

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 22

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	75	D	FAC
2. Populus balsamifera	10		
3.			
4.			
	85 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus spectabilis	50	D	FAC
2. Cornus sericea	25	D	FACW
3. Lonicera involucrata	10		
4.			
5.			
	85 = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		
% Bare Ground in Herb Stratum 100			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species _____	x 1 =	_____
FACW species _____	x 2 =	_____
FAC species _____	x 3 =	_____
FACU species _____	x 4 =	_____
UPL species _____	x 5 =	_____
Column Totals: _____ (A)		_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 22

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/2	80	10YR 4/6	20				
11-18	10YR 4/1	40	10YR 4/6	60				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 3 ft water marks on trees, 10" more recent water marks, drainage patterns

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 23

Investigator(s): MM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	70	D	FAC
2.			
3.			
4.			
	70 = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. Rubus spectabilis	70	D	FAC
2. Cornus sericea	10		
3.			
4.			
5.			
	80 = Total Cover		
Herb Stratum (Plot size: _____)			
1. Athyrium filix-femina	10	D	FACW
2. Hedera helix	40	D	NL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	40 = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 23

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR4/2	100					silt loam	
10-18	10YR4/1	60	10YR4/6	40				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: drainage patterns and water stained leaves

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Nooksack Delta City/County: Whatcom Sampling Date: 8/4/10

Applicant/Owner: Lummi Nation State: WA Sampling Point: SP 25

Investigator(s): mm Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. Thuja plicata	40	D	FAC
2. Picea sitchensis	20	D	FAC
3. Alnus rubra	15		
4. Salix lucida	10		
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: _____)			
1. Polygonum cuspidatum	60	D	FACU
2.			
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0	= Total Cover	
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: SP 25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/2							20% redox at 11 in.
11-18	10YR 4/1	60	10YR 4/6	40				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ✓ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): _____

Water Table Present? Yes ___ No ___ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: sediment deposits

Vegetation Plots	**SP1**	**(1b)**	**SP2**	**(2b)**	**SP3**	**SP4**	**SP5**	**SP6**	**(6a)**	**SP7**	**(7a)**	**SP8**	**SP9**	**SP10**	**SP11**	**SP12**	**SP13**	**SP14**	**(14b)**	**SP15**	**SP16**	**SP17**	**SP18**	**SP19**	**SP20**	**SP21**	**SP22**	**SP23**	**SP24**	**SP25**	**(25b)**	**SP26**
Tree	% cover or presence (X)																															
Aesculus hippocastanum (horse chesnut)																															X	
Alnus ruba (red alder)	<1			X		30	5		X			10	90	25	100	60	30	80			70	10	5		95	70	75	70		15		
Picea sitchensis (Sitka spruce)																														20		
Populus balsamifera (black cottonwood)		X	50	X	60	60						10								20	X						10					
Pseudotsuga menziesii (Douglas fir)																													20			
Salix lucida (Pacific willow)									X			80	20		10		60	15		20		X		15		5			45	10		
Thuja plicata (western red cedar)																														40		
Shrub																																
Cornus sericea (red-osier dogwood)	80		20	X	10	75						20	10					10				5			4	15	25	10				
Crataegus douglasii (black hawthorne)		X	15																													
Lonicera involucrata (black twinberry)				X		10								60			60	10			5			20			10					
Malus fusca (Pacific crabapple)	25																															
Oemleria cerasiformus (indian plum)													<1												10							
Physocarpus capitatus (Pacific ninebark)		X																							10	10						
Ribes divaricatum (straggly gooseberry)					2																											
Rosa nutkana (Nootka rose)		X	15			10									5		2	60			60											
Rubus spectabilis (salmonberry)	<1		10		90	30						100	100		10	15		10			20			5	65	80	50	70	15			
Salix hookeriana (Hooker's willow)									X		X																					
Salix lucida (Pacific willow) shrub form		X									X																					
Salix scouleriana (Scouler's willow)																						X	30									
Salix sitchensis (Sitka willow)				X												40				20		75										
Sambucus racemosa (red elderberry)	<1				5																											
Spiraea douglasii (Douglas spirea)			5	X															X	10			5									
Symphoricarpos albus (common snowberry)	5					5							10				30	10			40				10							
Herb																																
Agrostis alba (redtop)																																
Agrostis stolonifera (creeping bentgrass)		X									X																					
Agrostis tenuis (colonial bentgrass)																													40			
Alisma plantago-aquatica (water plantain)		X																														
Athyrium filix-femina (ladyfern)	<1					15												5										10				
Calamagrostis canadensis (bluejoint reedgrass)											X																					X
Carex lyngbyei (Lyngby's sedge)										60	X																					
Carex obnupta (slough sedge)		X				75													X	80												X
Carex sp. (unk. sedge)			5	X																												
Epilobium watsonii (Watson's willow-weed)	<1			X							X																		1			
Equisetum arvense (common horsetail)	<2		5	X												15																
Equisetum hyemale (common scouring-rush)																2																
Festuca arundinacea (tall fescue)											X																					X
Geum macrophyllum (large-leaf avens)																													2			
Juncus balticus (baltic rush)										5	X																					X
Juncus effusus (common rush)				X																												
Juncus gerardii (saltmeadow rush)											X																					
Lysichiton americanus (skunk cabbage)		X																														
Potentilla anserina (Pacific silverweed)										30	X																					X
Scirpus americanus (American bulrush)										40	X																					
Scirpus microcarpus (small-fruited bulrush)				X																												
Sidalcea hendersonii (Henderson's checker mallow)											X																					
Trifolium wormskjoldii (marsh clover)											X																					X
Triglochin maritima (seaside arrowgrass)										2																						

Vegetation Plots	**SP1**	**(1b)**	**SP2**	**(2b)**	**SP3**	**SP4**	**SP5**	**SP6**	**(6a)**	**SP7**	**(7a)**	**SP8**	**SP9**	**SP10**	**SP11**	**SP12**	**SP13**	**SP14**	**(14b)**	**SP15**	**SP16**	**SP17**	**SP18**	**SP19**	**SP20**	**SP21**	**SP22**	**SP23**	**SP24**	**SP25**	**(25b)**	**SP26**
Veronica americanum (American speedwell)	<1																															
Non-native																																
Circium arvense (Canada thistle)											X																					
Convolvulus sepium (hedge bindweed)											X																					
Crataegus monogyna (European hawthorne)																								1								
Hedera helix (English ivy)																												40			X	
Heracleum mantegazzianum (giant hogweed)																			X													
Impatiens glandulifera (policeman's helmet)				X															X													
Impatiens noli-tangere (western touch-me-not)																																
Impatiens sp. (unk. jewelweed)	<1										X																					
Iris pseudacorus (yellow flag iris)				<1				<2			X									5			4	1								
Lotus corniculata (bird's foot trefoil)											X																					X
Melilotus officinalis (sweetclover)											X																					X
Phalaris arundiancea (reed canarygrass)							95	100						60	<2	10				5			100	100								
Plantago major (English plantain*)*											X																					
Polygonum cuspidatum (Japanese knotweed)															10	30														60		
Rubus armeniacus (Himalayan blackberry)				<1							<5													1					20			
Rumex sp. (unk. dock)											X																					
Sonchus arvensis ssp. arvensis (perennial sowthistle)											X																					
Downed trees/drift logs	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Standing snags	X	X	X	X	X	X	X	X	X			X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Salinity (ppt) (surface water)																	0						0.53	0								

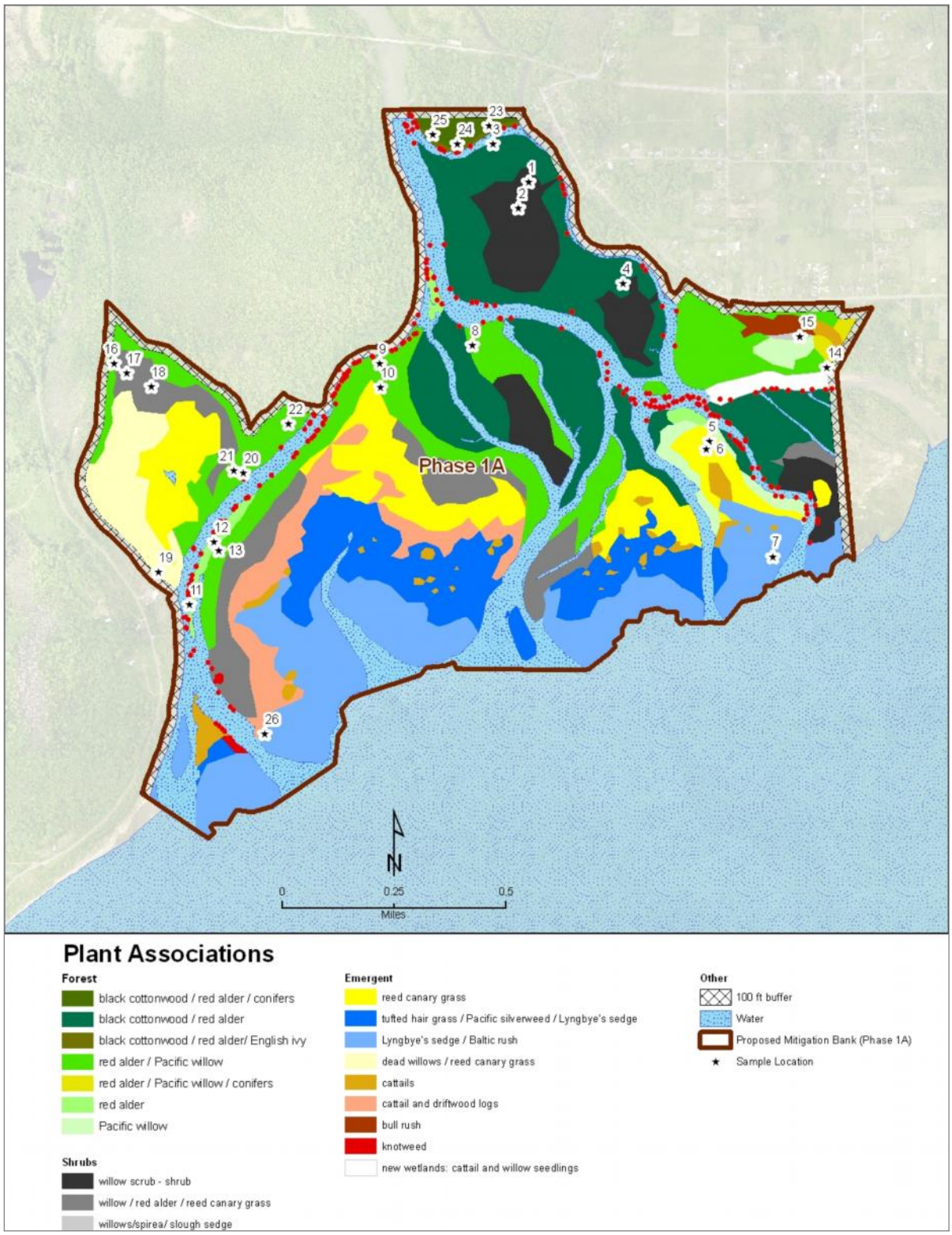


Figure C.1. Distribution of Plant Associations and Plot Locations

Deciduous Forest Plant Associations

1) Black Cottonwood / Red Alder



Figure C.2. Canopy of red alder and black Cottonwood, dense understory shrub layer. Near Plot 22.



Figure C. 3. Many red alder trees have a trunk diameter greater than 20 inches. Near Plot 22.



Figure C.4. Many black cottonwood have a trunk diameter greater than 30 inches. Near Plot 22.

2) Red Alder / Pacific Willow



Figure C.5. This plant association contains many mature Pacific willow and red alder trees and a dense understory shrub layer. Near Plot 14.



Figure C.6. Many of the Pacific willow trees have a wide canopy and have trunks greater than 20 inches dbh. Near Plot 9.

3) Pacific Willow



Figure C.7. This plant association has a nearly closed canopy of Pacific willow and a dense understory shrub layer. Near Plot 15.



Figure C.8. Pacific willow trees with trunks greater than 20 inches dbh are common in this plant association. Near Plot 15.

4) Black Cottonwood / Red Alder / Conifer



Figure C.9. There are a few Douglas fir, western red cedar, and Sitka spruce greater than 80 feet tall within this plant association. Plot 25.



Figure C.10. Sitka spruce. Near Plot 25.



Figure C.11. Western red cedar. Near Plot 25.



Figure C.12. Douglas fir with sediment on trunk indicating that floodwater was approximately 8 inches deep in recent years. Near Plot 25.

5) Red Alder



Figure C.13. Young red alder stands occur on many of the newly formed sand bars along the river channels. Near Plot 11.



Figure C.14. This red alder stand is dense enough to prevent significant herbaceous or shrub growth. Near Plot 11.



Figure C.15. Some of the red alder stands along the riverbank contain knotweed in the understory. Near Plot 11.

6) Red Alder / Pacific Willow / Conifer



Figure C.16. A few western red cedar trees occur in this area. Near Plot 14



Figure C.17. The upper canopy of a Douglas fir tree can be seen in the center background of this photo. Other conifers in this area are shorter and do not extend into the upper canopy. Near Plot 14.

7) Black Cottonwood / Red Alder / English Ivy



Figure C.18. A portion of this plant association contains a dense ground cover of English ivy. Near Plot 23.



Figure C.19. English ivy has grown to the top of many of the trees in this plant association. Near Plot 23.

Scrub-Shrub Associations

8) Willow Scrub-Shrub



Figure C.20. The willow association is typically a dense layer of shrub with limited herbaceous growth beneath. Near Plot 1.



Figure C.21. At this location a dense layer of slough sedge occurred beneath the willows. Near Plot 4.



Figure C.22. Many of the willow shrub areas showed signs of deep floodwater. The sediment line on the log in this photo is approximately 40 inches above the ground surface. Near Plot 1.

9) Willow / Red Alder / Reed Canarygrass



Figure C.23. Reed canarygrass occurs along the edge of the forested area but appears to be limited to within 50 feet of the edge of forest by shade and dense shrub cover. Near Plot 10.



Figure C.24. Photo shows reed canarygrass - native shrub cover interface along edge of forest. Large reed canarygrass fields with 100% cover occur behind the camera position. Near Plot 10.



Figure C.25. Many red alder seedlings are establishing on the partially decomposed drift logs that are common throughout this plant association and in the reed canarygrass fields. Near Plot 10.

10) Willow / Spirea / Slough Sedge



Figure C.26. This plant association was identified at only one location; between a bulrush meadow and a Pacific willow forest. Near Plot 15.



Figure C.27. The shrub layer in this association is relatively open and the herbaceous layer is very dense. Near Plot 15.

Emergent Plant Associations - Freshwater

11) Reed Canarygrass



Figure C.28. Reed canarygrass provides 100% cover in many areas between the intertidal wetlands and the forest. Near Plot 6.



Figure C.29. Drift logs are abundant beneath the reed canarygrass. Near Plot 6.

12) Drift Logs / Cattail





Figure C.30. Large areas are covered by dense piles of drift logs. Cattail and reed canarygrass grow between the logs. The width of the log pile in the Google Earth satellite image on the bottom is approximately 300 feet. Approximately 500 feet east of Plot 13.

14) Reed Canarygrass / Dead Willow



Figure C.31. Reed canarygrass provides nearly 100% cover in this area. Dead Pacific willow, and a few red alder, appear to have died simultaneously approximately 10 years ago. Near Plot 19.



Figure C.32. Many of the Pacific willow are re-sprouting from roots and small trunks. Near Plot 19.

15) Cattail



Figure C.33. Typical cattail stand at the landward side of the intertidal wetland. Approximately 1,000 feet south of Plot 10.



Figure C.34. The largest cattail stands are located in a band between the intertidal marsh and the edge of the forest. Approximately 1,000 feet south of Plot 10.

16) Newly Emerging Wetland: Cattail / Willow Seedlings



Figure C.35. A large log jam (Figure C.49) resulted in this former stream channel silting-up within the last couple of years. Many grasses and herbaceous weeds are establishing. Pacific willow seedlings are common. A few knotweed seedlings were also observed in this area.



Figure C.36. The east end of this newly formed wetland is dominated by cattail.

17) Bulrush



Figure C.37. A bulrush meadow is located south of Marietta Road near the east end of the Nooksack Delta Site. The bulrush meadow is in the center of the photo, which was taken from Marietta Road.

Estuarine Intertidal Emergent Plant Associations

18) Lyngbye's Sedge / Baltic Rush



Figure C.38. Lyngby sedge and Baltic rush are the dominant plants landward of the mudflats at the leading edge of the delta. Near Plot 26.



Figure C.39. This photo shows a transition area between the Lyngby sedge/Baltic rush association in the foreground, and tufted hairgrass/silverleaf/Lyngby sedge association in the background. Near Plot 7.



Figure C.40. Patches of tall fescue (up to 1/4 acre in size) occur within this plant association. East of Plot 7.

19) Tufted Hairgrass / Pacific Silverweed /Lyngbye's Sedge



Figure C.41. This plant association contains widely scatter small willows, as seen in the center of the photo. Near Plot 7.



Figure C.42. Willow species establishing in this plant association include Pacific willow (right) and Hooker's willow (left). Near Plot 7.



Figure C.43. Bird nest in willow saplings attests to the important wildlife habitat function that even small shrubs can provide in the intertidal marsh. Near Plot 7.



Figure C.44. The landward edge of this plant association transitions into cattail stands. Near Plot 7.



Figure C.45. Henderson's checkermallow together with bird's foot trefoil and cattail. Near Plot 7.

Other Habitat Types

20) Open Water



Figure C.46. Looking southwest on tidal channel near center of intertidal marsh.



Figure C.47. Looking northeast on tidal channel from near center of intertidal marsh.



Figure C.48. Looking south along the main river channel near the center of the Nooksack Delta Site.



Figure C.49. Aerial photograph of the large log jam that formed in the former easternmost primary distributary channel of the Nooksack River. This log jam resulted in changes to the channels downstream from the log jam and created the new wetlands plant association in the former channel located to the south east of this photograph.



Figure C.50. Ground level view of the log jam in the former eastern most primary distributary channel.

21) Knotweed



Figure C.51. Knotweed patches occur at many locations along the riverbanks.

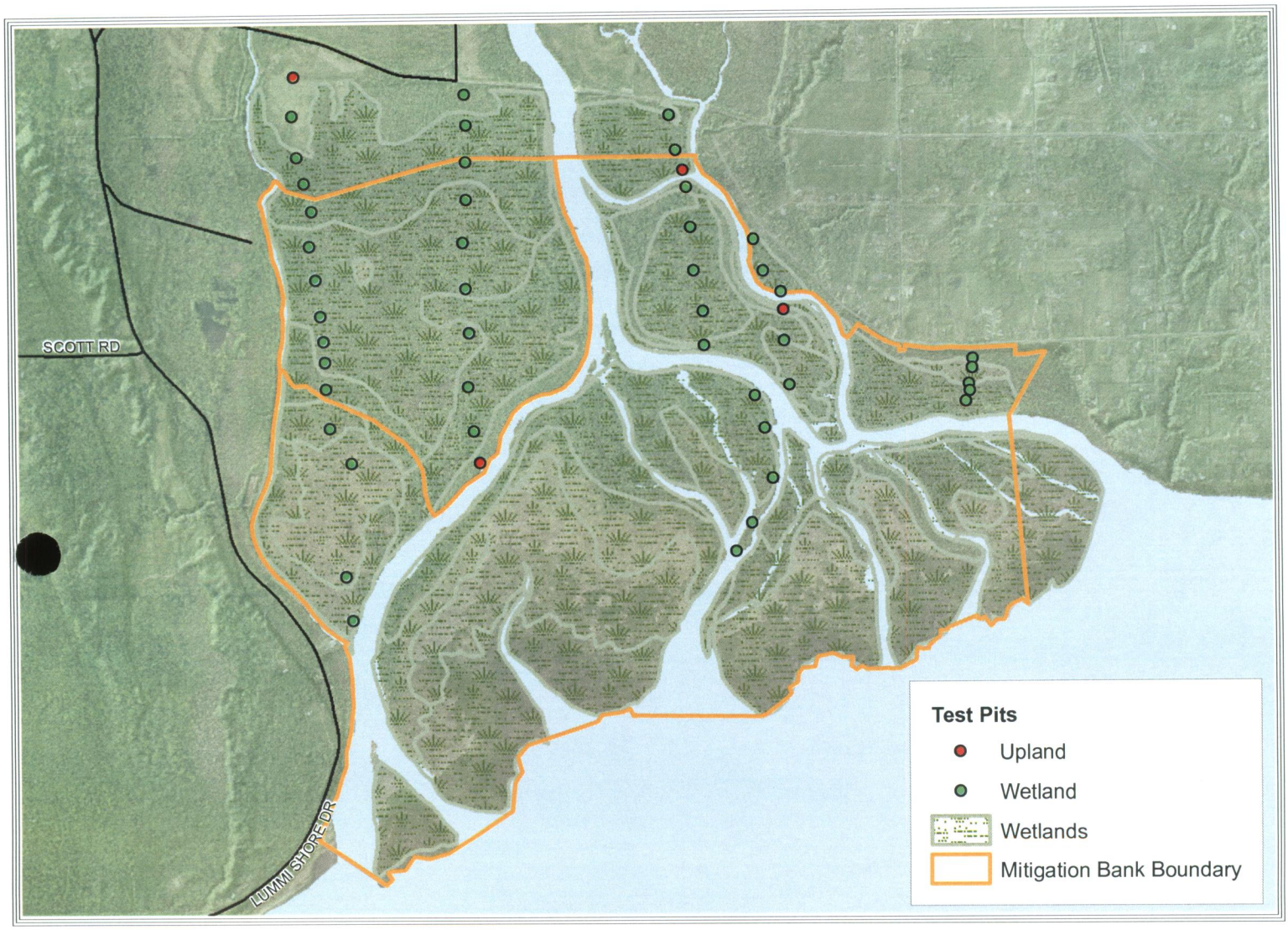


Figure C.52. Many of the knotweed occurrences are limited to a few stems within a dense layer of native shrubs.

Exhibit 3

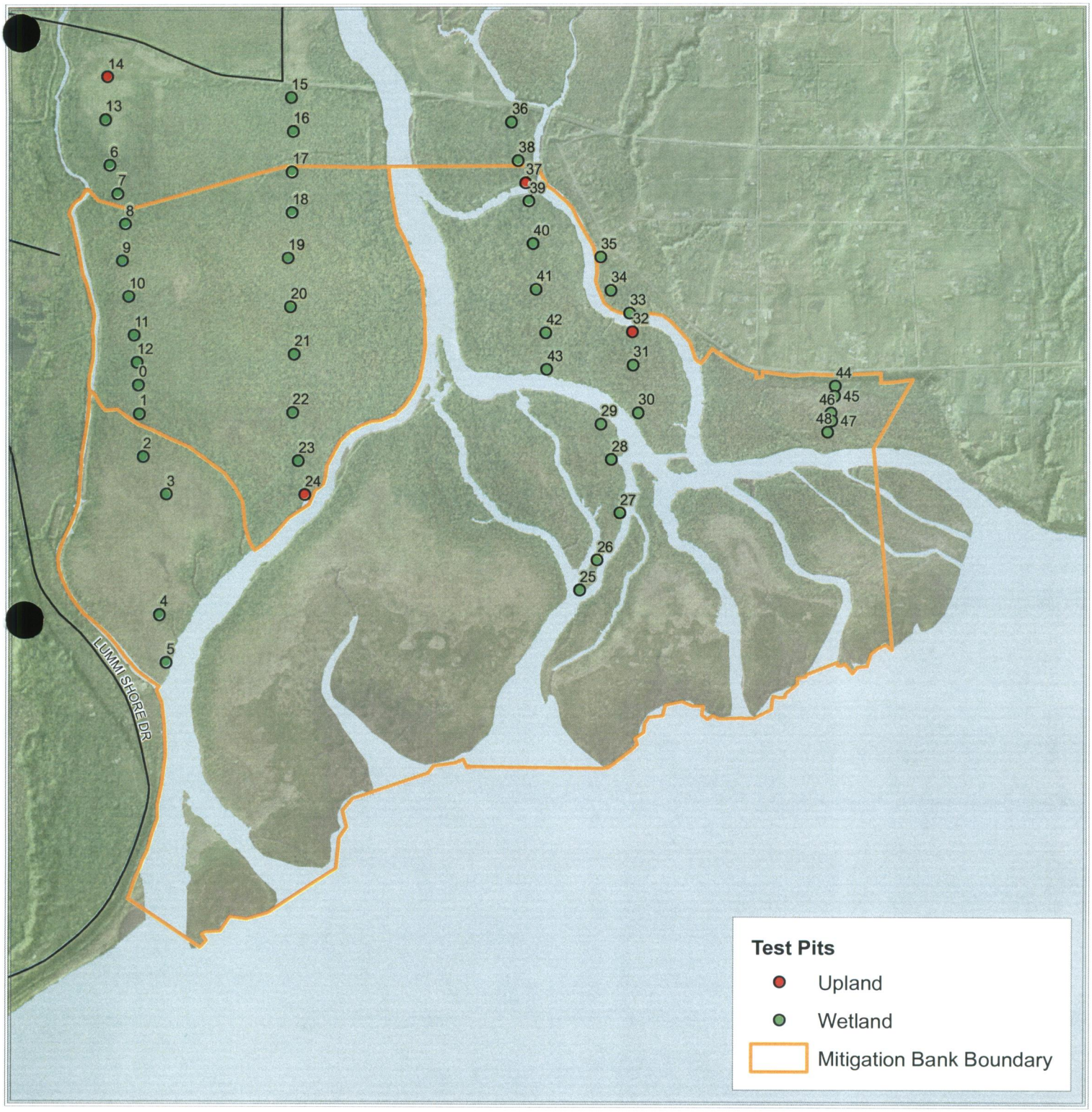
Wetland Determination Data sheets, Wetland Classification, and Function Assessment Worksheets – Nooksack Delta Site

Lummi Nation Wetland and Habitat Mitigation Bank
Wetland Determination Data Sheets, Wetland Classification, and Function Assessment Worksheets
Nooksack Delta Site



January 2010

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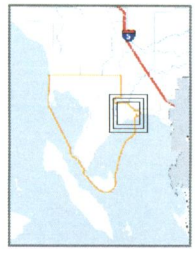


Soil Test Pits: Nooksack Delta Site

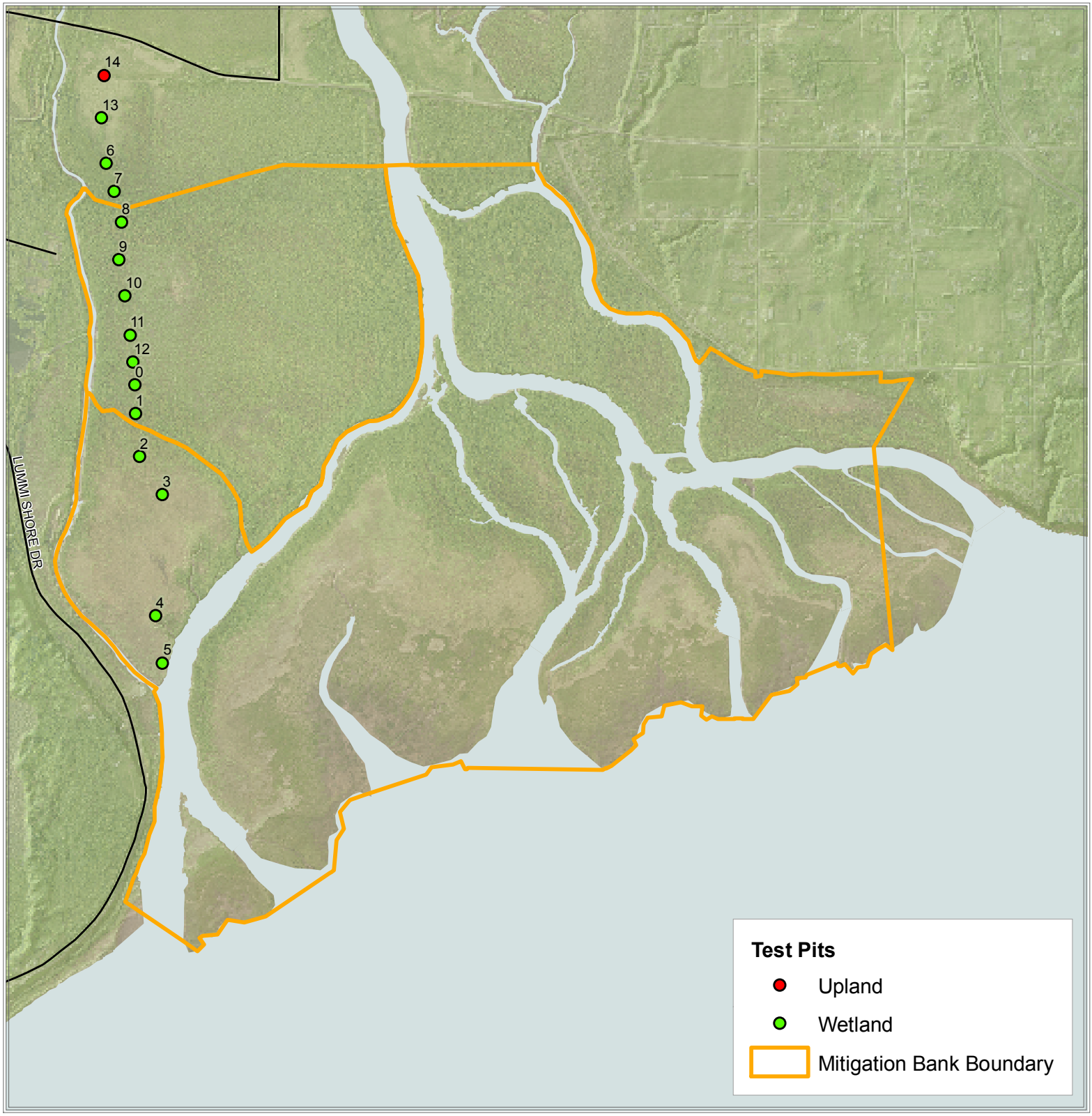
0 500 1,000
Feet

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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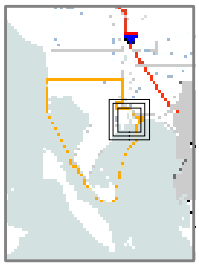
Soil Test Pits: Nooksack Delta Site
Transect 1

0 500 1,000
Feet

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PLOT ID 14

Lummi Natural Resources Department – Wetland and Habitat Assessment Form

TIP1 #1 **Nooksack Delta Project**

Plot/Transect Number: 1	Date: 4/14/04
Size of Plot: 10m (5m) ~~1m~~	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Common tansy	H	50%	NI	vetch	T	H	
Tall fescue	H	30%	~~FAC~~ FACU				
RCG	H	(20%)					

If invasives are present record % cover and species: 20% RCG ~~+ tansy~~

If forested list approximate age of stand: Ø

Core results: N/A DBH results: N/A

Snags - record number and describe: 0

LWD - Inside/outside of permanent water? NONE

Record number and describe: N/A

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 33%

Is hydrophytic vegetation criterion met? NO

Hydrology

e area inundated? NO	Depth of water present: N/A
Depth at which soil is saturated: N/A	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: NONE

Is the hydrology criterion met? NO

Rationale:

Soils

Mapped as: Mt Vernon fine sandy loam	Is soil on hydric soil list: NO
Is it a histosol? NO	Do field observations match mapped series? YES

Depth	Matrix	Redox features/Gley	Texture
0-9	10YR3/2		Sandy loam
9-~~18~~ 14	10YR3/2		" " w/Rocks + gravel

Other hydric soil indicators: NO

Is the hydric soil criteria met? NO Rationale:

Other information

Is the sample plot a wetland? NO

Type of wetland: PFO/PSS/(PEM)

General habitat description: Grassy field

Are upland islands present? NO

PLOT ID 13

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
TIP2 Nooksack Delta Project

Plot/Transect Number: 1 #2	Date: 4/14/04
Size of Plot: 10m (5m) 1m	Field Staff: LF / MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	S	10%	FACW+	polygonum spp	T	H	
R. Alder	S	20%	(FAC)				
RCG	H	90%	(FACW)				
Baltic Rush	H	20%	(FACW+)				

If invasives are present record % cover and species: 90% RCG

If forested list approximate age of stand: 7 yrs Alder

Core results: — DBH results: 6"

Snags - record number and describe: NONE

LWD - Inside/outside of permanent water? NONE

Record number and describe: N/A

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

: area inundated? N/D	Depth of water present: —
Depth at which soil is saturated: —	Depth to free water in pit: —

Other field evidence of surface inundation or soil saturation: NONE

Is the hydrology criterion met? NO - BUT it is infered from soil data

Rationale:

Soils

Mapped as: Eliza silt loam		Is soil on hydric soil list: yes	
Is it a histosol? No		Do field observations match mapped series? yes	
Depth 16"	Matrix	Redox features/Gley	Texture silty sand ~~sandy loam~~
0-16"	10YR4/1	Mottles 10YR3/3 common, large	

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: low chroma + mottles

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/(PSS)/PEM

General habitat description: Grassy field - area has been farmed

Are upland islands present? NO

PLOT ID 6

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

TIP3

Plot/Transect Number: 1 Plot ~~X~~ 3 | Date: 4/14/04

Size of Plot: (10m) 5m 1m Forested | Field Staff: LF, MD

Dominant Species

Species	%Cover	Stratum	Indicator
Red alder	70	F	80-100ft' (FAC)
Salmonberry	20	S	(FAC+)
R Dogwood	20	S	(FAC)
Pric. currant	10	S	FAC

Species	%Cover	Stratum	Indicator
lady fern	T	H	
RCG	50	H	(FACW)
Pacific willow ~ 100ft (T)	20%		(FACW+) sample taken

If invasives are present record % cover and species: RCG 50%

If forested list approximate age of stand:

Core results: NOT AVAIL DBH results: ~ 12"

Snags - record number and describe: lots of small snags ~ 8-10" DBH

LWD - Inside/(outside) of permanent water?

Record number and describe: 25 down trees criss-crossed in plot

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is area inundated? NO | Depth of water present: NONE

Depth at which soil is saturated: N/A | Depth to free water in pit: NONE

Other field evidence of surface inundation or soil saturation: mottles, low chroma

Is the hydrology criterion met? yes - infered from soil data

Rationale:

Soils

Mapped as: Eliza silt loam | Is soil on hydric soil list: yes

Is it a histosol? NO | Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	10YR4/3 large mottles, abundant	

Other hydric soil indicators: none

Is the hydric soil criteria met? yes | Rationale: low chroma + mottles

Other information

Is the sample plot a wetland? yes

Type of wetland: (PFO)/PSS/PEM

General habitat description: on edge of clearing

Are upland islands present? NO, but remnant channel is nearby, with beaver activity

PLOT ID 7

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

TIP 4

Plot/Transect Number: 1 plot 4 | Date: 7/14/04

Size of Plot: (10m) 5m 1m | Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	40	F	(FAC)	Snowberry	5	S	
Black cottonwood	40	F	(FAC)	Geum macilatum	T	H	
Crab apple	20	SH	(FACW)	Red osar Dog	15		
Salmonberry	25	SH	(FAC+)	lady fern	T		
				Indian plum	T		

If invasives are present record % cover and species: none

If forested list approximate age of stand:

Core results: DBH results: 18" 80 - 100'

Snags - record number and describe: 1 present

LWD - Inside/outside of permanent water?

Record number and describe: NO, but there are lots of 4-8" debris

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? NO | Depth of water present: None

Depth at which soil is saturated: 11" | Depth to free water in pit: None

Other field evidence of surface inundation or soil saturation: flood debris

Is the hydrology criterion met? yes

Rationale: soil SAT AT 11"

Soils

Mapped as: Eliza silt loam | Is soil on hydric soil list: yes

Is it a histosol? no | Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0 - 18"	10YR 4/1	10YR 4/3 Mottles -	large fabund. silt

Other hydric soil indicators: no

Is the hydric soil criteria met? low chroma, Mottles yes | Rationale:

Other information

Is the sample plot a wetland? YES

Type of wetland: PFO/PSS/PEM

General habitat description: flood debris present in plot - small sticks in clumps

Are upland islands present? NO

PLOT ID 8

Lummi Natural Resources Department – Wetland and Habitat Assessment Form

TIPS Nooksack Delta Project

Plot/Transect Number: 1 plot 5	Date: 4/14/04
Size of Plot: (10m) 5m 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	DBH	Species	%Cover	Stratum	Indicator
Alder	60	F	(FAC)	18"-20"	Salmonberry	35%	S	(FAC+)
Cottonwood	20%	F	(FAC)	35"	Ladyfern	35%	H	(FAC)
Red Osier	50%	S	(FAC)		Carex obnupta	25	H	(OBL)
Crabapple	10%	S			Snowberry	T	S	

If invasives are present record % cover and species: none

If forested list approximate age of stand: 18-20" DBH

Core results: — DBH results: 18–20" for alder, 30" for B. cotton (~100' tall) 2@

Snags - record number and describe: NO

LWD - Inside/outside of permanent water? small, no downed logs

Record number and describe: 3 8"

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? evid. of sat.	Depth of water present: —
Depth at which soil is saturated: 10½	Depth to free water in pit: 15"

Other field evidence of surface inundation or soil saturation: evid. of ponding nearby

Is the hydrology criterion met? yes

Rationale:

Soils

Mapped as: ELIZA	Is soil on hydric soil list:
Is it a histosol? NO	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0 – 10"	10YR 4/2	10YR 4/3 Mottles	abund/comm silt
10 – 18"	10YR 4/1	10YR 4/3 "	" "

Other hydric soil indicators:

Is the hydric soil criteria met? YES	Rationale: low chroma + mottles in upper part

Other information

Is the sample plot a wetland? YES

Type of wetland: PFO/PSS/PEM

General habitat description: open canopy

Are upland islands present? no

PLOT ID 9

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

TIP6 #6

Plot/Transect Number: 1 | Date: 4/14/04

Size of Plot: 10m (5m) 1m | Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
~~Shooter~~ SW	50	sh	(FACW+)	Alder	10	T	
Crabapple	10	sh		Rosa spp	10	sh	
Red Osier D	20	sh	(FAC)	~~Juncus~~ Carex sp	40%	H	(OBL)
Hawthorne sh	10	sh		ladyfern	10%	H	

If invasives are present record % cover and species: none

If forested list approximate age of stand:

Core results: DBH results: largest alder 14"

Snags - record number and describe: 7 alder 10"

LWD - Inside/outside of permanent water? A lot of debris, but NOT large
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? yes | Depth of water present: 2" in one area

Depth at which soil is saturated: 4" | Depth to free water in pit: 6" Filling fast

Other field evidence of surface inundation or soil saturation: evidence of recent surface ponding

Is the hydrology criterion met? ye

Rationale: low chroma, saturated soil, evid. of ponding

Soils

Mapped as: ELIZA | Is soil on hydric soil list: yes

Is it a histosol? NO | Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-6"	10YR4/1		

Other hydric soil indicators:

Is the hydric soil criteria met? YES | Rationale: low chroma + water

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: on edge of scrub zone

Are upland islands present? NO

PLOT ID 11

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: 1 #8 TIP8	Date: 4/14/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator
beaked Scouler's willow	~~100%~~ 80%	sh	FACW-
Twinberry	T	sh	FAC+
Spirea	5	sh	
Salmonberry	T	sh	

Species	%Cover	Stratum	Indicator
RCG	25%	H	FACW
Waterparsley	10%	H	
polygonum spp	T	H	
Alder	20%		FAC
pacific willow	1		

If invasives are present record % cover and species: RCG 25%

If forested list approximate age of stand: willow

Core results: — DBH results: 6" MAX

Snags - record number and describe: ~~none~~ 1, small

LWD - Inside/outside of permanent water? small to

Record number and describe: A few, medium size, willow

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: 3"
Depth at which soil is saturated: —	Depth to free water in pit: —

Other field evidence of surface inundation or soil saturation: inundated

Is the hydrology criterion met? yes

Rationale: Inundation

Soils

Mapped as: ELLA silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
no pit dug - inundated			

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: inundated

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description:

Are upland islands present? no

PLOTID 12

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: 1 #9 | Date: 4/13/04

Size of Plot: 10m (5m) 1m TIP9 | Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Scouler Willow (hooker)	60%	sh	FACW-	salmonberry	10%	sh	lady fern T
R. Alder sh	25%	sh	FAC	Spirea	10%	sh	
Pacific Willow	10%	sh	FACW+	water parsley	20%	H	OBL
Red osier dogwood	20%	sh	FAC	polystonium spp	T	H	

If invasives are present record % cover and species: iris - Tvace

If forested list approximate age of stand: —

Core results: — DBH results: largest alder 10"

Snags - record number and describe: 6, small

LWD - Inside/outside of permanent water? lots of small - medium

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

.e area inundated? yes | Depth of water present: 12"

Depth at which soil is saturated: — | Depth to free water in pit: —

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: inundation

Soils

Mapped as: Eliza Silt loam | Is soil on hydric soil list: yes

Is it a histosol? no | Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
To wet to dig pit			

Other hydric soil indicators: none needed

Is the hydric soil criteria met? yes | Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description:

Are upland islands present? no

PLOT ID 0

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T1P10	Date: 4/19
Size of Plot: 10m (5m) 1m	Field Staff: L-, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
R. Alder	15	F	FAC	Water parsley	20	H	(OBL)
Pacific willow	10	S	FACW+	RCG	10	H	
Sitka w.	30	S	(FACW)	Carex obnupta	T	Sh	
Iris	30%	H	~~30~~ OBL	Hooker willow	T	Sh	

Typha 10% H

If invasives are present record % cover and species: Iris, RCG 40% nitleshade

If forested list approximate age of stand: N/A

Core results: — DBH results: 4–5"

Snags - record number and describe: 4

LWD - (Inside/outside) of permanent water? 8

Record number and describe: medium size

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: 1' to 3'
Depth at which soil is saturated: all	Depth to free water in pit: all

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met?

