Historical Photograph of
Tribal Members in a Canoe

CHAPTER 4: ENVIRONMENT

Background

Tribal ancestors knew that their survivability was directly tied to the health of the environment. The land, water, and the Creator provided them everything necessary to survive. Tribal Elders taught that "when the tide was out, the table was set" and to only take what was needed. It has always been of prime importance to Tribal people and the wisdom of Tribal Elders to take care of the environment so it can continue to take care of us. The Tribal economy was subsistence-based, in that currency was not needed to be strong. Wealth was not measured by what one owned or acquired, but rather by what one gave.

Settlement and development within the Salish Sea Eco Region has illuminated the importance of environmental health. The diminished salmon runs, poor water quality in Tulalip Bay, and loss of important plant species has had an adverse impact upon the environment of the Reservation and subsequently the strength of the Tulalip Tribes. Once the environment is altered, it is extremely difficult and expensive to restore.

Tribal members understand the relationships between the air, land, water and all of the people on the Reservation. Tribal members also can see that the land area on the Reservation is not endless and that development must be balanced with management of environmental resources. Stewardship allows continuation of cultural practices and traditions passed down from previous generations to future generations.

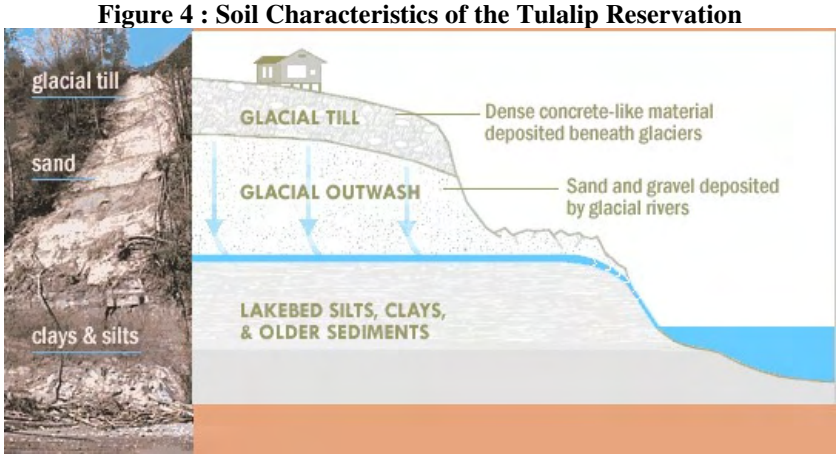
Development needs to be located not only to avoid damage to the environment, which is the basis of Tribal culture, but also to avoid areas that may be more costly to develop or where the investment in property may be lost due to natural events such as flooding or earth movement.

Geology and Soils

Approximately 14,000 years ago the Vashon Glacier was covering the Reservation with about 3,000 feet of ice. This glacier carved out a trough and when it melted the sea level rose 300 feet, filling the trough and creating what we now know as Puget Sound. The top layer is Vashon Till and can be found to depths up to 30 feet. Below the Vashon till is Esperance Sand underlied by Lawton Clay. Vashon Till is a stable mix of rocks, dirt, clay and sand that has the consistency of concrete. Esperance Sand is a permeable mixture of sand and gravel. Lawton Clay is an impermeable layer of clay, which is made up of fine sediments and large boulders. The ability of the Reservation to support development is dependant on the depth and composition of these layers on any given site.

Figure 4 shows the typical cross-section of the land beneath the Reservation, which is formed primarily from glacial deposits of various depths. This glacial till makes it difficult to construct a functioning septic system without special design. The glacial outwash material makes an excellent aquifer if the area that feeds it is kept in a natural state. Glacial outwash is often rich in minerals and can provide an excellent economic boost to the Tribe. Another characteristic of glacial outwash is that it can have severe slope failure when exposed to the forces of erosion or poor on-site drainage design.