Rationale:

Soils

Mapped as: Eliza silt	Is soil on hydric soil list:
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
Did not dig pits			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: some open water beaver evidence

Are upland islands present? no

PLOT ID 10

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

TIP 7

Plot/Transect Number: 1 #7	Date: 4/14/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator		Species	%Cover	Stratum	Indicator	
R Alder	20%	Sh	(FAC)	30'	Cedar (2)	sh	25' T	FAC	lady fern
B ~~Ch~~nwood	10%	Sh	aspen FAC+	25'	salmonberry	10%	sh	FAC+	skunk cab
Red Osier	40%	sh	(FAC)		Crabapple	5%	sh	FACW	equisetum
Twinberry	10%	sh	FAC+						~~hone~~ snowberry

If invasives are present record % cover and species: RC6 present between 6 & 7

If forested list approximate age of stand: 1 cedar 25' 6" dbh

Core results: — DBH results: largest alder 16"

Snags - record number and describe: 5

LWD - Inside/outside of permanent water? A lot, big 10"

Record number and describe: 10, large, old

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: 4"
Depth at which soil is saturated: inundated in part	Depth to free water in pit: full

Other field evidence of surface inundation or soil saturation: swales, relic channel

Is the hydrology criterion met? yes

Rationale: inundated

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-8"	10YR4/1	large mottles 10YR4/3	silt loam

Other hydric soil indicators: ponded water

Is the hydric soil criteria met? yes Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description:

Are upland islands present? NO

PLOT ID 1

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T1P11	Date: 4/19/04
Size of Plot: (10m) 5m 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific Willow T+sh	50%		(FACW+)	Iris	10%	H	
Red alder	10%		Sitka willow 10%	polygonum spp	T	H	
Spirea	10%	sh		water parsley	T	H	
Red Oster	10%	sh		RCG	T	H	

Salmonberry T

If invasives are present record % cover and species: Iris, RCG 10%

If forested list approximate age of stand:
Core results: DBH results: 12" (willow)

Snags - record number and describe: 10 small 8" DBH

LWD - (Inside)/outside of permanent water?
Record number and describe: A lot, mixed

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

area inundated? yes	Depth of water present: 1'
Depth at which soil is saturated: all	Depth to free water in pit: all

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Saturated at surface

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did NOT dig pit			

Other hydric soil indicators:

Is the hydric soil criteria met? yes | Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: Frog, frog eggs, mostly ponded

Are upland islands present? NO

PLOT ID 2

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T1P12	Date: 4/19/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Crabapple	≈20%	sh	(FACW)	Red Osier dogwood	10%	sh	
Hooker willow	30%	sh	(FACW-)	Nootka Rose	10%	sh	Iris 5%
Pacific willow	30%	F+sh	(FACW+)	RCG	75%	H	(FACW) Spirea 10%
Twinberry	15%	sh		Water parsley	10%	H	salmonberry T

If invasives are present record % cover and species: RCG 75% Iris 5% = 80%

If forested list approximate age of stand:
Core results: DBH results: willow up to 10" DBH

Snags - record number and describe: mostly small (5)

LWD - Inside/outside of permanent water? A lot, small, med, large
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is area inundated? yes	Depth of water present: none
Depth at which soil is saturated: SAT AT surface	Depth to free water in pit: SAT AT surface

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Saturation

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Eliza			

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: saturated

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: Fairly dense S-S

Are upland islands present? no

PLOTID3

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: 11P13	Date: 4/19/04
Size of Plot: 10m 5m (1m)	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
RCG	100%	H	(FACW)				
nearby Hooker Will							
Typha	5%	H					

If invasives are present record % cover and species: 100% RCG

If forested list approximate age of stand:
Core results: DBH results: willow 3"

Snags - record number and describe: A lot of SNAGS in meadow

LWD - Inside/outside of permanent water? NO - just RCG
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

area inundated? yes	Depth of water present: AT surface
Depth at which soil is saturated: 1"	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: saturated

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
DID NOT DIG – SAT			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/(PEM)

General habitat description: large wet meadow

Are upland islands present? NO

PLOT ID 4

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T1P14	Date: 4/19/04
Size of Plot: 10m 5m (1m)	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
TypHA	50%	H	(OBL)				
Iris	20%	H	(OBL)				
Scirpus americanus	20%	H	(OBL)				
RCG	5%						

If invasives are present record % cover and species: 25% RCG

If forested list approximate age of stand:
Core results: DBH results: OUT of plot: alder, hooker willow (small)

Snags - record number and describe: lots of small dead willow

LWD - Inside/outside of permanent water:
Record number and describe: NO

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: at surface
Depth at which soil is saturated:	Depth to free water in pit: did NOT dig

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Saturation

Soils

Mapped as: Eliza	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
did NOT dig			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM on edge of shrub

General habitat description: on S. edge of large field/marsh

Are upland islands present? NO

PLOT ID 5

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T1P15	Date: 4/19/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alder	40%	sh	(FAC)	RCG	75%	H	(FACW)
Hooker willow	10%	sh		salmonberry	5%	sh	
hawthorne	T	sh		lady fern	T	H	
Twinberry	20%	sh	(FAC+)	Iris	5%	Red oster	10%

If invasives are present record % cover and species: RCG - 75%, Iris 5% = 80%

If forested list approximate age of stand:

Core results: DBH results: Avg stem size 4" 45' tall alder w/ 10" stem outside of plot

Snags - record number and describe: yes - many small

LWD - Inside/outside of permanent water? yes - large, many
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: AT surface
Depth at which soil is saturated: SAT AT surface	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: SAT AT surface

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did NOT dig			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

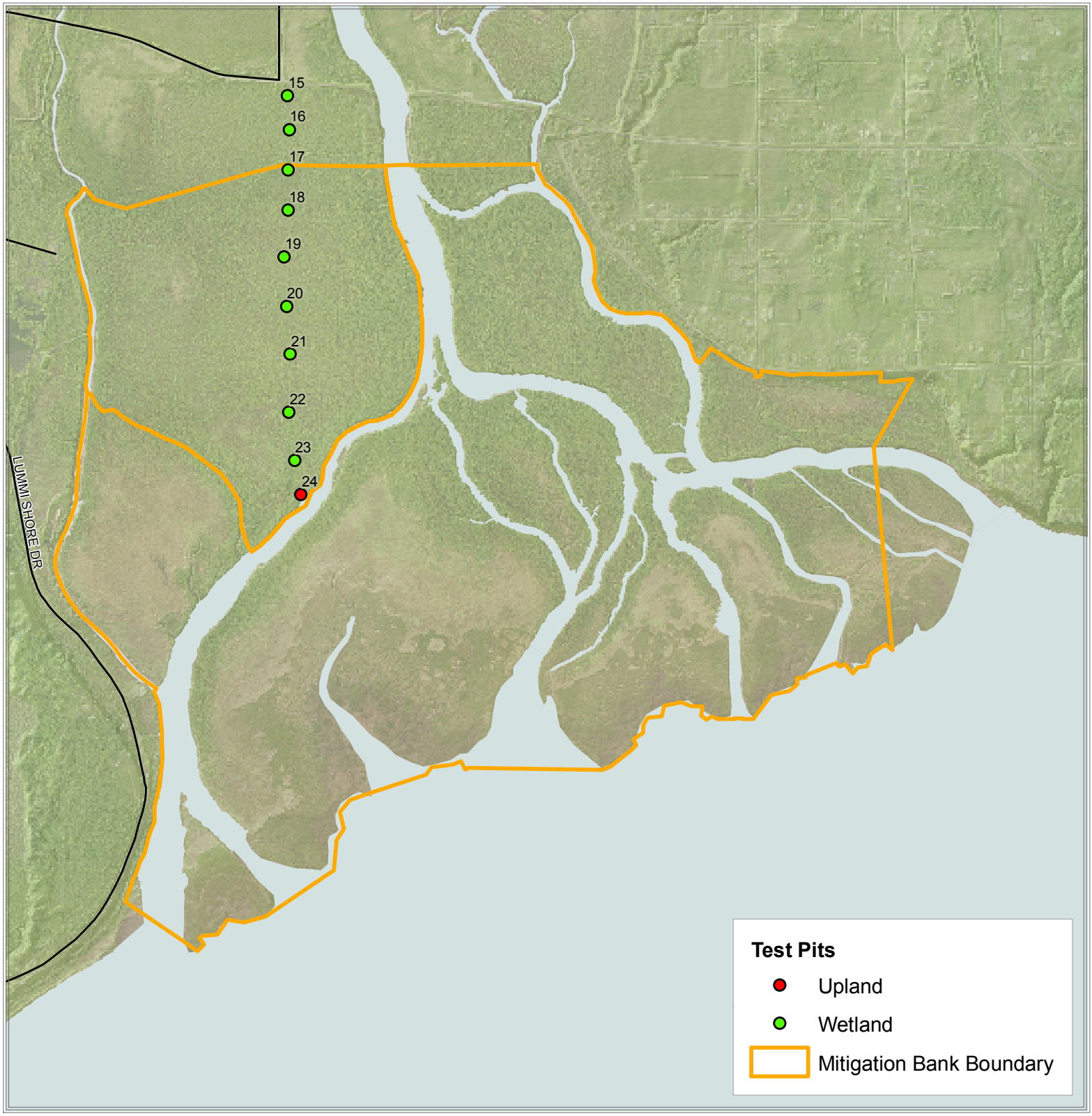
Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: A lot of big driftwood/dead willow

Are upland islands present? NO

Lummi Nation Wetland and Habitat Mitigation Bank



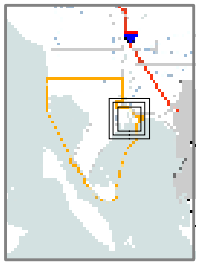
Soil Test Pits: Nooksack Delta Site
Transect 2

0 500 1,000
Feet

N

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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PLOT ID 15

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2 P1	Date: April 28 2004
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Hooker Willow	80%	S	(FACW-)	Waterparsley	20%	H	(OBL)
Salmonberry	10%	S		Skunk cabbage	5%	H	
Pacific willow	10%	S		lady fern	T		
Carex obnupta	50%	H	(OBL)				

If invasives are present record % cover and species: RCG Trace

If forested list approximate age of stand: Willow
Core results: DBH results:

Snags - record number and describe: 0

LWD - (Inside)/outside of permanent water? 4
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? soil SAT just below surface	Depth of water present: 4"
Depth at which soil is saturated: AT SURFACE	Depth to free water in pit: 6"

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Saturation during the growing season

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-10"	10YR3/1	yes - mottles	silt loam

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: low chroma in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: dense sh-sh dom. by willow

Are upland islands present? NO

PLOT ID 16

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P2	Date: 4/28/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alnus rubra	30%	F	(FAC)	Lonicera involucrata	10%	SH	lady fern
Rosa/Salix sp.	20%	SH	(FAC)	Snowberry	T	>4	water parsley
Pacific willow	20%		(FACW+)	Juncus/Carex group	50%		(OBL)
Salmonberry	20%		(FAC+)	Skunk cab	5%		

If invasives are present record % cover and species: 5% RCG

If forested list approximate age of stand:

Core results: DBH results: 12" biggest 8-10" Average 50' TALL

Snags - record number and describe: none

LWD - (Inside/outside of permanent water)? 6

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? Some standing water	Depth of water present: ~~X~~
Depth at which soil is saturated: At surface	Depth to free water in pit: 5½

Other field evidence of surface inundation or soil saturation: no

Is the hydrology criterion met? yes

Rationale: saturated conditions at ground surface during growing season

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-10"	10YR 3/1	mottle 5	silt loam

Other hydric soil indicators: no

Is the hydric soil criteria met? yes

Rationale: low chroma + mottles in upper part

Other information

Is the sample plot a wetland? yes

Type of wetland: (PFO)/PSS/PEM

General habitat description: Shrub/forest mix dom. by alder

Are upland islands present? no

PLOT ID 17

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P3	Date: 4/29/04
Size of Plot: (10m) 5m 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alnus rubra	50%	T	(FAC) 12"	Indian plum	10%	sh	
Malus fusca	20%	sh	(FACW)	lady fern	15%	H	
salmonberry	30%	sh	(FAC+)	Gooseberry (SUB AM)	10%	sh	
Red oster dogwood	sh	20%	(FAC)	Mainthemum	10%	H	

If invasives are present record % cover and species: NO

If forested list approximate age of stand: 80' Tall alder, MAX DBH = 25 Avg = 10"

Core results: DBH results:

Snags - record number and describe: 2

LWD - (Inside/outside of permanent water? 12 12
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

sat.

: area inundated? AT surface | Depth of water present: 6" rising

Depth at which soil is saturated: | Depth to free water in pit: 10" rising

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: sat at surface during the growing season

Soils

Mapped as: Eliza silt loam | Is soil on hydric soil list: yes

Is it a histosol? no | Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR3/1	mottles	silt loam

Other hydric soil indicators:

Is the hydric soil criteria met? yes | Rationale: low chroma + mottles in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: Forest/shrub mix, dom by alder

Are upland islands present? no

PLOT ID 18

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2 P4	Date: 4/28/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	25%	sh	(FACW+)	spirea	10%	sh	
~~Scouler's~~ Hooker willow	20%	sh	(FAC)	Carex obnupta	60%	H	(OBL)
Malus fusca	10%	sh		Red osier dogwood	10%	sh	

If invasives are present record % cover and species: iris 5% RCG T

If forested list approximate age of stand: Pacific willow is tallest tree ~ 35'

Core results: DBH results: N/A

Snags - record number and describe: yes 2 large

LWD - (Inside) (outside) of permanent water? 10

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100 %

Is hydrophytic vegetation criterion met? yes

Hydrology

area inundated? yes 1-2" in most	Depth of water present: 1-2"
Depth at which soil is saturated: SAT AT surface (agree)	Depth to free water in pit: N/A
Other field evidence of surface inundation or soil saturation:	
Is the hydrology criterion met? yes	
Rationale: SAT AT surface	

Soils

Mapped as: Elizn silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
Did not dig - inundated			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: inundation + hydrophytic veg criteria met

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/(PSS)/PEM

General habitat description: wet swamp dom by willow

Are upland islands present? no

PLOT ID 19

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2PS	Date: 4/27/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	40%	sh	(FACW-) 30'	spiraea	10%	sh	
Alder	20%	sh	(FAC)	Malus fusca	10%	sh	
Red osier	20%	sh	(FAC)	lady fern	5%	water parsley	5%
Carex obnupta	20%	H	(OBL)	equisetum	5%		

If invasives are present record % cover and species: iris, before plot also 5%

If forested list approximate age of stand: willow ~ 30 ft

Core results: DBH results: N/A

Snags - record number and describe: 6 6-8" willow

LWD - (Inside/outside) of permanent water?
Record number and describe: 10

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes - at surface	Depth of water present: 4" in some areas
Depth at which soil is saturated: at surface	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Sat. at surface

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did Not Dig			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: saturated

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: Fairly open ss dom by pacific willow

Are upland islands present? NO

PLOT ID 20

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P6	Date: 4/28/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	50%	sh	(FACW+)	lady fern	5%		
~~Scouler~~ Hooker willow	10%	sh		carex obnupta	30%		(OBL)
spiraea	5%	sh		water parsley	10%		
Salmonberry	10%	sh					

If invasives are present record % cover and species: none

If forested list approximate age of stand: 1 lg cottonwood ~ 50 ft tall DBH = 18"

Core results: DBH results: 10" largest willow

Snags - record number and describe: 2

LWD - (Inside/outside of permanent water? 10

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: 3" most places
Depth at which soil is saturated: completely	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: no

Is the hydrology criterion met? yes

Rationale: flooded, probably permanently

Soils

Mapped as: ELWA silt loam	Is soil on hydric soil list: yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did not dig - inundated			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: inundated, probably all the time

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/(PSS)/PEM

General habitat description: wet willow swamp

Are upland islands present? no

PLOT ID 21

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P7	Date: 4/29/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Malus fusca	10%	sh	Alder 5% 6" DBH	Spirea	10%	sh	Carex unupta 10%
Pacific willow	40%	sh	(FACW+)	Indian plum	T	sh	
Scouleri's willow	10%	sh		Water parsley	10%	H	
Salmonberry	10%	sh		Iris	5%	H	

If invasives are present record % cover and species: Iris 5%

If forested list approximate age of stand:

Core results: DBH results: 10" alder - only one

Snags - record number and describe: 1 - large

LWD - Inside/outside of permanent water? A lot

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes	Depth of water present: at surface
Depth at which soil is saturated: at surface	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: no

Is the hydrology criterion met? yes

Rationale: Sat. at surface

Soils

Mapped as: Elizan silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did NOT dig Too wet			

Other hydric soil indicators: no

Is the hydric soil criteria met? yes - sat + obl plants | Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: wet willow swamp dom by Pacific willow

Are upland islands present? no

PLOT ID 22

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P8	Date: 4/28/04
Size of Plot: (10m) 5m 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	60%	F	(FACW+) ~ 40'	RCG	5%	H	
Alnus rubra	10%	F	dbh = 6" ~ 40'				
lonicera	20%	sh	(FAC+)				
Iris	60%	H	(OBL)				

If invasives are present record % cover and species: 60% lot of iris between 7 & 8

If forested list approximate age of stand: willow up to 10'

Core results: DBH results:

Snags - record number and describe: 0

LWD - (Inside/outside) of permanent water? 4

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes - at surface	Depth of water present: at surface
Depth at which soil is saturated: at surface	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: inundated at surface in growing season

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
did not dig - inundated			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: wet willow dominated

Are upland islands present? NO

PLOTID 23

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P9	Date: 4/29/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Hooker willow	20%	S	(FAW-)	Scirpus americanus	20%	H	(OBL)
Pacific willow	30%	F	(FACW+)	Equisetum arven	20%	H	(FACW)
Salmonberry	10%	Sh		Carex obnupta	20%	H	(OBL)
Lonicera Involucrata	5%	Sh					

If invasives are present record % cover and species: NO - no IVs

If forested list approximate age of stand:
Core results: DBH results: willow up to 50' DBH = 10"

Snags - record number and describe: 0

LWD - Inside/outside of permanent water? 12 inside 10 out
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? yes - at surface	Depth of water present: N/A, but sat.
Depth at which soil is saturated: —	Depth to free water in pit: —

Other field evidence of surface inundation or soil saturation: —

Is the hydrology criterion met? yes

Rationale:

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Did not dig sat. at surface			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO/PSS/PEM)

General habitat description: swamp dom. by pacific willow

Are upland islands present? NO

PLOT ID 24

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T2P10	Date: 7/28/04
Size of Plot: (10m) 5m 1m	Field Staff: LF/MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alnus alder	60%	F	(FAC) 18" 80'	Malus fusca	10%	sh	
Cottonwood	20%	F	(FAC) 40" 100'	fall snowberry	10%	sh	
Salmonberry	25%	sh	(FAC+)				
Rubus sp.	10%	sh					

If invasives are present record % cover and species: Knotweed by River (NOT IN plot)

If forested list approximate age of stand:

Core results: DBH results: 18" - largest alder

Snags - record number and describe: 3

LWD - Inside/(outside) of permanent water? 5

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is area inundated? NO	Depth of water present: N/A
Depth at which soil is saturated: NOT SAT AT 12"	Depth to free water in pit: N/A
Other field evidence of surface inundation or soil saturation:	
Is the hydrology criterion met? NO	
Rationale: NO evidence of saturation at 12"	

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list:
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0-12"	10YR3/1	No mottles	Silt loam w/ small amt SAND

Other hydric soil indicators: no

Is the hydric soil criteria met? ~~NO~~ yes Rationale: low chroma in upper part

Other information

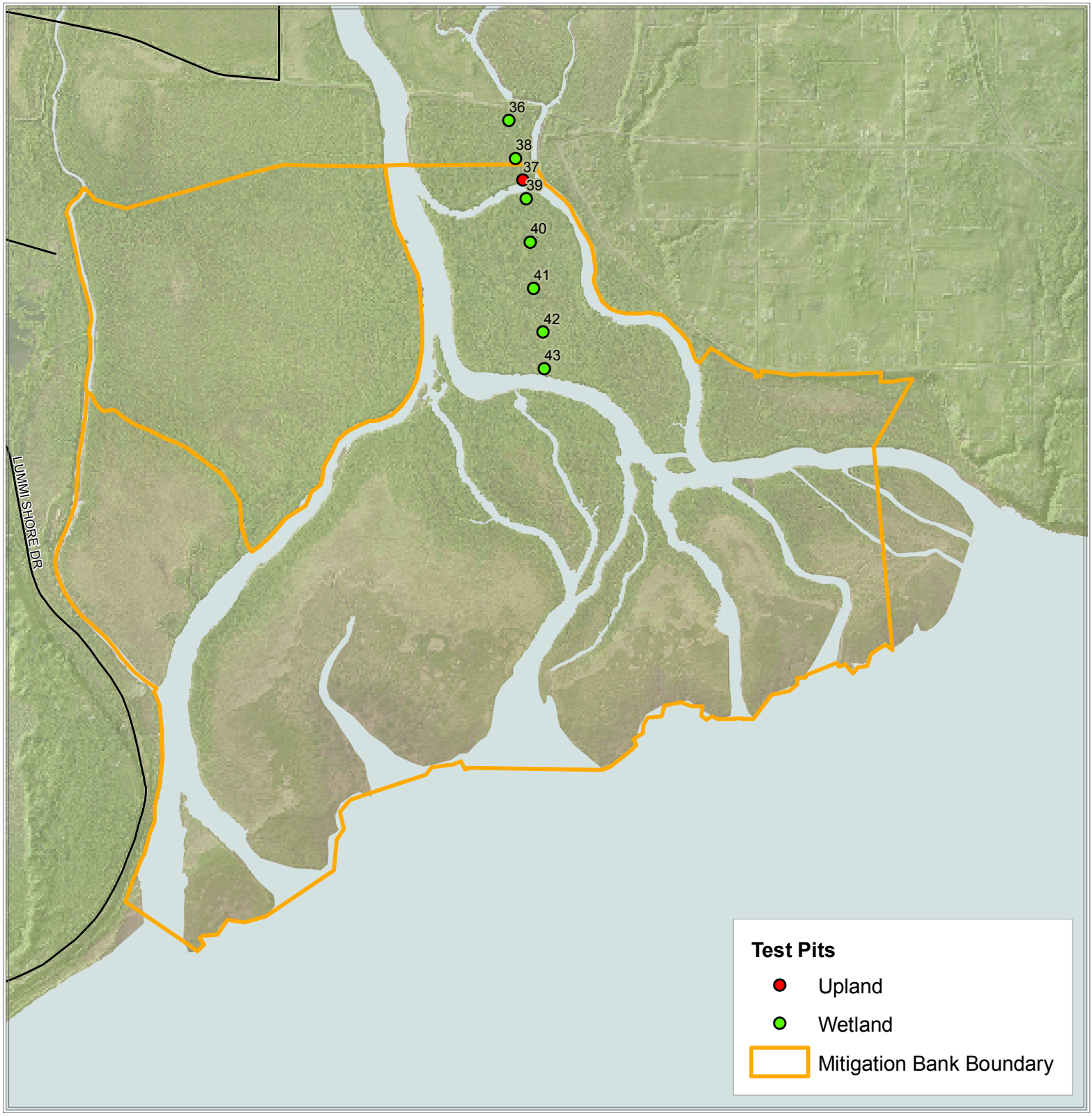
Is the sample plot a wetland? no

Type of wetland: PFO/PSS/PEM

General habitat description: alder forest - not wetland along Bank of west channel

Are upland islands present? yes - on one

Lummi Nation Wetland and Habitat Mitigation Bank



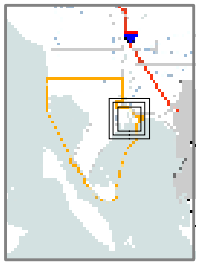
Soil Test Pits: Nooksack Delta Site
Transect 3

0 500 1,000
Feet

N

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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PLOT ID 36

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3P1	Date: 6/4/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red osier dogwood		sh	80 (FAC)	pacific willow	20		(FACW+)
salmonberry		sh	20 (FAC+)				
snowberry		sh	5				

If invasives are present record % cover and species: none

If forested list approximate age of stand:
Core results: DBH results: AVG 6" MAX 10"

Snags - record number and describe: 2

LWD - Inside/outside of permanent water? 6 in / 6 out
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

area inundated?	Depth of water present: NONE
D[illegible] at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: NO

Is the hydrology criterion met? yes - low chroma soil & dry year

Rationale:

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1		silt loam
		gravel AT	14"

Other hydric soil indicators: no

Is the hydric soil criteria met? yes Rationale: low chroma matrix

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM
General habitat description: sh/sh red osier dominant

Are upland islands present? no

PLOT ID 38

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3P2	Date: ~~LF~~ 6-4-04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Black cottonwood	50%	F	(FAC)	salmonberry	10%	sh	
Red alder	30%	F	(FAC)	skunk cabbage	10%	H	
Pacific willow	20%	sh	(FACW+)	lady fern	10%	H	
Red osier	30%	sh	(FAC)	IVY – surrounding plot			

If invasives are present record % cover and species: ~~none~~ IVY

If forested list approximate age of stand:
Core results: DBH results: 12" AVG 20 MAX

Snags - record number and describe: 2

LWD - Inside/outside of permanent water? 12
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? no - but recently was	Depth of water present: none
h at which soil is saturated: 11"	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: NO

Is the hydrology criterion met? yes

Rationale: inundated w/in 12" of surface

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0–8"	10YR4/1	no	
8–10"		10YR3/3	
		10YR4/6	

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: low chroma + mottles in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO/PSS/PEM)

General habitat description: black cott/alder forested wetland

Are upland islands present? no

PLOTID 37

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3P3	Date: 6/4/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	60%	F	(FAC)	Inv. Ivy	50%	H	(X)
Red osier dogwood	30%	S	(FAC)				
Salmonberry	25%	S	(FAC+)				
crabapple	10%	S					

If invasives are present record % cover and species: 50% Ivy

If forested list approximate age of stand:

Core results: 56 yo DBH results: Alder 16-18" AVG 24 MAX

Snags - record number and describe: 3

LWD - Inside/outside of permanent water? yes 6
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 75%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? NO	Depth of water present: N/A
h at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? NO

Rationale: No evidence of hydrology here - on levy

Soils

Mapped as: Ellica silt loam	Is soil on hydric soil list:
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	NONE	silt loam

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: low chroma throughout

Other information

Is the sample plot a wetland? NO
Type of wetland: (PFO)/PSS/PEM on levy

General habitat description: levy on river

Are upland islands present? NO

levy on channel ~ 30 ft wide

PLOTID 39

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3P4	Date: 6/15/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	60%	F	(FACW+)	Snowberry	10%	sh	
Alder	20%	F	(FAC)	nettle	T	H	
Elderberry	20%	F	(FACU)	trailing blackberry	T	sh	
Salmonberry	20%	sh	(FAC+)				

If invasives are present record % cover and species: inv. ivy near launch site

If forested list approximate age of stand: willow AVG 16" 10-18"
Core results: DBH results: alder AVG 18"

Snags - record number and describe: 1

LWD - Inside/outside of permanent water? lots of small
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 75%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? no	Depth of water present:
Depth at which soil is saturated:	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation: evidence of flow - tree flooding

Is the hydrology criterion met? YES

Rationale: water marks, flood debris

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
NOT examined - clearly hydric			
Same as other transects			

Other hydric soil indicators:

Is the hydric soil criteria met? YES	Rationale:

Other information

Is the sample plot a wetland? YES
Type of wetland: (PFO)/PSS/PEM

General habitat description: forested riparian wetland area w/ levy near bank

Are upland islands present? NO

PLOT ID 40

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 P5	Date: 6/15/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Malus fusca	45%	sh	(FACW)	cottonwood	20%	T	(FAC)
Pacific willow	20%	sh	(FACW+)	snowberry	T	sh	felix femina T
Red osier dogwood	20%	sh	(FAC)	equisetum	70%	H	
salmonberry	20%	sh	(FAC+)	skunkcabbage	T	H	

If invasives are present record % cover and species: none

If forested list approximate age of stand:
Core results: DBH results: AVG 10" MAX 15"

Snags - record number and describe: 10

LWD - Inside/outside of permanent water? 10 IN, 10 OUT
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? NO, but WAS recently	Depth of water present:
Depth at which soil is saturated:	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation: evid of recent ponding

Is the hydrology criterion met? YES

Rationale: water marks + evidence of flooding

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Not examined - clearly hydric			
same as other transects			

Other hydric soil indicators:

Is the hydric soil criteria met? YES	Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: sh sh

Are upland islands present? NO

PLOTID 41

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 P6	Date: 6/15/04
Size of Plot: 10m (5m) 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
spinea		sh	20% (FACW)	Nutka Rose		sh	T
~~sitka~~ scouler's willow		sh	50% (FACW)	shoush sedge		H	T
Red osier dogwood		sh	30% (FAC)	Equisetum	T	H	T
Pacific willow		F	30% (FACWT)				

If invasives are present record % cover and species: RCG just outside of plot

If forested list approximate age of stand:
Core results: DBH results: AVG = 6" MAX 10"

Snags - record number and describe: 4

LWD - Inside/outside of permanent water? inside 8, out 8
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? No, but recently	Depth of water present: water/sediment marks
Depth at which soil is saturated:	Depth to free water in pit: on trees ~ 4' from base

Other field evidence of surface inundation or soil saturation: evid. of flow-thru flooding

Is the hydrology criterion met? YES

Rationale: water marks, flood debris

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: Yes
Is it a histosol? No	Do field observations match mapped series? Yes

Depth	Matrix	Redox features/Gley	Texture
Not examined – clearly hydric			
Same as other transects			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: shrub wetland area

Are upland islands present? no

PLOT ID 42

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 P7	Date: 6/15/04
Size of Plot: 10m (5m) 1m	Field Staff: LF/MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red osier dogwood	80%	sh	(FAC)	equisetum	5%	H	
Sitka willow	20%		(FACW)	RCG	5%	H	
Salmonberry	15%			Skunk cabbage	5%	H	
Pacific willow	20%		(FACW+)				

If invasives are present record % cover and species: RCG Trace

If forested list approximate age of stand: AUG 9"
Core results: DBH results: MAX 16"

Snags - record number and describe: 15

LWD - Inside/outside of permanent water? 5/5
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

e area inundated? No but was recently	Depth of water present:
Depth at which soil is saturated:	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation: Sediment build up, Watermarks

Is the hydrology criterion met? YES Water marks ~ 4" up from base of trees

Rationale: See above

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: Yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Not examined - clearly hydric			
same as other transects			

Other hydric soil indicators:

Is the hydric soil criteria met? YES	Rationale:

Other information

Is the sample plot a wetland? YES
Type of wetland: PFO/PSS/PEM

General habitat description: Shrub wetland

Are upland islands present? NO

PLOT ID 43

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3P8	Date: 6/15/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	50%	F	(FAC)	Field horsetail	T	H	
Red osier dogwood	25%	sh	(FAC)				
Salmonberry	30%	sh	(FAC+)				
Snowberry	20%	sh	(FACU)				

If invasives are present record % cover and species: Knotweed on River bank on edge of levy ~ 50 feet wide

If forested list approximate age of stand:
Core results: DBH results: 12" AVG MAX = 18"

Snags - record number and describe:

LWD - Inside/outside of permanent water? 2/2
Record number and describe: water mark ~ 3' high on

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 75%

Is hydrophytic vegetation criterion met? YES

Hydrology

: area inundated? NO but has been	Depth of water present: water marks, end of
Depth at which soil is saturated:	Depth to free water in pit: flow-through

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? YES

Rationale: See above

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
Not examined - clearly hydric			
Same as other transects			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

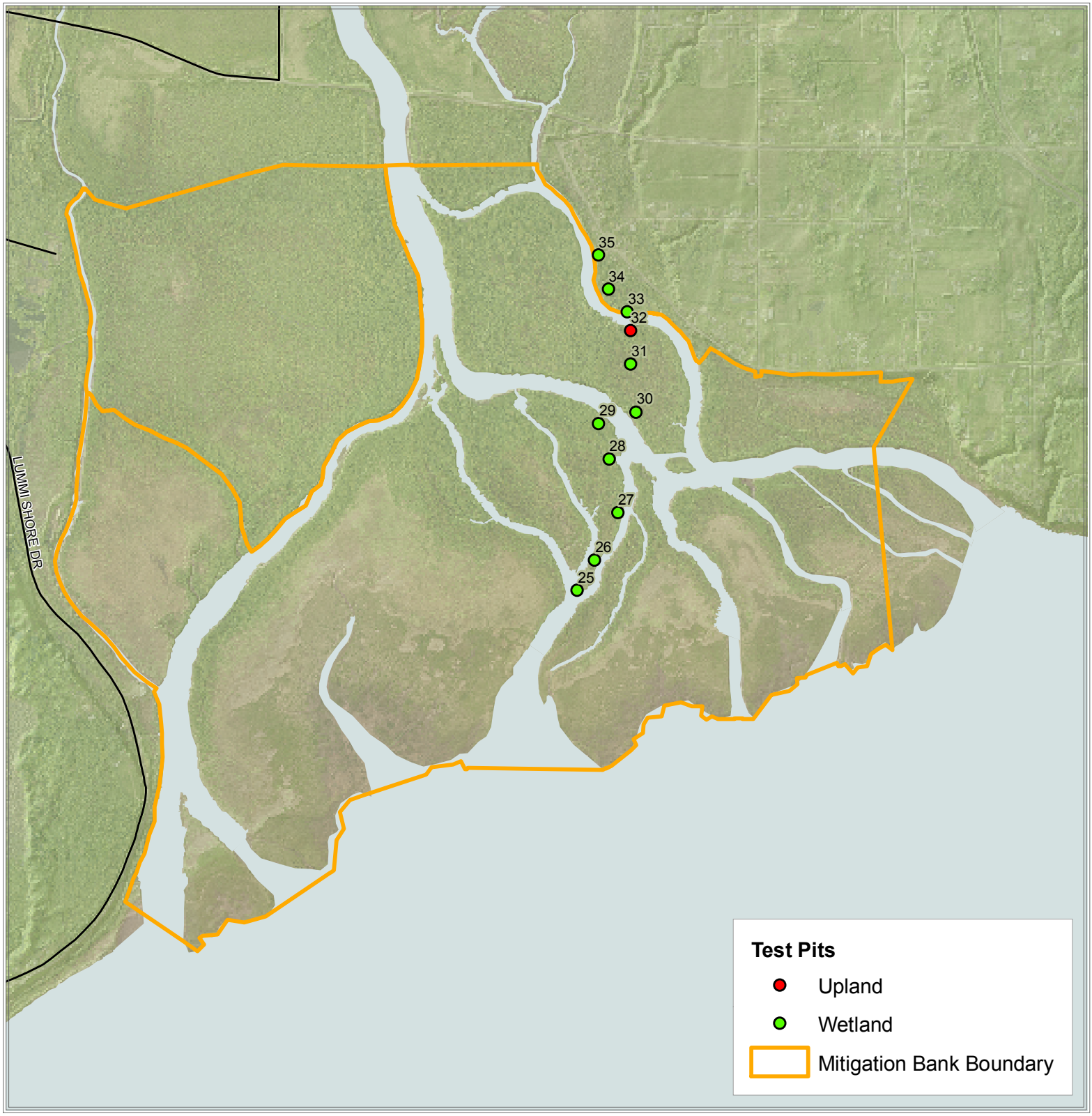
Other information

Is the sample plot a wetland? YES
Type of wetland: PFO/PSS/PEM

General habitat description: Forested riparian area

Are upland islands present? NO

Lummi Nation Wetland and Habitat Mitigation Bank



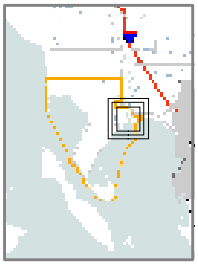
Soil Test Pits: Nooksack Delta Site
Transect 4

0 500 1,000
Feet

N

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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PLOT ID 35

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "K" ~~T3R~~ T4P1	Date: 5/21/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	50%	F	(FACW+)	~~Salmonberry~~ Snowberry	20%	SH	~~(FAC)~~
Alder	50%	F	(FAC)				
Red osier dog	30%	SH	(FAC)				
Salmonberry	50%		(FAC+)				

If invasives are present record % cover and species: none

If forested list approximate age of stand:
Core results: DBH results: willow: 00" AVG Alder: 16" AVG

Snags - record number and describe: 1

LWD - Inside/outside of permanent water?
Record number and describe: a lot of small stuff / flood debris

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 80%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? NO	Depth of water present: N/A
Depth at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: low chroma soil, flood debris, dry year

Soils

Mapped as: Eliza Silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? ye

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	10YR3/4	

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: low chroma / mottles in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO)/PSS/PEM

General habitat description: forested wetland

Are upland islands present? no

PLOT ID 34

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "J" ~~T3R2~~ T4P2	Date: 5-20-04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
B. Cottonwood	45%	F	(FAC)	Elderberry	10%	SH	
R. Alder	45%	F	(FAC)				
Salmonberry	100%	SH	(FAC+)				
Knotweed	25%	SH	~~FACU~~				

If invasives are present record % cover and species: Knotweed 25%

If forested list approximate age of stand: AVG 16" Alder
Core results: DBH results: Cottonwood 24"

Snags - record number and describe: 1

LWD - Inside/outside of permanent water? 2
Record number and describe: flood debris - stick

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 75%

Is hydrophytic vegetation criterion met? YES

Hydrology

Is area inundated? NO	Depth of water present: N/A
Depth at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? Yes

Rationale: low chroma, mottles, flood debris, dry year

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	10YR3/4	silty sand layered

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: low chroma/ mottles in upper part

Other information

Is the sample plot a wetland? YES
Type of wetland: PFO/PSS/PEM

General habitat description: riparian forest

Are upland islands present? NO

PLOTID 33

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "I" ~~T3P3~~ T4P3	Date: 5/20/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, n B

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
S. lu orberry	80%	sh	(FAC+)	Blackberry	20%	sh	(~~FAC~~)
Red alder	40%	F	(FAC)	Indian plum	5%	sh	
Pacific willow	20%	F	(FACW+)	Jap knotweed	T		

If invasives are present record % cover and species: Blackberry 20 Jap Knotweed 20%

If forested list approximate age of stand:
Core results: DBH results: AVG 10 ~~8~~" Alder 16" MAX

Snags - record number and describe: 1

LWD - Inside/outside of permanent water? ~~very little~~ (5) (1)
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 75%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? NO	Depth of water present: N/A
Depth at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? Yes

Rationale: low chroma soil, evid of flooding, dry year

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	10YR3/4 20% lots	Silty sand, layered mottles

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO)/PSS/PEM

General habitat description: riparian forest

Are upland islands present? no

PLOTID 32

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "H" T4P4	Date: 5-19-04
Size of Plot: (10m) 5m 1m	Field Staff: LI MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	65%	F	(FAC)	Indian plum	20%	S	(FACU)
Cottonwood	20%	F	(FAC)				
Red osier	25	S	(FAC)				
salmonberry	20	S	(FAC+)				

If invasives are present record % cover and species: none

If forested list approximate age of stand: 16" AVG (alder)
Core results: DBH results: cottonwood 30"

Snags - record number and describe: 4

LWD - Inside/outside of permanent water? 2 inside 4 outside
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 80%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? no	Depth of water present: none
Depth at which soil is saturated: 10"	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? NO

Rationale: no saturation, no hydric soils

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR3/2	NO MOTTLES	SILT/sand (layers)

Other hydric soil indicators: no

Is the hydric soil criteria met? NO Rationale: criteria not met

Other information

Is the sample plot a wetland? (NO)
Type of wetland: PFO/PSS/PEM

General habitat description: forested riparian area

Are upland islands present? no

PLOT ID 31

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 11 6" ~~T3P6~~ T4P5	Date: 5-19-04
Size of Plot: (10m) 5m 1m	Field Staff: LE/MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	45%	F	(FAC)	lady fern	10	H	
pacific willow	45%	F	(FACW+)	Carex obnupta	10	H	
Red osier dogwood	20	sh	(FAC)				
salmonberry	20	sh	(FAC+)				

If invasives are present record % cover and species: NO

If forested list approximate age of stand:
Core results: DBH results: 12 AVG 20 MAX

Snags - record number and describe: 3

LWD - Inside/outside of permanent water?
Record number and describe: 10

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? NO	Depth of water present: none - evidence of ponding nearby
Depth at which soil is saturated: AT surface	Depth to free water in pit: none

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? YES

Rationale: Saturated at surface

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series? Yes

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR2/1	10YR4/3	silt

Other hydric soil indicators: no

Is the hydric soil criteria met? yes Rationale: low chroma in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO)/PSS/PEM

General habitat description: forested riparian wetland

Are upland islands present? no

PLOTID 30

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "F" ~~T5~~ T4 T6	Date: 5/19/04
Size of Plot: 10m (5m) 1m	Field Staff: LF / MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Pacific willow	40%	F	(FACW+)	salmonberry	10	sh	
Red alder	30%	F/sh	(FAC)	Iris	20%	ht	(OBL)
sitka willow	10%	sh		RCG	30%	ht	(FACW)
Lonicera involucrata	20%	sh	(FAC+)				

If invasives are present record % cover and species: Iris & RCG 50%

If forested list approximate age of stand: AVG 8

Core results: DBH results: MAX 12"

Snags - record number and describe: 1

LWD - Inside/outside of permanent water? 4 / 4
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

: area inundated? NO	Depth of water present: NONE
Depth at which soil is saturated: AT surface	Depth to free water in pit: NONE

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: saturation

Soils

Mapped as: Alicia silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-8"	Chart 6 Gley 10YR3/N		
8-14"	10YR4/1	10YR4/4	40% common

Other hydric soil indicators:

Is the hydric soil criteria met? yes

Rationale: low chroma in upper part

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: SS wetland

Are upland islands present? no

PLOT ID 29

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "E" ~~T2~~ T4P7	Date: 5/19/04
Size of Plot: (10m) 5m 1m	Field Staff: LF/MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	35%	F	(FAC)	Salmonberry	50%	sh	(FAC+)
B. Cottonwood	35%	F	(FAC)	Nootka rugosa	20	H	(FACW)
Pacific willow	15%	F		bleeding heart	T	H	
Red osier	25%	sh	(FAC)				

If invasives are present record % cover and species: none

If forested list approximate age of stand: MAX 30" (cottonwood)
Core results: DBH results: AVG 20

Snags - record number and describe: 2

LWD - Inside/outside of permanent water? 10 inside 10 out
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

Is area inundated? no	Depth of water present: none
Depth at which soil is saturated: N/A	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: evidence of flow-thru flooding

Is the hydrology criterion met? YES

Rationale: inferred from low chroma soil, flooding evidence, dry year

Soils

Mapped as: Elize silt	Is soil on hydric soil list:
Is it a histosol? no	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR 3/1	no	sand + silt mix

Other hydric soil indicators: no understory - flood scouring

Is the hydric soil criteria met? yes Rationale:

Other information

Is the sample plot a wetland? YES
Type of wetland: PFO/PSS/PEM

General habitat description: forested riparian area

Are upland islands present? no

PLOT ID 28

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "D" ~~T3P8~~ T4P8	Date: 5/19/04
Size of Plot: (10m) 5m 1m	Field Staff: LF / MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	40%	F	FAC	Snowberry	10%		
Cottonwood	40%	F	FAC	Pacific willow	10%		
Red osier dogwood	40	sh	FACW	Carex obnupta	T		
Salmonberry	10%	sh	FAC+				

If invasives are present record % cover and species: NONE

If forested list approximate age of stand:
Core results: DBH results: AVG DBH 18" (alder) MAX 30" cottonwood

Snags - record number and describe: ~~X~~ 2

LWD - Inside/outside of permanent water? 6 in and outside of plot
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? YES

Hydrology

: area inundated? NO	Depth of water present: NO
Depth at which soil is saturated: NOT	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation: yes - silt & flood debris

Is the hydrology criterion met? ~~yes~~ - inferred from low chroma soil / dry year

Rationale:

Soils

Mapped as:	Is soil on hydric soil list:
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0-16"	10YR4/1	NO	silt + sand mix; many layers

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale:

Other information

Is the sample plot a wetland? YES
Type of wetland: (PFO)/PSS/PEM

General habitat description: riparian flood zone

Are upland islands present?

PLOT ID 27

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "C" ~~T3A~~ T4p9	Date: 5/19/04
Size of Plot: (10m) 5m 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alder	60%	F	(FAC)	Salmonberry	20%		(FAC+)
Cottonwood	20%	F	(FAC)	Snowberry	5%		
honicera	20%	sh	(FAC+)				
Him Blackberry	30%	sh	(~~FAC~~)				

If invasives are present record % cover and species: Him Blackberry ~~20~~ 30

If forested list approximate age of stand:
(Core) results: 59 yrs DBH results: 16 - 24" alder ~16" AVG primarily alder

Snags - record number and describe: ~~X~~ 3

LWD - Inside/outside of permanent water?
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 80% beaver meadow

Is hydrophytic vegetation criterion met? YES

Hydrology

Is area inundated? No	Depth of water present: NONE
Depth at which soil is saturated: 11½"	Depth to free water in pit: N/A dry year

Other field evidence of surface inundation or soil saturation: evidence of floods - silt on leaves

Is the hydrology criterion met? Yes - saturated w/in 12" of surface, and low chroma in upper part

Rationale:

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-15"	10YR3/1	No, low chroma	silt

Other hydric soil indicators:

Is the hydric soil criteria met? Yes	Rationale: low chroma in upper part

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO)/PSS/PEM

General habitat description: forested riparian wetland

Are upland islands present? NO

PLOT ID 26

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 B ~~T3R10~~ T4P10	Date: 5/19/04
Size of Plot: 10m (5m) 1m	Field Staff:

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Black cottonwood	20	F	(FAC)	salmonberry	10%	SH	
Alder	20	F	(FAC)	RCG	85%	H	(FACW)
Pacific willow	20	SH	(FACW+)	Noli tangere	30%	H	(FACW)
Sitka willow	20	SH	(FACW)				

If invasives are present record % cover and species: RCG 85%.

If forested list approximate age of stand: MAX 18" AVG 10

Core results: DBH results:

Snags - record number and describe: 0

LWD - Inside/outside of permanent water? 3/3

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%.

Is hydrophytic vegetation criterion met? YES

Hydrology

? area inundated? NO	Depth of water present: NONE
Depth at which soil is saturated: 12"	Depth to free water in pit: NONE

Other field evidence of surface inundation or soil saturation: NO

Is the hydrology criterion met? yes

Rationale: Saturation assumed - ~~wet~~ dry year, ~~ESS~~ inferred from soil data dry year

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0 - 10"	10YR4/2	NO	silt loam
10 - 16"	10YR3/2	10YR4/4 20% faint	silt loam

Other hydric soil indicators:

Is the hydric soil criteria met? YES

Rationale: As mottles w/in 12" of surface

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/(PSS)/PEM

General habitat description: shrub, W

Are upland islands present? NO

PLOT ID 25

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T3 "A" ~~T3P11~~ T4P11	Date: 5/19/04
Size of Plot: 10m (5m) 1m	Field Staff: LF/MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Alnus rubra	30%	sh	FAC	Reed canary	70%	H	FACW
Salix sitch	20%	sh	FACW	Salmonberry	10%	sh	
Pacific willow	20%	sh	FACW+	Ninebark	10%	sh	
Japanese knotweed	30%	H	FACU	Nootka Rose	10%	sh	

If invasives are present record % cover and species: JN, RCG 100%

If forested list approximate age of stand: 10-18" DBH
Core results: DBH results:

Snags - record number and describe: 0

LWD - Inside/outside of permanent water? 3 inside 2 outside
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 80%

Is hydrophytic vegetation criterion met? YES

Hydrology

e area inundated? No	Depth of water present: None
Depth at which soil is saturated: 11½"	Depth to free water in pit: None

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: Saturation

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? No	Do field observations match mapped series? yes

Depth	Matrix	Redox features/Gley	Texture
0-11"	10YR3/2	No	silt loam
11-16"	10YR3/1	yes 10YR 4/3	SAND + SILT LOAM

Other hydric soil indicators: No

Is the hydric soil criteria met? yes	Rationale: low chroma in upper part

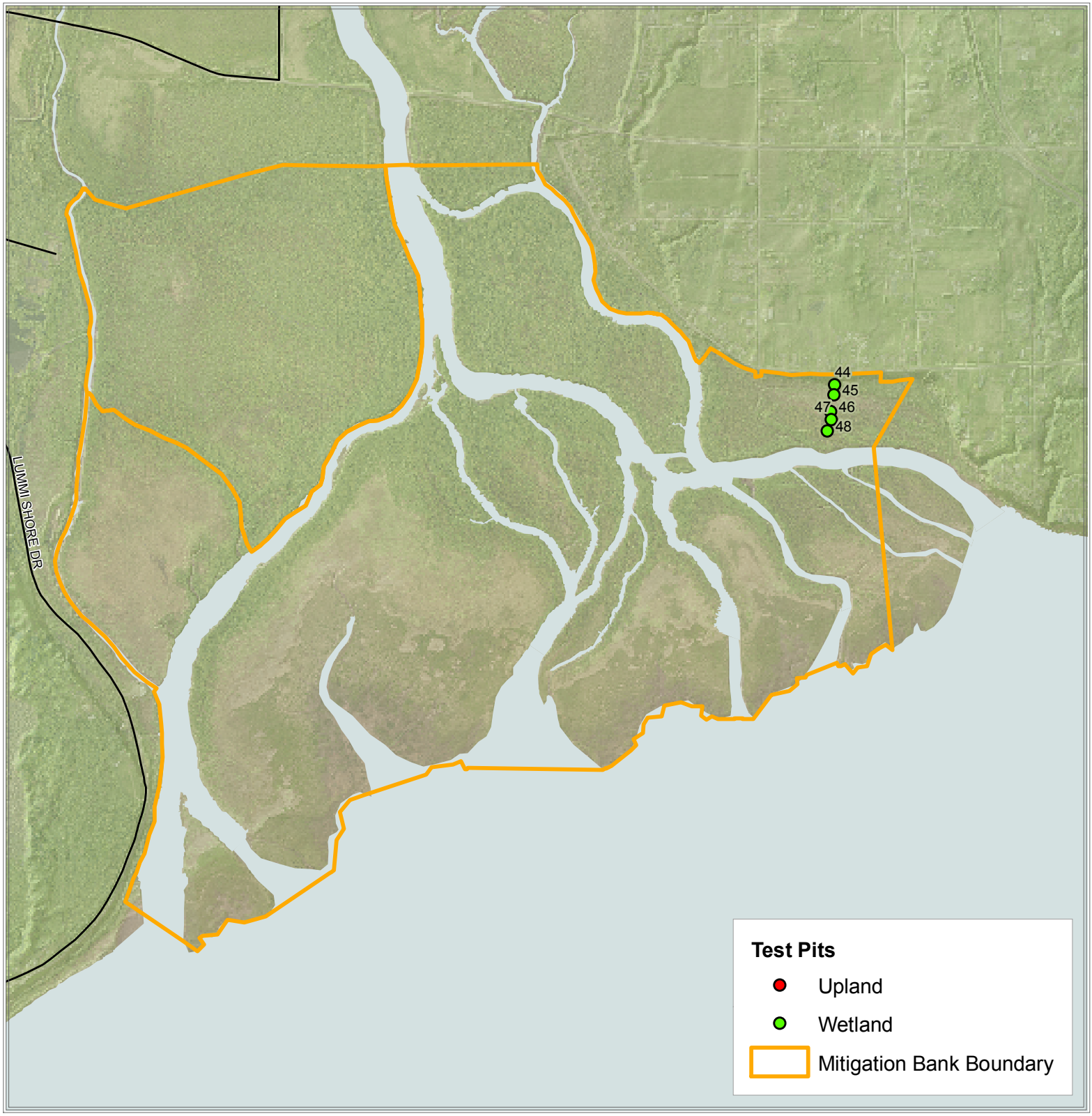
Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/PEM

General habitat description: sh sh dom by willow near forest, young invasive weeds

Are upland islands present? NO

Lummi Nation Wetland and Habitat Mitigation Bank



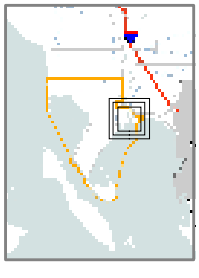
Soil Test Pits: Nooksack Delta Site
Transect 5

0 500 1,000
Feet

N

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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PLOT ID 44

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T5P1	Date: 7/9/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Rosa sicuda	20%	sh	(FAC)	Red alder	5	sh	FAC
Lonicera	15%	sh	FAC+	RCG	80	H	(FACW)
Sitka willow	20%	sh	(FACW)	Noli Tangere	T	H	
Pacific willow	20%	sh	(FACW+)				

If invasives are present record % cover and species: Ivy T RCG 80%

If forested list approximate age of stand:

Core results: DBH results: ~~0 — SAPLG~~ 2 AVG MAX = 4

Snags - record number and describe: 0

LWD - Inside/outside of permanent water? 0

Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is the area inundated? yes	Depth of water present: 2" in ½ of plot
Depth at which soil is saturated:	Depth to free water in pit: did NOT dig

Other field evidence of surface inundation or soil saturation: part of plot has standing water

Is the hydrology criterion met?

Rationale:

Soils

Mapped as: ELZA SILT LOAM	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
inundated - did NOT dig			

Other hydric soil indicators:

Is the hydric soil criteria met? yes	Rationale: inundated

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: edge of fresh marsh

Are upland islands present? NO

PLOTID 45

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: TSP2	Date: 7/9/04
Size of Plot: 10m 5m (1m)	Field Staff: LF/MB

In center of fresh marsh

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
softstem bullrush	90%	H	Scirpus tabernaemontanii				(OBL)
Iris	T	H					
Typha	10%	H					

If invasives are present record % cover and species: Iris T

If forested list approximate age of stand:
Core results: DBH results: no trees or shrubs present

Snags - record number and describe: NONE

LWD - Inside/outside of permanent water?
Record number and describe: NO

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is the area inundated? yes	Depth of water present: 1 foot
Depth at which soil is saturated: 1' water	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: standing water + wetland obligates

Soils

Mapped as: Elma silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
Did NOT examine inundated			

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale: see above

Other information

Is the sample plot a wetland? yes
Type of wetland: (PFO/PSS/PEM)

General habitat description: fresh marsh

Are upland islands present? no

PLOT ID 46

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: TPS P3	Date: 7/9/04
Size of Plot: 10m (5m) 1m	Field Staff: LF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Iris	30%	H	(OBL)	soft stem bullrush	30%		(OBL) (scirpus tabernae-montani)
Scirpus ?	40%	H Scirpus microcarpus	(OBL)	Typha	10%		
Carex obnupta	10%	H					
Salix lucida	20%	sh	(FACW+)				

If invasives are present record % cover and species: Iris 30%

If forested list approximate age of stand:
Core results: DBH results: AVG 4 MAX 8

Snags - record number and describe: 4

LWD - Inside/outside of permanent water? 6 inside outside 5
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is the area inundated? yes	Depth of water present: 1' deep
Depth at which soil is saturated:	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: standing water

Soils

Mapped as: E112a Silt loam	Is soil on hydric soil list: yes
Is it a histosol? no	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
DID NOT EXAMINE			

Other hydric soil indicators:

Is the hydric soil criteria met? yes Rationale:

Other information

Is the sample plot a wetland? yes
Type of wetland: PFO/PSS/(PEM)

General habitat description: edge of fresh marsh

Are upland islands present? no

PLOT ID 47

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T5P4	Date: 7/9/04
Size of Plot: (10m) 5m 1m	Field Staff: CF MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Salix lucida	80%	F	(FACW+)	Lonicera	20%	sh	(FAC+) Snowberry
Alder	10%	F	FAC	Salmonberry	10%	sh	
Red osier dogwood	20%	sh	(FAC)	Spirea	5%	sh	Skunk J
Malus fusca	10%	sh	FACW	Carex obnupta	50%	H	(OBL)
				felix lemmonii	20%	H	(FAC)
				Rosa	T	sh	

If invasives are present record % cover and species: NO

If forested list approximate age of stand:

Core results: DBH results: 16 AVG MAX 18"

Snags - record number and describe: 5

LWD - Inside/outside of permanent water? 6 / 6
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 100%

Is hydrophytic vegetation criterion met? yes

Hydrology

Is the area inundated? yes	Depth of water present: 1 foot deep
Depth at which soil is saturated:	Depth to free water in pit:

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale:

Soils

Mapped as: Eliza silt loam	Is soil on hydric soil list: yes
Is it a histosol? NO	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
Pit not dig - standing water			

Other hydric soil indicators:

Is the hydric soil criteria met?	Rationale:

Other information

Is the sample plot a ~~wetland~~? YES
Type of wetland: PFO/PSS/PEM

General habitat description: Forested wetland

Are upland islands present? NO

PLOT ID 48

Lummi Natural Resources Department – Wetland and Habitat Assessment Form
Nooksack Delta Project

Plot/Transect Number: T5P5	Date: 7/9/04
Size of Plot: (10m) 5m 1m	Field Staff: LF, MB

Dominant Species

Species	%Cover	Stratum	Indicator	Species	%Cover	Stratum	Indicator
Red alder	40%	T	(FAC)				
Salix lucida A	40%	F	(FACW+)				
Japanese knot	65%	sh	(FACU)				
Mdus fusca	10%	sh					

If invasives are present record % cover and species: Jap knot 65%

If forested list approximate age of stand:
Core results: DBH results: 10 AVG 16" MAX

Snags - record number and describe: 5

LWD - Inside/outside of permanent water? 12/12
Record number and describe:

Percent of Dominant Species which are OBL, FACW, and/or FAC (excluding FAC-): 66%

Is hydrophytic vegetation criterion met? YES

Hydrology

Is the area inundated?	Depth of water present: N/A
Depth at which soil is saturated: 10"	Depth to free water in pit: N/A

Other field evidence of surface inundation or soil saturation:

Is the hydrology criterion met? yes

Rationale: SAT. W/IN 12" of surface

Soils

Mapped as:	Is soil on hydric soil list:
Is it a histosol?	Do field observations match mapped series?

Depth	Matrix	Redox features/Gley	Texture
0–10"	10YR4/1	NO	
10–12" SAND			

Other hydric soil indicators:

Is the hydric soil criteria met? YES	Rationale:

Other information

Is the sample plot a wetland? yes

Type of wetland: PFO/PSS/PEM

General habitat description: forested wetland

Are upland islands present? NO

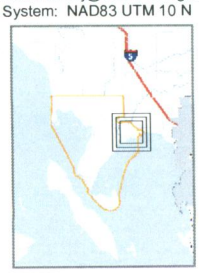
Lummi Nation Wetland and Habitat Mitigation Bank



Wetlands: Nooksack Delta Site

Cartography: Victor "Turtle" Johnson victorj@lummi-nsn.gov
Datum, Projection, Coordinate System: NAD83 UTM 10 N

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0 500 1,000
Feet

watershed

Wetland# 38N2E18-04

Wetland Name: Nooksack Delta - Assessment Area "A" **AU ID#:** _____

Location: Lummi Reservation **T/S/R:** T 38 R 02E, Sections 17, 18, 2

Data Collector: Lee First **Date:** May 21, 2004

Use this data sheet for:
***DEPRESSIONAL OUTFLOW** or **RIVERINE IMPOUNDING** wetlands in the Lowlands of Western Washington*

- *Use in conjunction with the written guidance provided in Parts 1 and 2*
- *Record only numbers, yes/no answers are recorded as a [1] or [0]*

Estimate, Score/ or Rating			
			LANDSCAPE DATA
0	1/0	**D0**	Do dikes surround the AU, and does it drain through a control structure that can be manipulated?
120.42	ha	**D1**	Area of AU hectares
1,534	ha	**D2**	Area of contributing basin (upgradient watershed) 3800 acres = 1534 hectares
		D3	Land use (as % of total area) within 1 km of AU (include contiguous AUs of different class)
19	%	*D3.1*	Undeveloped forest (if previously clear-cut, cut at least 5 years ago)
10	%	*D3.2*	Agriculture (tilled fields and pastures; includes golf courses)
0	%	*D3.3*	Clear-cut logging (<5 years since clearing)
0	%	*D3.4*	Urban/commercial (any developed areas not identified as residential)
3	%	*D3.5*	High density residential (>1 residence/acre)
8	%	*D3.6*	Low density residential (<= 1 residence/acre)
60	%	*D3.7*	Undeveloped areas, shrubland, other wetlands, and open water
			WATER REGIME
1	0/1	**D4**	Channels, ditches, or streams in AU
1	0/1	*D4.1*	Channels, ditches, or streams in AU have permanently flowing water *(you see water flowing)*
		D4.2	
0	0/1	*D4.3*	The only surface outflow from the AU is through a culvert (<60 cm) or vertical siphon
		D5	
		D6	
		D7	
		D8	Inundation
85	%	*D8.1*	Percent of AU that is ponded or inundated for >1 month
8	%	*D8.2*	Percent of AU with permanent standing or moving water
4	%	*D8.3*	Percent of AU with permanent open water *(without aquatic bed vegetation)*
0	%	*D8.4*	Percent of AU with unvegetated bars or mudflats
0	0/1	*D8.5*	Unvegetated bars or mudflats at least 100 square meters in size
		D9	Inundation regimes
1	0/1	*D9.1*	Permanently flooded (include vegetated areas)
1	0/1	*D9.2*	Seasonally flooded (>1 month)
1	0/1	*D9.3*	Occasionally flooded (<= 1 month)
1	0/1	*D9.4*	Saturated but seldom inundated
1	0/1	*D9.5*	Permanently flowing stream
1	0/1	*D9.6*	Intermittently flowing stream
0.6	m	**D10**	Average height of annual flooding above lowest point of outlet or surface of permanent stream at outlet (round to 0.3 m)

By definition:
D8.1 >= D8.2 >= D8.3

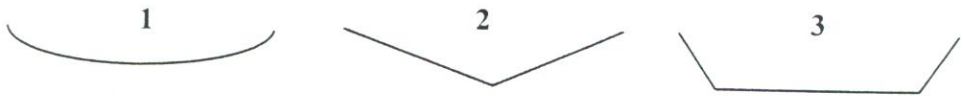
Chose all that apply that meet size criteria: area >0.1 ha (1/4 acre) or > 10% of AU if AU smaller than 1 ha (2.5 acres)

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Area "A" **AU ID#:**

D11 Cross section of AU in areas of seasonal inundation (record a 1 next to cross section that best fits)

1	0/1	*D11.1*	Cross section 1
0	0/1	*D11.2*	Cross section 2
0	0/1	*D11.3*	Cross section 3



D12 Categories of water depths in AU, areas permanently or seasonally inundated/flooded

1	0/1	*D12.1*	1-20 cm (<8 in)
1	0/1	*D12.2*	20-100 cm (8-40 in)
1	0/1	*D12.3*	>100 cm (>40 in)

Record a 1 for each category present if >0.1 ha (1/4 acre) or 10% of area

D13 Constriction of outlet

1	0/1	*D13.1*	Unconstricted or only slightly constricted
0	0/1	*D13.2*	Moderately constricted
0	0/1	*D13.3*	Severely constricted
0	0/1	*D13.4*	*Riverine Impounding only* – Completely constricted (no surface outlet)

If the AU has multiple outlets, judge the constriction as if all the outlets were combined into one large one.

VEGETATION

D14 Cowardin Classes (as % area of AU)

0	%	*D14.1*	Forest - evergreen
50	%	*D14.2*	Forest -deciduous
0	%	*D14.3*	Scrub-shrub - evergreen
35	%	*D14.4*	Scrub-shrub - deciduous
15	%	*D14.5*	Emergent
0	%	*D14.6*	Aquatic bed

- *Include forest only if trees are rooted in AU.*
- ***If forest is a mix of deciduous and evergreen estimate the relative % cover of each and divide percentage between the two categories.***
- ***If vegetation classes are patchy, add the patches together for each class to get a total.***
- *To count, a class must cover at least 0.1 ha or be more than 10% of the total area of the AU*

use data from plot 5

1	0/1	**D15**	Does D8.3 + D8.4 + sum (D14.1 to D14.6) = 100? **If not, give reason.**
30	%	**D16**	% area of herbaceous understory **in forest and shrub areas** (not % area in entire AU)
30	%	**D17**	% area of AU with >75% closure of canopy *(SS, FO classes > 1 m high)*
		D18	
		D19	Plant Richness
47	#	*D19.1*	Record number of native plant species found in AU
4	#	*D19.2*	Record number of non- native plant species found in AU
8	#	**D20**	The # of plant assemblages in the AU with area >0.1 ha (1/4 acre) or >10% if AU <1 ha *(if more than 12 record a 12)*
3	[1-6]	**D21**	Strata: The maximum # of strata present in any plant assemblage
0	0/1	*D21.1*	Is vine stratum dominated by non-native blackberries?

A stratum must have 20% cover in assemblage

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Area "A" **AU ID#:**

1 0/1 **D22** Mature trees in AU

Average DBH of 3 out of 5 largest trees of a species has to exceed size threshold

Tsuga heterophylla (western hemlock) >45 cm (18") no
Thuja plicata (western red cedar) >45 cm (18") no
Pseudotsuga menziesii (Douglas fir) >45 cm (18") no
Picea sitchensis (Sitka spruce) >45 cm (18") no
Populus balsamifera (black cottonwood) >45 cm (18") ✓
Acer macrophyllum (big-leaf maple) >45 cm (18") no
Alnus rubra (red alder) >30 cm (12") ✓
Fraxinus latifolia (Oregon ash) >30 cm (12") no
Pinus contorta (lodgepole pine) >30 cm (12") no
Salix lucida (Pacific willow) >30 cm (12") ✓

D23 Sphagnum bogs

0 0/1 *D23.1* % area of Sphagnum bogs >75%
0 0/1 *D23.2* % area of Sphagnum bogs = 50-75%
0 0/1 *D23.3* % area of Sphagnum bogs = 25-49%
0 0/1 *D23.4* % area of Sphagnum bogs = 1-24%
1 0/1 *D23.5* % area of Sphagnum bogs = 0%

D24 Dominance by non-native plant species

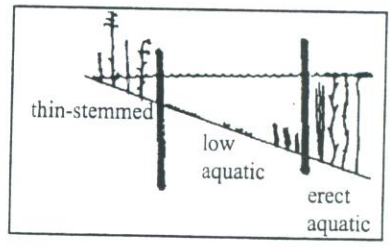
0 0/1 *D24.1* % area of non-native species >75%
0 0/1 *D24.2* % area of non-native species = 50-75%
0 0/1 *D24.3* %area of non-native species = 25-49%
1 0/1 *D24.4* % area of non-native species = 1-24%
0 0/1 *D24.5* % area of non-natives = 0%

use GIS data *

HABITAT CHARACTERISTICS

2 [0-3] **D25** Number of structure categories in aquatic bed vegetation
Applies only to aquatic bed species
DO NOT count persistent emergents

This is present in area of old channel, open middle



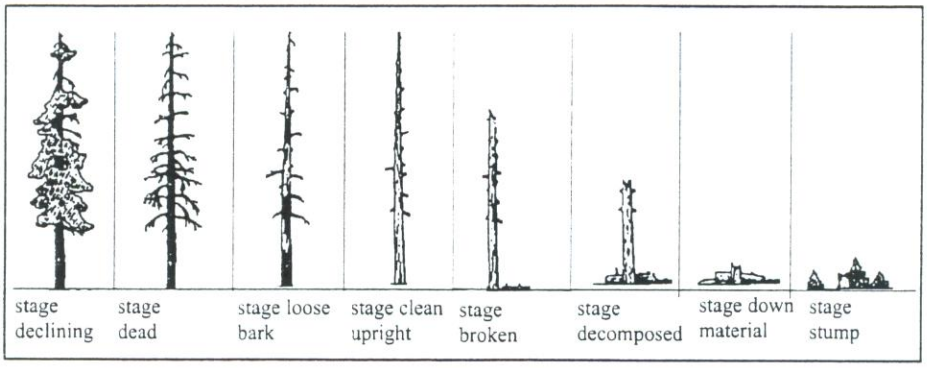
D26 pH

7 [4-9] *D26.1* pH of interstitial water *(measure immediately after digging hole in non-inundated areas)*
7 [4-9] *D26.2* pH of open or standing water (*record the lowest pH, if you cannot measure record a [7]*)
1 0/1 **D27** Estuary: AU is within 8 km (5 mi) of a brackish or salt water estuary
0 0/1 **D28** Large lake: AU is within 1.6km (1 mi) of a lake >8 ha (20 acres)
1 0/1 **D29** Open field: AU is within 5 km (3 mi) of an open field (agriculture or pasture) >16 ha (40 acres)
1 0/1 **D30** Preferred woody vegetation: AU has >1 ha (2.5 acres) of preferred woody vegetation for beaver in and within 100 m of AU

Wetland Name: Nooksack Delta Area "A" **AU ID#:**

3 [0-8] **D31** Snags (record # of stages)

Circle the categories present; minimum DBH of snag =10 cm (4")



1 0/1 *D31.1* At least one of the snags above has a DBH greater than 30 cm (12").

1 0/1 **D32** Overhanging vegetation, extending out for 1 m, for at least 10 m (33 ft) over stream or open water.

0 0/1 **D33** Upland islands of at least 10 square meters (100 square ft.) within AU boundary

Islands need to be surrounded by at least 30 m (100 ft) of open water deeper than 1 m (3 ft)

1 0/1 **D34** Undercut banks present for at least 2 m (6.6 ft.)

4 [0-4] **D35** Key for rating egg-laying structures for amphibians

1. Does the AU have thin-stemmed vegetation or thin branches **(<8 mm)** in at least 1/4 acre (or 10% of AU) of permanent or seasonally inundated areas? *Thin-stemmed vegetation can include herbaceous species such as water parsley.*
   NO – Score = 0 YES go to 2
2. Does the AU have at least 0.2 ha (1/2 acre) of thin-stemmed emergent vegetation or woody branches, **1-4 mm** in diameter?
   NO go to 5 YES go to 3
3. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water)?
   NO go to 4 **YES - Score = 4**
4. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 2 **YES – Score = 3** STOP
5. Does the AU have >0.1 ha (1/4 acre) of thin-stemmed emergent vegetation or woody branches, **1-4 mm**?
   NO – Score = 1 YES go to 6
6. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water)?
   NO go to 7 **YES – Score = 3**
7. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 1 **YES – Score = 2**

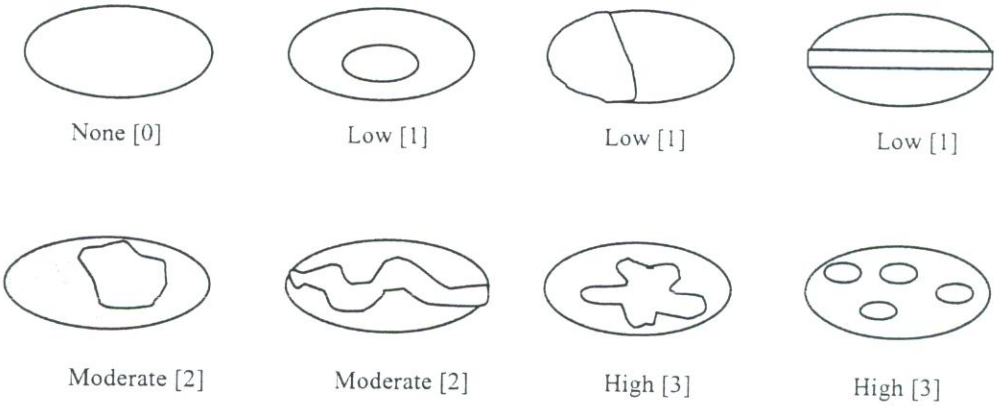
DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Area "A"	**AU ID#:**

0 0/1 **D36** Tannins in surface waters >10% of water surface

1 0/1 **D37** Steep banks for denning (>30 degree slope, fine material, >10 m long, >0.6 m high) *(may be a dike)*

3 [0-3] **D38** Interspersion between erect vegetation and permanent open water (POW + AB) areas of AU

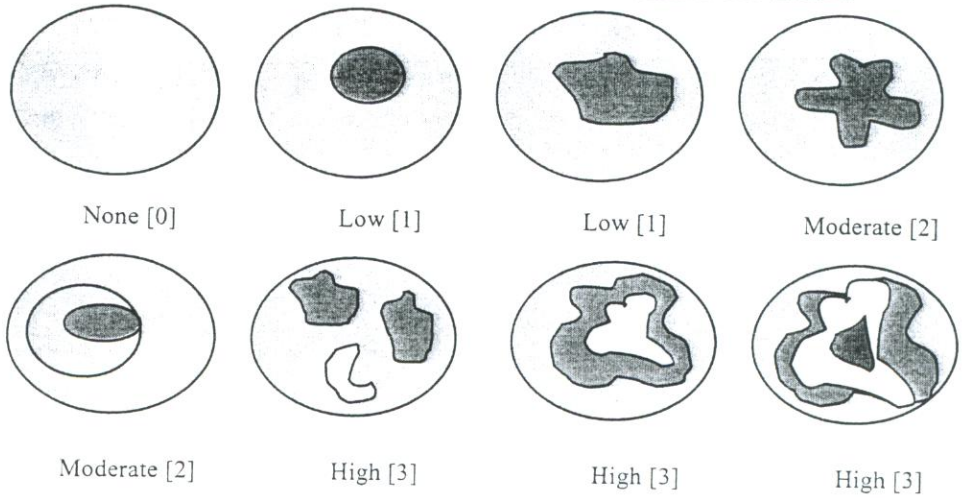


None [0] Low [1] Low [1] Low [1]

Moderate [2] Moderate [2] High [3] High [3]

3 [0-3] **D39** Interspersion between Cowardin vegetation classes

**AUs with only 2 classes can only score a moderate[2] or lower*
**AUs with 4 vegetation classes score a high [3]*
**AUs with 3 classes can score a moderate (2) or a high (3)*



None [0] Low [1] Low [1] Moderate [2]

Moderate [2] High [3] High [3] High [3]

Wetland Name: Nooksack Delta Area "A" **AU ID#:**

D40

0 [0-3] **D41** Edge of AU: The characteristics of the edge between AU and uplands or adjacent wetlands.

Choose the description that best fits the characteristics of the AU edge:

0 There are **no differences in level** of vegetation height as reflected by vegetation classes on each side of the AU for more than 50% of the circumference: record a [0] **regardless of the sinuosity**. Examples: emergent (or herbaceous) to emergent (or herbaceous), shrub to shrub, forest to forest.

1 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight** for more than 50% of the circumference: record a [1]. Example: emergent (or herbaceous) to shrub, shrub to forest

2 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous** for more than 50% of the circumference: record a [2]. Examples: emergent (or herbaceous) to shrub, shrub to forest.

2 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight: record a [2]**. Examples: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

3 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous: record a [3]**. Example: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

2 If **no single category** above extends for more than 50% of the circumference, and the **edge is straight: record a [2]**

3 If **no single category** above extends for more than 50% of the circumference, and the **edge is sinuous: record a [3]**

4 [0-5] **D42** Buffer of AU: Choose the description that best represents condition of AU buffer

> * *Open water or adjacent wetlands are considered part of the buffer*
> * *Infrequently used gravel or paved roads or vegetated dikes in a relatively undisturbed buffer can be ignored as a "disturbance"*

5 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >95% of circumference. Clear-cut >5 years old is OK. No developed areas within undisturbed part of buffer.

4 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >50% circumference OR 50 m (170 ft) of forest scrub, grassland or open water >95% circumference. No developed areas within undisturbed part of buffer.

3 100 m (330 ft) of forest, scrub, grassland or open water >25% circumference, OR 50 m (170 ft) of forest, scrub, grassland or open water >50% circumference.

2 No paved areas or buildings within 25m (80 ft) of wetland >95% circumference. Pasture or lawns are OK. OR no paved areas or buildings within 50m of wetland >50% circumference

0 Vegetated buffers are <2 m wide (6.6 ft) for more than 95% of the circumference

1 Does not meet any of the criteria above

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Area "A"	**AU ID#:**

3 [0-3] **D43** Corridors of AU: Rate corridors using following key *(record rating of 0, 1, 2, or 3)*

1. Is the AU part of a riparian corridor *(see text for definitions)*
   NO go to 5 **YES go to 2**
2. Is the wetland part of riparian corridor > 50 m wide connecting 2 or more wetlands within 1 km with at least 30% shrub or forest cover in the corridor?
   NO go to 3 **YES = [3]**
3. Is the AU part of a riparian corridor 25-50 m wide connecting to other wetlands with at least 30% shrub or forest cover in the corridor?
   NO go to 4 **YES = [2]**
4. Is the AU part of a riparian corridor >5 m wide with relatively undisturbed veg. (grasslands, abandoned pasture are OK) that extends for more than 1 km?
   NO go to 5 **YES = [1]**
5. Is there a corridor >50 m wide with good (>30%) cover of forest or shrub (>2 m high) to natural upland area or open water that is >100 ha in size?
   NO go to 6 **YES = [3]**
6. Is there a 10-50 m wide forest or shrub corridor to a relatively undisturbed upland or open water that is >10 ha?
   NO go to 7 **YES = [2]**
7. Is there a corridor of relatively undisturbed vegetation (grassland, abandoned pasture) >50 m wide to an undisturbed upland or open water that is >10 ha?
   NO go to 8 **YES = [2]**
8. Is there any vegetated corridor 5-50 m wide between the AU and any relatively undisturbed area or open water that is >2.5 ha?
   NO = [0] **YES = [1]**

12 [0-12] **D44** # of categories of large woody debris in AU **outside of perm. water**

Freshly cut stumps are not included



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

6 [0-12] **D45** # of categories of large woody debris **in permanent water** of AU (may include aquatic bed areas)



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

Wetland Name: Nooksack Delta Area "A" **AU ID#:**

SOILS and SUBSTRATES

		D46	Composition of AU surface
1	0/1	*D46.1*	Deciduous, broad-leaved, leaf litter
1	0/1	*D46.2*	Other plant litter
0	0/1	*D46.3*	Decomposed organic
0	0/1	*D46.4*	Exposed cobbles
0	0/1	*D46.5*	Exposed gravel
0	0/1	*D46.6*	Exposed sand
1	0/1	*D46.7*	Exposed silt
0	0/1	*D46.8*	Exposed clay

Record a 1 for each category present if its area is > 10 square meters. Note: bare earth from animal tunnels does NOT count.

		D47	Soils present in top (15 cm) of A horizon (record [1] if 1-49% area of AU, [2] if 50-95%, [3] if >95%)
0	[0-3]	*D47.1*	Peat
2	[0-3]	*D47.2*	Organic Muck
1	[0-3]	*D47.3*	Mineral with clay fraction <30%
0	[0-3]	*D47.4*	Clay (clay fraction >30%)

Record the least permeable layer if there are several down to 60 cm.

		D48	Infiltration rate of top 60 cm of soil in seasonally inundated areas
0	0/1	*D48.1*	Fast >50% gravel and cobble and the rest a sand, loamy sand, or sandy loam
0	0/1	*D48.2*	Moderate >50% sand and rest cobble, gravel, loamy sand, or sandy loam
1	0/1	*D48.3*	Slow - muck, peat, or loams (except sandy loam), silts, and clays
		D49	Substrate of streams
0	0/1	*D49.1*	Substrate **of permanent stream** or river in AU has at least 1 square meter of gravel
0	0/1	*D49.2*	Substrate **of permanent stream** or river in AU has at least 1 square meter of cobbles
		D49.3	

Judgements of Opportunity (Ratings of High, Medium, Low)

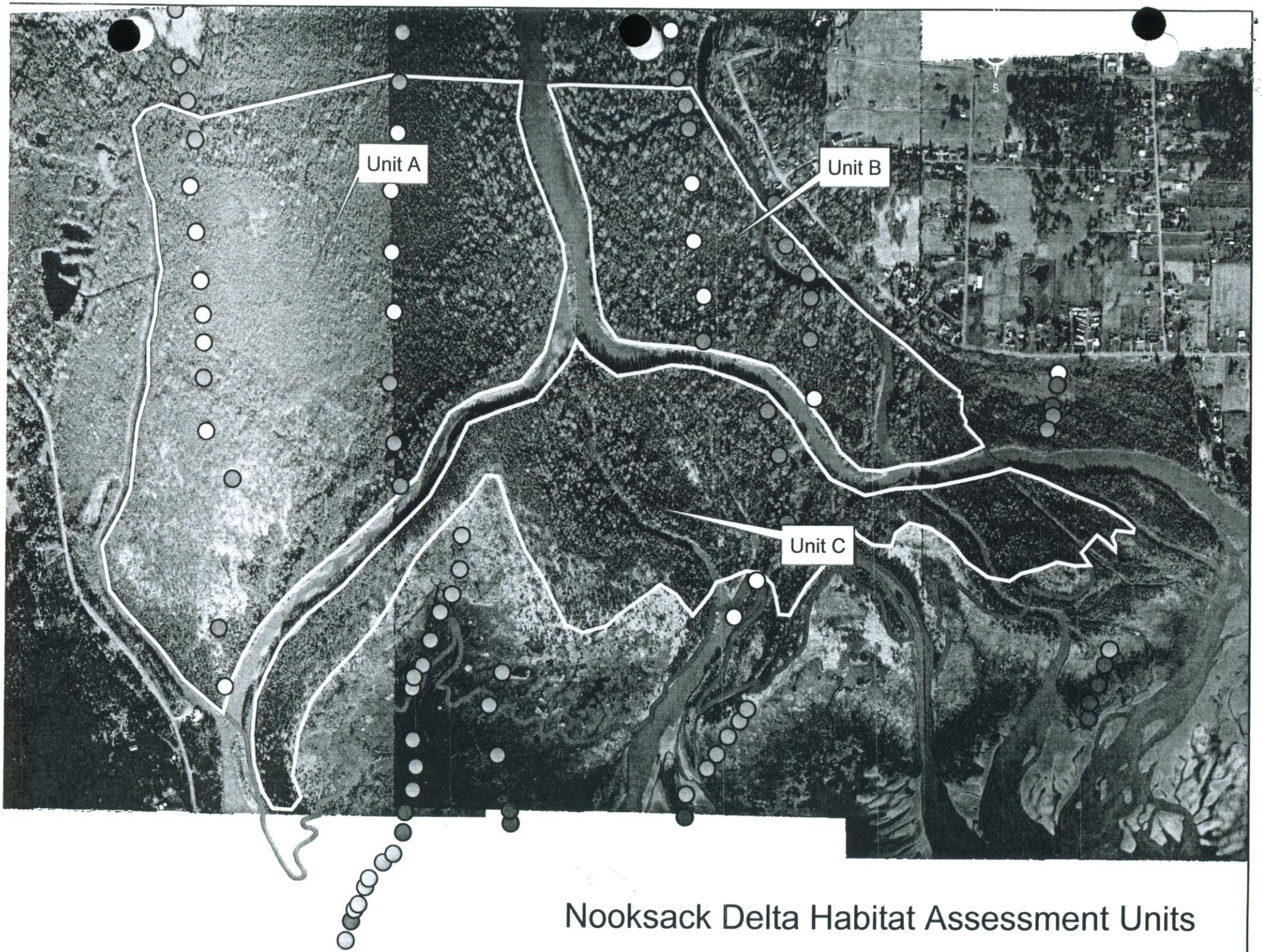
Rating	*Functions*
H	Removing Sediments From floodwaters
H	Removing Nutrients
M	Removing Toxic Metals and Organics
H	Reducing Peak Flows
H	Reducing Downstream Erosion
L	Recharging Groundwater
H	General Habitat
H	Anadromous Fish Habitat

SITE	NooksackDelta Unit A	#AU-	0

Riverine Impounding

Summary of Function Assessments

Function	Index
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 Decreasing Downstream Erosion	10
Potential for Groundwater 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 Habitat Assessment Units

Wetland #	38N2E18-04
Complex	☐
T/S/R	38N/2E/18
Location Desrciptio	due south of intersection of Ferndale Road and Marine Drive
Reviewer initials	JD
Date of review	6/8/99
Aerial photo #	15-13/ 92-21
USGS quad name	Ferndale
On NWI Map	☑
Previously inventor	☐
Date of previous in	
Previous wetland #	
Watershed	S
Watershed size	
Wetland Size	0
Cowardin Classes P	RFO, ROW, REM, RSS
Associated with Str	☑
Stream Name	Nooksack River
Soil Units	Eliza-Tacoma (H)
Team Initials	
Date Field Checked	
Base Map	38-2-17b
Evaluation method	Aerial photo
GPS	☐
GPS file	
Water Sources	Stream, sheetflow, floodplain, precipitation
Describe Outlet	Floodplain
Outlet Constriction	Slight to none
Inundation	tidal

Hydrology indicato	Watermarks on vegetation, drift lines, drainage patterns, sedim
Hydrologic regime	Tidal
Evidence for tidal	Nooksack Delta
Function Classifica	Riverine flowthrough
Hydrologic alterati	Diking and Road building confine wetland boundaries.
Cowardin Class I	RFO, ALRU
Cowardin Class II	REM
Cowardin Class III	ROW
Cowardin Class IV	RSS
Degree of Intersper	Moderate
Tree Height	
Tree DBH	
Invasive/%	N/O
Vegetation Disturb	N/O
Buffer description	N - Marine drive, E - Nooksack River, W - diked slough, S - rive
Soil Profile	N/O
Soil Disturbances	N/O
General Wetland D	Predominantly forested area on Nooksack River floodplain

JD 7/22/99

LUMMI RESERVATION
WETLAND INVENTORY DATA FORM

JD 7/7/99

OFFICE DATA

WETLAND NO. 38N2E18-04 TOWNSHIP/RANGE/SECTION 38N - 2E - 18

LOCATION DESCRIPTION Due South of intersection of Ferndale Rd. & Marine Dr

REVIEWER INITIALS JD DATE OF REVIEW 6/8/99

AERIAL PHOTO NO.: NORMAL COLOR 15-13 COLOR INFRARED 92-21

USGS QUAD NAME Ferndale WL ON NWI MAP? (Y) N

WL PREVIOUSLY INVENTORIED/DELINEATED BY LUMMI STAFF/CONTRACTOR? Y (N)

DATE OF WORK _____ WETLAND NO. USED PREVIOUSLY _____

WATERSHED 5 APPROX. SIZE OF WATERSHED ? acres

APPROX. SIZE OF WL _____

COWARDIN CLASSES PRESENT IN WL RFO, ROW, REM, RSS

IS WL ASSOCIATED W/ STREAM OR RIVER? (Y) N STREAM NAME Nooksack R.

SOIL UNITS MAPPED IN WL (circle hydric soils) (Eliza - Tacoma)

FIELD DATA

TEAM INITIALS _____ DATE FIELD CHECKED _____

BASE MAP NO. 38-217B SITE ACCESS / WINDSHIELD ACCESS / NO VISUAL ACCESS (Aerial Photo)

GPS USED TO FIELD LOCATE WL? YES / (NO) GPS FILE NAME _____

WETLAND HYDROLOGY

WATER SOURCES: (STREAM) CLVRTED STRMWTR / (SHEET FLOW) (FLDPLAIN) / SEEP / (PRECIP)

DESCRIBE WL OUTLET (width, structure, flowing?) Flood plain

OUTLET CONSTRICTION: NO OUTLET / SEVERE / MODERATE / (SLIGHT TO NONE)

WL IS: PONDED (Depth) varies / (SATURATED)

WL HAS: WATERMARKS ON VEG. / (DRIFT LINES) / (DRAINAGE PATTERNS) / (SEDIMENT DEPOSITS)

WL HAS: (TIDAL) / NONTIDAL / UNKNOWN HYDROLOGIC REGIME

EVIDENCE FOR TIDAL REGIME Nooksack delta

WA STATE WETLAND FUNCTION CLASSIFICATION (use key) Riverine Flow Through

OBSERVED ALTERATIONS TO HYDROLOGY & OTHER RELEVANT INFORMATION:

Diking & road building confine wetland boundaries

JD 7/19/99

WETLAND VEGETATION

COWARDIN CLASS	MAJOR PLANT ASSOCIATIONS	% TOTAL WL AREA BY CLASS
PFO	ALRU	
PEM		
POW		
PSS		

(Should total 100%)

DEGREE OF INTERSPERSION OF CLASSES: HIGH (MODERATE) LOW / NONE

IF FORESTED, AVERAGE SIZE OF DOM. TREE SPECIES: HEIGHT _____ft. DBH _____in.

INVASIVE SPECIES PRESENT IN WL & APPROX. % COVER OF TOTAL WL

?

OBSERVED DISTURBANCES TO VEGETATION: None

BUFFER DESCRIPTION: Road-N, River-E, Diked Slough-W, River/Slough-S.

WETLAND SOILS (Observed only if necessary to confirm wetland presence)

SOIL PROFILE: NA

OBSERVED DISTURBANCES TO SOILS: None

GENERAL WETLAND DESCRIPTION: Predominantly forested area on Nooksack floodplain

MANAGEMENT RECOMMENDATIONS:

JD 7/22/19

Wetland # 38N2E17-02

Wetland Name: Nooksack Delta Assessment Unit B **AU ID#:** _____
Location: Lummi Reservation **T/S/R:** _____
Data Collector: Lee First **Date:** _____

Use this data sheet for:
***DEPRESSIONAL OUTFLOW** or **RIVERINE IMPOUNDING** wetlands in the Lowlands of Western Washington*
- *Use in conjunction with the written guidance provided in Parts 1 and 2*
- *Record only numbers, yes/no answers are recorded as a [1] or [0]*

Estimate, Score/ or Rating			
			LANDSCAPE DATA
0	1/0	**D0**	Do dikes surround the AU, and does it drain through a control structure that can be manipulated?
50	ha	**D1**	Area of AU 124 acres =
1534	ha	**D2**	Area of contributing basin (upgradient watershed)
		D3	Land use (as % of total area) within 1 km of AU (include contiguous AUs of different class)
40	%	*D3.1*	Undeveloped forest (if previously clear-cut, cut at least 5 years ago)
20	%	*D3.2*	Agriculture (tilled fields and pastures; includes golf courses)
~	%	*D3.3*	Clear-cut logging (<5 years since clearing)
0	%	*D3.4*	Urban/commercial (any developed areas not identified as residential)
10	%	*D3.5*	High density residential (>1 residence/acre)
20	%	*D3.6*	Low density residential (<= 1 residence/acre)
10	%	*D3.7*	Undeveloped areas, shrubland, other wetlands, and open water
			WATER REGIME
1	0/1	**D4**	Channels, ditches, or streams in AU
1	0/1	*D4.1*	Channels, ditches, or streams in AU have permanently flowing water *(you see water flowing)*
		D4.2	
0	0/1	*D4.3*	The only surface outflow from the AU is through a culvert (<60 cm) or vertical siphon
		D5	
		D6	
		D7	
		D8	Inundation
90	%	*D8.1*	Percent of AU that is ponded or inundated for >1 month
7	%	*D8.2*	Percent of AU with permanent standing or moving water
7	%	*D8.3*	Percent of AU with permanent open water *(without aquatic bed vegetation)*
0	%	*D8.4*	Percent of AU with unvegetated bars or mudflats
0	0/1	*D8.5*	Unvegetated bars or mudflats at least 100 square meters in size
		D9	Inundation regimes
1	0/1	*D9.1*	Permanently flooded (include vegetated areas)
1	0/1	*D9.2*	Seasonally flooded (>1 month)
1	0/1	*D9.3*	Occasionally flooded (<= 1 month)
1	0/1	*D9.4*	Saturated but seldom inundated
1	0/1	*D9.5*	Permanently flowing stream
1	0/1	*D9.6*	Intermittently flowing stream
0.9	m	**D10**	Average height of annual flooding above lowest point of outlet or surface of permanent stream at outlet (round to 0.3 m)

By definition:
D8.1 >= D8.2 >= D8.3

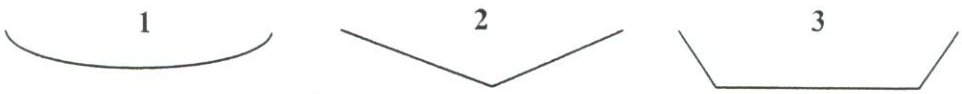
Chose all that apply that meet size criteria: area >0.1 ha (1/4 acre) or > 10% of AU if AU smaller than 1 ha (2.5 acres)

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name:	**AU ID#:**

D11 Cross section of AU in areas of seasonal inundation (record a 1 next to cross section that best fits)

1	0/1	*D11.1*	Cross section 1
0	0/1	*D11.2*	Cross section 2
0	0/1	*D11.3*	Cross section 3



D12 Categories of water depths in AU, areas permanently or seasonally inundated/flooded

1	0/1	*D12.1*	1-20 cm (<8 in)
1	0/1	*D12.2*	20-100 cm (8-40 in)
1	0/1	*D12.3*	>100 cm (>40 in)

Record a 1 for each category present if >0.1 ha (1/4 acre) or 10% of area

D13 Constriction of outlet

1	0/1	*D13.1*	Unconstricted or only slightly constricted
0	0/1	*D13.2*	Moderately constricted
0	0/1	*D13.3*	Severely constricted
0	0/1	*D13.4*	*Riverine Impounding only* – Completely constricted (no surface outlet)

If the AU has multiple outlets, judge the constriction as if all the outlets were combined into one large one.

VEGETATION

D14 Cowardin Classes (as % area of AU)

0	%	*D14.1*	Forest - evergreen
50	%	*D14.2*	Forest -deciduous
0	%	*D14.3*	Scrub-shrub - evergreen
45	%	*D14.4*	Scrub-shrub - deciduous
5	%	*D14.5*	Emergent
0	%	*D14.6*	Aquatic bed

- *Include forest only if trees are rooted in AU.*
- ***If forest is a mix of deciduous and evergreen estimate the relative % cover of each and divide percentage between the two categories.***
- ***If vegetation classes are patchy, add the patches together for each class to get a total.***
- *To count, a class must cover at least 0.1 ha or be more than 10% of the total area of the AU*

1	0/1	**D15**	Does D8.3 + D8.4 + sum (D14.1 to D14.6) = 100? **If not, give reason.**
20	%	**D16**	% area of herbaceous understory **in forest and shrub areas** (not % area in entire AU)
30	%	**D17**	% area of AU with >75% closure of canopy *(SS, FO classes > 1 m high)*
		D18	
		D19	Plant Richness
26	#	*D19.1*	Record number of native plant species found in AU
5	#	*D19.2*	Record number of non- native plant species found in AU
6	#	**D20**	The # of plant assemblages in the AU with area >0.1 ha (1/4 acre) or >10% if AU <1 ha *(if more than 12 record a 12)*
3	[1-6]	**D21**	Strata: The maximum # of strata present in any plant assemblage
0	0/1	*D21.1*	Is vine stratum dominated by non-native blackberries?

A stratum must have 20% cover in assemblage

Wetland Name:	**AU ID#:**

1 0/1 **D22** Mature trees in AU

Average DBH of 3 out of 5 largest trees of a species has to exceed size threshold

Tsuga heterophylla (western hemlock) >45 cm (18")
Thuja plicata (western red cedar) >45 cm (18")
Pseudotsuga menziesii (Douglas fir) >45 cm (18")
Picea sitchensis (Sitka spruce) >45 cm (18")
Populus balsamifera (black cottonwood) >45 cm (18") ✓
Acer macrophyllum (big-leaf maple) >45 cm (18")
Alnus rubra (red alder) >30 cm (12") ✓
Fraxinus latifolia (Oregon ash) >30 cm (12")
Pinus contorta (lodgepole pine) >30 cm (12")
Salix lucida (Pacific willow) >30 cm (12") ✓

D23 Sphagnum bogs

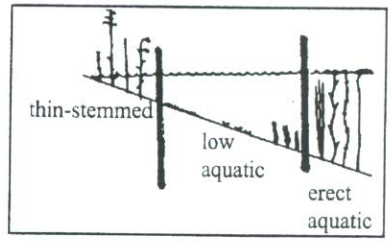
0 0/1 *D23.1* % area of Sphagnum bogs >75%
0 0/1 *D23.2* % area of Sphagnum bogs = 50-75%
0 0/1 *D23.3* % area of Sphagnum bogs = 25-49%
0 0/1 *D23.4* % area of Sphagnum bogs = 1-24%
1 0/1 *D23.5* % area of Sphagnum bogs = 0%

D24 Dominance by non-native plant species

0 0/1 *D24.1* % area of non-native species >75%
0 0/1 *D24.2* % area of non-native species = 50-75%
0 0/1 *D24.3* %area of non-native species = 25-49%
1 0/1 *D24.4* % area of non-native species = 1-24%
0 0/1 *D24.5* % area of non-natives = 0%

HABITAT CHARACTERISTICS

0 [0-3] **D25** Number of structure categories in aquatic bed vegetation
Applies only to aquatic bed species
DO NOT count persistent emergents



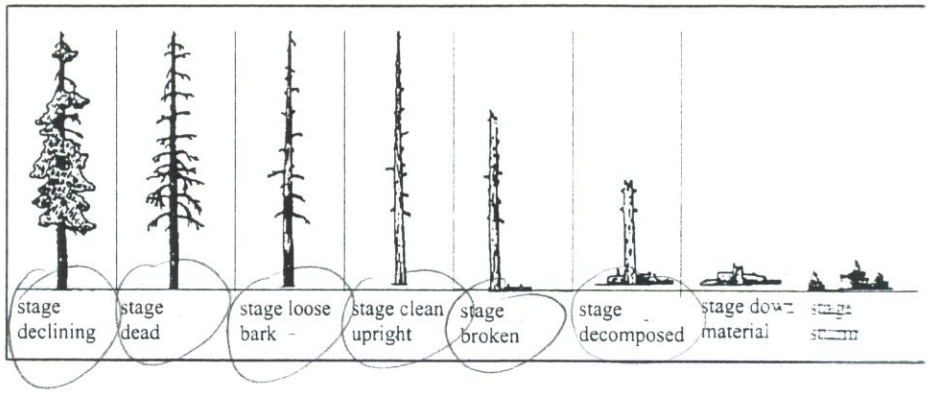
D26 pH

7 [4-9] *D26.1* pH of interstitial water *(measure immediately after digging hole in non-inundated areas)*
7 [4-9] *D26.2* pH of open or standing water (*record the lowest pH, if you cannot measure record a [7])*
1 0/1 **D27** Estuary: AU is within 8 km (5 mi) of a brackish or salt water estuary
0 0/1 **D28** Large lake: AU is within 1.6km (1 mi) of a lake >8 ha (20 acres)
1 0/1 **D29** Open field: AU is within 5 km (3 mi) of an open field (agriculture or pasture) >16 ha (40 acres)
1 0/1 **D30** Preferred woody vegetation: AU has >1 ha (2.5 acres) of preferred woody vegetation for beaver in and within 100 m of AU

Wetland Name:	**AU ID#:**

0 [0-8] **D31** Snags (record # of stages)

Circle the categories present; minimum DBH of snag =10 cm (4")



1 0/1 *D31.1* At least one of the snags above has a DBH greater than 30 cm (12").

1 0/1 **D32** Overhanging vegetation, extending out for 1 m, for at least 10 m (33 ft) over stream or open water.