Figure 4 : Soil Characteristics of the Tulalip Reservation



Source: Washington State Department of Ecology, 2008

Climate

The Tulalip Reservation has the temperate climate typical of the Puget Sound coastal lowlands. Summers are dry with mild temperatures, and winters are rainy with occasional snow. The average temperature for January is 38° F and 63° F for July. Summer highs can reach the high 90s, while winter lows can reach 0° F. Average annual rainfall is approximately 35 inches.

Winds vary in direction, but are predominantly southerly and westerly. Winter winds average 25 mph, with gusts up to 50 mph not uncommon. Air inversions and periods of stagnation occur for short periods during the winter, resulting in regional burn bans and other pollution control measures. Fog may occur in low lying areas such as Tulalip Bay and the Snohomish River delta due to the proximity of Puget Sound.

Rivers, Stream Courses, and Lakes

Map 4-1 shows stream courses and lakes on the Reservation. All streams flow to Puget Sound. Of particular interest to the Tribe is Tulalip Bay for cultural and environmental reasons. The Reservation also contains a few ponds and lakes such as Weallup Lake, Ross Lake, John Sam Lake, Mary Shelton Lake, Lake Agnes, and Fryberg Lake.

The Snohomish River's delta forms the southern boundary of the Reservation along Steamboat Slough. The Snohomish River has an average annual discharge of 3,945 cubic feet of water per second and is a major producer of several species of salmon, including steelhead, and trout. Development is limited near the delta of the Snohomish due to tidal influences. The river deposits debris and sediment along the mouth of the river and into Possession Sound adjacent to the Reservation's coast.