0 0/1 **D33** Upland islands of at least 10 square meters (100 square ft.) within AU boundary

Islands need to be surrounded by at least 30 m (100 ft) of open water deeper than 1 m 3 ft

1 0/1 **D34** Undercut banks present for at least 2 m (6.6 ft.)

3 [0-4] **D35** Key for rating egg-laying structures for amphibians

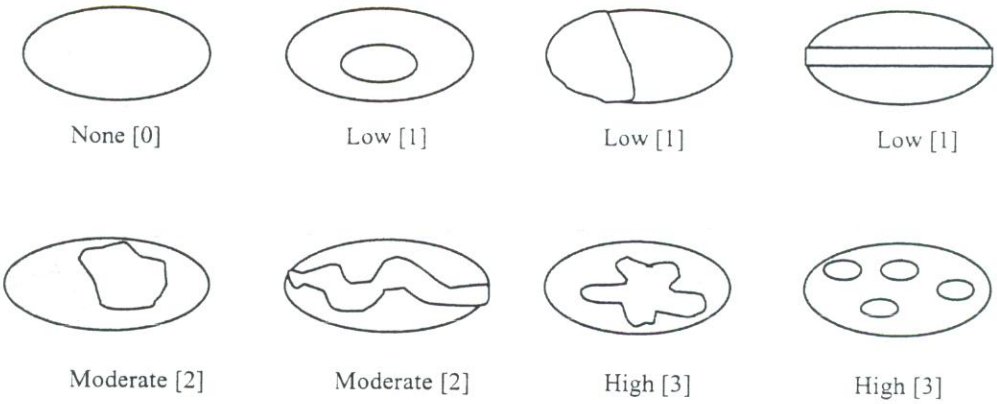
1. Does the AU have thin-stemmed vegetation or thin branches **(<8 mm)** in at least 1 acre (or 10% of AU) of permanent or seasonally inundated areas? *Thin-stemmed vegetation can include herbaceous species such as water parsley.*
   NO – Score = 0 (YES) go to 2
2. Does the AU have at least 0.2 ha (1/2 acre) of thin-stemmed emergent vegetation or woody branches, **1-4 mm** in diameter?
   NO go to 5 (YES) go to 3
3. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water]?
   NO go to 4 **YES - Score = 4**
4. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 2 (**YES – Score = 3** STOP)
5. Does the AU have >0.1 ha (1/4 acre) of thin-stemmed emergent vegetation or woody branches, 1-**4 mm**?
   NO – Score = 1 YES go to 6
6. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water]?
   NO go to 7 **YES – Score = 3**
7. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 1 **YES – Score = 2**

Wetland Name:	**AU ID#:**

0 0/1 **D36** Tannins in surface waters >10% of water surface

1 0/1 **D37** Steep banks for denning (>30 degree slope, fine material, >10 m long, >0.6 m high) *(may be a dike)*

1 [0-3] **D38** Interspersion between erect vegetation and permanent open water (POW + AB) areas of AU

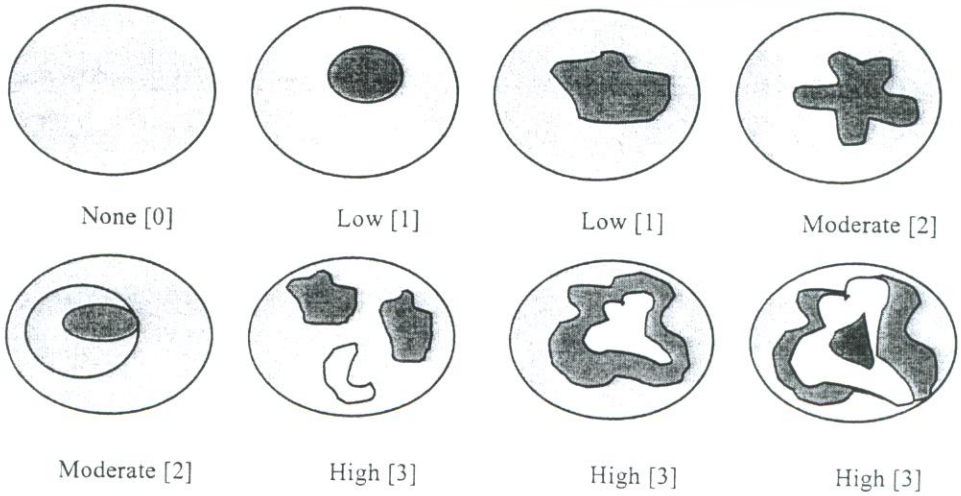


None [0] Low [1] Low [1] Low [1]

Moderate [2] Moderate [2] High [3] High [3]

2 [0-3] **D39** Interspersion between Cowardin vegetation classes

**AUs with only 2 classes can only score a moderate[2] or lower*
**AUs with 4 vegetation classes score a high [3]*
**AUs with 3 classes can score a moderate (2) or a high (3)*



None [0] Low [1] Low [1] Moderate [2]

Moderate [2] High [3] High [3] High [3]

Wetland Name:	AU ID#:

D40

0 [0-3] **D41** Edge of AU: The characteristics of the edge between AU and uplands or adjacent wetlands.

Choose the description that best fits the characteristics of the AU edge:

0 There are **no differences in level** of vegetation height as reflected by vegetation classes on each side of the AU for more than 50% of the circumference: record a [0] **regardless of the sinuosity**. Examples: emergent (or herbaceous) to emergent (or herbaceous), shrub to shrub, forest to forest.

1 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight** for more than 50% of the circumference: record a [1]. Example: emergent (or herbaceous) to shrub, shrub to forest

2 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous** for more than 50% of the circumference: record a [2]. Examples: emergent (or herbaceous) to shrub, shrub to forest.

2 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight: record a [2]**. Examples: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

3 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous: record a [3]**. Example: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

2 If **no single category** above extends for more than 50% of the circumference, and the **edge is straight: record a [2]**

3 If **no single category** above extends for more than 50% of the circumference, and the **edge is sinuous: record a [3]**

4 [0-5] **D42** Buffer of AU: Choose the description that best represents condition of AU buffer

> * *Open water or adjacent wetlands are considered part of the buffer*
> * *Infrequently used gravel or paved roads or vegetated dikes in a relatively undisturbed buffer can be ignored as a "disturbance"*

5 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >95% of circumference. Clear-cut >5 years old is OK. No developed areas within undisturbed part of buffer.

4 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >50% circumference OR 50 m (170 ft) of forest scrub, grassland or open water >95% circumference. No developed areas within undisturbed part of buffer.

3 100 m (330 ft) of forest, scrub, grassland or open water >25% circumference, OR 50 m (170 ft) of forest, scrub, grassland or open water >50% circumference.

2 No paved areas or buildings within 25m (80 ft) of wetland >95% circumference. Pasture or lawns are OK. OR no paved areas or buildings within 50m of wetland >50% circumference

0 Vegetated buffers are <2 m wide (6.6 ft) for more than 95% of the circumference

1 Does not meet any of the criteria above

Wetland Name: **AU ID#:**

3 [0-3] **D43** Corridors of AU: Rate corridors using following key *(record rating of 0, 1, 2, or 3)*

1. Is the AU part of a riparian corridor *(see text for definitions)*
   NO go to 5 **YES go to 2**
2. Is the wetland part of riparian corridor > 50 m wide connecting 2 or more wetlands within 1 km with at least 30% shrub or forest cover in the corridor?
   NO go to 3 **YES = [3]**
3. Is the AU part of a riparian corridor 25-50 m wide connecting to other wetlands with at least 30% shrub or forest cover in the corridor?
   NO go to 4 **YES = [2]**
4. Is the AU part of a riparian corridor >5 m wide with relatively undisturbed veg. (grasslands, abandoned pasture are OK) that extends for more than 1 km?
   NO go to 5 **YES = [1]**
5. Is there a corridor >50 m wide with good (>30%) cover of forest or shrub (>2 m high) to natural upland area or open water that is >100 ha in size?
   NO go to 6 **YES = [3]**
6. Is there a 10-50 m wide forest or shrub corridor to a relatively undisturbed upland or open water that is >10 ha?
   NO go to 7 **YES = [2]**
7. Is there a corridor of relatively undisturbed vegetation (grassland, abandoned pasture) >50 m wide to an undisturbed upland or open water that is >10 ha?
   NO go to 8 **YES = [2]**
8. Is there any vegetated corridor 5-50 m wide between the AU and any relatively undisturbed area or open water that is >2.5 ha?
   NO = [0] **YES = [1]**

12 [0-12] **D44** # of categories of large woody debris in AU **outside of perm. water**

Freshly cut stumps are not included



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

12 [0-12] **D45** # of categories of large woody debris **in permanent water** of AU (may include aquatic bed areas)



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

Wetland Name: **AU ID#:**

SOILS and SUBSTRATES

D46 Composition of AU surface

1	0/1	*D46.1*	Deciduous, broad-leaved, leaf litter
1	0/1	*D46.2*	Other plant litter
1	0/1	*D46.3*	Decomposed organic
0	0/1	*D46.4*	Exposed cobbles
0	0/1	*D46.5*	Exposed gravel
0	0/1	*D46.6*	Exposed sand
1	0/1	*D46.7*	Exposed silt
0	0/1	*D46.8*	Exposed clay

Record a 1 for each category present if its area is > 10 square meters. Note: bare earth from animal tunnels does NOT count.

D47 Soils present in top (15 cm) of A horizon (record [1] if 1-49% area of AU, [2] if 50-95%, [3] if >95%)

0	[0-3]	*D47.1*	Peat
1	[0-3]	*D47.2*	Organic Muck
2	[0-3]	*D47.3*	Mineral with clay fraction <30%
0	[0-3]	*D47.4*	Clay (clay fraction >30%)

Record the least permeable layer if there are several down to 60 cm.

D48 Infiltration rate of top 60 cm of soil in seasonally inundated areas

0	0/1	*D48.1*	Fast >50% gravel and cobble and the rest a sand, loamy sand, or sandy loam
0	0/1	*D48.2*	Moderate >50% sand and rest cobble, gravel, loamy sand, or sandy loam
1	0/1	*D48.3*	Slow - muck, peat, or loams (except sandy loam), silts, and clays

D49 Substrate of streams

0	0/1	*D49.1*	Substrate **of permanent stream** or river in AU has at least 1 square meter of gravel
0	0/1	*D49.2*	Substrate **of permanent stream** or river in AU has at least 1 square meter of cobbles
		D49.3	

Judgements of Opportunity (Ratings of High, Medium, Low)

Rating	*Functions*
M	Removing Sediments
M	Removing Nutrients
M	Removing Toxic Metals and Organics
M	Reducing Peak Flows
L	Reducing Downstream Erosion
L	Recharging Groundwater
H	General Habitat
H	Anadromous Fish Habitat

Species List - Assessment Unit B

Black cottonwood
Red alder
pacific willow
Red osier dogwood
Salmonberry
Skunk cabbage
lady fern
ivy - I
snowberry
crabapple
red elderberry
stinging nettle
trailing blackberry
Japanese knotweed - I
Equisetum
spirea
sitka willow
Nootka rose
slough sedge
RCG - I
Indian plum
Him. blackberry - I
Iris - I
Sitka willow
Lonicera involucrata

Nolí tangere
bleeding heart
Softstem bullrush
typha
Scirpus tabernaemontanii
water parsley

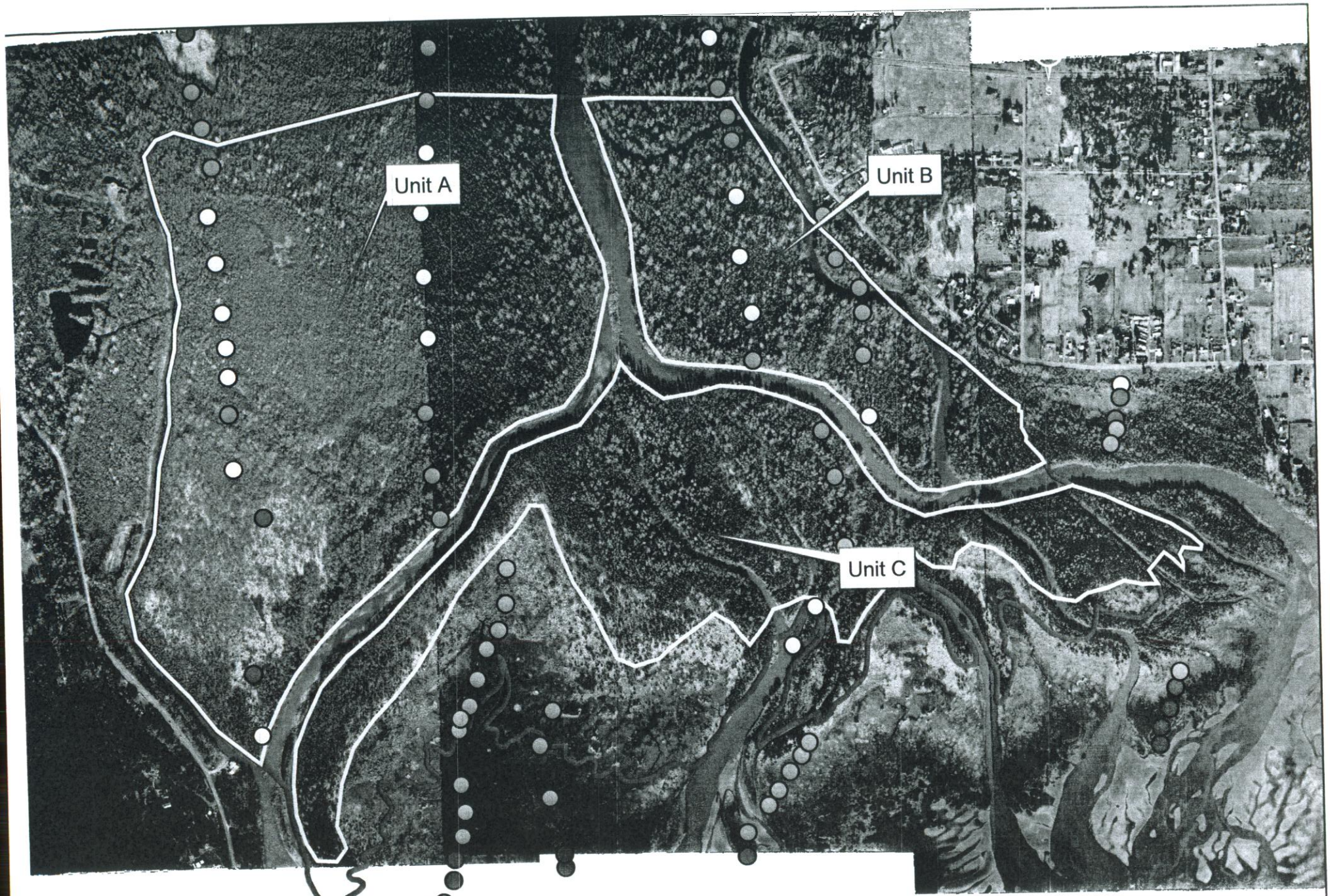
invasives: 5
natives: 26

SITE Nooksack Delta Unit B #AU- 0

Riverine Impounding

Summary of Function Assessments

Function	Index
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 Decreasing Downstream Erosion	10
Potential for Groundwater 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 Habitat Assessment Units

Wetland #	38N2E17-02
Complex	☐
T/S/R	38N/2E/17
Location Desrciptio	An island west of Silver Creek and East of Nooksack River
Reviewer initials	JD
Date of review	6/25/99
Aerial photo #	16-13/ 92-20
USGS quad name	Ferndale
On NWI Map	☑
Previously inventor	☐
Date of previous in	
Previous wetland #	
Watershed	S
Watershed size	
Wetland Size	0
Cowardin Classes P	RFO, RSS, REM
Associated with Str	☑
Stream Name	Nooksack River
Soil Units	Eliza-Tacoma (H)
Team Initials	
Date Field Checked	
Base Map	38-2-17B
Evaluation method	Aerial photo
GPS	☐
GPS file	
Water Sources	Sheetflow, floodplain, precipitation
Describe Outlet	Floodplain
Outlet Constriction	Slight to none
Inundation	Tidal

Hydrology indicato	Watermarks on vegetation, drift lines, drainage patterns, sedim
Hydrologic regime	Tidal
Evidence for tidal	Nooksack Delta
Function Classifica	Riverine flowthrough
Hydrologic alterati	N/O
Cowardin Class I	RFO,
Cowardin Class II	RSS
Cowardin Class III	REM
Cowardin Class IV	
Degree of Intersper	Moderate
Tree Height	
Tree DBH	
Invasive/%	N/O
Vegetation Disturb	N/O
Buffer description	Surrounded by tidally influenced freshwater channels
Soil Profile	N/O
Soil Disturbances	N/O
General Wetland D	Forested area on Lower Nooksack River floodplain. Within fore

JD 7/22/99

DJ

LUMMI RESERVATION
WETLAND INVENTORY DATA FORM

ID 7/7/99

OFFICE DATA

WETLAND NO. 38N2E17Q2 TOWNSHIP/RANGE/SECTION 38N-2E-17

LOCATION DESCRIPTION An island West of Silver Creek & East of Nooksack River south of

REVIEWER INITIALS ID DATE OF REVIEW 6/25/99

AERIAL PHOTO NO.: NORMAL COLOR 16-13 COLOR INFRARED 92-20

USGS QUAD NAME Ferndale WL ON NWI MAP? (Y) N

WL PREVIOUSLY INVENTORIED/DELINEATED BY LUMMI STAFF/CONTRACTOR? Y (N)

DATE OF WORK _____ WETLAND NO. USED PREVIOUSLY _____

WATERSHED 5 APPROX. SIZE OF WATERSHED _____ acres

APPROX. SIZE OF WL _____

COWARDIN CLASSES PRESENT IN WL RFO, RSS, REM

IS WL ASSOCIATED W/ STREAM OR RIVER? (Y) N STREAM NAME Nooksack R.

SOIL UNITS MAPPED IN WL (circle hydric soils) (Eliza-Tacoma)

FIELD DATA

TEAM INITIALS _____ DATE FIELD CHECKED _____

BASE MAP NO. 38-2-17 B SITE ACCESS / WINDSHIELD ACCESS / NO VISUAL ACCESS (Aerial Photo)

GPS USED TO FIELD LOCATE WL? YES / (NO) GPS FILE NAME _____

WETLAND HYDROLOGY

WATER SOURCES: STREAM / CLVRTED STRMWTR / (SHEET FLOW) / (FLDPLAIN) / SEEP / (PRECIP)

DESCRIBE WL OUTLET (width, structure, flowing?) Floodplain

OUTLET CONSTRICTION: NO OUTLET / SEVERE / MODERATE / (SLIGHT TO NONE)

WL IS: PONDED (Depth) 0 / SATURATED

WL HAS: (WATERMARKS ON VEG.) / DRIFT LINES / (DRAINAGE PATTERNS) / SEDIMENT DEPOSITS

WL HAS: (TIDAL) / NONTIDAL / UNKNOWN HYDROLOGIC REGIME

EVIDENCE FOR TIDAL REGIME Nooksack delta

WA STATE WETLAND FUNCTION CLASSIFICATION (use key) Riverine Flowthrough

OBSERVED ALTERATIONS TO HYDROLOGY & OTHER RELEVANT INFORMATION:

None Obs

ID 7/19/99

M
DJ

WETLAND VEGETATION

COWARDIN CLASS	MAJOR PLANT ASSOCIATIONS	% TOTAL WL AREA BY CLASS
PFO	?	
PSS	?	
PEM		

(Should total 100%)

DEGREE OF INTERSPERSION OF CLASSES: HIGH / (MODERATE) / LOW / NONE

IF FORESTED, AVERAGE SIZE OF DOM. TREE SPECIES: HEIGHT _____ ft. DBH _____ in.

INVASIVE SPECIES PRESENT IN WL & APPROX. % COVER OF TOTAL WL

?

OBSERVED DISTURBANCES TO VEGETATION: None

BUFFER DESCRIPTION: Surrounded by tidally influenced fresh water channels

WETLAND SOILS (Observed only if necessary to confirm wetland presence)

SOIL PROFILE: NA

OBSERVED DISTURBANCES TO SOILS: None

GENERAL WETLAND DESCRIPTION: forested area on Long Island Nooksack River floodplain

MANAGEMENT RECOMMENDATIONS:

TD 7/22/14

Wetland # 38N2E17-01

Wetland Name: Nooksack Delta - Unit C
Location: Nooksack Delta, S. of forks
Data Collector: Lee First

AU ID#:
T/S/R: T38N02E Sec 17, 18, 2c
Date: 9/13/04

Use this data sheet for:
***DEPRESSIONAL OUTFLOW** or **RIVERINE IMPOUNDING** wetlands in the Lowlands of Western Washington*

- *Use in conjunction with the written guidance provided in Parts 1 and 2*
- *Record only numbers, yes/no answers are recorded as a [1] or [0]*

Estimate, Score/ or Rating			
			LANDSCAPE DATA
0	1/0	**D0**	Do dikes surround the AU, and does it drain through a control structure that can be manipulated?
77.51	ha	**D1**	Area of AU
1534	ha	**D2**	Area of contributing basin (upgradient watershed)
		D3	Land use (as % of total area) within 1 km of AU (include contiguous AUs of different class)
13	%	*D3.1*	Undeveloped forest (if previously clear-cut, cut at least 5 years ago)
7	%	*D3.2*	Agriculture (tilled fields and pastures; includes golf courses)
0	%	*D3.3*	Clear-cut logging (<5 years since clearing)
0	%	*D3.4*	Urban/commercial (any developed areas not identified as residential)
10	%	*D3.5*	High density residential (>1 residence/acre)
10	%	*D3.6*	Low density residential (<= 1 residence/acre)
60	%	*D3.7*	Undeveloped areas, shrubland, other wetlands, and open water
			WATER REGIME
1	0/1	**D4**	Channels, ditches, or streams in AU
1	0/1	*D4.1*	Channels, ditches, or streams in AU have permanently flowing water *(you see water flowing)*
		D4.2	
1	0/1	*D4.3*	The only surface outflow from the AU is through a culvert (<60 cm) or vertical siphon
		D5	
		D6	
		D7	
		D8	Inundation
75	%	*D8.1*	Percent of AU that is ponded or inundated for >1 month
8	%	*D8.2*	Percent of AU with permanent standing or moving water
8	%	*D8.3*	Percent of AU with permanent open water *(without aquatic bed vegetation)*
0	%	*D8.4*	Percent of AU with unvegetated bars or mudflats
0	0/1	*D8.5*	Unvegetated bars or mudflats at least 100 square meters in size
		D9	Inundation regimes
1	0/1	*D9.1*	Permanently flooded (include vegetated areas)
1	0/1	*D9.2*	Seasonally flooded (>1 month)
1	0/1	*D9.3*	Occasionally flooded (<= 1 month)
1	0/1	*D9.4*	Saturated but seldom inundated
1	0/1	*D9.5*	Permanently flowing stream
1	0/1	*D9.6*	Intermittently flowing stream
0.6	m	**D10**	Average height of annual flooding above lowest point of outlet or surface of permanent stream at outlet (round to 0.3 m)

By definition:
D8.1 >= D8.2 >= D8.3

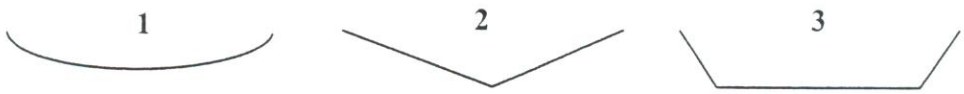
Chose all that apply that meet size criteria: area >0.1 ha (1/4 acre) or > 10% of AU if AU smaller than 1 ha (2.5 acres)

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Units **AU ID#:**

D11 Cross section of AU in areas of seasonal inundation (record a 1 next to cross section that best fits)

1	0/1	*D11.1*	Cross section 1
0	0/1	*D11.2*	Cross section 2
0	0/1	*D11.3*	Cross section 3



D12 Categories of water depths in AU, areas permanently or seasonally inundated/flooded

1	0/1	*D12.1*	1-20 cm (<8 in)
1	0/1	*D12.2*	20-100 cm (8-40 in)
1	0/1	*D12.3*	>100 cm (>40 in)

Record a 1 for each category present if >0.1 ha (1/4 acre) or 10% of area

D13 Constriction of outlet

1	0/1	*D13.1*	Unconstricted or only slightly constricted
0	0/1	*D13.2*	Moderately constricted
0	0/1	*D13.3*	Severely constricted
0	0/1	*D13.4*	*Riverine Impounding only* – Completely constricted (no surface outlet)

If the AU has multiple outlets, judge the constriction as if all the outlets were combined into one large one.

VEGETATION

D14 Cowardin Classes (as % area of AU)

0	%	*D14.1*	Forest - evergreen
70	%	*D14.2*	Forest -deciduous
0	%	*D14.3*	Scrub-shrub - evergreen
25	%	*D14.4*	Scrub-shrub - deciduous
5	%	*D14.5*	Emergent
0	%	*D14.6*	Aquatic bed

- *Include forest only if trees are rooted in AU.*
- ***If forest is a mix of deciduous and evergreen estimate the relative % cover of each and divide percentage between the two categories.***
- ***If vegetation classes are patchy, add the patches together for each class to get a total.***
- *To count, a class must cover at least 0.1 ha or be more than 10% of the total area of the AU*

1	0/1	**D15**	Does D8.3 + D8.4 + sum (D14.1 to D14.6) = 100? **If not, give reason.**
25	%	**D16**	% area of herbaceous understory **in forest and shrub areas** (not % area in entire AU)
40	%	**D17**	% area of AU with >75% closure of canopy *(SS, FO classes > 1 m high)*
		D18	
		D19	Plant Richness
32	#	*D19.1*	Record number of native plant species found in AU
5	#	*D19.2*	Record number of non- native plant species found in AU
5	#	**D20**	The # of plant assemblages in the AU with area >0.1 ha (1/4 acre) or >10% if AU <1 ha *(if more than 12 record a 12)*
3	[1-6]	**D21**	Strata: The maximum # of strata present in any plant assemblage
0	0/1	*D21.1*	Is vine stratum dominated by non-native blackberries?

A stratum must have 20% cover in assemblage

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Unit C **AU ID#:**

1 0/1 **D22** Mature trees in AU

Average DBH of 3 out of 5 largest trees of a species has to exceed size threshold

Tsuga heterophylla (western hemlock) >45 cm (18")
Thuja plicata (western red cedar) >45 cm (18")
Pseudotsuga menziesii (Douglas fir) >45 cm (18")
Picea sitchensis (Sitka spruce) >45 cm (18")
Populus balsamifera (black cottonwood) >45 cm (18")
Acer macrophyllum (big-leaf maple) >45 cm (18")
Alnus rubra (red alder) >30 cm (12")
Fraxinus latifolia (Oregon ash) >30 cm (12")
Pinus contorta (lodgepole pine) >30 cm (12")
Salix lucida (Pacific willow) >30 cm (12")

D23 Sphagnum bogs

0 0/1 *D23.1* % area of Sphagnum bogs >75%
0 0/1 *D23.2* % area of Sphagnum bogs = 50-75%
0 0/1 *D23.3* % area of Sphagnum bogs = 25-49%
0 0/1 *D23.4* % area of Sphagnum bogs = 1-24%
1 0/1 *D23.5* % area of Sphagnum bogs = 0%

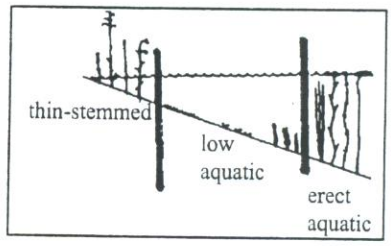
D24 Dominance by non-native plant species

0 0/1 *D24.1* % area of non-native species >75%
0 0/1 *D24.2* % area of non-native species = 50-75%
0 0/1 *D24.3* %area of non-native species = 25-49%
1 0/1 *D24.4* % area of non-native species = 1-24%
0 0/1 *D24.5* % area of non-natives = 0%

HABITAT CHARACTERISTICS

0 [0-3] **D25** Number of structure categories in aquatic bed vegetation

Applies only to aquatic bed species
DO NOT count persistent emergents



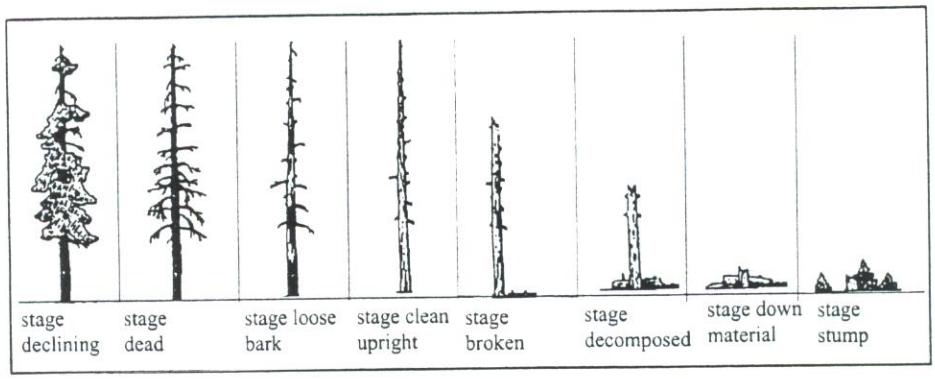
D26 pH

7 [4-9] *D26.1* pH of interstitial water *(measure immediately after digging hole in non-inundated areas)*
7 [4-9] *D26.2* pH of open or standing water (*record the lowest pH, if you cannot measure record a [7])*
1 0/1 **D27** Estuary: AU is within 8 km (5 mi) of a brackish or salt water estuary
0 0/1 **D28** Large lake: AU is within 1.6km (1 mi) of a lake >8 ha (20 acres)
1 0/1 **D29** Open field: AU is within 5 km (3 mi) of an open field (agriculture or pasture) >16 ha (40 acres)
1 0/1 **D30** Preferred woody vegetation: AU has >1 ha (2.5 acres) of preferred woody vegetation for beaver in and within 100 m of AU

Wetland Name: Nooksack Delta Unit C **AU ID#:**

5 [0-8] **D31** Snags (record # of stages)

Circle the categories present; minimum DBH of snag =10 cm (4")



1 0/1 *D31.1* At least one of the snags above has a DBH greater than 30 cm (12").

1 0/1 **D32** Overhanging vegetation, extending out for 1 m, for at least 10 m (33 ft) over stream or open water.

0 0/1 **D33** Upland islands of at least 10 square meters (100 square ft.) within AU boundary

Islands need to be surrounded by at least 30 m (100 ft) of open water deeper than 1 m (3 ft)

1 0/1 **D34** Undercut banks present for at least 2 m (6.6 ft.)

0 [0-4] **D35** Key for rating egg-laying structures for amphibians

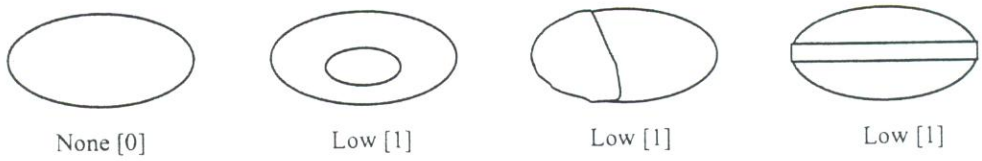
1. Does the AU have thin-stemmed vegetation or thin branches **(<8 mm)** in at least 1/4 acre (or 10% of AU) of permanent or seasonally inundated areas? *Thin-stemmed vegetation can include herbaceous species such as water parsley.*
   NO – Score = 0 YES go to 2
2. Does the AU have at least 0.2 ha (1/2 acre) of thin-stemmed emergent vegetation or woody branches, **1-4 mm** in diameter?
   NO go to 5 YES go to 3
3. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water)?
   NO go to 4 **YES - Score = 4**
4. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 2 **YES – Score = 3** STOP
5. Does the AU have >0.1 ha (1/4 acre) of thin-stemmed emergent vegetation or woody branches, **1-4 mm**?
   NO – Score = 1 YES go to 6
6. Does the area with thin stems contain open water interspersed in a patchwork of a ratio that is approximately 1:1 [no more than a 40- 60% of the total area is open water)?
   NO go to 7 **YES – Score = 3**
7. Is the area of open water between 25% and 75% of the total area in the zone of thin stemmed vegetation?
   NO – Score = 1 **YES – Score = 2**

Wetland Name: Nooksack Delta Unit C **AU ID#:**

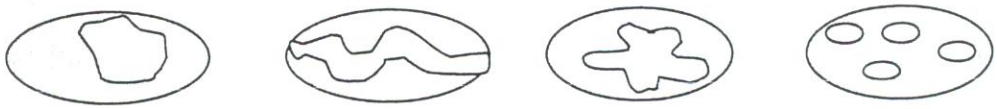
0 0/1 **D36** Tannins in surface waters >10% of water surface

1 0/1 **D37** Steep banks for denning (>30 degree slope, fine material, >10 m long, >0.6 m high) *(may be a dike)*

2 [0-3] **D38** Interspersion between erect vegetation and permanent open water (POW + AB) areas of AU



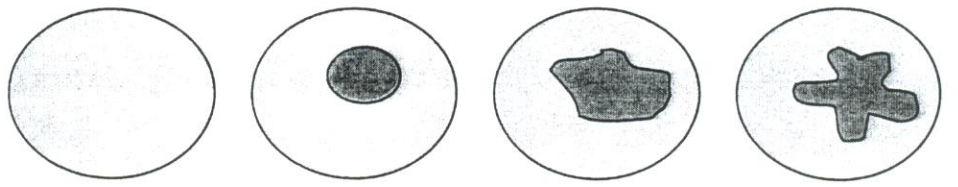
None [0] Low [1] Low [1] Low [1]



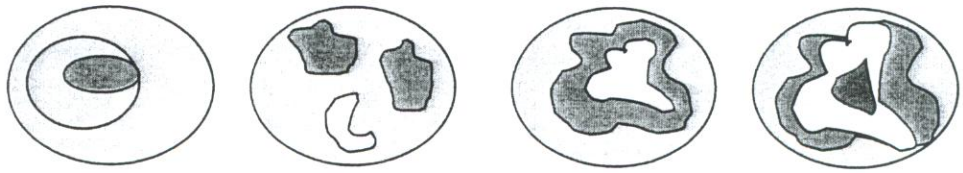
Moderate [2] Moderate [2] High [3] High [3]

3 [0-3] **D39** Interspersion between Cowardin vegetation classes

**AUs with only 2 classes can only score a moderate [2] or lower*
**AUs with 4 vegetation classes score a high [3]*
**AUs with 3 classes can score a moderate (2) or a high (3)*



None [0] Low [1] Low [1] Moderate [2]



Moderate [2] High [3] High [3] High [3]

Wetland Name: Nooksack Delta Unit C **AU ID#:**

D40

3 [0-3] **D41** Edge of AU: The characteristics of the edge between AU and uplands or adjacent wetlands.

Choose the description that best fits the characteristics of the AU edge:

0 There are **no differences in level** of vegetation height as reflected by vegetation classes on each side of the AU for more than 50% of the circumference: record a [0] **regardless of the sinuosity**. Examples: emergent (or herbaceous) to emergent (or herbaceous), shrub to shrub, forest to forest.

1 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight** for more than 50% of the circumference: record a [1]. Example: emergent (or herbaceous) to shrub, shrub to forest

2 There is a **difference of one level** in vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous** for more than 50% of the circumference: record a [2]. Examples: emergent (or herbaceous) to shrub, shrub to forest.

2 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is straight: record a [2]**. Examples: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

3 There is a **difference of more than one level** of vegetation height as reflected by vegetation classes on each side of the AU and the **edge is sinuous: record a [3]**. Example: emergent (or herbaceous) to forest, bryophytes to scrub/shrub or forest.

2 If **no single category** above extends for more than 50% of the circumference, and the **edge is straight: record a [2]**

3 If **no single category** above extends for more than 50% of the circumference, and the **edge is sinuous: record a [3]**

5 [0-5] **D42** Buffer of AU: Choose the description that best represents condition of AU buffer

> * *Open water or adjacent wetlands are considered part of the buffer*
> * *Infrequently used gravel or paved roads or vegetated dikes in a relatively undisturbed buffer can be ignored as a "disturbance"*

5 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >95% of circumference. Clear-cut >5 years old is OK. No developed areas within undisturbed part of buffer.

4 100 m (330 ft) of forest, scrub, relatively undisturbed grassland or open water >50% circumference OR 50 m (170 ft) of forest scrub, grassland or open water >95% circumference. No developed areas within undisturbed part of buffer.

3 100 m (330 ft) of forest, scrub, grassland or open water >25% circumference, OR 50 m (170 ft) of forest, scrub, grassland or open water >50% circumference.

2 No paved areas or buildings within 25m (80 ft) of wetland >95% circumference. Pasture or lawns are OK. OR no paved areas or buildings within 50m of wetland >50% circumference

0 Vegetated buffers are <2 m wide (6.6 ft) for more than 95% of the circumference

1 Does not meet any of the criteria above

DEPRESSIONAL OUTFLOW or RIVERINE IMPOUNDING

Wetland Name: Nooksack Delta Unit C **AU ID#:**

3 [0-3] **D43** Corridors of AU: Rate corridors using following key *(record rating of 0, 1, 2, or 3)*

1. Is the AU part of a riparian corridor *(see text for definitions)*
   NO go to 5 **YES go to 2**
2. Is the wetland part of riparian corridor > 50 m wide connecting 2 or more wetlands within 1 km with at least 30% shrub or forest cover in the corridor?
   NO go to 3 **YES = [3]**
3. Is the AU part of a riparian corridor 25-50 m wide connecting to other wetlands with at least 30% shrub or forest cover in the corridor?
   NO go to 4 **YES = [2]**
4. Is the AU part of a riparian corridor >5 m wide with relatively undisturbed veg. (grasslands, abandoned pasture are OK) that extends for more than 1 km?
   NO go to 5 **YES = [1]**
5. Is there a corridor >50 m wide with good (>30%) cover of forest or shrub (>2 m high) to natural upland area or open water that is >100 ha in size?
   NO go to 6 **YES = [3]**
6. Is there a 10-50 m wide forest or shrub corridor to a relatively undisturbed upland or open water that is >10 ha?
   NO go to 7 **YES = [2]**
7. Is there a corridor of relatively undisturbed vegetation (grassland, abandoned pasture) >50 m wide to an undisturbed upland or open water that is >10 ha?
   NO go to 8 **YES = [2]**
8. Is there any vegetated corridor 5-50 m wide between the AU and any relatively undisturbed area or open water that is >2.5 ha?
   NO = [0] **YES = [1]**

12 [0-12] **D44** # of categories of large woody debris in AU **outside of perm. water**

Freshly cut stumps are not included



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

12 [0-12] **D45** # of categories of large woody debris **in permanent water** of AU (may include aquatic bed areas)



Diameter		Log Class 1	Log Class 2	Log Class 3	Stump
10-20cm	(4-8")				
21-50cm	(8-20")				
>50 cm	(>20")				

Wetland Name: Nooksack Delta Unit C **AU ID#:**

SOILS and SUBSTRATES

		D46	Composition of AU surface
1	0/1	*D46.1*	Deciduous, broad-leaved, leaf litter
1	0/1	*D46.2*	Other plant litter
0	0/1	*D46.3*	Decomposed organic
0	0/1	*D46.4*	Exposed cobbles
0	0/1	*D46.5*	Exposed gravel
1	0/1	*D46.6*	Exposed sand
1	0/1	*D46.7*	Exposed silt
0	0/1	*D46.8*	Exposed clay

Record a 1 for each category present if its area is > 10 square meters. Note: bare earth from animal tunnels does NOT count.

		D47	Soils present in top (15 cm) of A horizon (record [1] if 1-49% area of AU, [2] if 50-95%, [3] if >95%)
0	[0-3]	*D47.1*	Peat
0	[0-3]	*D47.2*	Organic Muck
3	[0-3]	*D47.3*	Mineral with clay fraction <30%
0	[0-3]	*D47.4*	Clay (clay fraction >30%)

Record the least permeable layer if there are several down to 60 cm.

		D48	Infiltration rate of top 60 cm of soil in seasonally inundated areas
0	0/1	*D48.1*	Fast >50% gravel and cobble and the rest a sand, loamy sand, or sandy loam
1	0/1	*D48.2*	Moderate >50% sand and rest cobble, gravel, loamy sand, or sandy loam
0	0/1	*D48.3*	Slow - muck, peat, or loams (except sandy loam), silts, and clays
		D49	Substrate of streams
0	0/1	*D49.1*	Substrate **of permanent stream** or river in AU has at least 1 square meter of gravel
0	0/1	*D49.2*	Substrate **of permanent stream** or river in AU has at least 1 square meter of cobbles
		D49.3	

Judgements of Opportunity (Ratings of High, Medium, Low)

Rating	*Functions*
M-H	Removing Sediments
M	Removing Nutrients
M	Removing Toxic Metals and Organics
M	Reducing Peak Flows
L	Reducing Downstream Erosion
L	Recharging Groundwater
H	General Habitat
H	Anadromous Fish Habitat

Species list - Nooksack Delta "C"

Atriplex
baltic rush
potentilla
slough sedge
eel grass
american dunegrass
douglas aster
RCG - I
~~[illegible]~~
sweet clover - I
fescue
triglochlin
cattail - both
bulrush
knotweed - I
juncus articulatus

Red alder
black cottonwood
pacific willow
red osier dog
salmonberry
Nootka tanglebark
bleeding heart
snowberry
him black - I
Lonicera involucrata
sitka willow
pacific ninebark
Nootka Rose
hooker willow
skunk cabbage
spirea
lady fern
water parsley
crabapple
Indian plum
iris - I

Non-Natives: 5 Natives: 32

SITE Nooksack Delta Assessment Unit C #AU- 0

Riverine Flow-through

Summary of Function Assessments

Function	Index
Potential for Removing Sediment	7
Potential for Removing Nutrients	7
Potential for Removing Heavy Metals and Toxic Organics	4
Potential for Reducing Peak Flows	10
Potential for Reducing Decreasing Downstream Erosion	10
Potential for Groundwater Recharge	10
General Habitat Suitability	10
Habitat Suitability for Invertebrates	8
Habitat Suitability for Amphibians	10
Habitat Suitability for Anadromous Fish	8
Habitat Suitability for Resident Fish	9
Habitat Suitability for Wetland Associated Birds	10
Habitat Suitability for Wetland Associated Mammals	10
Native Plant Richness	9
Primary Production and Export	7

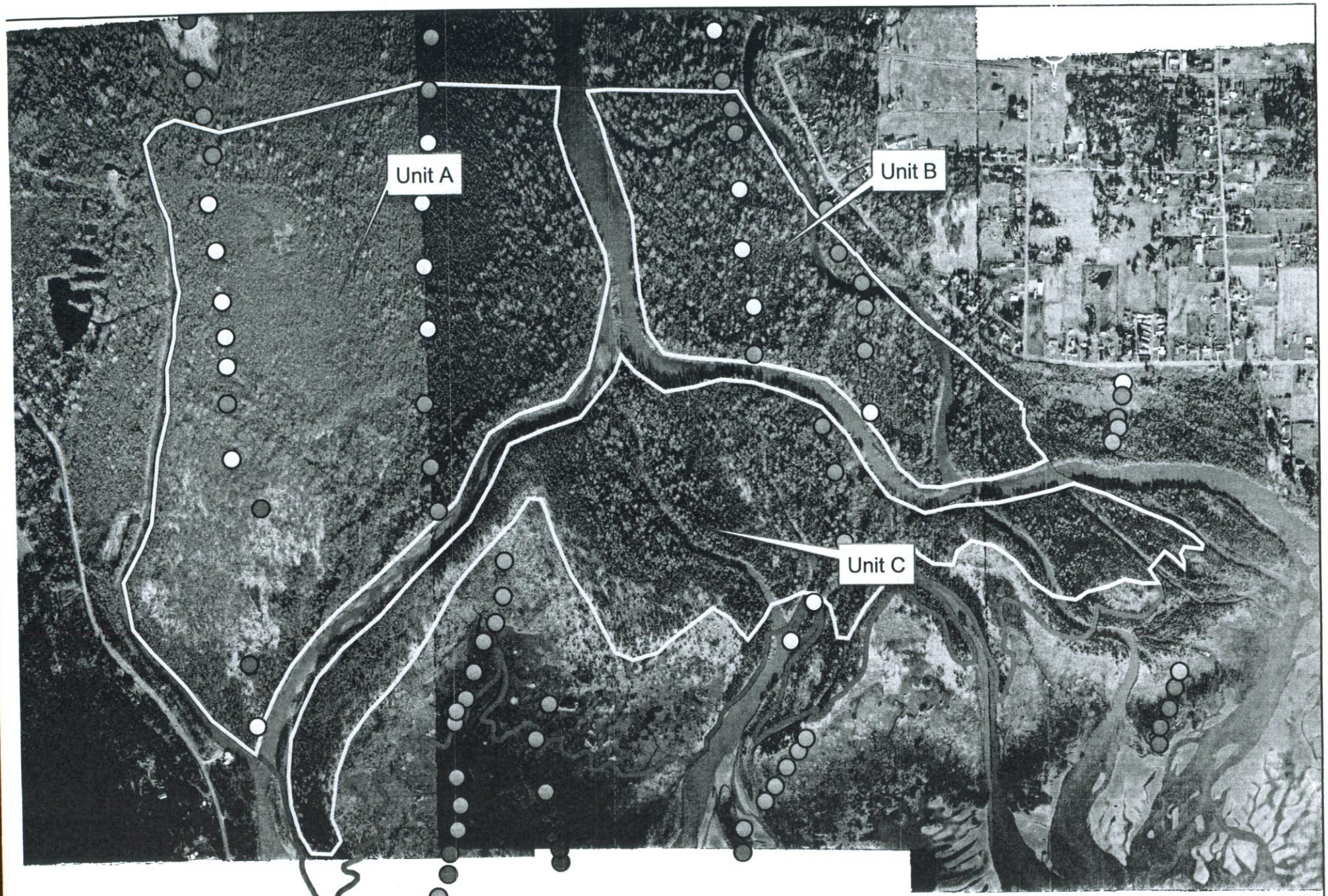

N
W
E
S
0
1,800
3,600
7,200
Fee

SITE	Nooksack Delta Unit C	#AU-	0

Riverine Impounding

Summary of Function Assessments

Function	Index
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 Decreasing Downstream Erosion	10
Potential for Groundwater 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



Nooksack Delta Habitat Assessment Units

Wetland #	38N2E17-01
Complex	☐
T/S/R	38N/2E/17
Location Desrciptio	Between distributaries at mouth of Nooksack River
Reviewer initials	JD
Date of review	6/25/99
Aerial photo #	16-13/ 92-20
USGS quad name	Ferndale
On NWI Map	☑
Previously inventor	☐
Date of previous in	
Previous wetland #	
Watershed	S
Watershed size	
Wetland Size	0
Cowardin Classes P	RFO, RSS, REM
Associated with Str	☑
Stream Name	Nooksack River
Soil Units	Hydraquent (H), Eliza-Tacoma (H)
Team Initials	
Date Field Checked	
Base Map	38-2-17B
Evaluation method	Aerial photo
GPS	☐
GPS file	
Water Sources	Sheetflow, floodplain, precipitation
Describe Outlet	Floodplain
Outlet Constriction	Slight to none
Inundation	Tidal

Hydrology indicato	Watermarks on vegetation, drift lines, drainage patterns, sedim
Hydrologic regime	Tidal
Evidence for tidal	Nooksack delta
Function Classifica	Riverine flowthrough
Hydrologic alterati	N/O
Cowardin Class I	RFO
Cowardin Class II	RSS
Cowardin Class III	REM
Cowardin Class IV	
Degree of Intersper	Moderate
Tree Height	
Tree DBH	
Invasive/%	N/O
Vegetation Disturb	N/O
Buffer description	S - Bellingham Bay, otherwise Nooksack River
Soil Profile	N/O
Soil Disturbances	N/O
General Wetland D	Saltmarsh to forested freshwater marsh at Nooksack Delta

JD 7/22/99

LUMMI RESERVATION
WETLAND INVENTORY DATA FORM

JD 7/7/99

OFFICE DATA

WETLAND NO. 38N2E17-01 TOWNSHIP/RANGE/SECTION 38N-2E-17

LOCATION DESCRIPTION Between Distributaries @ Mouth of Nooksack River

REVIEWER INITIALS JD DATE OF REVIEW 6/25/99

AERIAL PHOTO NO.: NORMAL COLOR 16-13 COLOR INFRARED 92-20

USGS QUAD NAME Ferndale WL ON NWI MAP? (Y) N

WL PREVIOUSLY INVENTORIED/DELINEATED BY LUMMI STAFF/CONTRACTOR? Y (N)
DATE OF WORK _____ WETLAND NO. USED PREVIOUSLY _____
WATERSHED 5 APPROX. SIZE OF WATERSHED 3 acres

APPROX. SIZE OF WL _____

COWARDIN CLASSES PRESENT IN WL PFO, PSS, PEM

IS WL ASSOCIATED W/ STREAM OR RIVER? (Y) N STREAM NAME Nooksack R.

SOIL UNITS MAPPED IN WL (circle hydric soils) (Hydraquent), (Eliza-Tacoma)

FIELD DATA

TEAM INITIALS _____ DATE FIELD CHECKED _____

BASE MAP NO. 38-2-17B SITE ACCESS / WINDSHIELD ACCESS / NO VISUAL ACCESS (Aerial Photo)

GPS USED TO FIELD LOCATE WL? YES / (NO) GPS FILE NAME _____

WETLAND HYDROLOGY

WATER SOURCES: STREAM / CLVRTED STRMWTR / (SHEET FLOW) / (FLDPLAIN) / SEEP / (PRECIP)

DESCRIBE WL OUTLET (width, structure, flowing?) Floodplain

OUTLET CONSTRICTION: NO OUTLET / SEVERE / MODERATE / (SLIGHT TO NONE)

WL IS: PONDED (Depth) 3" / SATURATED

WL HAS: WATERMARKS ON VEG. / DRIFT LINES / DRAINAGE PATTERNS / SEDIMENT DEPOSITS

WL HAS: TIDAL / NONTIDAL / UNKNOWN HYDROLOGIC REGIME

EVIDENCE FOR TIDAL REGIME Nooksack Delta

WA STATE WETLAND FUNCTION CLASSIFICATION (use key) Riverine Flow through

OBSERVED ALTERATIONS TO HYDROLOGY & OTHER RELEVANT INFORMATION:

None

JD 7/7/99

WETLAND VEGETATION

COWARDIN CLASS	MAJOR PLANT ASSOCIATIONS	% TOTAL WL AREA BY CLASS
PFO	?	
PSS	?	
PEM		

(Should total 100%)

DEGREE OF INTERSPERSION OF CLASSES: HIGH / (MODERATE) / LOW / NONE

IF FORESTED, AVERAGE SIZE OF DOM. TREE SPECIES: HEIGHT _____ft. DBH _____in.

INVASIVE SPECIES PRESENT IN WL & APPROX. % COVER OF TOTAL WL

None Obs

OBSERVED DISTURBANCES TO VEGETATION: None Obs

BUFFER DESCRIPTION: S – B'ham Bay, otherwise Nooksack River

WETLAND SOILS (Observed only if necessary to confirm wetland presence)

SOIL PROFILE: NA

OBSERVED DISTURBANCES TO SOILS: None

GENERAL WETLAND DESCRIPTION: Saltmarsh to forested fresh water marsh at nooksack delta.

MANAGEMENT RECOMMENDATIONS:

JB 7/27/99

Exhibit 4

Legal Description – Nooksack Delta Site Phase 1B

(To Be Developed)

Exhibit 5

Baseline Vegetation Conditions
Nooksack Delta Site Phase 1B

(To Be Developed)

Exhibit 6

Legal Description – Blockhouse Site (Phase 2)

(To Be Developed)

Exhibit 7

Wetland Determination Data sheets, Wetland Classification, and Function Assessment Worksheets – Blockhouse Site

(To Be Developed)

Exhibit 8

Baseline Vegetation Conditions
Blockhouse Site (Phase 2)

(To Be Developed)

Exhibit 9

Legal Description – Lummi Delta Site (Phase 3)

(To Be Developed)

Exhibit 10

Wetland Determination Data sheets, Wetland Classification, and Function Assessment Worksheets – Lummi Delta Site

(To Be Developed)

Exhibit 11

Baseline Vegetation Conditions
Lummi Delta Site (Phase 3)

(To Be Developed)

Exhibit 12

Resource Folder

1. Baseline Plant Associations
2. Wetland Enhancement Areas at the Nooksack Delta Site
3. Service Area for the Lummi Nation Wetland and Habitat Mitigation Bank
4. Nooksack River Delta Knotweed Survey, September 21, 2009 (September 25, 2009)
5. Nooksack River Delta Suitability for Enhancement Measures (February 26, 2010)
6. Nooksack River Delta Salinity Regime (March 24, 2010)
7. August 2, 2010 Nooksack River Delta Site Visit Report – Conifer Underplanting Potential and Pacific Willow Mortality (August 30, 2010)

Nooksack Delta Mitigation Bank Phase 1A
Plant Association

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0 0.1 0.2
Miles

LUMMI NATION
TREATY OF 1855

N

Forest
- black cottonwood / red alder / conifers
- black cottonwood / red alder
- black cottonwood / red alder/ English ivy
- red alder / Pacific willow
- red alder / Pacific willow / conifers
- red alder
- Pacific willow

Shrubs
- willow scrub - shrub
- willow / red alder / reed canary grass
- willows/spirea/ slough sedge

Emergent
- reed canary grass
- tufted hair grass / Pacific silverweed / Lyngbye's sedge
- Lyngbye's sedge / Baltic rush
- dead willows / reed canary grass
- cattails
- cattail and driftwood logs
- bull rush
- knotweed
- new wetlands: cattail and willow seedlings

Other
- 100 ft buffer
- Proposed Mitigation Bank (Phase 1A)
- ⋆ Sample Location

English Ivy

Phase 1A

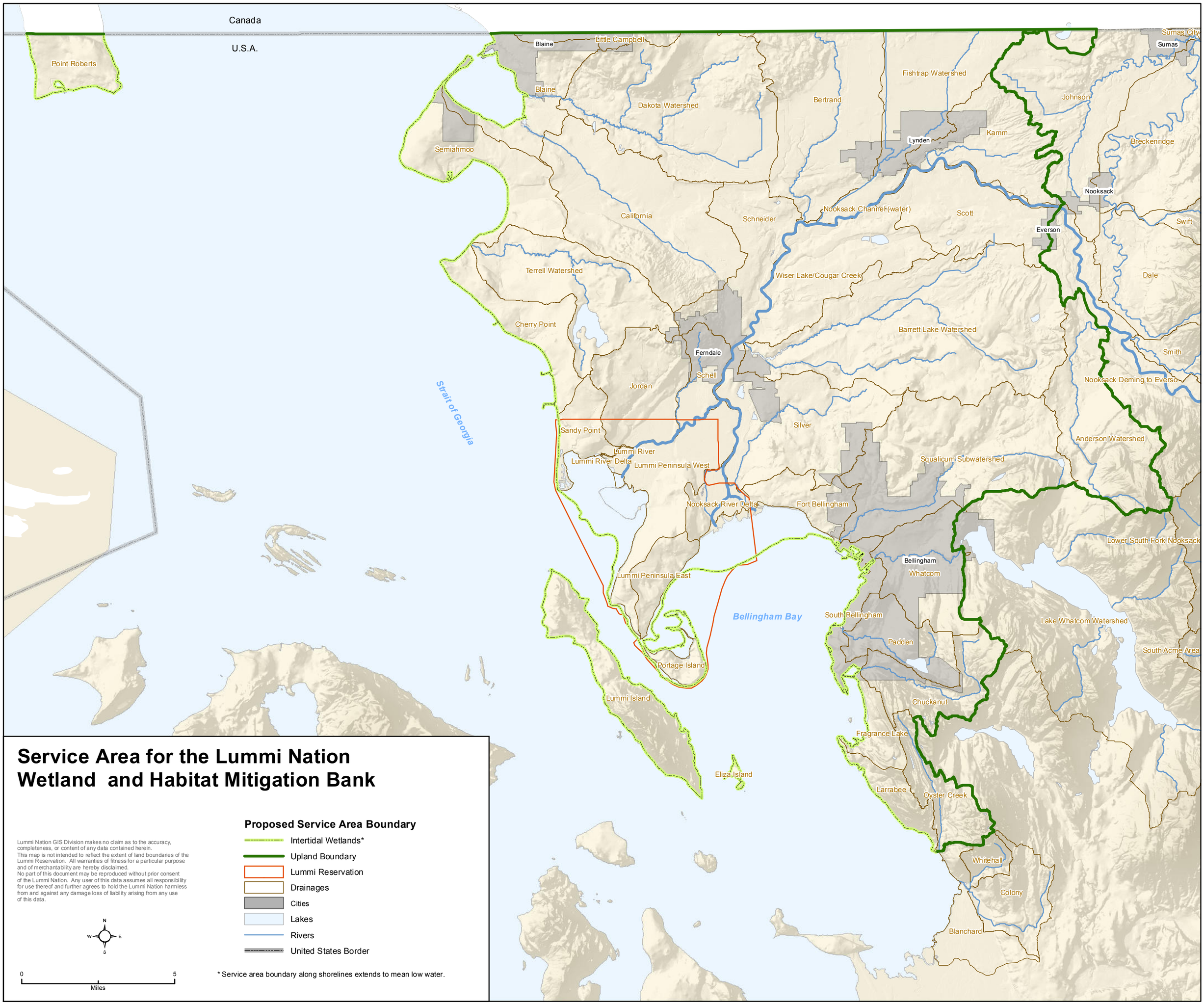
Nooksack Delta Mitigation Bank Phase A1
Wetland Enhancements

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N

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Miles

- Conifer Underplanting
- reed canary grass mowing and spraying
- ivy removal
- knotweed stem injection and removal
- 100 ft buffer
- Proposed 20ft dia. RCG Planting Patches
- 15 ft Knotweed Treatment And Monitoring Area
- Proposed Mitigation Bank (Phase 1A)



Service Area for the Lummi Nation Wetland and Habitat Mitigation Bank

Proposed Service Area Boundary

- Intertidal Wetlands*
- Upland Boundary
- Lummi Reservation
- Drainages
- Cities
- Lakes
- Rivers
- United States Border

* Service area boundary along shorelines extends to mean low water.

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N W E S

0 5
Miles

LUMMI INDIAN BUSINESS COUNCIL
2616 KWINA ROAD · BELLINGHAM, WASHINGTON 98226 · (360)384-1489

MEMORANDUM

DATE: September 25, 2009

TO: Jeremy Freimund, P.H., Water Resources Manager

FROM: Gerald Gabrisch, GIS Manager

SUBJECT: **Nooksack River Delta Knotweed Survey, September 21, 2009**

Purpose: The purpose of this report is to describe the equipment, methods, and results of a survey of the Nooksack River Delta to record the riparian locations of introduced and invasive species of knotweed (Polygonum cuspidatum or Polygonum polystachyum). This survey was intended to duplicate the September 22, 2004 Nooksack River Delta knotweed survey. Although I participated in the September 22, 2004 survey with the former GIS Manager (Ann Newton-Stark) and the former Water Resources Planner (Lee First), this early effort was never formally documented other than through the creation of a geo-spatial dataset. The September 21, 2009 geo-spatial dataset of knotweed locations was created to compare with the 2004 geo-spatial dataset. These combined data will serve to quantify knotweed density and distribution over time.

Equipment: The equipment used to measure the location of invasive knotweeds during both the 2004 and 2009 survey included a Trimble Geo-XT (CE edition) Global Positioning System (GPS) unit used in conjunction with a Countour LS range-finding-offset laser. The 2004 survey was conducted from a canoe and the 2009 survey conducted using the Water Resources Division 16 foot Harborcraft V-hull aluminum skiff fitted with a 30 hp Honda outboard motor. All boating safety equipment detailed by the *Lummi Nation Boating Safety Policy* was also used.

Methods: Based on a favorable high tide of 8.6 feet Mean Lower Low Water at 8:18 am, Lummi Natural Resources (LNR) staff members Jeremy Freimund, Frank Lawrence III, and I departed from the LNR building and put-in at the Nooksack River bridge at Marine Drive. Frank Lawrence operated the skiff and acted as observer and lookout for knotweed, Jeremy Freimund acted as observer and lookout for knotweed, and Gerry Gabrisch acted as observer and lookout for knotweed and operated the GPS unit. Patches were visually identified along the riverbank by all of the survey participants from the slow moving vessel. Identified knotweed patches were recorded using the GPS unit with attached offset laser.

Trimble GPS Pathfinder Office software was used to post-process/ differentially correct the collected GPS data using the Bellingham virtual reference network

(*http://www.wsrn.org/*). The corrected GPS data were incorporated into an ArcGIS v.9.3.1 file geo-database containing the results of both the 2004 and 2009 surveys.

Results: The 2009 travel route attempted to duplicate the 2004 route as shown in Figure 1. However, an ebbing tide level prevented the crossing of the Bellingham Bay front of the delta from the West Channel to the easternmost channel. In addition, a log jam had formed in the eastern channel which prevented boat access to this area, the downstream extent of the easternmost channel was dry and the primary discharge channel had changed to a channel more to the west. The alternative course used for the 2009 survey is shown in green in Figure 1.

As summarized in Table 1, a total of 168 knotweed patches were identified during the 2009 survey for a patch density of 45.4 knotweed patches per river mile. This compares to the 112 knotweed patches identified during the 2004 survey for a patch density of 35.5 patches per mile. Based on a consensus of the three observers during the 2009 survey, the average patch size was estimated to be about 50 square feet (10 ft x 5 ft). It is likely that additional knotweed patches exist within the smaller channels that were not accessible by boat and/or in areas within the delta that are not visible from the channel.

Table 1. Summary of 2004 and 2009 Nooksack River Delta Knotweed Survey Results

Date	Miles Traveled	Knotweed Patch Count	Patches Per Mile
9/21/2009	3.7	168	45.4
9/22/2004	3.15	112	35.5

The resulting geo-spatial data for the 2004 survey and the 2009 survey are located at *Z:\Data\Environmental\Vegetation\Knotweed.gdb.*

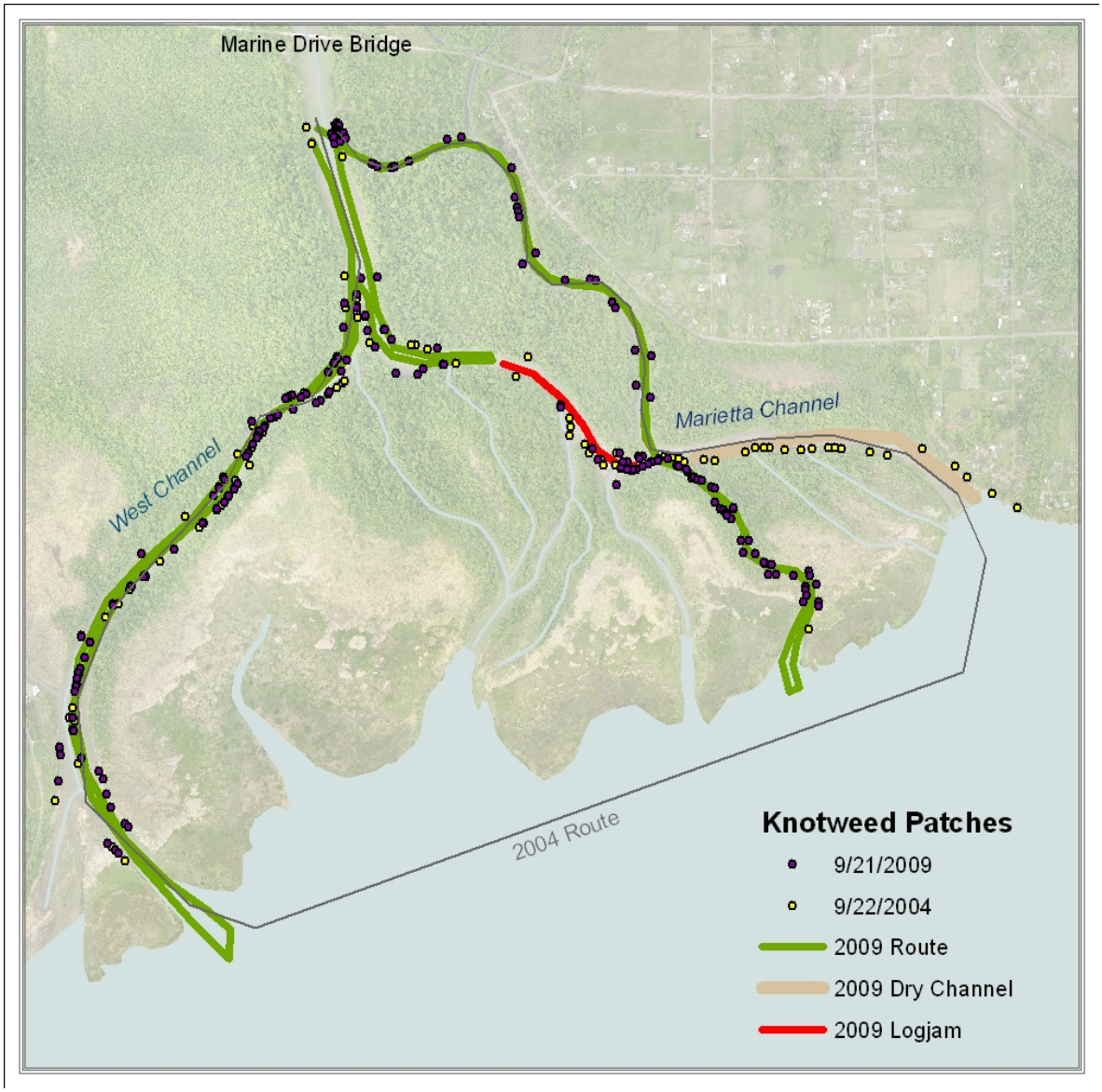


Figure 1. Comparison of Survey route and knotweed patches, 2004 and 2009

LUMMI INDIAN BUSINESS COUNCIL
2616 KWINA ROAD · BELLINGHAM, WASHINGTON 98226 · (360)384-1489

MEMORANDUM

DATE: February 26, 2010

TO: Inter-Agency Review Team – Lummi Nation Wetland and Habitat Mitigation Bank

FROM: Jeremy Freimund, P.H., Water Resources Manager
Gerald Gabrisch, Geographic Information System Manager
Monika Lange, Natural Resources Analyst

SUBJECT: **Nooksack River Delta Suitability for Enhancement Measures**

Purpose:
The purpose of this analysis is to identify areas within the Nooksack River Delta Site that can reasonably be assumed to be suitable for wetland enhancement through the under-planting of conifer trees and therefore generate enhancement credits for the Lummi Nation Wetland and Habitat Mitigation Bank (WHMB). Planting recommendations from the Lummi Nation Forest Manager are also presented based on an evaluation of an adjacent restoration project site (Kwina Slough Restoration Project) that was planted during the 2005/2006 season.

Rationale:
Due to the flooding risk in the Nooksack Delta Site, this analysis focused on identifying locations that have land surface elevations suitable to support the under-planting of conifer tree seedlings. The soil survey for this area (USDA 1992) indicates that the soils within the Nooksack Delta Site are Eliza-Tacoma silt loams (Map Unit No. 47). Red alder (*Alnus rubra*) is the main woodland species for this soil type and western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), black cottonwood (*Populus trichocarpa*), and Sitka spruce (*Picea sitchensis*) are identified as among the trees with limited extent (USDA 1992). The identified common understory plants for this soil type are willow, Douglas spiraea (*Spiraea douglasii*), western swordfern (*Polystichum munitum*), western brackenfern (*Pteridium aquilinum*), devilsclub (*Oplopanax horridus*), and Indian plum (*Oemleria cerasiformis*) (USDA 1992). The soil survey states that reforestation for this soil type can be accomplished by planting western red cedar seedlings but survival rates can be low where there is a high water table or where flooding occurs (USDA 1992). Land surface elevation was judged to be a reliable indicator of water table elevation and exposure to flooding in this analysis and thus a reasonable basis for identifying areas suitable for wetland enhancement through the under-planting of conifer trees. Other wetland enhancement measures (e.g., invasive species control) are not specifically addressed in this analysis.

General Site Conditions:
As summarized in Table 1, the total area of the Nooksack Delta Site is approximately 1,177 acres. For implementation purposes of the Lummi Nation WHMB, the Nooksack Delta Site has been divided into Phase 1A and Phase 1B. Most of the area being considered for conifer underplanting is characterized as either palustrine forested wetland (PFO) or palustrine scrub-shrub (PSS) wetland, which combined total 560 acres. The locations of the PFO and PSS wetlands within the Nooksack Delta Site are shown in Figure 1. Figure 1 also shows the locations of conifer trees identified within the Nooksack Delta site using the methods described below.

Table 1. Cowardin Classification of Mitigation Bank Phases

	Palustrine Forested Wetland (acres)	**Palustine Scrub-Shrub Wetland (acres)**	**Other Wetland Types/ Classifications (acres)**	**Total Area (acres)**
Phase 1A	321	39	569	929
Phase 1B	99	101	48	248
Total	420	140	617	1,177

The PFO wetlands have a tree canopy consisting of black cottonwood, red alder, and Pacific willow (*Salix lucida*). Deciduous trees form a canopy of approximately 80 to 100 percent cover, are generally 50 to 80 feet tall, and have a trunk diameter of approximately 12 to 25 inches diameter at breast height (dbh). Snags and large downed logs are common throughout the wetland. Conifers (Sitka spruce, western red cedar, western hemlock, and Douglas fir (*Psuedotsuga menziesii*)) are limited to a few small areas shown on Figure 1. The Douglas fir is located at a slightly higher elevation on the natural levees along the riverbank. All of the conifers observed during field studies were relatively mature trees, with dbh of 12 inches to 24 inches. Although no conifer seedlings or small trees were observed during the site surveys, conifer seedling success was evaluated for an adjacent restoration project site (see Attachment 1).

Beneath the deciduous tree canopy is a moderately dense shrub layer consisting primarily of salmonberry (*Rubus spectabilis*), red-stemmed dogwood (*Cornus sericea*), and willow (*Salix* spp.). Beneath the shrub layer is a relatively sparse herbaceous layer but herbs and sedges are locally abundant in some areas. Common herbaceous plants include slough sedge (*Carex obnupta*), ladyfern (*Athyrium filix-femina*), and skunk cabbage (*Lysichitum americanum*). Invasive plant species in the PFO wetlands include Japanese knotweed (*Polygonum cuspidatum*) (primarily on the natural levees along river channels) and a limited amount of reed canarygrass (*Phalaris arundinacea*). The reed canarygrass is more abundant (up to 30% cover) in the PFO immediately north of the large reed canarygrass fields at the south end of the site. A small portion of the PFO on the north end of the site contains English ivy (*Hedera helix*). English ivy was also observed in small isolated patches throughout the site. In limited portions of this area the English ivy covers approximately 50 percent of the ground.

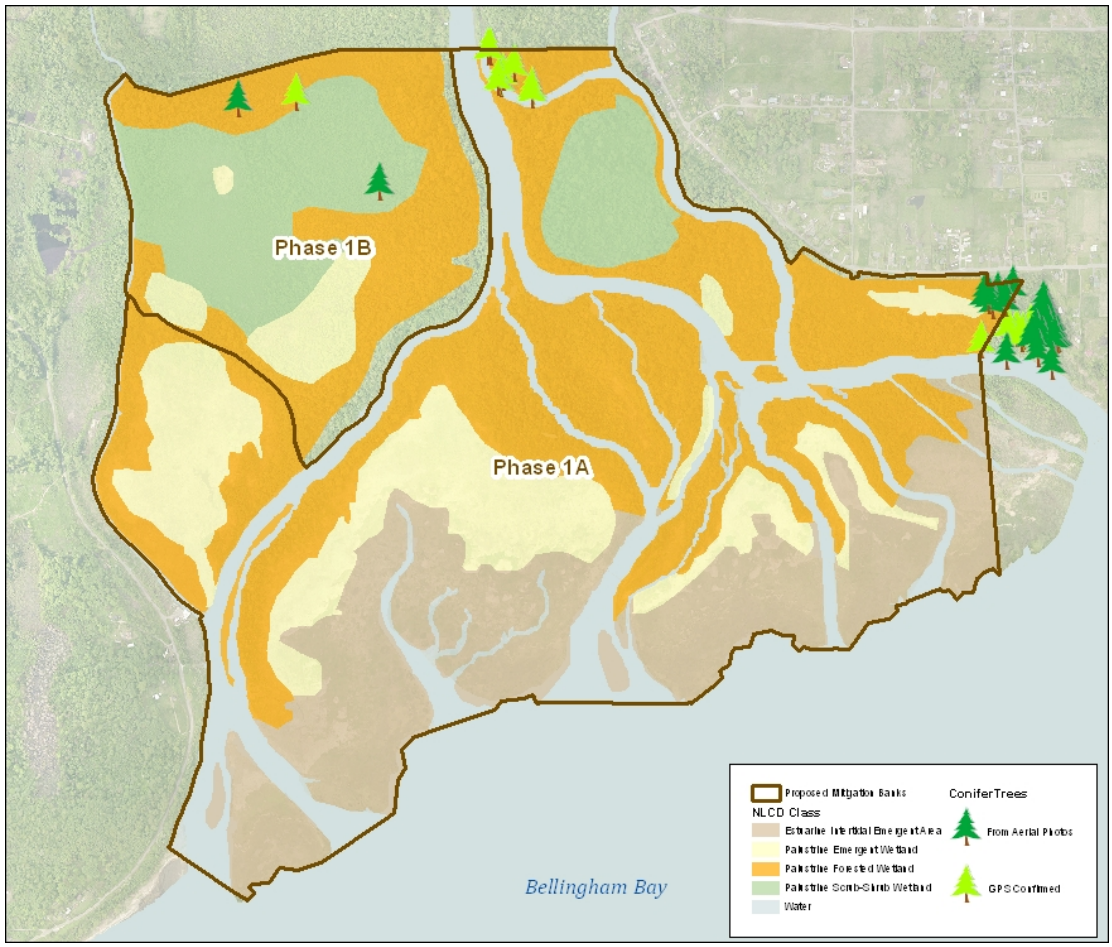


Figure 1. Cowardin classifications of wetlands in the Nooksack Delta Site and Locations of Conifer Trees.

The PSS wetland consists primarily of a dense layer of salmonberry, willow, Douglas spiraea, and twinberry (*Lonicera involucrata*). More than 30 native shrub and herbaceous plant species were observed in the Nooksack Delta PSS and PFO wetlands during field studies conducted during 2004 and are documented in the wetland determination data sheets in the Resource Folder. A few scattered trees (Pacific willow) occur throughout the PSS but do not provide enough cover to be classified as forest. Yellow iris (*Iris psuedocaris*) and reed canarygrass are locally common in portions of the PSS where they have over 30 percent cover. Knotweed was observed in widely scattered patches in the PSS wetland.

The presence of only a few conifers in the 420-acre PFO wetland area shows that colonization by conifers is still in the early stages. Much of the area in the vicinity of the Nooksack Delta Site is open agricultural fields and residential development. It is likely that either seed sources are too distant to promote widespread conifer establishment, or that conditions for seed germination and establishment are not sufficient. An exception is found along the southeastern extent of the Nooksack Delta Site. Local residents had planted Douglas fir trees as a windbreak and these trees have apparently served as a seed source resulting in Douglas fir in the PFO wetland (see Figure 5).

Because the river floods most of the wetland area during a portion of the year, conifer seedlings may establish at a very slow rate. The depth and duration of flooding is related to the ground surface elevation. Conifers planted at elevations similar to those where existing trees are located can reasonably be expected to survive and advance the development of a coniferous forest. Underplanting conifers would increase species diversity and habitat complexity to the existing deciduous forest. Conifers are generally longer lived trees and decompose more slowly than black cottonwood and red alder, therefore a larger component of coniferous forest in the wetland would provide habitat features that are currently lacking. The analysis below documents the presence of coniferous trees within the study area, and provides methods for predicting the areas that are at an appropriate elevation to support coniferous trees.

Methods:

Two different methods were used in this analysis. Method 1 is based on the land surface elevations within an area of the Nooksack Delta Site that supported merchantable timber including Sitka spruce trees as of the August 2006 Timber Valuation (IFC 2006). The hypothesis is that the elevations of areas supporting merchantable quantities of red alder and Sitka spruce in 2006 can be used to identify areas that can support similar tree species within the Nooksack Delta Site in the future and are therefore suitable for enhancement by under-planting conifer tree species.

Method 2 identified the land surface elevations within those areas of the Nooksack Delta Site that currently support conifer trees (e.g., Sitka spruce, western red cedar trees, Douglas fir). The existing conifer trees were located in field surveys conducted December 10-11, 2009 and on February 8, 2010 by Lummi Natural Resources staff members and through the use of 2004 high-resolution aerial photographs. The hypothesis is that the elevations of current viable conifer tree locations can be used to identify other

areas in the Nooksack Delta that will be able to support conifer trees and are therefore suitable for enhancement by under-planting conifer tree species. Photographs of representative conifer trees observed within the Nooksack Delta Site are shown in Figure 2 through Figure 5.

Data:

The data used to conduct this analysis and apply the two methods are the following:

- Nooksack River Delta Timber Valuation Report, prepared for the Lummi Nation by International Forestry Consultants, Inc, August 23, 2006 (IFC 2006).
- A 3-foot pixel digital elevation surface model developed from the Light Distance and Ranging (LiDAR) data for the Nooksack River Delta. The LiDAR data were collected April 2005 by Terrapoint, L.L.C. with elevation values expressed in feet above the North American Vertical Datum of 1988 (NAVD 88). The LiDAR data have a vertical accuracy for this type of terrain of ±15 to 25 centimeters (± 0.5 to 0.8 feet) (Terrapoint 2005).
- Global Positioning System (GPS) point data of confirmed conifer tree locations (*Picea sitchensis* and *Thuja plicata*) collected December 10 and 11, 2009 by Lummi Natural Resource staff members Jeremy Freimund, Gerry Gabrisch, Victor Johnson, and Alex Levell using a Trimble GeoXT GPS unit and on February 8, 2010 by Gerry Gabrisch.
- 2004 geo-referenced oblique and orthogonal aerial photographs of the Nooksack River Delta take during February and March 2004, by Pictometry Inc. of Sammamish, WA. Oblique image pixel sizes vary between 4.5-inches to 9-inches of ground distance. Orthogonal images pixel sizes are 6-inch to 2-foot resolution.



Figure 2. Sitka spruce in PFO Wetland Area



Figure 3. Western Red Cedar and Sitka Spruce in PFO Wetland Area



Figure 4. Western Red Cedar in PFO Wetland Area



Figure 5. Douglass Fir in PFO Wetland near Southeastern Extent of Phase 1A Site

Method 1

The Nooksack River Delta Timber Valuation report defines a 9-acre area labeled Stand Type 02 (Figure 6) that contains red alder (*Alnus rubra*) and Sitka spruce (*Picea sitchensis*) in merchantable quantities. Red alder is generally a forerunner in succession to conifer trees, and it is assumed here that red alder indicates suitable habitat for conifers. The ESRI ArcGIS v. 9.3.1 software was used to obtain elevation metrics from the LiDAR data including the mean, the minimum elevation, and the standard deviation for the area bound by Stand Type 02 (Table 2).

Table 2. Metrics for Timber Valuation Stand Type 02 (Method 1).

Area (acres)	Mean Elevation (feet)	Minimum Elevation (feet)	Standard Deviation (feet)
9	**10.32**	**7.39**	**1.55**

Because merchantable quantities of trees exist in Stand Type 02, the following assumptions were made for Method 1:

1. Areas outside of Stand Type 02 will support conifer trees if and only if they are higher in elevation than the minimum elevation of Stand Type 02.
2. Areas in the Nooksack Delta Site with a similar range of elevations to Stand Type 02 will support conifer trees.
3. Areas in the Nooksack Delta Site with elevations higher than the mean elevation of Stand Type 02 will support conifer trees.

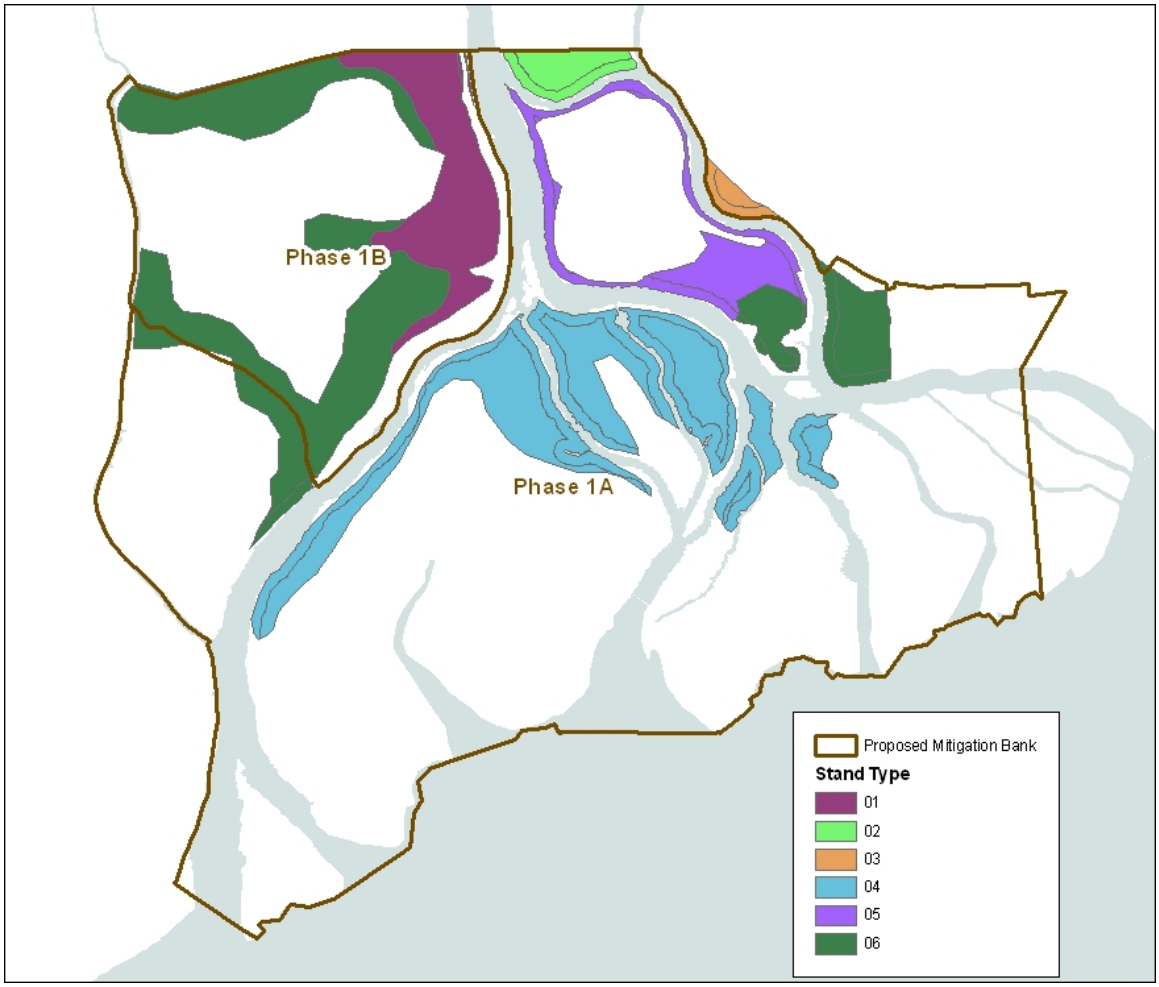


Figure 6. Timber Valuation report stand types (IFC 2006).

Using the Geographical Information System (GIS) software for all lands bound by the Nooksack Delta Site boundaries of the Lummi Nation Wetland and Habitat Mitigation Bank, a focal mean layer was generated using 3-foot x 3-foot cell rectangular windows. For each pixel (*n*) in the focal mean layer, the value of the pixel *n* equals the average elevation of the 9 pixels within the focal window. The focal mean layer was then reclassified into values that express the distance from the mean elevation value in Stand Type 02 expressed as a standard deviation (Table 3).

Standard deviation was chosen as the objective measure to define similarity between the mean elevation measured in Stand Type 02 and the average elevations measured throughout the Nooksack Delta Site. For Stand Type 02, 64.2 percent of the elevations recorded are within ±1 standard deviation from the mean and 92.4 percent of all elevations are within ±2 standard deviations from the mean. Therefore, a focal mean reclassification value of ±1 is similar in value to 64.2 percent of the elevations closest to the mean elevation of Stand Type 02, and a value of ±2 is similar in value to 92.4 percent of the elevations closest to the mean.

A "mask" was created for all areas of the original LiDAR elevation surface that have an elevation greater than or equal to the 7.39 feet, which is the minimum elevation of Stand Type 02. All areas with elevations less than the Stand Type 02 minimum elevation value were removed from the standard deviations layer, as they were judged to be unsuitable to support conifer trees. As a result, even though two standard deviations below the mean elevation for Method 1 is equal to 7.22 feet, no areas with an elevation less than 7.39 feet were considered. The final suitable areas layer (Figure 7) shows those areas that have elevation values greater than the minimum elevation of Stand Type 02 in the form of standard deviation from the mean of Stand Type 02. Area totals for each classification of the Nooksack Delta Site by development phase are presented in Table 4.

Figure 7 shows the areas defined using Method 1 as suitable for wetland enhancement through the under planting of conifer trees for the Nooksack Delta Site. A positive standard deviation value (+1, +2, or +3) correlates with elevations higher than the mean elevation of Stand Type 02 and negative values with elevations lower than the mean. The entire shaded area is above the minimum elevation for Stand Type 02 and therefore suitable for enhancement. However, assuming that the higher the elevation, the better conifer trees would be supported, locations for plantings in lower elevation areas should be chosen more carefully to take advantage of soil mounds or other protected areas.

Table 3. Method 1 Timber Valuation Stand Re-Classifications of Average Elevation Values by Standard Deviation (σ = Standard Deviation).

	Less than the minimum elevation of Stand Type 02	Greater than or equal to 2 σ below the mean[1]	Greater than or equal to 1 σ below the mean	Greater than or equal to 1 σ above the mean	Greater than or equal to 2 σ above the mean	Greater than or equal to 3 σ above the mean
Original Elevation Range (ft)	<7.39	7.39-8.77	8.77 - 10.32	10.32 - 11.87	11.87 - 13.42	>13.42
Re-classified Value (standard deviations from the mean)	Null	-2	-1	1	2	3

[1] Although two standard deviations from the mean elevation would equal 7.22 feet, the lowest elevation considered was the minimum elevation of Stand Type 02, which was 7.39 feet. As a result, the reclassified values are all equal to or greater than 7.39 feet.
σ = Standard Deviation

Table 4. Method 1 Timber Valuation Stand Area Calculations By Mitigation Bank Phase

	Greater than or equal to 2 σ below the mean[1]	Greater than or equal to 1 σ below the mean	Greater than or equal to 1 σ above the mean	Greater than or equal to 2 σ above the mean	Greater than or equal to 3 σ above the mean	Total acres
Phase 1A (acres)	356.1	179.6	50.4	19.7	4.6	610.4
Phase 1B (acres)	91.4	125.9	16.2	9.5	2.2	245.1
Total:	**447.5**	**305.5**	**66.6**	**29.2**	**6.8**	**855.5**

[1] Adjusted so that the lowest elevation considered was the minimum elevation of Stand Type 02. As a result, the reclassified values are all equal to or greater than 7.39 feet.
σ = Standard Deviation

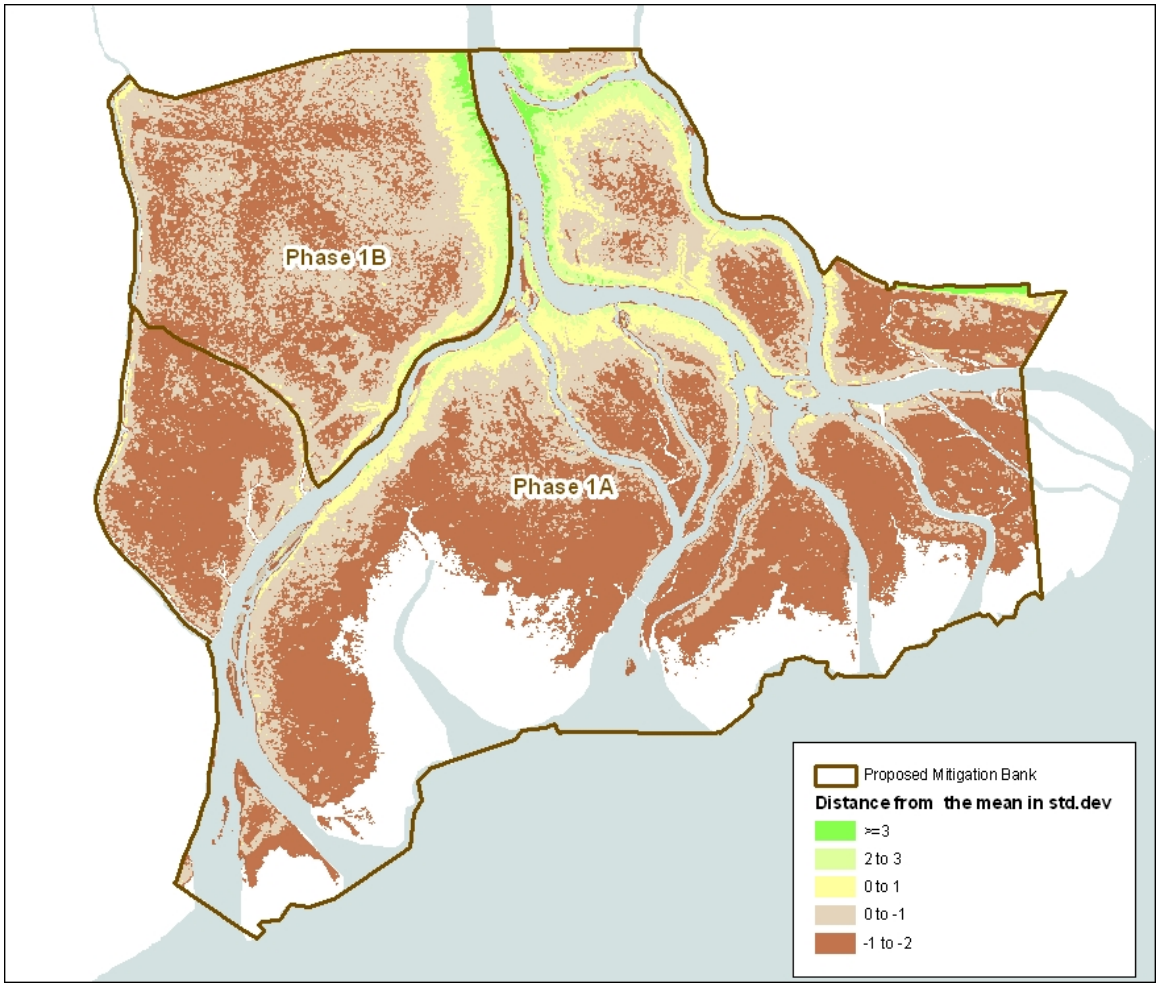


Figure 7. The shaded areas are defined as suitable conifer tree under planting conditions based on Method 1 results. Indicated area elevations are all above the minimum elevation of Stand Type 02 and above (positive standard deviation values) or below (negative standard deviation values) the mean elevation of Stand Type 02.

Method 2

The point locations of conifer trees in the Nooksack Delta Site were recorded by Lummi Natural Resources staff members using a resource-grade GPS unit (Trimble GeoXT). Examples of the trees observed within the Nooksack Delta Site are shown in Figure 2 through Figure 5. These GPS data points were overlaid onto spatially referenced high resolution aerial photographs in a GIS to confirm that conifer trees could visually be identified in the aerial photographs (Figure 8). Using these photographs, conifer trees located in the Nooksack Delta Site but not field verified by a ground survey were added to the point dataset for a total of 46 conifer trees (Figure 9).

Because mature conifer trees exist within the boundary of the Nooksack Delta Site, the following assumptions were made for Method 2:

1. Conditions are conducive to support conifer trees in the Nooksack Delta Site.
2. Surface elevations greater than or equal to the surface elevations that currently support conifer trees will be able to support the under planting of conifer seedlings.

The point dataset of conifer tree locations was used to extract elevation values from the LiDAR elevation data. These elevation values were statistically evaluated for the mean, minimum, and standard deviation (Table 5). The LiDAR elevation data were then reclassified into standard deviations from the mean similar to Method 1 (Table 6).

Similar to Method 1, a "mask" was created for all areas of the original LiDAR elevation surface that have an elevation greater than or equal to the 8.46 ft minimum land surface elevation of identified conifer trees. All areas with elevations less than the identified conifer minimum elevation value were removed from the standard deviations layer as unsuitable for conifers. That is, even though two standard deviations below the mean elevation for Method 2 is equal to 6.96 feet, no areas with an elevation less than 8.46 feet were considered in this analysis. The final suitable areas layer shows those areas that have land surface elevation values greater than the minimum elevation of identified trees expressed as standard deviations from the mean identified conifer elevation value (Figure 10). Acreage totals for each classification for the different phases of the Nooksack Delta Site of the mitigation bank are presented in Table 7.