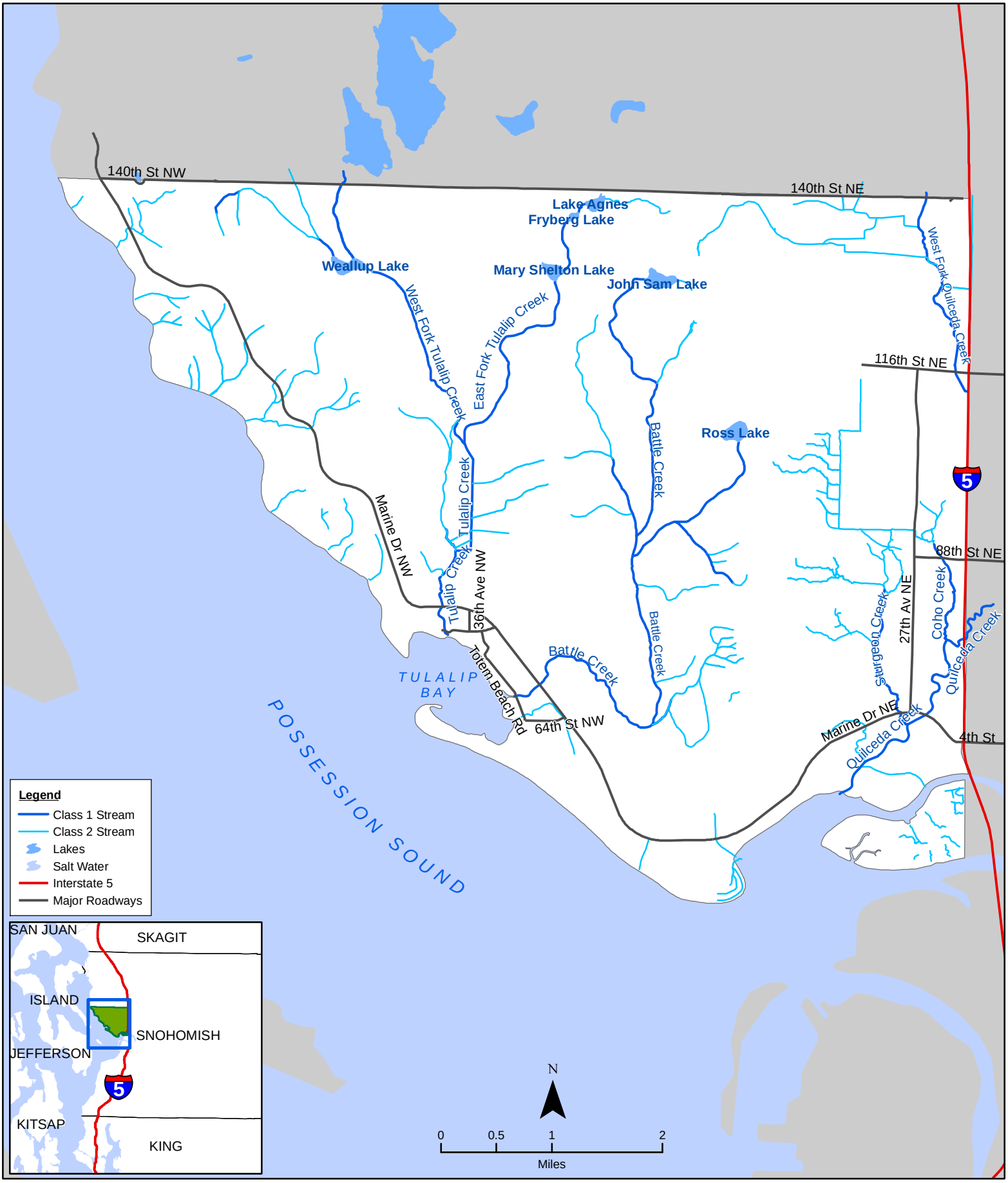
Water Resources

Surface water and ground water are some of the most precious Reservation resources. Water sustains fish and wildlife habitat, wetlands, forests, and people. Water bodies on the Reservation are fed by precipitation, groundwater and freshwater flow within the Reservation and from the north and the east of the Reservation. Water resources on the Reservation include:

- Groundwater
- Streams
- Lakes
- Ponds

- Wetlands
- Port Gardner
- Port Susan
- Possession Sound
- Snohomish River Estuary

There are three aquifers on the Reservation: a shallow upper aquifer (Qvr), a middle aquifer (Qva), and a deep aquifer (Qu) (**Figure 5**)**.** The majority of wells on the Reservation are drilled into the middle aquifer, which is found from 0 to 250 feet below ground level. The middle aquifer is also an important source of baseflow during summer months for Tulalip, Battle, and Quil Ceda creeks.



Map 4-1 Streams and Lakes

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Oct 17, 2008

Data Source:
Tulalip Tribes Natural Resources,
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Map Path: M:\GISData\Maps\Projects\CompPlan\2008\10-17-08\4-1_Stream and Lakes_10-17-08.mxd