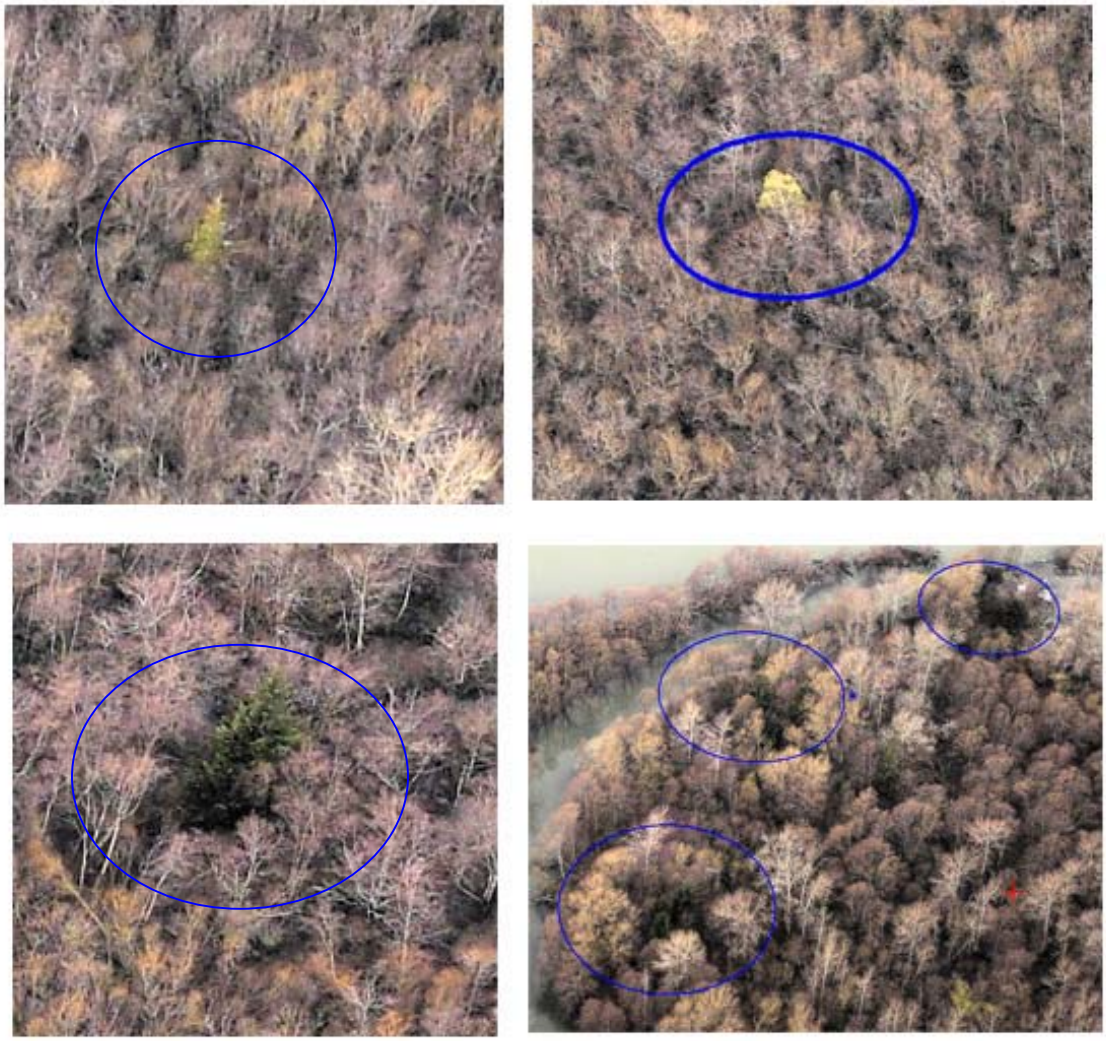


Figure 8. Top row images show conifers identified by oblique high-resolution aerial photographic imagery. Bottom row images are conifers identified by high-resolution aerial photographic imagery, field verified/ground truthed, and recorded with a GPS.

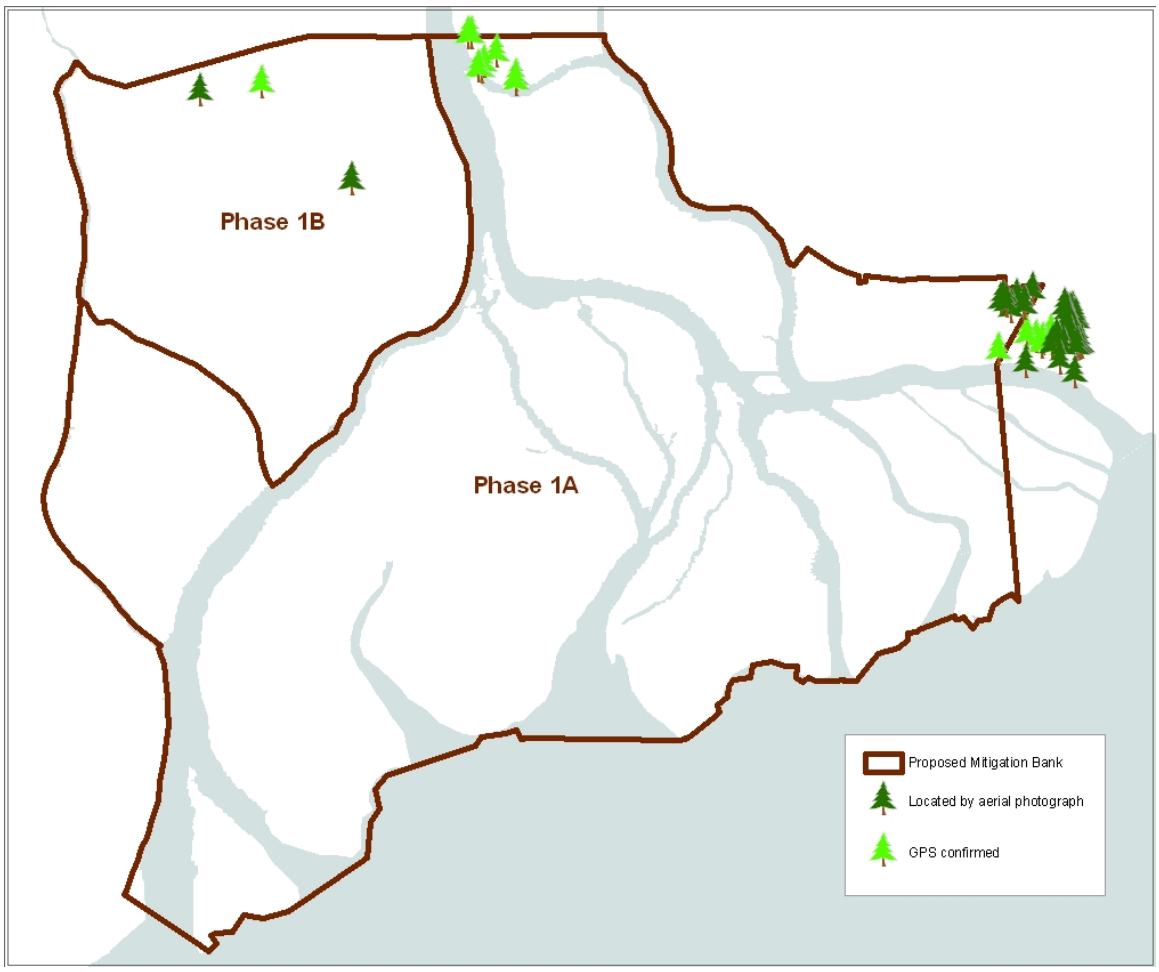


Figure 9. Distribution of identified conifers in the Nooksack Delta Site.

Table 5. Existing Conifer Tree Location Metrics (Method 2).

Conifer Count	Mean Elevation (feet)	Minimum Elevation (feet)	Standard Deviation (feet)
46	10.58	8.46	1.5

Table 6. Existing Conifer Tree Location Re-Classifications of Average Elevation Values by Standard Deviation.

	Less than the minimum elevation of an observed conifer tree	Greater than or equal to 2 σ below the mean[1]	Greater than or equal to 1 σ below the mean	Greater than or equal to 1 σ above the mean	Greater than or equal to 2 σ above the mean	Greater than or equal to 3 σ above the mean
Original Elevation Range (ft)	<8.46	8.46-9.08	9.08 - 10.58	10.58 - 12.08	12.08 - 13.58	>13.58
Reclassified Value (standard deviations from the mean)	Null	-2	-1	1	2	3

[1] Although two standard deviations from the mean elevation would equal 6.96 feet, the lowest elevation considered was the minimum elevation of an observed conifer. As a result, the reclassified values are all equal to or greater than 8.46 feet.
σ = Standard Deviation

Table 7. Existing Conifer Tree Location Area Calculations By Mitigation Bank Phase.

	Greater than or equal to 2 σ below the mean	Greater than or equal to 1 σ below the mean	Greater than or equal to 1 σ above the mean	Greater than or equal to 2 σ above the mean	Greater than or equal to 3 σ above the mean	Total
Phase 1A (acres)	210.5	124.2	29.9	2.0	1.6	368.2
Phase 1B (acres)	139.8	57.1	13.4	1.5	0.0	211.7
Total:	**350.3**	**181.3**	**43.3**	**3.5**	**1.6**	**579.9**

[1] Adjusted so that the lowest elevation considered was the minimum elevation of an observed conifer tree. As a result, the reclassified values are all equal to or greater than 8.46 feet.
σ = Standard Deviation

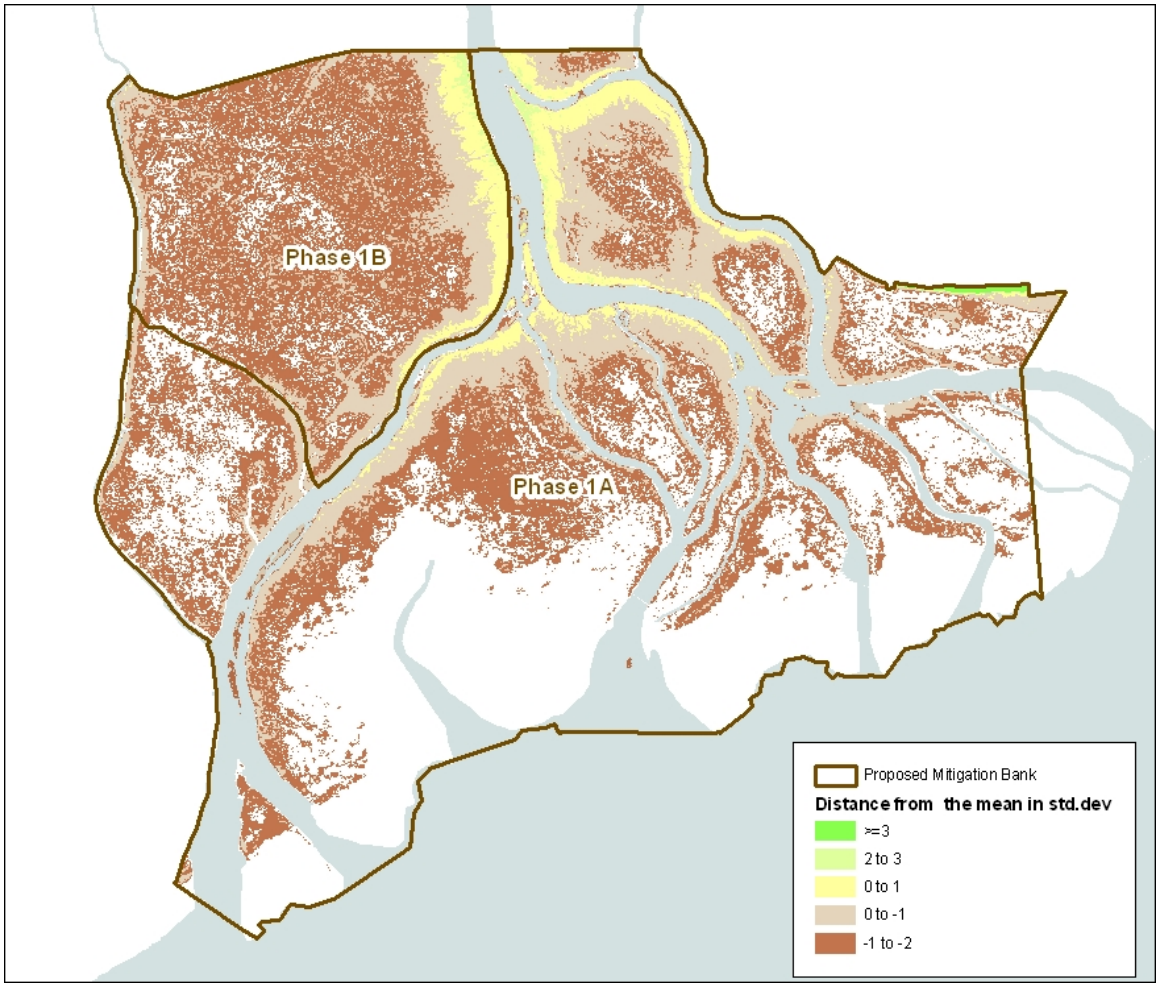


Figure 10. The shaded areas are defined as suitable conifer tree under planting conditions based on Method 2 results. Indicated area elevations are all above the minimum elevation of observed conifer trees and above (positive standard deviation values) or below (negative standard deviation values) of the mean elevation of identified conifer trees.

Discussion/Conclusion:
In summary, Method 1 determined that there are approximately 856 acres within the Nooksack Delta Site overall and 610 acres within the Phase 1A Nooksack Delta Site that have elevations similar to locations that support merchantable quantities of timber and are therefore anticipated to be suitable for wetland enhancement efforts through the under-planting of conifer trees.

Method 2 determined that there are approximately 580 acres within the Nooksack Delta Site overall and 368 acres within the Phase 1A Nooksack Delta Site that have surface elevations similar to the locations that currently support conifer trees and are therefore anticipated to be suitable for enhancement through the under-planting of conifer trees.

The areas identified as suitable for enhancement by Method 2 (the conifer tree method) is more restrictive and is entirely contained within the area identified by Method 1 (the timber valuation method). The primary difference in results between the two methods is the minimum elevation threshold used to eliminate areas from consideration. The minimum elevation threshold for Method 1 is approximately 1.1 feet lower than the threshold for Method 2.

Method 1 is based on the area where the largest density of conifers in the study site are currently growing and is based on a larger set of elevation data points (a 9 acre area) than Method 2. Consequently, the elevation statistics derived using Method 1 could be considered to be more representative of the topography that exists throughout the Nooksack Delta Site and a reliable indicator of lands suitable for enhancement through under-planting of conifer trees.

Method 2 is based on elevations where existing conifers are growing and includes the conifer trees within Stand Type 02 (Method 1). Although the Method 2 sample size for land surface elevation is small (only 46 trees/points) relative to the sample size used for Method 1 (9 acres), the existence of conifer trees at these elevations is empirical evidence that the lowest elevation considered in Method 2 is suitable for conifer trees. Method 2 likely better reflects the micro-topography that is suitable for under-planting conifer trees. Since all of the land areas depicted in Figure 10 and tabulated in Table 7 are at elevations equal to or greater than the elevation where conifer trees currently exist, at least 368 acres of lands within the Phase 1A Nooksack Delta Site are suitable for enhancement through the under-planting of conifer trees.

The 368 acres of land in the Phase 1A Nooksack Delta Site represents the acreage of suitable planting sites determined using Method 2, which is different than the acreage of wetlands that would be enhanced. In principle, the area of enhanced wetlands would be larger than the acreage with land surface elevations suitable for conifer under plantings. However, no method to estimate the effective area of enhanced wetlands through the under planting of conifers was identified.

If the preliminary credit generation ratio for enhancement that was discussed during the July 16, 2009 Inter-Agency Review Team (IRT) is adopted, the 4:1 credit generation

ratio would result in 92 credits for the conifer under planting in Phase 1A of the Nooksack Delta Site. Additional credits could be generated through other enhancement measures (e.g., invasive weed control).

ATTACHMENT 1

Memorandum from the Lummi Nation Forest Manager Regarding the Viability of Conifer Underplanting in the Nooksack Delta

MEMORANDUM

TO: JEREMY FREIMUND, WATER RESOURCES MANAGER

FROM: ZACH DEWEES, FOREST MANAGER

SUBJECT: VIABILITY OF CONIFER UNDERPLANTING IN NOOKSACK DELTA

DATE: 2/26/2010

CC: FRANK LAWRENCE III, WATER RESOURCES PLANNER I; GERALD GABRISCH, GIS MANAGER

Per your request, on February 11, 2010 I accompanied your staff out to the Kwina Slough Restoration Project site (see Figure 1) to evaluate the success of planting Sitka spruce, western red cedar, and grand fir in the understory of a red alder/black cottonwood/salmonberry forest type. This forest type is present throughout most of the Nooksack Delta and is therefore useful in determining if conifer under-planting is a viable enhancement strategy throughout this area. Photographs of western red cedar and Sitka spruce at the restoration project site are included as Figure 2 through Figure 4.

The Kwina Slough Restoration Project was planted in 2005 and 2006 at a density of approximately 194 trees per acre (15 x 15 foot spacing). Based on our survey, we estimate a planting success rate of approximately 80 percent (approximately 20 percent mortality) four to five years after out-planting. This success rate factors in an additional 5 percent mortality, which may have gone unnoticed due to the difficulty in visually locating dead trees in heavy underbrush. Sitka spruce seedlings exhibited the highest mortality followed by western red cedar and grand fir. Conifer seedlings ranged in height from 1.5 to 6 feet tall. Sitka spruce seedlings were the tallest followed by western red cedar and grand fir. For comparative purposes, the Forestry Division usually experiences 10 to 15 percent mortality in our forestry plantations, which receive vegetation management treatments. Our shade-tolerant conifers typically achieve heights of 4 to 8 feet within four to five years after out-planting depending on growing stock and the level of plantation maintenance. The minimum and maximum elevation of located seedlings was 5.6 feet and 13.7 feet respectively with a mean elevation of 11.3 feet.

Due to the planting success rate of the Kwina Slough Restoration Project in comparison to our forestry plantations, I am confident that under-planting shade-tolerant conifers throughout most of the Nooksack Delta is a viable enhancement strategy. However, there are some characteristic differences between the soil type present along Kwina Slough and the soil type present throughout most of the Nooksack Delta. These differences must be considered when developing the reforestation plan.

The Nooksack Delta is comprised predominantly of Eliza-Tacoma silt loam. According to the Whatcom County Soil Survey, this soil type is considered to be very poorly drained, subject to frequent, long periods of flooding from December through April, and

may experience high erosion in some areas due to flooding. In contrast, Kwina Slough is comprised of Hovde silt loam. This soil type is considered to be poorly drained, subject to frequent, but brief periods of flooding from November through April, and has no hazard of erosion. The Whatcom County Soil Survey states that both soil types have a high water table that hinders root respiration, which can result in low seedling survival and that both can be reforested with red alder or western red cedar.

Considering the site conditions present throughout the Nooksack Delta, I have developed the following planting guidelines to increase the likelihood of enhancement success.

1. Purchase seedlings from an industrial seedling producer instead of a conservation district. In our experience, seedlings from an industrial producer are more vigorous, grow faster, and are about $0.15 cheaper per tree.
2. Ensure that the seedlings are from the 201 or 202 seed zones.
3. Use a Plug+1 or 1+1 stock type. These stock types are larger and are designed to be more competitive in brushy conditions. Larger seedlings are also more resistant to animal browse (deer browse was noted on some of the western red cedar seedlings at the Kwina Slough site).
4. Use a higher planting density than the Kwina Slough site. Planting on a 13 x 13 foot spacing will equate to approximately 260 trees per acre. Due to the soil conditions listed above, I expect that seedling mortality will be higher throughout the Nooksack Delta. By planting at a higher density, you can account for this anticipated mortality.
5. Instruct tree planters to brush a 5-foot circle around each seedling. Consider follow-up vegetation management treatments to ensure out-planting success.
6. Plant western red cedar. Based on the Kwina Slough site visit, the western red cedar trees survived inundation better than the Sitka spruce trees and the soil survey specifically recommends this species.
7. Although beaver cages were used on the Kwina Slough Restoration Project site, we typically do not use such protective measures. Restoration Division staff has informed me that the beaver cages were a requirement of the granting agency. Beaver cages should be considered in areas where there are obvious signs of beaver activity, but I don't think this will be necessary throughout most of the planned enhancement area.

Please feel free to contact me if you have any further questions (360-384-2228).

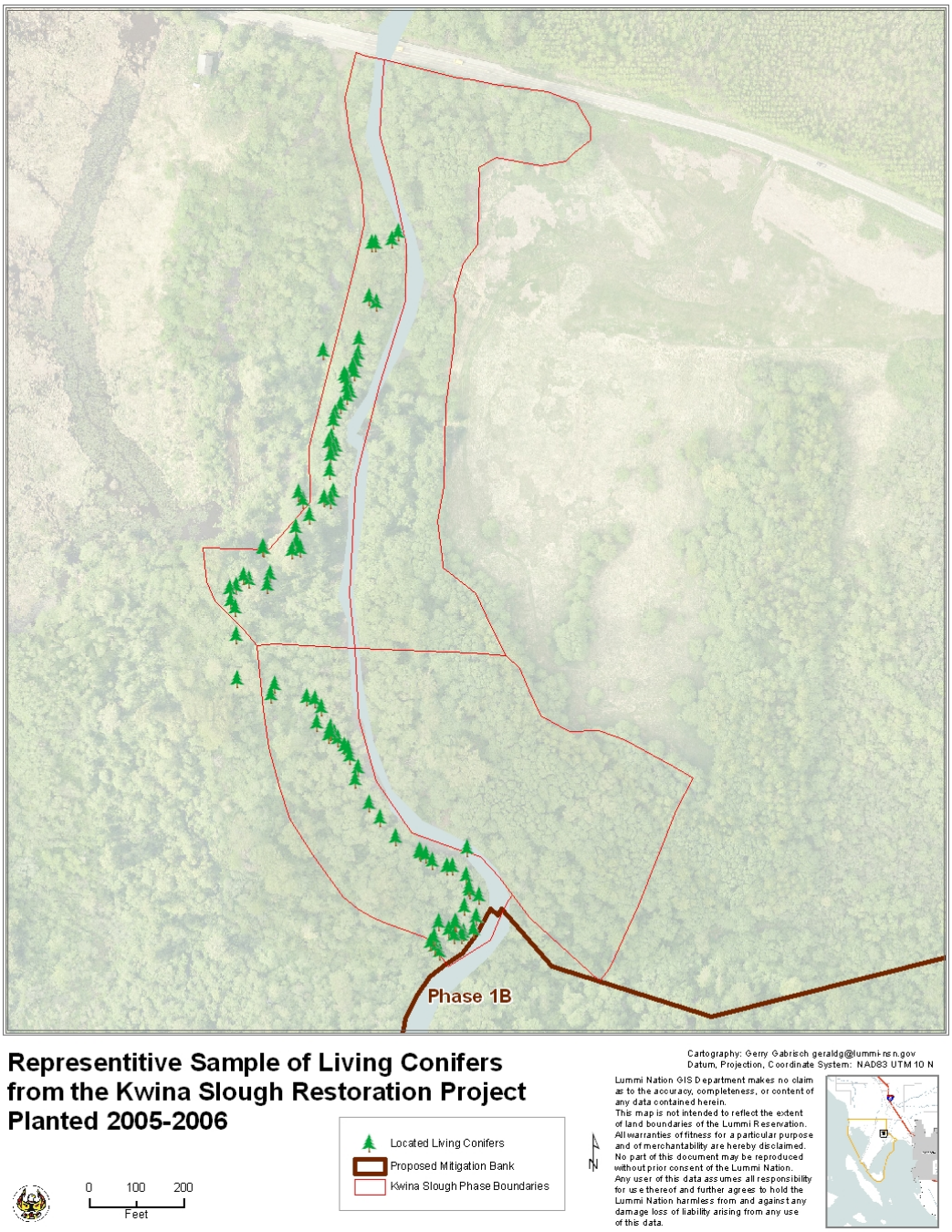


Figure 1. Representative sample of living conifers identified at the 2005-2006 Kwina Slough Restoration Project during a February 11, 2010 site visit.



Figure 2. Sitka spruce at the Kwina Slough Restoration Project Site – note the debris line on the beaver cage showing the flood level and the thick salmonberry in the background.



Figure 3. Western red cedar at the Kwina Slough Restoration Project Site.



Figure 4. Western red cedar at the Kwina Slough Restoration Project Site – note the evidence of flooding and the thick salmonberry.

LUMMI INDIAN BUSINESS COUNCIL
2616 KWINA ROAD · BELLINGHAM, WASHINGTON 98226 · (360)384-1489

MEMORANDUM

DATE: March 24, 2010

TO: Inter-Agency Review Team – Lummi Nation Wetland and Habitat Mitigation Bank

FROM: Jeremy Freimund, P.H., Water Resources Manager

SUBJECT: **Nooksack River Delta Salinity Regime**

Purpose:
The purpose of this memorandum is to describe the salinity regime within the lower Nooksack River with respect to the Nooksack Delta Site of the Lummi Nation Wetland and Habitat Mitigation Bank (WHMB). The salinity regime at the Kwina Slough Restoration Project site, which is located more distant from Bellingham Bay than the Nooksack Delta Site, is also described.

This memorandum is in response to questions raised by the Lummi Nation WHMB Inter-Agency Review Team (IRT) in a March 19, 2010 email response to the February 26, 2010 memorandum from the Lummi Nation regarding the Nooksack Delta Site suitability for enhancement measures – specifically the under planting of conifer trees. The IRT requested additional information regarding the location of the elevations identified as suitable for the under planting of conifer trees in relation to the saline regime in the estuary.

Methodology:
The saline regime for the project area was evaluated using the following three information sources:

1. The results of salinity surveys conducted by the Lummi Water Resources Division in the Nooksack River Delta during 2000 and 2002.
2. The geographic extent of the mean higher high water line as determined using a 3-foot pixel digital elevation surface model developed from the Light Distance and Ranging (LiDAR) data for the Nooksack River Delta and the Bellingham tidal station (converted to the NAVD 88 datum). The LiDAR data were collected April 2005 by Terrapoint, L.L.C. with elevation values expressed in feet above the North American Vertical Datum of 1988 (NAVD 88). The LiDAR data have a vertical accuracy for this type of terrain of ±15 to 25 centimeters (± 0.5 to 0.8 feet) (Terrapoint 2005).
3. The results from the Lummi Water Resources Division ambient water quality monitoring program at three sampling locations in the vicinity of the study area.

Results:
As detailed in Attachment 1, on September 26, 2000 Lummi Water Resources Division staff members performed a salinity survey of the Nooksack River Delta. The purpose of this survey was to document the probable maximum upstream extent of salt water in the delta. To make this determination, the survey was conducted during a time when the Nooksack River flows were relatively low and the tidal elevation was relatively high. On the date and time of the survey, the flow in the Nooksack River was approximately 1,140 cfs, which was about 660 cfs less than the mean daily flow for September 26 based on a 33-year record at the USGS gaging station in Ferndale (Station No. 12213100). The tidal elevation at the time of the salinity survey was the Mean Higher High Water (MHHW) level at the NOAA Bellingham tidal station (Station No. 9449211). The MHHW for Bellingham Bay is +8.5 ft Mean Lower Low Water (ft MLLW), which converts to an elevation of +8.03 ft if the NAVD 88 datum is used rather than the tidal datum. As described in Attachment 1, the upstream extent of the salt water wedge was located on an aerial photograph of the Nooksack Delta that had a scale of 1 inch equals 1,680 feet. The location of the upstream extent of the salt water wedge was approximated based on the drawing in Attachment 1 and added to the Lummi GIS (see Figure 1). At the time of the 2000 salinity survey, the primary distributary channel of the Nooksack River was the eastern most channel. Due to changes within the delta associated with the formation of a large logjam during 2006, this eastern most channel is now dewatered. However, the age of the conifer trees observed along this channel indicate that they existed at this location during the period of the salinity survey.

The upstream extent of the saltwater wedge in Kwina Slough (the western most distributary channel of the Nooksack River and formerly the primary channel) could not be determined during the September 26, 2000 salinity survey. However, as detailed in Attachment 2, Lummi Water Resources Division staff members conducted a salinity survey of Kwina Slough on October 16, October 17, and November 1, 2002 during conditions of relatively low Nooksack River flow and high tides. Although the exact location of the fresh water and saltwater boundary in Kwina Slough was not located, it was determined that the boundary was located between a smokehouse along the channel and where the channel passes under Marine Drive (identified as Site 5 in Attachment 2). The approximate location of this saltwater boundary is also shown in Figure 1. Site 5 in the Kwina Slough salinity survey corresponds to Site SW007 of the Lummi Nation Surface Water Quality Monitoring Program. Although Site SW007 is tidally influenced in that the water surface elevation changes with the tide, as shown in Figure 2, although there was a single salinity measurement of 14 parts per thousand, in general the salinity levels have been low at Site SW007 over the period of record (1993-2009).

As shown in Figure 1, the areas identified as suitable for conifer under plantings are both upstream and downstream from the location of the upstream extent of the saltwater wedge. The upstream extent of the saltwater wedge in Kwina Slough is approximately in the middle of the Kwina Slough Restoration Project site. Figure 1 also shows that the areas identified as suitable for conifer under plantings in the areas more proximate to Bellingham Bay are generally located landward of the mean higher high water line.

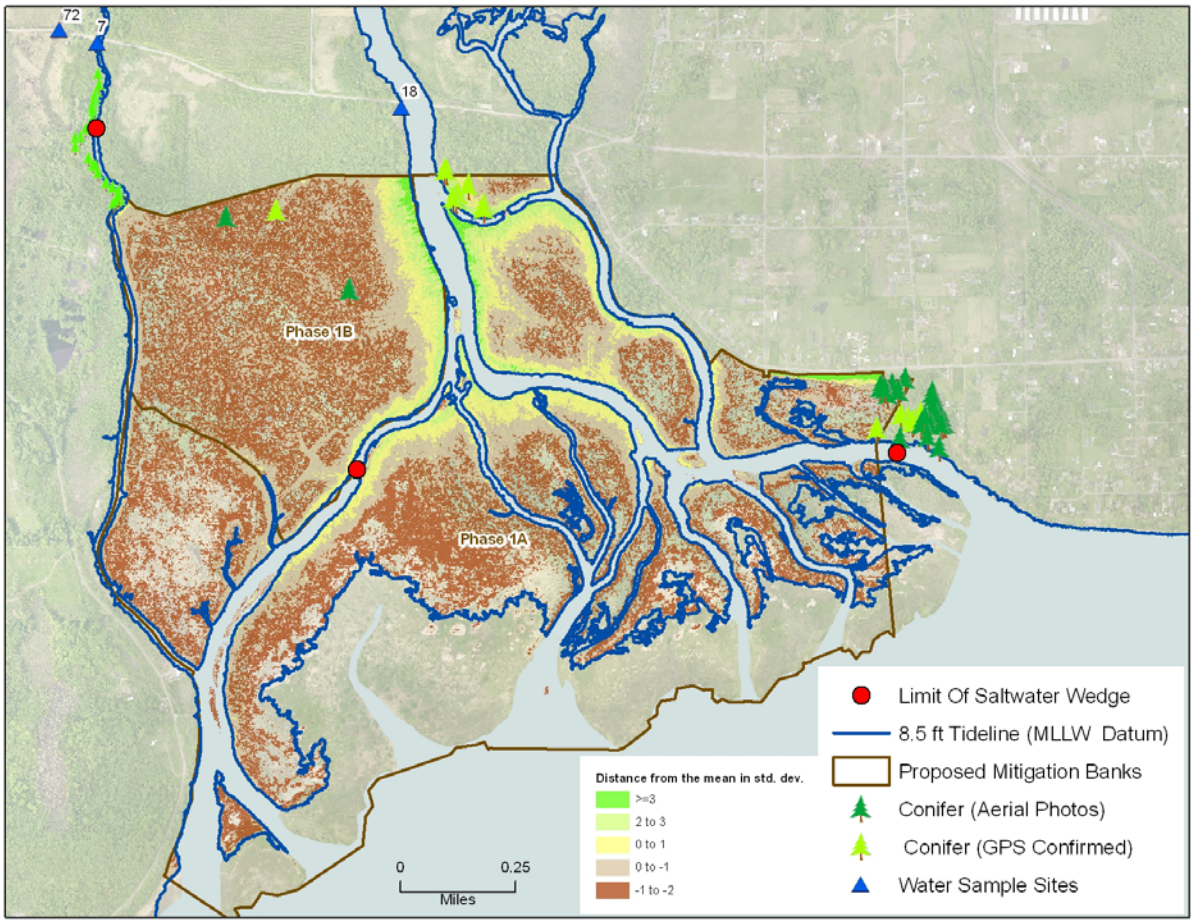


Figure 1. Nooksack Delta Site: Location of Areas Identified as Suitable for Enhancement Through Conifer Under Plantings in Relation to the Upstream Extent of Salt Water in the Nooksack River and Kwina Slough and the Mean Higher High Water Line.

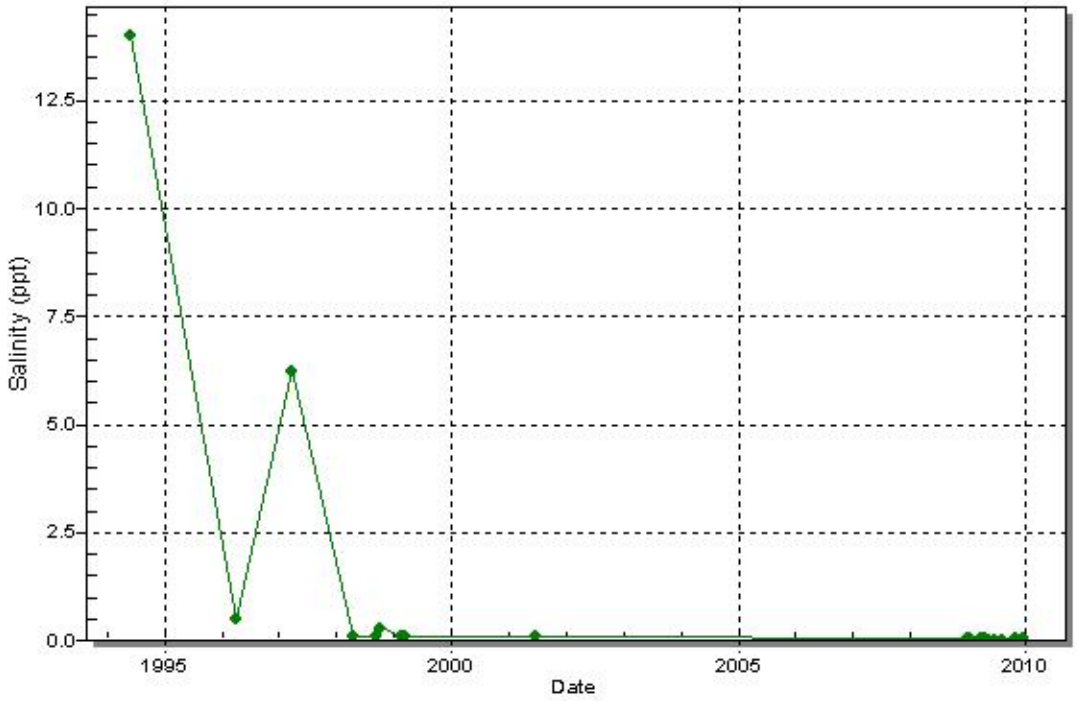


Figure 2. Salinity Time Series at Site SW007 (Kwina Slough at Marine Drive) over the 1993-2009 period of record

Discussion:

As described in the February 26, 2010 memorandum to the IRT, only locations where the elevation was greater than or equal to the 8.46 feet (NAVD 88) minimum land surface elevation of identified conifer trees were considered in Method 2. All areas with elevations less than the identified minimum elevation where a conifer tree was observed were removed from the standard deviations layer as unsuitable for conifers. That is, even though two standard deviations below the mean elevation for Method 2 is equal to 6.96 feet, no areas with an elevation less than 8.46 feet (NAVD 88) were considered suitable for enhancement through conifer under planting. As described above, the MHHW level at the NOAA Bellingham tidal station (Station No. 9449211) is +8.5 ft MLLW, which converts to an elevation of +8.03 feet (NAVD 88). Consequently, all of the locations identified using Method 2 in the February 26, 2010 memorandum as suitable for conifer under planting are located at least 0.43 feet above the MHHW for Bellingham Bay. As shown in Figure 1, although there are a few isolated areas more proximate to Bellingham Bay than the depicted MHHW line, essentially all of the identified areas are landward of the MHHW. In addition, as shown in Figure 1 conifer trees currently exist both within the Nooksack Delta Site and within the adjacent Kwina Slough Restoration Project site adjacent to channels where the salt water has been detected during periods of low Nooksack River flow and relatively high tide conditions.

Attachment 1. September 26, 2000 Nooksack Delta Salinity Survey

Memorandum

DATE: September 28, 2000

TO: Jeremy Freimund

FROM: Andy Ross

SUBJECT: Preliminary Results of Salinity Survey of the Nooksack River Delta on 09/26/00

DATA AND ANALYSIS ARE DRAFT, PRELIMINARY, AND SUBJECT TO REVISIONS

Attached please find a tide chart for Bellingham Bay, a sketch of the Nooksack River Delta, a photocopy of the aerial photograph used as the base for the sketch, and stream flow record for the Nooksack River at Ferndale.

On 9/26/00 Keith Tom and I performed a salinity survey in the Nooksack River Delta (delta). The goal was to document the upstream extent of saltwater in the Delta when Nooksack River flows were relatively low, and the tides were relatively large. The work was performed from the 16 foot Natural Resources Skiff using the original of the attached aerial photograph for locating positions. Salinity was measured in the water column and along the bed of the watercourses using a WTW LF 330 Salinity, Conductivity, TDS, and Temperature probe attached to a 12 foot long pole. Water depths did not exceed 12 feet (ft).

Saltwater was found in the Nooksack River Delta (see attached sketch). The saltwater wedge (wedge) extended farther upstream on the west side of the delta than the east side. On the west side of the delta (West Channel), the wedge gradually decreased in thickness and salinity. On the east side of the delta (East Channel), the wedge terminated abruptly. No saltwater was found upstream of the wedges in the East and West Channels, including at the inlets to the smaller distributaries off of the East Channel. The West Channel is much shallower than the East Channel and receives considerably less freshwater flow. These factors likely explain the differences between the wedges in each of the channels.

The background salinity in Bellingham Bay about 500 yards off-shore from the West Channel was 26.5 parts per thousand (ppt). The water level where the mainstem branches into the West and East Forks rose 2 to 3 feet from 15:45 to 18:15. High tide was at 17:20 and was 8.5 feet mean lower low water (ft MLLW). The mean higher high water for Bellingham Bay is +8.46 ft MLLW. Flow in the Nooksack River at the USGS gauging station at Ferndale was 1,140 cfs, which is about 660 cfs less than the mean daily flow at this time (based on 33 year record).

The attached sketch illustrates the results, and the notes below are referenced on the sketch.

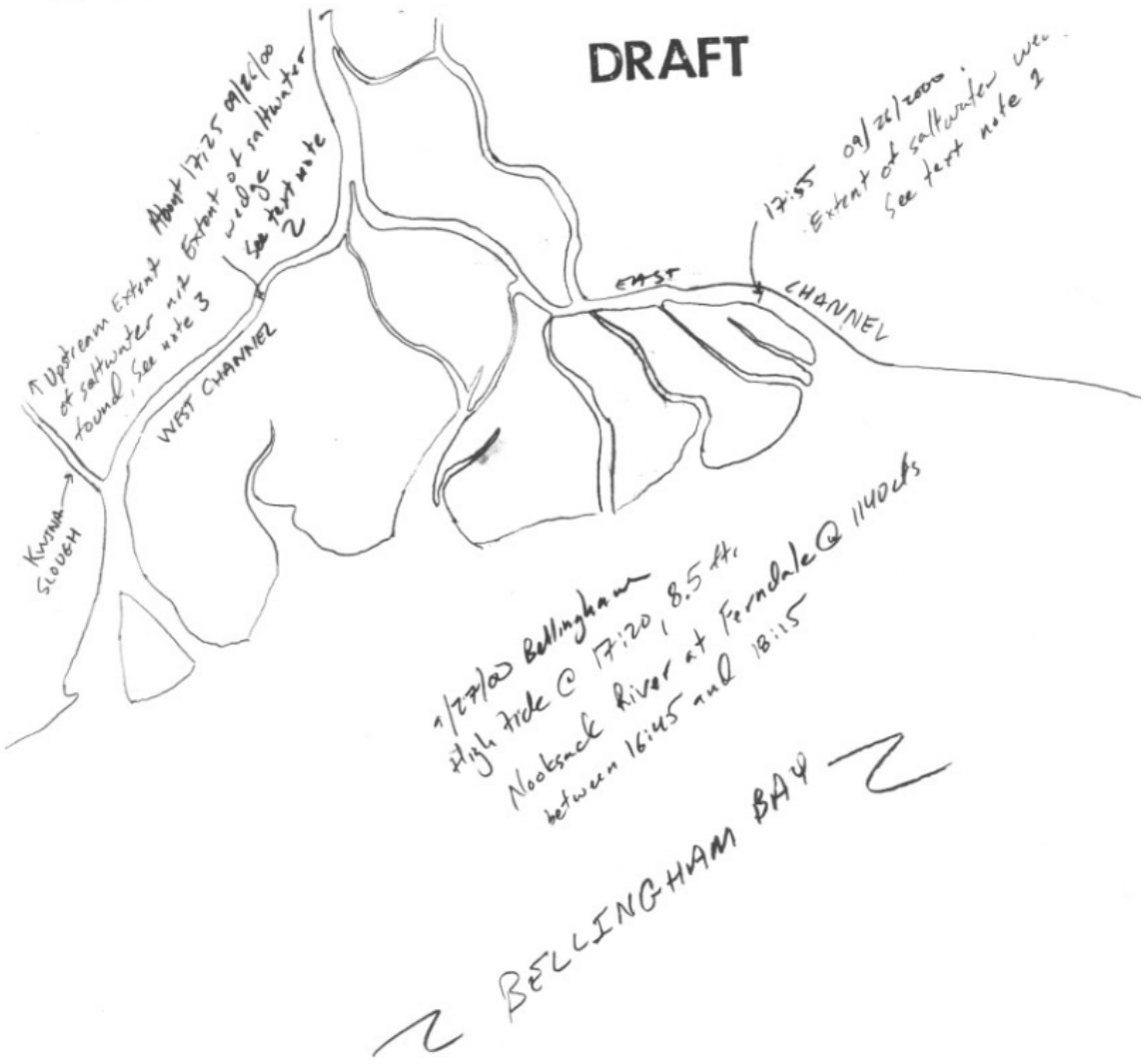
1. The salinity wedge at this location ended abruptly (as of 17:55). The exact position of the end of the wedge could not be determined due to the presence of a fishing net, but at a distance of less than 100 ft upstream the wedge disappeared (e.g., bottom salinity of 0.0 ppt). Where the wedge was last present (measured) the bottom salinity was 13.5 ppt and it was about 5 ft thick (total water depth was about 7 ft). Another 100 ft downstream the salinity of the wedge was 17.3 ppt. The channel was generally 6 to 8 ft deep at the terminus of the wedge, and the current was moving slowly downstream (the fishing net appeared to move about 100 ft

downstream in approximately 10 minutes).

At about 16:00 (while the tide was still coming in) saltwater was encountered where the defined channel opens up to the portion of the delta which is a sand flat at low tide and part of Bellingham Bay at high tide.

2. The wedge did not terminate as abruptly at this location. Downstream the water column was well mixed or weakly stratified (e.g., only a couple ppt difference in salinity between the top and bottom of the water column) until several hundred yards downstream of the terminus of the wedge. At this point the water column became strongly stratified with low salinities on top (0.6 ppt) and a salinity of 10.2 ppt on the bottom. The bottom salinities decreased, and the width of the wedge decreased gradually going upstream several hundred yards to the terminus of the wedge. This channel is shallower than the East Channel. Depths ranged from 3 to 5 ft, but often were shallower--it is very likely that the boat could not have gone up this channel at low tide.

3. Kwina Slough was saline as far up as we could travel. We stopped at a small logjam where the current was flowing upstream. We recorded the location of the logjam using GPS and estimated that we were about 500 yards upstream of the Native American Shellfish facility at the outlet of Kwina Slough (Fish Point). The water column was stratified with top and bottom salinity values of 10.3 ppt and 23.8 ppt respectively. The top layer was about 1.5 ft thick and total water depth was 6.5 ft.


DRAFT
Upstream Extent of saltwater found, See note 3
About 17:25 09/26/00 Extent of saltwater at ridge See text note 2
WEST CHANNEL
EAST
17:55 09/26/2000 Extent of saltwater See text note 2
CHANNEL
KWINA SLOUGH
9/27/00 Bellingham high tide @ 17:20, 8.5 ft. Nooksack River at Ferndale @ 1140 cfs between 16:45 and 18:15
BELLINGHAM BAY

Tides-Bellingham Bay, Bellingham

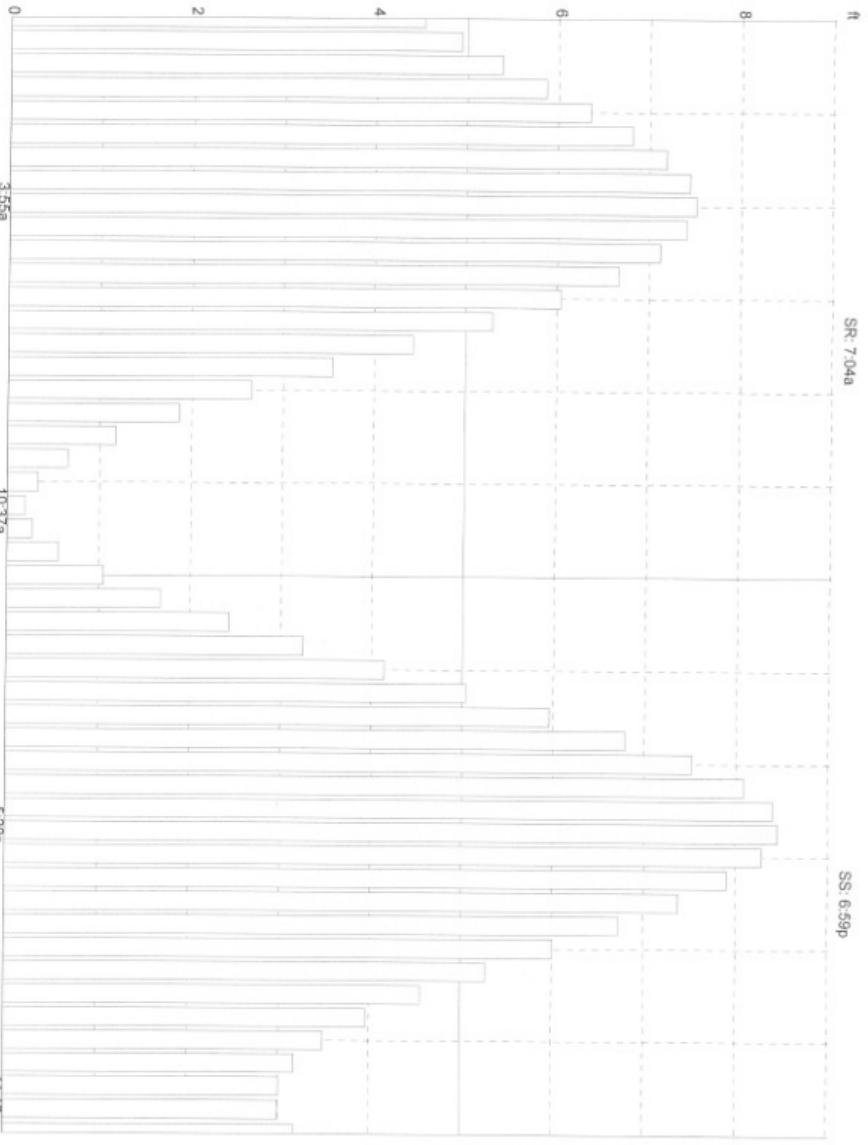
based on Port Townsend, Washington (NOAA)
48° 44.70 N 122° 29.70 W

Tuesday, September 26, 2000

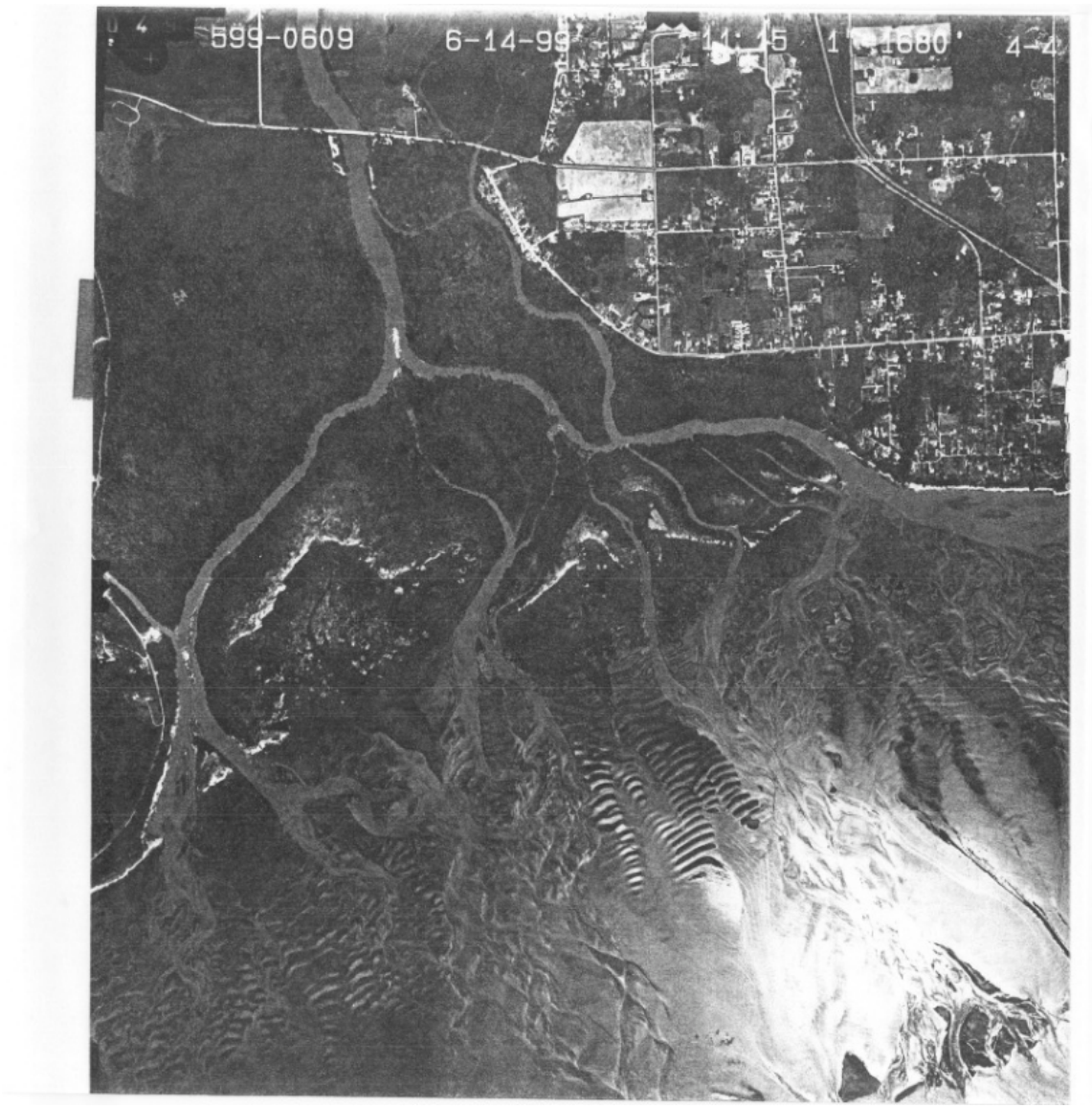
Average Tides	
Mean Range:	5.2 ft
MHHW:	8.5 ft
Mean Tide:	5.1 ft

Daily Highs & Lows		
3:55a	7.5 ft	High
10:37a	0.2 ft	Low
5:20p	8.5 ft	High
11:17p	3.0 ft	Low

(PDT)	Tide
12:00a	4.5 ft
12:30a	4.9 ft
1:00a	5.4 ft
1:30a	5.9 ft
2:00a	6.4 ft
2:30a	6.8 ft
3:00a	7.2 ft
3:30a	7.4 ft
4:00a	7.5 ft
4:30a	7.4 ft
5:00a	7.1 ft
5:30a	6.7 ft
6:00a	6.0 ft
6:30a	5.3 ft
7:00a	4.4 ft
7:30a	3.5 ft
8:00a	2.7 ft
8:30a	1.9 ft
9:00a	1.2 ft
9:30a	0.7 ft
10:00a	0.3 ft
10:30a	0.2 ft
11:00a	0.3 ft
11:30a	0.6 ft
12:00p	1.1 ft
12:30p	1.7 ft
1:00p	2.4 ft
1:30p	3.2 ft
2:00p	4.1 ft
2:30p	5.0 ft
3:00p	6.0 ft
3:30p	6.8 ft
4:00p	7.5 ft
4:30p	8.1 ft
5:00p	8.4 ft
5:30p	8.5 ft
6:00p	8.3 ft
6:30p	7.9 ft
7:00p	7.4 ft
7:30p	6.7 ft
8:00p	6.0 ft
8:30p	5.3 ft
9:00p	4.6 ft
9:30p	4.0 ft
10:00p	3.5 ft
10:30p	3.2 ft
11:00p	3.0 ft
11:30p	3.0 ft
12:00a	3.2 ft



© Nautical Software (503) 579-1414


599-0609
6-14-99

USGS

12213100-- Nooksack River at Ferndale

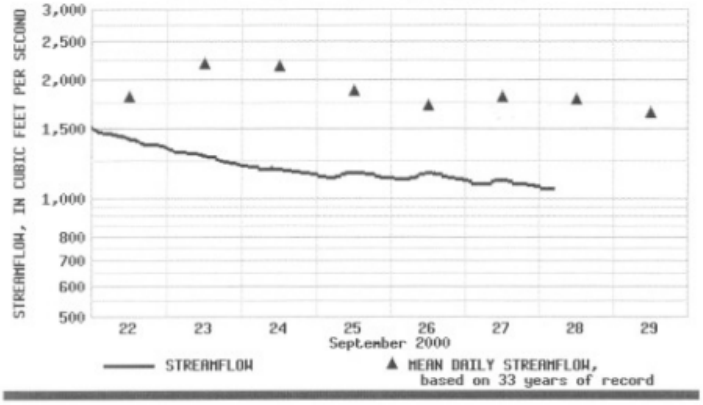
Station Description

```
Station name:  NOOKSACK RIVER AT FERNDALE
Latitude (degrees, minutes, and seconds)..... 485042
Longitude (degrees, minutes, and seconds)..... 1223517
State Code..................................... 53
County Code.................................... 073
Hydrologic Unit Code........................... 17110004
Drainage Area (square miles)..................   786.00
Gage Datum (feet above NGVD)..................     4.61
----Period(s) of Record----
1 1966.10.01-1988.09.30
2 1989.10.01-Current
```

Current Conditions

Flow (ft^3/s)	Stage (ft)	Date	Time
1,060	3.71	09/28	05:00

Streamflow -- download presentation-quality graph



Stage -- download presentation-quality graph

22 23 24 25 26 27 28 29
September 2000

Data used in graph

Daily Mean Flow Statistics for 09/28 based on 33 years of record, in ft³/s

Latest flow 09/28 05:00	Minimum	Mean	Maximum	80 percent exceedance	50 percent exceedance	20 percent exceedance
1,060	823	1,780	6,080	1,050	1,420	2,450
Percent exceedance means that 80, 50, or 20 percent of all daily mean flows for 09/28 have been greater than the the value shown.						

Questions or Comments? -- Please see our **FAQ page** *or* **e-mail** us.

Click on heading to get more data or return!

Current | Station List | Station Data | Station Graph | State Map | Frames

rt_www -- (rev 2.02) -- Acknowledgements

Attachment 2. 20002 Kwina Slough Salinity Survey

MEMORANDUM

DATE: November 5, 2002

TO: Jeremy Freimund, Water Resources Manager

FROM: Andy Ross, Water Resources Specialist

SUBJECT: Kwina Slough Salinity Survey Results

Water Resources staff (Steve Heywood, Water Resources Planner; Keith Tom, Water Resources Technician; and myself) conducted three independent salinity surveys along Kwina Slough on October 16, October 17, and November 1, 2002. The results are presented below and graphically on the attached map. Saline water was consistently recorded in Kwina Slough above the entrance to the mitigation ponds. The boundary between fresh and saline water is somewhere between Marine Drive and the Smokehouse (Sites 4 and 5) on Kwina Slough.

A WTW LF330 Salinity-Conductivity-Temperature meter was used for salinity measurements. The WTW was validated against distilled water immediately before each sample run and measurements were taken from the streambank with the probe lowered and raised through the water column. Presented on the next page are a map (Figure 1) and Table 2, which show the results of the salinity sampling. Predicted tidal conditions are presented below.

Saline water was measured in Kwina Slough up to Site 4, approximately 2,875 feet upstream of the dam at Mamoya Ponds. The actual location of the boundary between fresh and salt water was not located, but it occurs between the Marine Drive crossing of Kwina Slough (Site 5) and the Smokehouse (Site 4). This reach is shown in Figure 1. Saline water has not been measured at Site 5 since 1993.

Table 1. Bellingham Bay predicted tidal times and elevations.

Date (mm/dd/yy)	Low Tide Time (24 hours)	Low Tide Elevation (feet)	High Tide Time (24 hours)	High Tide Elevation (feet)	Low Tide Time (24 hours)	Low Tide Elevation (feet)
10/16/02	8:30	1.4	15:44	8.3	10:20	3.9
10/17/02	9:22	1.7	16:13	8.1	22:44	3.2
11/1/02	7:30	1.3	14:20	8.6	20:50	2.9

Table 2. Kwina Slough salinity sampling results.

Date (mm/dd/yy)	Time (24 hours)	Sampler (initials)	Sample Station Number (See Map)	Water Column Stratified? (Y/N)	Strata Sampled	Salinity (ppt.)	Comments	Nooksack River Flow At Ferndale (cfs)	Bellingham Bay Predicted Tidal Condition
10/16/02	15:55	AR	2	Y	Top Bottom	15.6 17.0	(1)	847	Falling from high of 8.3 feet at 15:44.
10/16/02	16:00	AR	1	Not Measured	Bottom	18.6		847	Falling from high of 8.3 feet at 15:44.
10/16/02	16:10	AR	4	N	N/A	12.5		847	Falling from high of 8.3 feet at 15:44.
10/16/02	16:21	AR	5	N	N/A	0.0		847	Falling from high of 8.3 feet at 15:44.
10/17/02	15:15	KT, SH	2	N	N/A	11.4		840	Rising to high of 8.1 feet at 16:13.
10/17/02	15:42	KT, SH	3	N	N/A	11.9		840	Rising to high of 8.1 feet at 16:13.
10/17/02	16:10	KT, SH	4	N	N/A	11.7		840	Rising to high of 8.1 feet at 16:13.
11/1/02	14:05	SH	2	Y	Top Bottom	19.0 20.9	(2)	604	Rising to high of 8.6 feet at 14:20.
11/1/02	14:26	SH	4	Y	Top Bottom	15.2 15.5	(3)	604	Falling from high of 8.6 feet at 14:20.
11/1/02	14:47	SH	2	Y	Top Bottom	20.5 22.4		604	Falling from high of 8.6 feet at 14:20.
11/1/02	15:04	SH	5	N	N/A	0.0		604	Falling from high of 8.6 feet at 14:20.

(1) Salinity varied between 15.1 to 16.1, turbulant water in wake of dam.
(2) Salinity varied from 20.6 to 21.2 ppt.
(3) Flow reversed from upstream to downstream between 14:30 and 14:34.

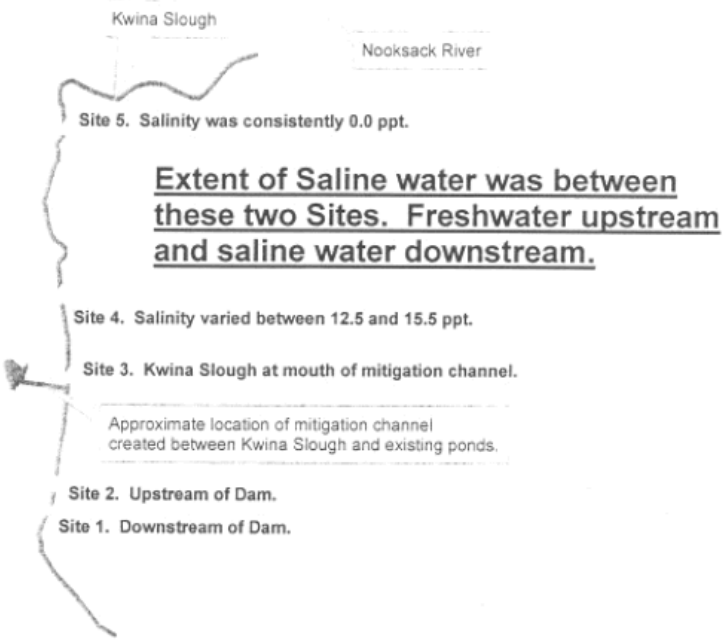


Figure 1. Location of Sample Sites along Kwina Slough and selected salinity information.

LUMMI INDIAN BUSINESS COUNCIL
2616 KWINA ROAD • BELLINGHAM, WASHINGTON 98226 • (360) 384-1489

Memorandum

To: Jeremy Freimund, Water Resources Manager

cc: Leroy Deardorff, Environmental Director

From: Zach Dewees, Forest Manager

Date: 8/30/2010

SUBJECT: August 3, 2010 Nooksack Delta Site Visit Report – Conifer Underplanting Potential and Pacific Willow Mortality

Per your request, on August 3, 2010 I accompanied Water Resources Division staff, GIS Division staff, and a contractor from ESA Adolfson on a day-long site visit to various sites throughout the Nooksack River Delta. The primary purpose for my participation in the visit was to: 1) locate potential sites within the Delta where underplanting shade-tolerant conifers would be appropriate, and 2) to attempt to determine the cause of the widespread Pacific willow mortality present within a southwestern portion of the Nooksack River Delta.

1. Conifer Underplanting

There are a number of sites within the Nooksack Delta where underplanting conifers would be successful. Sites that are particularly viable for conifer underplanting include the red alder-black cottonwood and the red alder-salmonberry stand types. These sites are very similar to the sites that were evaluated in my earlier memorandum to you in February 2010 regarding the viability of underplanting throughout the Delta. Therefore, the information I provided in this earlier memorandum applies to the sites we evaluated on our more recent site visit. I also believe that conifer planting in the dead Pacific willow-reed canary grass stand type could be successful. I spoke to the LNR Restoration Division about this and they informed me that they have successfully planted western red cedar throughout reed canary grass patches. The trees grow slower than they would if planted on more suitable sites but survivorship is still high.

2. Widespread Pacific Willow Mortality

Pacific willow is a pioneer or early seral species that is fast growing and short-lived. This species is often found in riverbanks, floodplains, lakeshores, and wet meadows often standing in quiet river backwaters.[1] Pacific willow is commonly found on fresh alluvium and

[1] Jim Pojar and Andy Mackinnion. 1994. "Plants of the Pacific Northwest Coast (Washington, Oregon, British Columbia, & Alaska"). B.C. Forest Service, Research Program.

repeated flooding allows stands to persist.[2] Pacific willow grows best in a sunny position scattered at low elevations along major rivers and is widely distributed throughout the Nooksack Delta. Seed dispersal is Pacific willow's primary mode of reproduction. Pacific willow is unable to produce sucker shoots from lateral roots but can sprout from its own root crown or stem base following fire or cutting.[2]

Four theories were considered for the widespread willow mortality present at this location within the Nooksack River Delta. These included salt water intrusion(s), excessive sediment deposition, insects, and natural mortality caused by a combination of old age and flooding (anaerobic conditions).

A. Saltwater Intrusion

Pacific willow is characterized as having little to no tolerance for saltwater.[2] Therefore, if a saltwater intrusion (or intrusions) did occur within this area, it is possible that this could have caused the widespread mortality. The saltwater intrusion(s) would have had to been very large, isolated to this one area, and would have had to persist for a long enough time or be frequent enough to kill all of the willows in this area. I am skeptical of the salt water intrusion theory for the following reasons:

- Many of the dead willows are re-sprouting from the base and along the trunks. If a salt water intrusion or series of intrusions did occur and saturate the root zones sufficiently enough to kill the trees, I suspect the entire tree would be dead and therefore, would not re-sprout.
- I noted a few red alder seedlings regenerating in the area. Most of the seedlings were sprouting from older downed red alder trees but we noted at least one red alder seedling that was rooted in mineral soil. Red alder is characterized as having no tolerance for saltwater.[3] Therefore, the downed trees that the alder seedlings are sprouting from should have been killed by the saltwater.
- There is a healthy stand of red alder and black cottonwood growing along the river shoreline across the channel to the east and southeast from the dead willow patch. An elevation analysis done by the GIS Division indicates that these areas are at the same elevation. Therefore, this stand of red alder and black cottonwood should have also been killed if a salt water intrusion or series of intrusions did occur.
- Finally, and perhaps less important since the willow stand appears to have died in 2004, salinity readings of the ground water within the dead willow stand showed that the ground water was fresh.

B. Sediment Deposition

Excessive sediment deposition around a tree's root zone can result in tree mortality. Tree root systems consist of large perennial roots and smaller, short-lived feeder roots. Feeder roots grow predominantly outward and upward to the soil surface where minerals, water, and oxygen are relatively abundant. The addition of only 4 to 6 inches of soil over a root zone drastically reduces the amount of oxygen and water available to the feeder roots

[2] USDA Natural Resource Conservation Service (NRCS). 2010. http://plants.usda.gov/java/charProfile?symbol=SALUL

[3] USDA Natural Resource Conservation Service (NRCS). 2010. http://plants.usda.gov/java/charProfile?symbol=ALRU2

which can result in tree death.[4] Excessive sediment deposition around root zones is a common cause of tree mortality in riparian zones. However, because willow is adapted to riparian zones, it can withstand sediment deposition better than other species. When sediment is dropped out of the water column, it accumulates around the stem. As the stems are covered with sediment, root buds in the stem start to swell and sprout roots. This is one way willow increase their root mass.[5] We did not note excessive sediment deposition around the root collars of the dead willow trees we inspected and given willow's ability to withstand sediment deposition within its root zone, it is unlikely this was the cause of the mortality.

C. Insects

Insects generally do not pose a direct threat to coastal forests of the Puget Sound. Secondary infestations of boring insects and bark girdlers are observed in trees that have been weakened by disease or mechanical damage.[6] Forest insects in western Washington that can cause foliage damage or loss include aphids, adelgids, tent caterpillars, sawflies, leaf beetles, and loopers. Direct control of these insects is rarely necessary since damage is cyclical and most trees recover from these types of insect attacks.[7] The hemlock looper attacks forests in the western hemlock zone on a cyclical basis but seldom causes extensive loss of forest.[6] The red alder bark beetle has been noted as a problem in red alder plantations in British Columbia but the extent of the damage has yet to be documented. No insect problems were detected during the forest inventory of the Nooksack Delta or during the forest inventory of the Reservation mainland.

While onsite, we did notice an insect that was thought to possibly be an Asian Long-horned Beetle (ALB). The ALB is known to attack at least 18 species of hardwood trees including maple, birch, horse chestnut, poplar, willow, elm, ash, and black locust.[8] However, it is very uncommon in western Washington. We took a close up photo of this insect and emailed it to a specialist at the Washington State Department of Agriculture Plant Protection/Pest Program. The specialist identified it as a Banded Alder Borer Beetle. These beetles are native to our state and only feed on dead or distressed trees. They do not harm healthy trees. Since there are a large number of dead trees in the vicinity, it is likely good habitat for the Banded Alder Borer Beetle.

D. Combination of Old Age and Flooding (Anaerobic Conditions)

As trees age, they loose their health and vigor and become more susceptible to mortality agents. Pacific willow is a short-lived tree with an average life span of around 25 years.[9] While onsite, we took an increment core sample from one of the dead willow trees that appeared to be representative of the entire stand to determine the stand's approximate age. This increment core showed the subject willow tree to be 43 years old. The evidence onsite suggests that this stand of willow trees is the first generation of trees to colonize this area. Given the old age of this willow stand and the series of continual

---

[4] J.M. Silick and W.R. Jacobi. 2009. "Healthy Roots and Healthy Trees". Gardening Series: Diseases. Colorado Sate University Extension.

[5] J. Chris Hoag. 2003. "Technical Note: Willow Clump Plantings". USDA Natural Resources Conservation Service (NRCS).

[6] International Forestry Consultants (INFO). 1995. "Forest Management Plan for the Tulalip Indian Reservation".

[7] Washington State University (WSU) Forest & Wildlife Extension. Accessed 2009. "Forest Health in Western Washington". http://ext.wsu.edu/forestry/FspringsrestHealthWWA.htm.

[8] BugGuide. 2010. http://bugguide.net/node/view/18855

[9] Washington State Department of Ecology. 2010. http://www.ecy.wa.gov/programs/sea/pubs/93-90/table3.html

flood events inherent within riparian zones, I believe that this willow stand died due to a combination of old age and flooding (anaerobic conditions). We noted evidence of water inundation two feet up from the root collar, which is consistent for the area. Although willow trees are adapted to frequent flooding, a flood event that would not have killed a younger willow could be lethal to an older willow nearing the end of its lifespan.

Please feel free to contact me if you have any further questions (360)384-2228.

Exhibit 13

Conservation Easement
Nooksack Delta Site Phase 1A

RECEIVED
OCT 17 2012
Lummi Planning & Public Works
2828 Kwina Road
Bellingham, WA 98226

2121002411
Page: 1 of 34
10/17/2012 11:25 AM
EASE $105.00
Whatcom County, WA
Request of: DIANA BOB

RETURN DOCUMENT TO:

Diana Bob, Attorney at Law
Lummi Indian Business Council
2616 Kwina Rd. Bellingham, WA 98226

STEVEN N. OLIVER
EXEMPT
PAID
AMT. $
DATE
REAL ESTATE
EXCISE TAX
TREASURER OF WHATCOM COUNTY, WASHINGTON
10-17-12 LA

Use dark black ink and print legibly. Documents not legible will be rejected per RCW 65.04.045 & 65.04.047

DOCUMENT TITLE(S):
Grant Deed of Conservation Easement, Lummi Nation Wetland and Habitat Mitigation Bank - Phase 1A, Nooksack Delta Site

AUDITOR FILE NUMBER & VOL. & PG. NUMBERS OF DOCUMENT(S) BEING ASSIGNED OR RELEASED:

Additional reference numbers can be found on page_____of document.

GRANTOR(S)

Lummi Nation

Additional grantor(s) can be found on page_____of document.

GRANTEE(S):

Northwest Indian Fisheries Commission

Additional grantee(s) can be found on page_____of document.

ABBREVIATED LEGAL DESCRIPTION: (Lot, block, plat name OR; qtr/qtr, section, township and range OR; unit, building and condo name.)

Township 38 North, Range 2 East of the Willamette Meridian, Washington, all or fractions of Sections 16, 17, 18, 19, 20 and 21

Additional legal(s) can be found on page_____of document.

ASSESSOR'S 16-DIGIT GEO-PARCEL NUMBER:

Additional numbers can be found on page_____

The Auditor/Recorder will rely on the information provided on this form. The responsibility for the accuracy of the indexing information is that of the document preparer.

GRANT DEED OF CONSERVATION EASEMENT
LUMMI NATION WETLAND AND HABITAT MITIGATION BANK
PHASE 1A – NOOKSACK DELTA SITE

Record in the Bureau of Indian Affairs Title Plant and Whatcom County

When Recorded Return to:
Mary Neil, Reservation Attorney
Lummi Nation
2616 Kwina Road
Bellingham, Washington 98226

With Conformed Copies to:
U.S. Army Corps of Engineers
Seattle District
P.O. Box 3755
Seattle, WA 98124-3755
Attn: Chief, Regulatory Branch

Grantor: Lummi Nation (the Nation)
Grantee: Northwest Indian Fisheries Commission (NWIFC)

Legal Description Abbreviated form:

Township 38 North, Range 2 East, of the Willamette Meridian, Washington, all or fraction of Sections 16, 17, 18, 19, 20, and 21 (See Exhibit A, Amended Protraction Diagram File 35, Unit II, Lummi Indian Reservation, dated May 3, 2010).

As to Conservation Easement:

THIS GRANT DEED OF CONSERVATION EASEMENT ("Easement") is made by the Lummi Nation, a federally- recognized Indian tribe, having an address at 2616 Kwina Road, Bellingham WA, 98226 ("Grantor") in favor of the Northwest Indian Fisheries Commission, a support service organization created in 1974 to assist the 20 member treaty Indian tribes in western Washington in their role as natural resources co-managers, having an address of 6730 Martin Way E., Olympia, WA 98516 ("Grantee") (collectively "Parties").

1. RECITALS

1.1 Grantor is the sole beneficiary of certain real property held in trust by the United States for the exclusive use of the Lummi Nation located within and adjacent to the Lummi Reservation in Washington State, consisting of the

ORIGINAL

riparian zone areas of the Nooksack River, palustrine wetlands and uplands adjacent to the riparian zone, and the estuarine zone areas of Bellingham Bay; totaling approximately 842 acres, and more particularly described in Exhibit A, and shown in map form on Exhibit B, attached hereto and incorporated by this reference (the "Protected Property").

1.2 Grantee is a quasi-governmental support service organization, created in 1974 by and for the 20 treaty Indian tribes in western Washington, to assist those member tribes in their role as natural resources co-managers. Grantee, as a not-for-profit legal entity that has among its principal purposes the conduct or facilitation of scientific research regarding natural resources, and the conservation of natural resources for the benefit of its member tribes as well as the general public, all within the geographic region encompassing this Conservation Easement, thus qualifies as a suitable grantee for the Lummi Nation Wetland and Habitat Mitigation Bank conservation easement.

1.3 The Protected Property is currently zoned as Open Space and possesses wetlands, aquatic and associated upland habitat ("Conservation Values"). Wetlands and other fish and wildlife habitat on the Protected Property that are enhanced after the effective date of this Easement shall also be considered Conservation Values.

1.4 The Conservation Values are a result of the Protected Property's inherent ecological potential and of the existing and/or anticipated enhancement of wetlands and other habitats on the Protected Property by the Nation. The foregoing enhancement is intended to qualify the Protected Property for inclusion by the Nation in a wetland and habitat mitigation bank and issuance of credits therefrom ("Mitigation Bank"). Additional restoration and enhancement of the Protected Property may occur as identified and described in that certain Mitigation Banking Instrument for the Lummi Nation Wetland and Habitat Mitigation Bank Phase 1A, on record with the U.S. Army Corps of Engineers (Corps) (Reference Number 20081519) as may be amended from time to time (collectively "Banking Instrument"), approved by the Corps ("Banking Agency"), as well as other certain public agencies.

1.5 Phase 1A of the Lummi Nation Wetland and Habitat Mitigation Bank was established by the Grantor in coordination with, and approved by, the Banking Agency, as well as other certain public agencies. This Easement is a condition of the operation of Phase 1A of the Mitigation Bank. Grantee acknowledges that from time-to-time Grantor may increase the real property that is subject to this Easement in furtherance of the Mitigation Bank. Grantor and Grantee may amend this Easement to accomplish the foregoing as provided in Section 12.1 below.

1.6 Grantor and Grantee intend that the Conservation Values be preserved and maintained in perpetuity by permitting only those land uses on the Protected Property that do not impair or interfere with the Conservation Values, which include, but are not limited to, such enhancement and cultural and religious uses as further provided in this Easement.

1.7 Grantor is a federally-recognized Indian tribe located in Washington State.

1.8 Grantee agrees, by accepting this Easement, to preserve and protect in perpetuity the Conservation Values and enforce the provisions hereof, unless this Easement is sooner terminated as expressly provided for herein at Section 11.

1.9 The Parties acknowledge that this Easement does not provide standards or criteria regarding the effectiveness of the Grantor's enhancement of the Protected Property and this Easement is not intended to provide a basis for ensuring the effectiveness of such enhancement or to obligate Grantee to ensure such effectiveness. The Parties further acknowledge that such standards and criteria and the ability to ensure the effectiveness thereof are provided for in the Banking Instrument and documents referenced therein and provided to Grantee.

2. CONVEYANCE AND CONSIDERATION

2.1 For the reasons stated above, and in consideration of the mutual covenants, terms, conditions, and restrictions contained in this Easement, and other good and valuable consideration provided by the Parties, Grantor hereby voluntarily grants, conveys and *quit claims* to Grantee a conservation easement in perpetuity over the Protected Property, consisting of certain rights in the Protected Property, as set forth in this Easement, subject only to the restrictions contained in this Easement.

2.2 This grant shall be subject to easements, restrictions, interests and water rights of record as of the effective date of this Easement, including, but not limited to, those set forth in Exhibit C, which is attached and incorporated into this Easement by this reference.

2.3 This grant of easement constitutes a conveyance of an interest in real property. Grantor expressly intends that this Easement run with the land and this Easement shall be binding upon Grantor's successors and assigns.

2.4 This Easement does not transfer any water or water rights. This Easement also does not transfer, or create any entitlement in, any credit from, or rights in, the Mitigation Bank.

2.5 Notwithstanding any other provision of this Easement to the contrary, this Easement shall not be interpreted to preclude Grantor from using the acreage of the Protected Property for the purpose of calculating permissible lot yield or development density of any other property. Grantor may participate in County sponsored transfer of development rights programs as long as high density or clustered development is not enabled on any land adjacent to the Protected Property.

3. PURPOSE

The purpose of this Easement is to assure that the Protected Property will be retained forever predominately in its condition as wetland and other aquatic and riparian habitat of fish, wildlife, and plants, providing the wetland, aquatic and riparian functions and values described in the Baseline Documentation

(described below), and to prevent any use of, or activity on, the Protected Property that will impair or interfere with the Conservation Values (the "Purpose"). Grantor intends that this Easement will confine the use of, or activity on, the Protected Property to such uses and activities that are consistent with this Purpose. This Easement shall not be construed as affording to the general public physical access to any portion of the Protected Property.

4. RIGHTS CONVEYED TO GRANTEE

To accomplish the Purpose of this Easement, the following rights are conveyed to Grantee by this Easement:

4.1 **Identification and Protection.** To preserve and protect, in perpetuity, unless sooner terminated as expressly provided under this Easement, and to enhance by mutual agreement, the Conservation Values.

4.2 **Access.**

4.2.1 To enter the Protected Property at a minimum annually, at a mutually agreeable time and upon prior written notice to Grantor, for the purpose of making a general inspection to monitor compliance with the terms of this Easement.

4.2.2 To enter the Protected Property at such other times as are necessary if Grantee reasonably believes that a violation of the Easement is occurring or has occurred, for the purpose of mitigating or terminating the violation and otherwise enforcing the provisions of this Easement. Such entry shall be upon prior reasonable notice to Grantor, and Grantee shall not in any case unreasonably interfere with Grantor's use and quiet enjoyment of the Protected Property.

4.2.3 To enter the Protected Property, at mutually agreeable times and upon prior written notice to Grantor, to exercise any other affirmative rights as expressly provided for herein.

4.3 **Notice to Remedy and Restore the Protected Property.** To enjoin any use of, or activity on, the Protected Property that is inconsistent with the Purpose of this Easement, including trespass by members of the public, and to require the restoration of the Protected Property, including seeking injunctive relief, of such areas or features of the Protected Property as may be damaged by uses or activities inconsistent with the provisions of this Easement. Grantee shall provide written notice to the Director of the Lummi Natural Resources Department outlining any use that is inconsistent with this agreement and make demand for Grantor to remedy the problem(s). Grantee shall provide a copy of that correspondence to the Inter-agency Review Team that provides regulatory oversight to the Lummi Nation Wetland and Habitat Mitigation Bank. Grantor shall have forty-five (45) days to remedy the problem(s), to the satisfaction of the Grantee. If, after forty-five (45) days, the situation is not remedied to the satisfaction of the Grantee, then Grantee shall bring an action in the Lummi Nation Tribal Court to compel specific performance of this agreement. The Lummi Indian

Business Council has provided a limited waiver of tribal sovereign immunity to permit specific performance of this agreement in the form of a Lummi Indian Business Council resolution (Resolution No. 2011-036).

4.4 Enforcement. To enforce the terms of this Easement through an action in Lummi Nation Tribal Court if notice required in Section 4.3 is not sufficient to compel performance by Grantor.

4.5 Maintenance of Protected Property. To report non-native, noxious weeds and invasive weeds (collectively "Weeds") at the Protected Property, and direct Grantor to remedy non-native noxious weeds and invasive weeds at Grantor's sole expense.

4.6 Baseline Documentation.

4.6.1 Within sixty (60) days after the effective date of this Easement, or within sixty (60) days after the recording of any amendment hereof under Section 12.1 below, unless otherwise precluded due to site conditions (e.g., growing season, riverine flooding) in which case as soon as practicable as determined jointly by the Grantor and the Grantee, Grantee shall verify the accuracy of the Conservation Values in an inventory of relevant features of the Protected Property, which Grantee shall maintain on file at its offices and which shall be incorporated into this Easement by this reference ("Baseline Documentation"). The Baseline Documentation shall consist of reports, maps, photographs, and other documentation that provide, collectively, an accurate representation of the Protected Property. The Baseline Documentation is intended to serve as an objective, although nonexclusive, information baseline for monitoring compliance with the terms and conditions of this Easement.

4.6.2 As previously noted, the additional enhancement work under the Banking Instrument that may occur on the Protected Property is likely to enhance significantly the Conservation Values. Grantee may from time-to-time and as necessary verify the accuracy of updates of the Baseline Documentation to reflect such work and to document the enhanced Conservation Values resulting therefrom for purposes of monitoring compliance with the terms and conditions of this Easement.

5. GRANTOR'S RESERVED RIGHTS AND OBLIGATIONS

5.1 General. Grantor reserves for itself and its successors and assigns all rights accruing from being sole beneficiaries of the Protected Property, including, but not limited to, the right to sell, lease, and devise the Protected Property (subject to applicable laws regarding trust property) and the right to engage in, or permit or invite others to engage in, any use of, or activity on, the Protected Property that is not inconsistent with the Purpose of this Easement and that is not prohibited by this Easement. Without limiting the generality of this Section 5.1, Grantor specifically reserves for itself and its successors and assigns the following uses and activities:

5.2 **Treaty, Cultural and Religious Use.** The right to permit nonintrusive ceremonial and subsistence, commercial, and other nonintrusive uses or activities that are common and/or inherent to the Lummi cultural way of life (e.g., plant, leave, and fiber collection for traditional crafts and purposes) consistent with this Easement, provided that the exercise of these reserved rights does not cause more than *de minimis* adverse impact on the Conservation Values.

5.3 **Protection of Historical and/or Archaeological Sites.** The right to protect historical and/or archaeological sites, including, without limitation, the right to survey the site, excavate the site, and remove artifacts and other items of historical and archaeological interest, subject to obtaining any required Corps and/or other applicable permits, provided that the exercise of these reserved rights does not cause more than *de minimis* adverse impact on the Conservation Values.

5.4 **Ceremonial, Subsistence, and Commercial Fishing.** Treaty-reserved fishing, hunting, and gathering for ceremonial, subsistence and commercial purposes and fishing for commercial purposes by enrolled Lummi Tribal members may take place on the Protected Property so long as it is conducted in a manner that will not impair the development of an old growth forest on the Protected Property and does not cause more than *de minimis* adverse impacts on the Conservation Values of the Bank. This fishing and gathering activity by enrolled members of the Lummi Nation includes the right to erect temporary structures associated with fishing and gathering activities for ceremonial, subsistence, and commercial purposes so long as the structures and any associated solid wastes are removed within one month following the end of the permitted activity. The term "commercial fishing" does not include commercially led fishing parties in the mitigation bank area. In this context, the term "commercial fishing" means fishing by individual tribal members who possess a valid Lummi Nation Treaty Indian Fishing Identification Card issued by the Lummi Natural Resources Department and who sell the caught fish to buyers licensed by the Lummi Nation who are required pursuant to a buyers agreement to report the sale on a fish ticket and to provide that fish ticket to the Lummi Natural Resources Department within 96 hours of the purchase.

5.5 **Ceremonial and Subsistence Hunting.** Treaty reserved hunting for ceremonial and subsistence purposes by enrolled Lummi Tribal members may take place on the Protected Property so long as it is conducted in a manner that will not impair the development of an old growth forest on the Bank site and does not cause more than *de minis* adverse impacts on the Conservation Values of the Bank. This hunting activity by enrolled members of the Lummi Nation includes the right to erect temporary structures associated with hunting activities for ceremonial and subsistence purposes so long as the structures and any associated solid wastes are removed within one month following the permitted activity. No commercial hunting is allowed.

5.6 **Trees for Cultural Uses.** The cutting and removal of individual trees for cultural uses, which include but are not limited to totem poles or canoes, if the Grantor demonstrates that suitable trees do not exist on nearby lands that are not restricted by this Easement or on other lands readily accessible to the Lummi Nation, and provided that such cutting and removal do not negatively impact the Conservation Values of this Easement. Old-growth cedar trees that have fallen from natural causes on or within an area that is fifty (50) feet on either side of the centerline of any waterway identified in Exhibit B attached hereto may be removed by enrolled Lummi Tribal members for religious, spiritual or cultural purposes of the Lummi Nation and not for the commercial resale thereof. Any removal must be conducted in a manner that will minimize damage to the forest floor and avoid damage to trees larger than twelve (12) inches diameter at breast height and avoid adverse impact on the Conservation Values of this Easement; and any equipment used in the removal process must remain on the waterway.

5.7 **Plant Material for Religious, Spiritual and Cultural Use.** Gathering of plant material, roots, or herbs by enrolled Lummi Tribal members for religious, spiritual, and cultural purposes, and not for the commercial resale thereof so long as no action is taken that will destroy trees or impair the growth of an old growth forest on the Protected Property, and provided that the exercise of these reserved rights does not cause more than *de minimis* adverse impact on the Conservation Values.

5.8 **River Maintenance.** Taking various actions necessary to maintain the Nooksack River as a navigable waterway suitable for passage of fishing vessels (e.g., removal of log jams, removal of downed trees that fall across the water ways), provided that the exercise of these reserved rights does not cause more than *de minimis* adverse impact on the Conservation Values.

5.9 **Fences.** The construction and maintenance of fences within or around the Protected Property provided that the design and location shall not adversely impact the Conservation Values.

5.10 **Signs.** The installation and maintenance of signs, provided that such installation does not cause an adverse impact on the Conservation Values.

5.11 **Habitat Stewardship, Restoration and Enhancement.** Constructing, installing, planting, maintaining, and engaging in other activities to maintain or further restore or enhance the Conservation Values in accordance with the Banking Instrument and any final construction or management plans and bid specifications subsequently developed in conformance with the Banking Instrument, which may include, but are not limited to: planting and irrigating plants; removing and controlling weeds; installing and maintaining ditches, berms, dikes, wells, log weirs and water control and production structures ("Water Control Structures"); diking wetland areas; altering or manipulating ponds and water courses; and creating new wetlands, water impoundments, or water courses. Motorized and mechanized vehicles may be used in furtherance of, and to facilitate, the foregoing activities, provided that any off-road use thereof does not cause more than a de minimis

adverse impact on the Conservation Values. If Grantor has conveyed or assigned its rights to engage in the activities described in this Section 5.11 to Grantee or third parties, Grantor covenants to not interfere with such restoration and/or enhancement, including, but not limited to, by the exercise of any rights reserved to Grantor under this Easement.

5.12 Educational and Scientific Activities. Educational and scientific activities that do not conflict with the use limitations or other provisions of the conservation easement, do not interfere with the delineated purposes and goals of the Bank, and do not adversely affect the ecological viability and functionality of the Bank may take place on the Bank site. These activities may include but are not limited to: guided site tours, water quality or quantity measurements, and topographic or hydrographic surveys.

5.13 Protection of Health or Safety. The undertaking of other activities necessary to protect health or safety, or that are actively required by and subject to compulsion of any governmental agency with authority to require such activity; provided that any such activity shall be conducted so that significant adverse impacts on the Conservation Values are avoided, or, if avoidance is not possible, minimized to the greatest extent possible under the circumstances.

5.14 Grantor's Obligations.

5.14.1 Noxious Weed Control. Grantor shall control noxious weeds within the Protected Property. Grantor shall voluntarily comply with the following provisions of Washington State law for the purpose of identifying and controlling noxious weeds within the Protected Property: RCW 17.10.010, RCW 17.10.140, WAC 16-750-001, WAC 16-750-003 and WAC 16-752-500. Enforcement by grantee shall be consistent with the terms of this agreement. The state and local noxious weed control boards shall not have authority to regulate or enforce Grantor's actions with the sections of state law listed above.

5.14.2 Structures, Facilities, and Improvements. Grantor shall maintain all structures, facilities and improvements associated with the foregoing activities, including roads, trails and fences, that are within the Protected Property and are merely incidental to the functionality of the mitigation site, but that are necessary to Mitigation Bank management and maintenance activities, for as long as necessary to serve the needs of long-term management and maintenance, as described in the Banking Instrument and related documents.

5.14.3 Access and Non-Interference. Grantor shall provide access for the purpose of implementing the long-term management and maintenance plan of the Mitigation Bank, as set forth in the Banking Instrument ("Plan"). Grantor, furthermore, shall refrain from impeding or otherwise interfering with implementation of the Plan. Activities in furtherance of the Plan are to be carried out by the Grantor. Such activities may include, but are not limited to, maintenance and repair of water control structures; maintenance, repair, removal, or

abandonment of structural elements of the Mitigation Bank; and removal of invasive plant species.

6. USES AND ACTIVITIES INCONSISTENT WITH THE PURPOSE OF THE EASEMENT

6.1 **General.** Any use of, or activity on, the Protected Property inconsistent with the Purpose of this Easement is prohibited, and Grantor acknowledges and agrees that it will not conduct, engage in, or permit any such use or activity. Without limiting the generality of the foregoing, the following uses of, or activities on, the Protected Property, although not an exhaustive list of inconsistent use of activities, are inconsistent with the Purpose of this Easement and shall be prohibited:

6.2 **Subdivision.** The legal or "de facto" division or subdivision of the Protected Property, which shall include, but not be limited to, any subdivision, short subdivision, platting, binding site plan, testamentary division, or other process by which the Protected Property is divided into lots. This prohibition shall not be interpreted to preclude any lot line adjustment that does not create a number of lots that is greater than the number of lots in existence on the effective date of this Easement.

6.3 **Construction.** The placement, installation, or construction of any buildings, structures, or other improvements of any kind, including, but not limited to, roads, railroads, utilities, cellular phone towers, septic systems, wells, recreational facilities, and parking lots, except as expressly provided in Section 5 above.

6.4 **Alteration of Land.** The alteration of the surface of the land, including, without limitation, the excavation or removal of soil, sand, gravel, rock, peat, or sod except in conjunction with a use or activity expressly allowed in Section 5 above.

6.5 **Removal of Trees and Other Vegetation.** The pruning, topping, cutting down, uprooting, girdling, or other destruction or removal of live and dead trees and other vegetation, except as expressly provided in Section 5 above or in conjunction with a use or activity expressly allowed in this Easement.

6.6 **Erosion or Water Pollution.** Any use or activity that causes or is likely to cause significant soil degradation or erosion or significant pollution of any surface or subsurface waters. For the purposes of this Easement, the uses and activities expressly allowed under Section 5 shall be deemed to not violate this prohibition.

6.7 **Waste Disposal.** The disposal, storage, or Release of Hazardous Substances, rubbish, debris, unregistered vehicles, abandoned equipment, parts thereof, or other offensive waste or material. The term "Release" shall mean release, generation, treatment, disposal, storage, dumping, burying, or abandonment. The term "Hazardous Substances" shall mean any substances, materials, or wastes that are hazardous, toxic, dangerous, or harmful or are designated as or contain components

that are, or are designated as, hazardous, toxic, dangerous, or harmful, and/or that are subject to regulation as hazardous, toxic, dangerous or harmful or as a pollutant by any federal, state, or local law, regulation, statute, or ordinance including but not limited to, petroleum or any petroleum product.

6.8 **Mining.** The exploration for, or development and extraction of, oil, gas, coal, limestone, fossils, metals, geothermal resources, sand, gravel, or rock of any type on or below the surface of the Protected Property, except as expressly provided in Section 5.

6.9 **Recreational Activities.** The undertaking of recreational activities and the installation or construction of improvements in furtherance of the same.

6.10 **Access.** No right of access by the general public to any portion of the Protected Property is conveyed by this Easement without specific written authority from the Lummi Nation describing places, trails, and other conditions upon which entry may be granted. Upon seven (7) days advance written notice to the Lummi Nation, a member of the general public may request permission to enter the Protected Property. For private property inspection and monitoring required for compliance with federal law and this Easement, nothing contained in this Easement shall be construed to diminish the United States' right of entry.

7. NOTICE AND APPROVAL

7.1 **Notice.**

7.1.1 **Grantor.** Certain provisions of this Easement require Grantor to notify Grantee and/or to receive Grantee's written approval prior to undertaking certain permitted uses and activities. The purpose of requiring Grantor to notify Grantee prior to undertaking these permitted uses and activities is to afford Grantee an adequate opportunity to ensure that the use or activity in question is designed and carried out in a manner consistent with the Purpose of this Easement. Whenever such notice is required, Grantor shall notify Grantee in writing not less than thirty (30) days prior to the date Grantor intends to undertake the use or activity in question. The notice shall describe the nature, scope, design, location, timetable, and any other material aspect of the proposed use or activity in sufficient detail to permit Grantee to make an informed judgment as to its consistency with the terms of this Easement and the Purpose thereof.

7.1.2 **Grantee.** Certain provisions of this Easement require Grantee to give notice to Grantor prior to undertaking certain activities. Whenever such notice is required, Grantee shall notify Grantor in writing not less than thirty (30) days prior to the date Grantee intends to undertake the use or activity in question, unless otherwise provided for by this Easement.

7.2 **Approval.** Where approval by one of the Parties is required under this Easement, such approval shall be granted or denied in writing within thirty (30) days of receipt of a written request for approval, and such approval shall not be unreasonably withheld. Such approval may include reasonable conditions consistent with the Banking Instrument that must be satisfied in undertaking the proposed use or activity. When approval is required under this Easement, and when such approval is not granted or denied within the time period and manner set forth in this Section 7.2, the non approving party may conclusively assume the other party's approval of the use or activity in question.

7.3 **Optional Consultation.** If Grantor is unsure whether a proposed use or activity is prohibited by this Easement, Grantor may consult Grantee by providing Grantee a written notice describing the nature, scope, design, location, timetable, and any other material aspect of the proposed use or activity in sufficient detail to permit Grantee to make an informed judgment as to its consistency with the Purpose of this Easement and to provide comments thereon to Grantor.

7.4 **Addresses.** Any notice, demand, request, consent, approval, or communication that either party desires or is required to give to the other shall be in writing and either served personally or sent by first class certified mail, postage prepaid, or by facsimile (if available) with original dispatched by certified mail, addressed as follows, or to such other address as either party from time to time shall designate by written notice to the other:

To Grantor: Executive Director
Lummi Natural Resources Department
2616 Kwina Road
Bellingham, WA 98226

To Grantee: Executive Director
Northwest Indian Fisheries Commission
6730 Martin Way E.
Olympia, WA 98516

8. COSTS AND LIABILITIES

The Grantor retains all responsibility and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Protected Property. The Grantor shall keep the Protected Property free of any liens arising out of any work performed for, materials furnished to, or obligations incurred by the Grantor. In the event of litigation, the Grantor shall bear all reasonable costs.

9. JUDICIAL RESOLUTION

9.1 **Notice of Violation, Corrective Action.** If either party determines that the other is in violation of the terms of this Easement or that a violation is threatened, they shall give written notice to the other of such violation and demand corrective action sufficient to cure the violation and, where the violation involves injury to the Protected Property resulting from any use or activity inconsistent with the Purpose of this Easement, to restore the portion of the Protected Property so injured to its prior condition in accordance with a plan approved by Grantee.

9.2 **Failure to Respond.** Either party may bring an action as provided in Section 9.3 below if the other party:

9.2.1 Fails to cure the violation within forty-five (45) days after receipt of a notice of violation; or

9.2.2 Under circumstances where the violation cannot reasonably be cured within a forty-five (45) day period, fails to begin curing the violation within the forty-fine (45) day period and fails to continue diligently to cure such violation until finally cured.

9.3 **Action.**

9.3.1 **Injunctive Relief.** Either party may bring an action at law or in equity in a court having jurisdiction to enforce the terms of this Easement:

9.2.1.1 To enjoin the violation, *ex parte* as necessary and as allowed under the applicable civil rules, by temporary or permanent injunction; and

9.2.1.2 To require the restoration of the Protected Property to the condition that existed prior to any such injury.

9.4 **Emergency Enforcement.** If Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate significant damage to the Conservation Values, Grantee may pursue its remedies under this Section 9 without prior notice to Grantor or without waiting for the period provided for cure to expire.

9.5 **Scope of Relief.** Grantee's rights under this Section 9 apply equally in the event of either actual or threatened violations of the terms of this Easement. Grantor agrees that Grantee's remedies at law for any violation of the terms of this Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in this Section 9, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of this Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this Section 9 shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity.

9.6 **Costs of Enforcement.** Costs of enforcement shall be handled as provided in Section 8 above, so long as the action that is presented to the court is reasonable for the circumstances.

9.7 **Discretion in Enforcement.** Enforcement of the terms of this Easement shall be at the discretion of Grantee, and any forbearance by Grantee to exercise its rights under this Easement in the event of any breach of any

terms of this Easement by Grantor, its agents, employees, contractors, invitees or licensees shall not be deemed or construed to be a waiver by Grantee of such term of any of Grantee's rights under this Easement. No delay or omission by Grantee in the exercise of any right or remedy upon any breach by Grantor shall impair such right or remedy or be construed as a waiver.

9.8 **Acts Beyond Party's Control.** Neither Grantor nor Grantee shall be in default or violation as to any obligation created hereby and no condition precedent or subsequent shall be deemed to fail to occur if such party is prevented from fulfilling such obligation by, or such condition fails to occur due to:

9.8.1 Actions by trespasser upon the Protected Property;

9.8.2 Forces beyond such party's reasonable control, including without limitation, destruction or impairment of facilities resulting from breakdown not resulting from lack of ordinary care and maintenance, flood, earthquake, slide, tsunami, storm, lightning, fire, epidemic, war, riot, civil disturbance, sabotage, proceeding by court or public authority, or act or failure to act by court, public authority, or third party, which forces by exercise of due diligence and foresight such party could not reasonably have expected to avoid; or

9.8.3 Any action deemed reasonable by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Protected Property resulting from such causes.

In the event the terms of this Easement are violated by acts of trespassers, Grantor agrees to take appropriate actions against the responsible parties.

9.9 **Compliance Certificates.** Upon request by Grantor, Grantee shall within thirty (30) days execute and deliver to Grantor, or to any party designated by Grantor, any document, including a compliance certificate, that certifies, to the best of Grantee's knowledge, the status of Grantor's compliance with any obligation of Grantor contained in this Easement and otherwise evidences the status of this Easement.

9.10 **Non-Interference.** The Lummi Nation representatives to the Northwest Indian Fisheries Commission shall recuse themselves from any participation, to include voting and advocacy, regarding measures before the Northwest Indian Fisheries Commission (Grantee) pertaining to this conservation easement that affect or may affect the financial or other interests of the Lummi Nation.

10. COSTS, LIABILITIES, TAXES, ENVIRONMENTAL COMPLIANCE, AND INDEMNIFICATION

10.1 **Costs, Legal Requirements, Liabilities and Insurance.** Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Protected Property.

10.2 Taxes and Other Costs. Grantor shall pay all applicable taxes, fees and charges assessed against the Protected Property by governmental authority as they become due, including taxes imposed upon, or incurred as a result of, this Easement, and shall furnish Grantee with satisfactory evidence of payment upon request. To preserve its rights under this Easement, Grantee may, but is in no event obligated to, make payment of any taxes upon five (5) days prior written notice to Grantor, in accordance with any bill, statement, or estimate procured from the appropriate authority, without inquiry into the validity of the taxes or the accuracy of the bill, statement or estimate, and the obligation to Grantee created by such payment will bear interest until paid by Grantor at the same rate imposed by the relevant government authority for the late payment of the tax so paid by Grantee.

10.3 Representations and Warranties. Grantor represents and warrants that to Grantor's actual knowledge, and except as disclosed to Grantee in writing prior to the effective date of this Easement:

10.3.1 There are no apparent or latent defects in or on the Protected Property; and

10.3.2 Grantor and the Protected Property are in compliance with all federal, state, and local laws, regulations, and requirement applicable to the Protected Property and its use, including, but not limited to, environmental laws, regulations, and requirements.

10.4 Control. Nothing in this Easement shall be construed as giving rise, in the absence of a judicial decree, to any right or ability in Grantee to exercise physical or managerial control over the day-to-day operations of the Protected Property, or any of Grantor's activities on the Protected Property, or otherwise to become an operator with respect to the Protected Property within the meaning of the Comprehensive Environmental Response Compensation and Liability Act of 1980, as amended ("CERCLA"), and the Model Toxics Control Act, as amended ("MTCA").

10.5 Grantor's Indemnification. Grantor shall hold harmless, indemnify, and defend Grantee and its members, directors, officers, employees, agents, and contractors (collectively "Grantee Indemnified Parties") from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, or judgments, including, without limitation, reasonable attorneys' and consultants' fees, arising from or in any way connected with breach of its representations and warranties or injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition (including pollution), or other matter related to or occurring on or about the Protected Property that is not a consequence of any action or omission of any of the Grantee Indemnified Parties on or about the Protected Property.

10.6 Grantee's Indemnification. Grantee shall hold harmless, indemnify, and defend Grantor and Grantor's members, directors, officers, employees, agents, and contractors (collectively "Grantor Indemnified Parties") from and against all liabilities, penalties, costs, losses, damages, expenses, causes of action, claims, demands, or judgments, including, without limitation,

reasonable attorneys' and consultants' fees, arising from or in any way connected with injury to or the death of any person, or physical damage to any property, resulting from any act omission, condition, or other matter related to or occurring on or about the Protected Property that is a consequence of Grantee's actions or omissions or the actions or omissions of Grantee's members, directors, officers, employees, agents, or contractors on or about the Protected Property. Grantee shall not be liable for any failure to detect pollution.

11. EXTINGUISHMENT, CONDEMNATION, AND SUBSEQUENT TRANSFER

11.1 Extinguishment. If circumstances arise in the future that render the Purpose of this Easement impossible to accomplish, this Easement can only be terminated or extinguished, whether in whole or in part, by the Parties' mutual agreement and with the written approval of the Banking Agency, or by judicial proceedings of a court having jurisdiction. Neither party shall unreasonably withhold agreement to modify or terminate this easement. Unless otherwise agreed to by the Parties, Grantee shall have no compensable interest in this Easement under such circumstances. The immediately foregoing provision shall be limited solely to the circumstances described in this Section 11.1, and shall not be interpreted to have any application or inference to any other provision of, or circumstance under, this Easement, including, but not limited to, those provisions pertaining to Grantee's rights to enforce the terms of this Easement and Grantee's rights to damages to, or the cost of restoring, the Conservation Values.

11.2 Condemnation. If the Easement is taken, in the whole or in the part, by the exercise of the power of eminent domain, Grantee shall not be entitled to compensation and the entirety of any compensation award shall belong to Grantor. The immediately foregoing provision shall be limited solely to the circumstances described in this Section 11.2, and shall not be interpreted to have any application or inference to any other provision of, or circumstance under, this Easement, including, but not limited to, those provisions pertaining to Grantee's rights to enforce the terms of this Easement and Grantee's rights to damages to, or the cost of restoring, the Conservation Values.

11.3 Subsequent Transfers. Grantor agrees to:

11.3.1 Incorporate the terms of this Easement by reference in any deed or other legal instrument by which it divests itself of any interest in all or a portion of the Protected Property, including, without limitation, a leasehold interest;

11.3.2 Describe this Easement in and append it to any executory contract for the transfer of any interest in the Protected Property; and

11.3.3 Give written notice to Grantee of the transfer of any interest in all or a portion of the Protected Property prior to the date of such transfer. Such notice to Grantee shall include the name, address, and

telephone number of the transferee or the transferee's representative. The failure of Grantor to perform any act required by this Section 11.3 shall not impair the validity of this Easement or limit its enforceability in any way.

11.4 No Merger. In the event that Grantee acquires the fee title to the Protected Property, it is the Parties' intention that no merger of title shall take place that would merge the restrictions of this Easement with fee title to the Protected Property and thereby eliminate them, and that the restrictions on the use of the Protected Property, as embodied in this Easement shall, in the event title becomes vested in Grantee, become and remain permanent and perpetual restrictions on the use of the Protected Property.

12. AMENDMENT

12.1 Amendment to Expand Area. Grantor and Grantee are free to jointly amend this Easement to increase the real property that is subject to this Easement, provided that any such additional real property is contiguous with the property that is already subject to this Easement. Any such amendment shall be recorded in the official records of the Lummi Nation Realty Division and the Bureau of Indian Affairs Title Plant and any other jurisdiction in which such recording is required.

12.2 Other Amendments. If circumstances arise, other than as described in Section 12.1 above, under which an amendment to or modification of this Easement would be appropriate, Grantor and Grantee are free to jointly amend this Easement upon approval of such amendment or modification by the Banking Agency. Any such amendment shall be recorded in the official records of the Lummi Nation Realty Division and the Bureau of Indian Affairs Title Plant and any other jurisdiction in which such recording is required.

13. RECORDATION

The Lummi Nation shall record, at its cost, this instrument, within thirty (30) days of the Banking Agency and the Bureau of Indian Affairs approval of this Conservation Easement, in the official records of the Lummi Nation Realty Division, the Bureau of Indian Affairs Title Plant, and Whatcom County. Upon recording, a conformed copy of the recorded Easement shall be sent to Banking Agency within thirty (30) days.

14. ASSIGNMENT AND SUCCESSION

14.1 Assignment. With Grantor's written approval, which will not be unreasonably withheld, and the Banking Agency's written approval, this Easement is transferable, but Grantee may assign its rights and obligations under this Easement only to an organization that is authorized to acquire and hold conservation easements under RCW 64.04.130 or RCW 84.34.210 (or any successor provision(s) then applicable). As a condition of such transfer,

Grantee shall require that the transferee exercise its rights under the assignment consistent with the Purpose of this Easement. Grantee shall notify Grantor in writing forty-five (45) days prior to such assignment at Grantor's last known address.

14.2 Succession. If at any time (a) it becomes impossible for Grantee to ensure compliance with the covenants, terms, conditions and restrictions contained in this Easement, (b) the Grantor and the Banking Agency, or the Banking Agency alone, determine that this Easement should be assigned due to any reasons of actual non performance by the Grantee, including, but not limited to, circumstances under which actual non performance occurs because Grantee is the holder of both the fee title to the Protected Property and this Easement, (c) Grantee ceases to exist as a not-for-profit legal entity having among its principal purposes the conduct or facilitation of scientific research regarding natural resources, or the conservation of natural resources for the benefit of its member tribes as well as the general public, within the geographic region encompassing this Conservation Easement, or (d) Grantee is otherwise released from its liabilities and obligations under the Easement, then, if Grantee has been provided forty five (45) days prior notice and Opportunity to cure any non performance or otherwise remedy any other circumstance forming the basis of any transfer under this Section14.2, Grantee's rights and obligations under this Easement shall become vested and fall upon such other entity, with purposes similar to Grantee's, that is authorized to acquire and hold Conservation Easements under RCW 64.04.130 and 84.34.210 (or any successor provision(s) then applicable), selected by the Grantor and approved by the Banking Agency; provided that if such vesting is deemed to be void under the Rule Against Perpetuities, the rights and obligations under this Easement shall vest in such organization as a court having jurisdiction shall direct, pursuant to the applicable Washington law and with due regard to the Purpose of this Easement.

15. GENERAL PROVISIONS

15.1 Controlling Law. This Agreement shall be governed and construed in accordance with the laws of the Lummi Nation, except where matters exclusively of federal law are concerned (such as the provisions regarding lease of restricted Indian lands), notwithstanding any choice of law provisions. This Agreement shall not be construed for or against any party based on drafting or preparation. Each Party has been represented by legal counsel of its choosing throughout the negotiation of this Agreement and the uplands and tidelands leases. Captions in this Agreement are included for convenience only and in no way define or limit the meaning or intent of any provision herein.

15.2 Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Easement shall be liberally construed in favor of the grant to affect the purpose of this Easement. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the

purpose of this Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

15.3 **Severability.** If any provision of this Easement, or the application thereof to any person or circumstance, is found to be invalid, the remainder of the provisions of this Easement, or the application of such provision to persons or circumstances other than those as to which it is found to be invalid, as the case may be, shall not be affected thereby.

15.4 **Entire Agreement.** Except as to any other written agreement between the Parties, all prior discussions, negotiations, understandings, communications, or oral arguments regarding this Easement have been superseded by, and are merged into, this Easement.

15.5 **No Forfeiture.** Nothing contained herein will result in a forfeiture or reversion of the Lummi Nation's title in any respect.

15.6 **Successors.** The covenants, terms, conditions, and restrictions of this Easement shall be binding upon the Lummi Nation and its personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Protected Property.

15.7 **Successors and Assigns.** The covenants, terms, conditions, and restrictions of this Easement shall be binding upon, and inure to the benefit of, the Parties to this Easement and the respective successors and assigns, and shall continue as a servitude running in perpetuity with the Protected Property, unless sooner terminated as expressly provided herein. No term or provision of this Easement is intended to be, or shall be, for the benefit of any person, firm, organization or corporation not a party to this Easement, and such other person, firm, organization, or corporation shall have nay right or cause of action hereunder, except as expressly provided in Section 14, above.

15.8 **Termination of Rights and Obligations.** A party's rights and obligations under this Easement terminate upon transfer of the party's interest in the Easement or Protected Property, except that liability for acts or omissions occurring prior to transfer shall survive transfer.

15.9 **Captions.** The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

15.10 **No Precedent.** The parties agree that the terms and conditions set forth in this Easement shall not act as a precedent, nor be binding upon either party, in regards to any future dealings between parties.

15.11 **Effective Date.** The effective date of this Easement is the date of recording of this Easement.

15.12 **Signatures and Authority.** Each of the signatories below represents and warrants on behalf of the entity he purports to represent that he has been duly authorized by resolution to enter into and execute this Agreement and to commit to the performance of the obligations herein. This Agreement with any subsequent amendments or changes to this Agreement, and any subsequent implementation agreements, shall be approved by the Lummi Indian Business Council and the Northwest Indian Fisheries Commission.

IN WITNESS WHEREOF the Lummi Nation has set its hand this 3rd day of August, 2012.

Lummi Nation

By _____
Clifford Cultee
Lummi Indian Business Council
Chairman

STATE OF WASHINGTON)
)ss:
COUNTY OF WHATCOM)

Before me, the undersigned Notary Public, personally appeared Clifford Cultee, to me known to be the Chairman of the Lummi Indian Business Council, and acknowledged to me that he executed the above instrument on behalf of the Lummi Nation as his free and voluntary act and with knowledge of its contents for the purposes therein expressed.

WITNESS my hand and official seal this 3rd day of August, 2012.



_____
Notary Public, State of Washington
My commission expires 11/4/13

The Northwest Indian Fisheries Commission does hereby accept the above Grant Deed of Conservation Easement this 1st day of August, 2012.

Northwest Indian Fisheries Commission

By _____
Michael Grayum
Northwest Indian Fisheries Commission
Executive Director

STATE OF WASHINGTON)
Thurston)ss:
COUNTY OF ~~WHATCOM~~)

Before me, the undersigned Notary Public, personally appeared Michael Grayum, to me known to be the Executive Director of the Northwest Indian Fisheries Commission, and acknowledged to me that ~~s/he~~ executed the above instrument on behalf of the Northwest Indian Fisheries Commission as ~~his/her~~ free and voluntary act and with knowledge of its contents for the purposes therein expressed.

WITNESS my hand and official seal this 1st day of August, 2012.

TAMARA L. HALE NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 7-01-14

_____
Notary Public, State of Washington TAMARA L. HALE
My commission expires 7/1/2014

BIA SECTION 81 APPROVAL

I, Judith R. Joseph, Superintendent of the Puget Sound Agency, Bureau of Indian Affairs, being the duly authorized representative of the Secretary of the Interior, approve this grant and conveyance pursuant to the requirements of 25 U.S.C. 81 and 25 C.F.R. Part 84.

_____
Superintendent

_____
Date 9/28/12

The land within Lummi Nation Wetland and Habitat Mitigation Bank Phase 1A Conservation Easement is recorded in the Office of Indian Affairs in Volume _____, Page _____, Indian Land Deed Book.

EXHIBIT A. Legal Description of the Protected Property

The legal description of the protected property is set forth below in the form of a Title Status Report prepared by the Bureau of Indian Affairs based on an Amended Protraction Diagram prepared by the Bureau of Land Management. The Phase 1A site of the Lummi Nation Wetland and Habitat Mitigation Bank is wholly contained within the Amended Protraction Diagram. However, the Phase 1A site does not include portions of the Amended Protraction Diagram located in the northwest quarter of Section 17 (Protraction Block 38) on the west side of the Nooksack River or portions of the Amended Protraction Diagram located in the northeast quarter of Section 18 (Protraction Block 39). These two excluded areas comprise approximately 22 acres.

DATE: 7/06/2011
TIME: 15:20:12 CST

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
TITLE STATUS REPORT
TITLE INTERESTS HELD IN FEE OR TRUST

REQUESTOR: DWILSON

TRACT ID: LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	DATE OF LAST CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

SEC	TOWNSHIP	RANGE	STATE	COUNTY	MERIDIAN	LEGAL DESCRIPTION	ACRES	CUMULATIVE ACRES	LAND DESCRIPTION NOTES REMARK OR EXPLANATION
16	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		3.090	3.090	
17	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		409.600	412.690	
18	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		130.260	542.950	
19	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		117.610	660.560	
20	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		198.020	858.580	
21	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		5.580	864.160	

METES AND BOUNDS: UNSURVEYED TIDELANDS AND WATER AREA IDENTIFIED AS PROTRACTION BLOCK 37 (NO WATER AREA) IN SECTION 16; BLOCK 38 (ACREAGE 350.99 + WATER AREA OF 58.61) IN SECTION 17; BLOCK 39 (ACREAGE 116.27 + WATER AREA OF 13.99) IN SECTION 18; BLOCK 40 (ACREAGE 91.66 + WATER AREA OF 25.95) IN SECTION 19; BLOCK 41 (ACREAGE 169.67 + WATER AREA OF 28.35) IN SECTION 20 AND BLOCK 42 (NO WATER AREA) IN SECTION 21, ALL IN TOWNSHIP 38 NORTH, RANGE 2 EAST, WILLAMETTE MERIDIAN, WHATCOM COUNTY, WASHINGTON, CONTAINING ANAGGREGATED 864.16 ACRES, MORE OR LESS, ACCORDING TO BLM AMENDED PROTRACTION DIAGRAM DATED MAY 3, 2010, RECORDED OCTOBER 14, 2010 UNDER BIA DOCUMENT NO. 107-2927.

TOTAL SECTION ACRES: 864.160 864.160

OWNER TRB	NUM/DOB	TYP	OT	INT	CLS	DOCUMENT TYP	DOCUMENT NUMBER	NAME IN WHICH ACQUIRED SURNAME / FIRST NAME	FRACTION TRACT AS ACQUIRED	AGGREGATE SHARE CONVERTED TO LCD	AGGREGATE DECIMAL
107	XXXXXXXXX	T	R	A	04	AT	2944	LUMMI INDIAN NATION	1	1	
									1	1	1.0000000000

--------TRACT ID--------							-------DATE OF LAST-------
LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

-------- OWNER --------				--- DOCUMENT ---		NAME IN WHICH ACQUIRED	FRACTION TRACT	AGGREGATE SHARE	AGGREGATE
TRB	NUM/DOB	TYP	OT INT	CLS	TYP	NUMBER	SURNAME / FIRST NAME	AS ACQUIRED	CONVERTED TO LCD	DECIMAL
								IN TRUST:	1	
									1	1.0000000000
								IN FEE:	0	
									1	.0000000000
								TOTAL:	1	
									1	1.0000000000

TITLE IS SUBJECT TO THE FOLLOWING ENCUMBRANCES AND NOTES:

NO TRACT NOTES FOUND

NO REALTY DOCUMENTS FOUND

NATURE OF ENCUMBRANCE	ENCUMBRANCE HOLDER	EXPIRATION DATE	----- DOCUMENT ----- CLS	TYP	NUMBER	DESCRIPTION / EXPLANATION
CERTIFICATE OF SURVEY	BLM		14	CD	2927	BLM AMENDED PROTRACTION DIAGRAM APPROVED 5/3/2010 CHANGES THE LEGAL DESCRIPTION AND/OR ACREAGE OF SUBJECT PROPERTY. SEE DOCUMENT FOR PARTICULARS.
		IMAGE NO.: SCANNED				

DATE: 7/06/2011
TIME: 15:20:13 CST

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
TITLE STATUS REPORT
TITLE INTERESTS HELD IN FEE OR TRUST

TRACT ID							DATE OF LAST
LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

AS OF THE 6th DAY OF July, 2011, THE FOREGOING CONSISTING OF 3 PAGES, IS A TRUE AND CORRECT REPORT OF THE STATUS OF THE TITLE TO THE REAL ESTATE DESCRIBED HEREIN ACCORDING TO THE OFFICIAL LAND RECORDS MAINTAINED IN THIS OFFICE.

THIS REPORT DOES NOT COVER ENCROACHMENTS, OR QUESTIONS OF LOCATION, BOUNDARY, ACCURATE SURVEY MAY DISCLOSE; RIGHTS OR CLAIMING TO BE IN POSSESSION; EASEMENT ENCUMBRANCES, INCLUDING, BUT NOT LIMITED TO IRRIGATION CHARGES, UNPAID CLAIMS, WHICH ARE NOT FILED FOR RECORD IN THIS OFFICE; ANY OTHER RIGHTS WHICH MIGHT BE PHYSICAL INSPECTION OF THE PREMISES.

BY AUTHORIZED BY

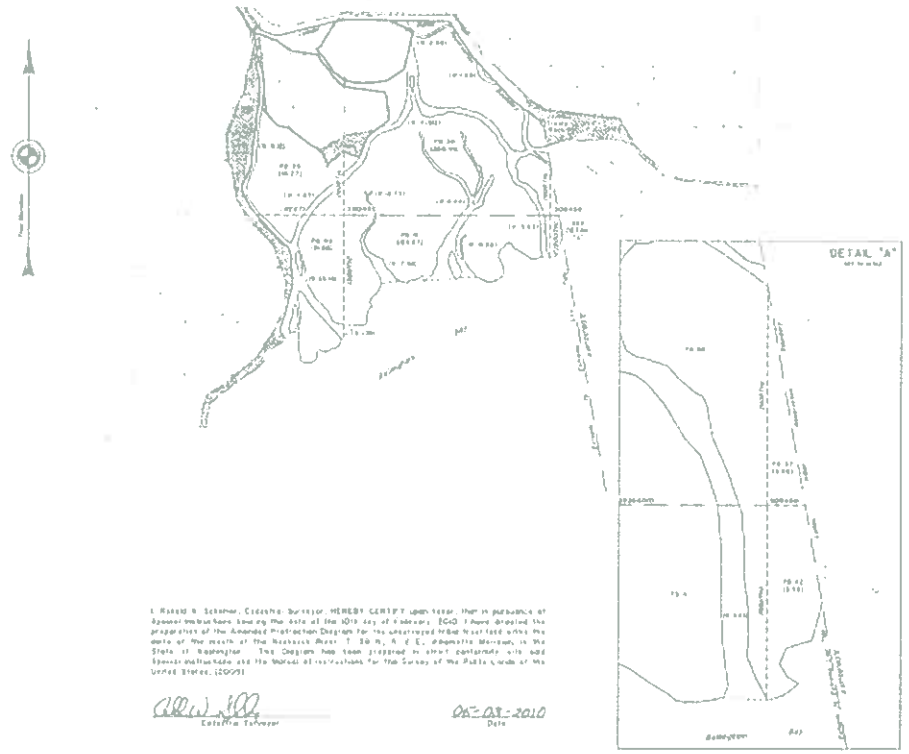
REGIONAL LAND TITLES AND RECORDS OFFICE
PORTLAND, OR

* * * * END OF REPORT * * * *

ORIGINAL

TOWNSHIP 38 NORTH, RANGE 2 EAST, OF THE WILLAMETTE MERIDIAN, WASHINGTON

AMENDED PROTRACTION DIAGRAM FILE 35, UNIT II
LUMMI INDIAN RESERVATION
UNSURVEYED



This protraction diagram was prepared for the express purpose of demarcating unsurveyed trust and fee lands and does not constitute an official survey but establishes the plan for extending the rectangular survey system over unsurveyed Indian trust lands within the delta of the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This diagram may be used for leasing and administrative purposes only.

The actual area of protracted tracts #35 shown on this diagram may vary due to the possibility of the survey information used to determine the position of existing survey boundaries and accuracy of the data used to determine the line of Mean High Water. Where a protracted block is bounded by a water body, creating two or more separate parcels of ground within the boundaries of the block, these separate parcels will be combined and a single area reported for the block. A separate water body will be reported for each water segment within the block. A protracted block cannot be subdivided without an official survey. The sections and lots on this diagram might have the area they be surveyed, but still that have they will continue to be characterized words. Each above a proportionate (1) are proposed alternatives for the plan of survey and subject to change.

The line of mean high water was determined from FOOT LOAD data held in the GIS library of the Lummi Nation. Mean high water is 7.70 feet above mean lower low water. Where exceptions have formed to obtain lands bounding this protraction it has been shown as "Accretions to ground not a part of this protraction". To determine the exact extent of the accretions an official investigation will be necessary.

Latitudes and longitudes were computed to portray standard protracted corners using an elevation of 10 feet for the township.

This Diagram was prepared under the direction of Roland W. Schanno, Cadastral Surveyor, beginning February 11, 2010, and completed February 22, 2010, pursuant to Special Instructions dated February 10, 2010, and approved February 11, 2010, and Supplemental Instructions dated February 8, 2010, to bring the N.S.S. Geodetic

NAD 1983

Point ID	Latitude (N)	Longitude (W)
200400	48°46'32.4229"	122°35'42.2443"
500400	48°46'32.4229"	122°34'23.4981"

LEGEND

- Surveyed Lines (Boundary of Protracted Areas)
- Mean High Water
- Historic Protracted Lines
- Protracted Lines
- (0.41.60) Water Area
- Boundary of Surveyed Lands
- Accretions to upland, not a part of the protraction

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Portland, Oregon

The diagram represents the official protraction of the rectangular system of surveys and is hereby accepted

For the Director

Mary J. M. Hartel

Chief Cadastral Surveyor of Washington

May 3, 2010
Date

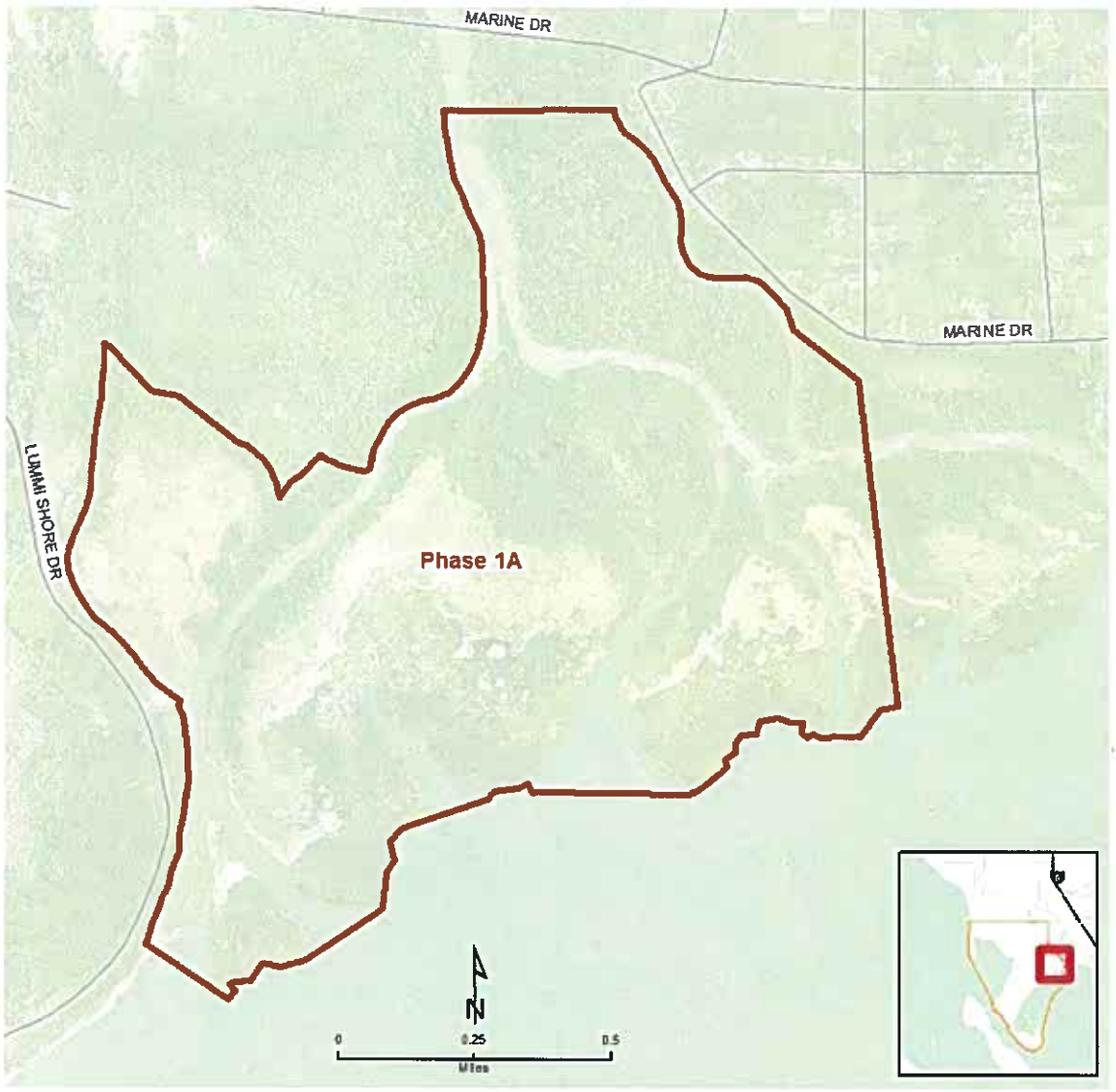
I, Roland W. Schanno, Cadastral Surveyor, HEREBY CERTIFY that I am pursuant of Special Instructions bearing the date of the 10th day of February, 2010, I have compiled the projection of the Amended Protraction Diagram for the unsurveyed tribal trust lands within the delta of the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This Diagram has been prepared in strict conformity with said Special Instructions and the Manual of Instructions for the Survey of the Public Lands of the United States, 2009.

Catherine Tarver

02-02-2010
Date

Scale in Feet

EXHIBIT B. Map of the Protected Property



Lummi Nation Wetland and Habitat Mitigation Bank Phase 1A

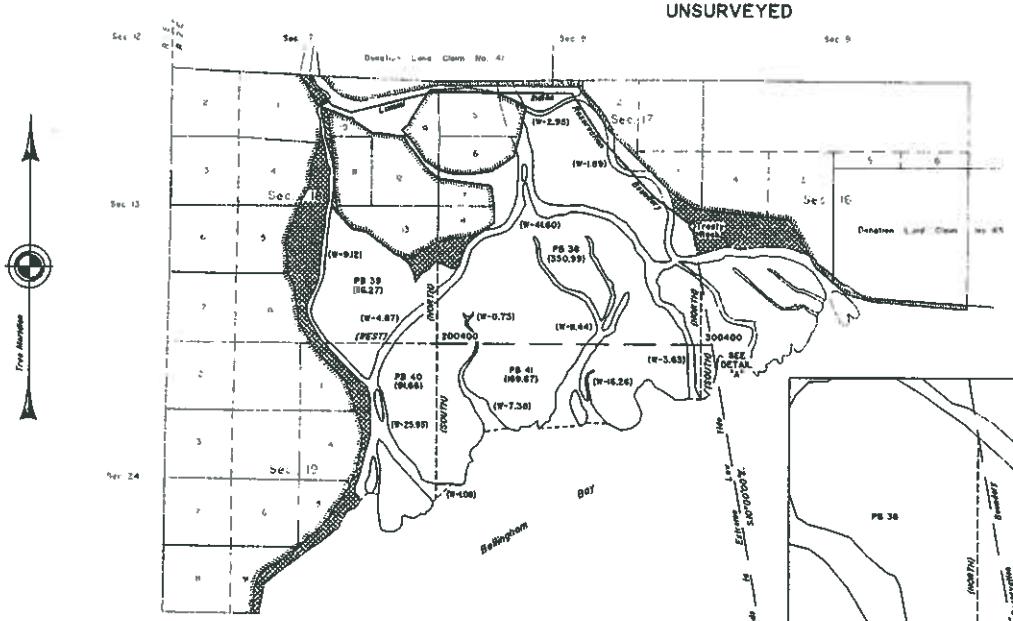
Exhibit C. Easements, Restrictions, Interests and Water Rights of Record

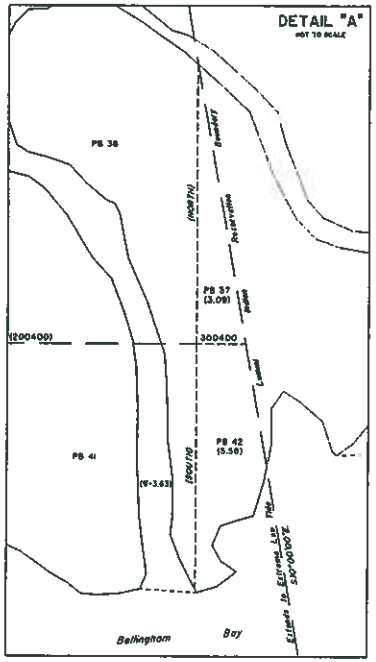
There are no known easements, restrictions, interests or water rights of record associated with the Lummi Nation Wetland and Habitat Mitigation Bank Phase 1A site.

ORIGINAL

TOWNSHIP 38 NORTH, RANGE 2 EAST, OF THE WILLAMETTE MERIDIAN, WASHINGTON

AMENDED PROTRACTION DIAGRAM FILE 35, UNIT II
LUMMI INDIAN RESERVATION
UNSURVEYED





I, Ronald W. Scherler, Cadastral Surveyor, HEREBY CERTIFY upon honor, that in pursuance of Special Instructions bearing the date of the 10th day of February, 2010, I have directed the preparation of the Amended Protraction Diagram for the unsurveyed tribal trust land within the delta of the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This Diagram has been prepared in strict conformity with said Special Instructions and the Manual of Instructions for the Survey of the Public Lands of the United States, (2009).

Cadastral Surveyor

05-03-2010
Date

1000 500 0 1000 2000 3000 4000 5000
Scale in Feet

This protraction diagram was prepared for the express purpose of describing unsurveyed tribal trust land. It does not constitute an official survey but establishes the plan for extending the rectangular survey system over unsurveyed tribal trust land within the delta of the mouth of the Nooksack River, T. 38 N., R. 2 E., Willamette Meridian, in the State of Washington. This diagram may be used for leasing and administrative purposes only.

The actual area of protracted blocks (PB) shown on this diagram may vary due to the reliability of the survey information used to determine the position of existing survey boundaries and accuracy of the data used to determine the line of Mean High Water. Where a protracted block is bisected by a water body creating two or more seperate parcels of upland within the boundaries of the block, these seperate parcels will be combined and a single area reported for the block. A separate water area will be reported for each water segment within the block. A protracted block cannot be subdivided without an official survey. The sections and lots on this diagram depict how the area may be surveyed; but until that time they will continue to be unsurveyed lands. Data shown in parenthesis () are proposed information for the plan of survey and subject to change.

The line of mean high water was determined from 2008 LiDAR data held in the GIS library of the Lummi Nation. Mean high water is 7.70 feet above mean lower low water. Where accretions have formed to upland parcels bounding this protraction it has been shown as "Accretions to upland, not a part of this protraction". To determine the exact extent of the accretions an official investigation will be necessary.

Latitudes and longitudes were computed to portray standard protracted sections using an elevation of 10 feet for this township.

This Diagram was prepared under the direction of Ronald W. Scherler, Cadastral Surveyor, beginning February 11, 2010, and completed February 22, 2010, pursuant to Special Instructions dated February 10, 2010, and approved February 11, 2010, and Assignment Instructions dated February 11, 2010, for Group No. 625, Washington.

NAD 1983

Point ID	Latitude (N)	Longitude (W)
200400	48°46'32.4229"	122°35'42.2443"
300400	48°46'32.4228"	122°34'23.4190"

LEGEND

- Surveyed Lines (Boundary of Protracted Area)
- Mean High Water
- Reliable Protracted Lines
- Protracted Lines
- (W-41.60) Water Area
- Boundary of Surveyed Lands
- Accretions to upland, not a part of this protraction

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Portland, Oregon

The diagram represents the official protraction of the rectangular system of surveys and is hereby accepted.

For the Director

Chief Cadastral Surveyor of Washington

May 3, 2010
Date

OFFICIALLY FILED:

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
TITLE STATUS REPORT
TITLE INTERESTS HELD IN FEE OR TRUST

--------TRACT ID-------- LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	-------DATE OF LAST------- CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

SEC	TOWNSHIP	RANGE	STATE	COUNTY	MERIDIAN	LEGAL DESCRIPTION	ACRES	CUMULATIVE ACRES	LAND DESCRIPTION NOTES REMARK OR EXPLANATION
16	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		3.090	3.090	
17	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		409.600	412.690	
18	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		130.260	542.950	
19	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		117.610	660.560	
20	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		198.020	858.580	
21	038.00N	002.00E	WASHINGTON	WHATCOM	Willamette		5.580	864.160	

METES AND BOUNDS: UNSURVEYED TIDELANDS AND WATER AREA IDENTIFIED AS PROTRACTION BLOCK 37 (NO WATER AREA) IN SECTION 16; BLOCK 38 (ACREAGE 350.99 + WATER AREA OF 58.61) IN SECTION 17; BLOCK 39 (ACREAGE 116.27 + WATER AREA OF 13.99) IN SECTION 18; BLOCK 40 (ACREAGE 91.66 + WATER AREA OF 25.95) IN SECTION 19; BLOCK 41 (ACREAGE 169.67 + WATER AREA OF 28.35) IN SECTION 20 AND BLOCK 42 (NO WATER AREA) IN SECTION 21, ALL IN TOWNSHIP 38 NORTH, RANGE 2 EAST, WILLAMETTE MERIDIAN, WHATCOM COUNTY, WASHINGTON, CONTAINING ANAGGREGATED 864.16 ACRES, MORE OR LESS, ACCORDING TO BLM AMENDED PROTRACTION DIAGRAM DATED MAY 3, 2010, RECORDED OCTOBER 14, 2010 UNDER BIA DOCUMENT NO. 107-2927.

TOTAL SECTION ACRES: 864.160 864.160

-------- OWNER -------- TRB	NUM/DOB	TYP	OT	INT	CLS	--- DOCUMENT --- TYP	NUMBER	NAME IN WHICH ACQUIRED SURNAME / FIRST NAME	FRACTION TRACT AS ACQUIRED	AGGREGATE SHARE CONVERTED TO LCD	AGGREGATE DECIMAL
107	XXXXXXXXX	T	R	A	04	AT	2944	LUMMI INDIAN NATION	1	1	
									1	1	1.0000000000

--------TRACT ID--------

LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	-------DATE OF LAST------- CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

-------- OWNER -------- TRB	NUM/DOB	TYP	OT	INT	--- DOCUMENT --- CLS	TYP	NUMBER	NAME IN WHICH ACQUIRED SURNAME / FIRST NAME	FRACTION TRACT AS ACQUIRED	AGGREGATE SHARE CONVERTED TO LCD	AGGREGATE DECIMAL
									IN TRUST:	1	
										1	1.0000000000
									IN FEE:	0	
										1	.0000000000
									TOTAL:	1	
										1	1.0000000000

TITLE IS SUBJECT TO THE FOLLOWING ENCUMBRANCES AND NOTES:

NO TRACT NOTES FOUND

NO REALTY DOCUMENTS FOUND

NATURE OF ENCUMBRANCE	ENCUMBRANCE HOLDER	EXPIRATION DATE	----- DOCUMENT ----- CLS	TYP	NUMBER	DESCRIPTION / EXPLANATION
CERTIFICATE OF SURVEY	BLM		14	CD	2927	BLM AMENDED PROTRACTION DIAGRAM APPROVED 5/3/2010 CHANGES THE LEGAL DESCRIPTION AND/OR ACREAGE OF SUBJECT PROPERTY. SEE DOCUMENT FOR PARTICULARS.
		IMAGE NO.: SCANNED				

--------TRACT ID-------- LAND AREA	PFX	NUMBER	SFX	TITLE PLANT	LAND AREA NAME	RESOURCES	-------DATE OF LAST------- CERTIFICATION/VERIFICATION
107	T	1045		PORTLAND	LUMMI	Both	7/6/2011

AS OF THE 6th DAY OF July, 2011, THE FOREGOING CONSISTING OF 3 PAGES, IS A TRUE AND CORRECT REPORT OF THE STATUS OF THE TITLE TO THE REAL ESTATE DESCRIBED HEREIN ACCORDING TO THE OFFICIAL LAND RECORDS MAINTAINED IN THIS OFFICE.

THIS REPORT DOES NOT COVER ENCROACHMENTS, OR QUESTIONS OF LOCATION, BOUNDARY, ACCURATE SURVEY MAY DISCLOSE; RIGHTS OR CLAIMING TO BE IN POSSESSION; EASEMENT ENCUMBRANCES, INCLUDING, BUT NOT LIMITED TO IRRIGATION CHARGES, UNPAID CLAIMS, WHICH ARE NOT FILED FOR RECORD IN THIS OFFICE; ANY OTHER RIGHTS WHICH MIGHT BE PHYSICAL INSPECTION OF THE PREMISES.

EXAMINED BY

MANAGER, LAND TITLES AND RECORDS OFFICE
PORTLAND, OR

* * * * END OF REPORT * * * *

DOCUMENT TRANSMITTAL MEMO

TO: Portland Title Plant **DATE:** September 28, 2012

FROM: ___Puget Sound Agency – P10, NW Region_____

Please record the attached document and:

Received
OCT 1 - 2012
Northwest Title Plant

__X_ Return ____Other (Specify) _____
___ Retain in title plant ____ Create New Suffix/Partition

Reservation Code: ____107_____ **Tract No:** _____T1045____

Type of Document (Code No.): _____ROW___

Agency's File No. (If any): _____107 00084312PT_____

X-Reference to Document No: _____
(Satisfaction, completion, cancellation, modification, assignment, etc.)

TRANSMITTAL ACKNOWLEDGEMENT

TO: PSA **DATE:** OCT 11 2012

FROM: Portland Title Plant

The document identified above has been recorded as number:

107-00084312PT **and is:**

X Returned herewith
___ Retained
___ Other – Specify _____

SCOTT BEAUVAIS
_____
Authorized Signature

Remarks:

Date Recorded: OCT 11 2012

29

107FA-01130

FORM A
TAAMS Encoding Tracking Document
Bureau of Indian Affairs – Northwest Region

ENCODING

1.Type of Contract.

- ☐ a. Leasing (Business, Housing, Agricultural, etc.)
- ☐ b. Range Permit
- ☐ c. Forestry
- ☐ d. Right of Way
- ☐ e. Minerals
- ☐ f. Revocable Permit

Received
OCT 1 - 2012
Northwest Title Plant

2. Agency assigned contract number: 107 00084312 PT
(10 digits)

Type of transaction: ROW ~~BUSINESS~~ Easement

Indicate number of tracts: 1 Total acres: 22.0

1. LTRO document record number: None
Indicate NONE, if not recorded in LTRO

Date recorded in LTRO: _____

4. Encoding performed by: Leora Circle Date: 9/24/12

5. Attach comments/issues:

107 T1045

Superintendent Approval
DATE 9/28/12

Northwest Indian Fisheries Commission 107C25 0021

REVIEW, QUALITY ASSURANCE, APPROVAL, AND RECORDATION

1. Agency QA: _____ Date: 9/24/12
2. Superintendent (or Designee): _____ Date: 9/28/12
3. LTRO Recording: EDWARD LYONS JR. Date: OCT 11 2012
4. LTRO Doc # of expired lease in TAAMS: _____ Date: _____
5. LTRO Date sent back to Agency coordinator Date: _____

6. Agency tracking system update completed Date: _____

Exhibit 14

Conservation Easement
Nooksack Delta Site Phase 1B

(To Be Developed)

Exhibit 15

Conservation Easement
Blockhouse Site
(To Be Developed)

Exhibit 16

Conservation Easement
Lummi Delta Site
(To Be Developed)