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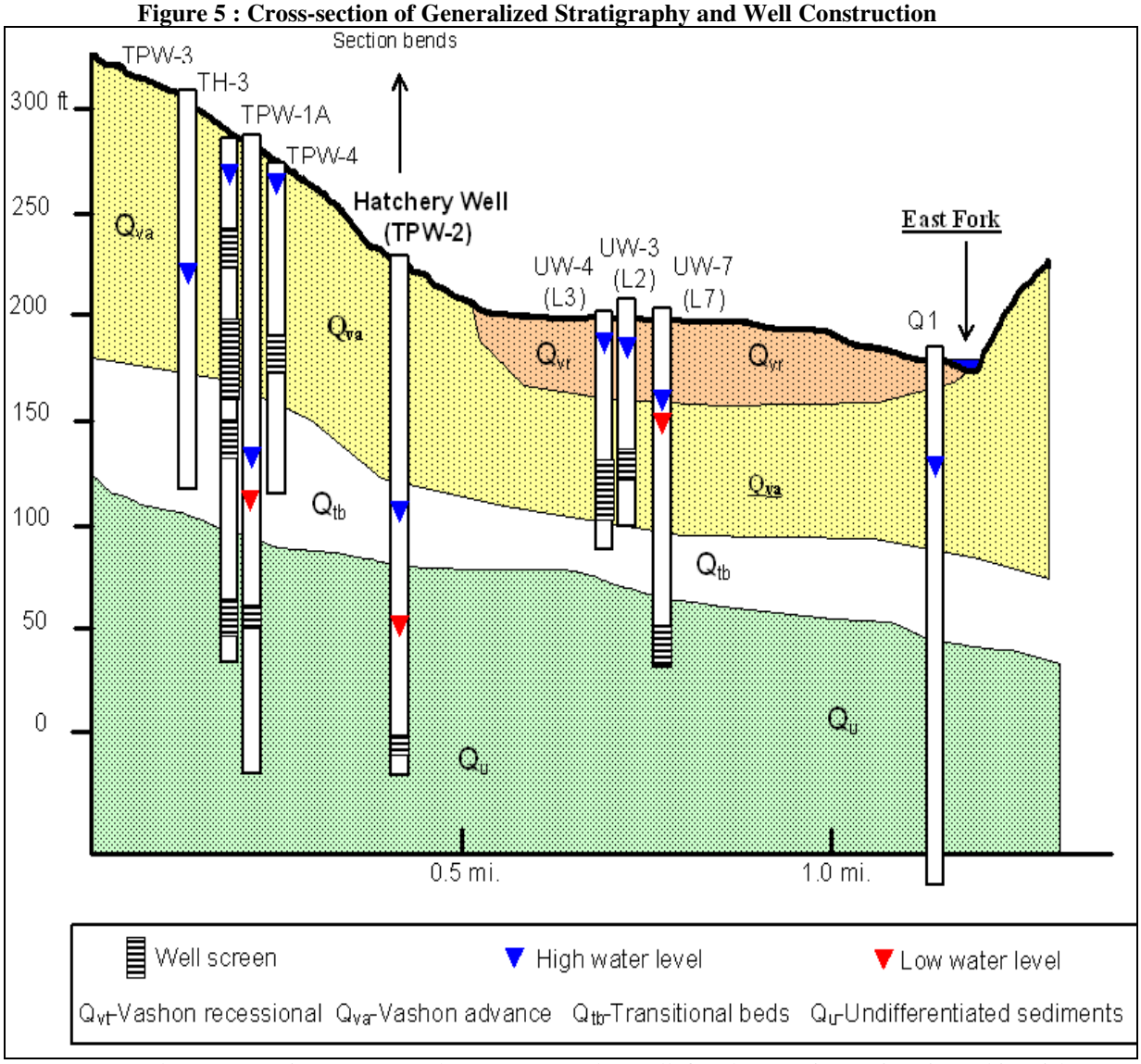
Figure 5 : Cross-section of Generalized Stratigraphy and Well Construction



Source: Groundwater Pumping Tests on the Water Supply Well for the Bernie "Kai Kai" Gobin Fish Hatchery, October 2005

In order to protect the quality of stream flow and its characteristics, it is necessary to protect streams, wetlands, and aquifer recharge areas - locations that filter and store water. The Tribe must develop a plan to control the location of wells and installation of septic systems on the Reservation to protect groundwater resources both from overuse and ground contamination.

There is an interconnection between groundwater and surface water impacting one can negatively affect the quality of the other. Groundwater and wetlands provide the majority of stream flow on the Reservation during the summer or “base flow period”. Battle Creek, Tulalip Creek, and Quil Ceda Creek all rely on discharge from the middle aquifer. The amount of discharge from this aquifer is influenced by volumes of groundwater

pumped from wells and land use that either disrupts recharge of water into the aquifer or drilling wells that require water from the aquifer.

Map 4-2 shows the five separate drainage basins on the Reservation. The Reservation is largely drained by three stream systems: Tulalip Creek, Battle Creek, and Quilceda Creek. The Stillaguamish coastal drainage basin drains a very small portion of the northwest Reservation. The Tulalip drainage basin, covers the western two-thirds of the Reservation, and is drained by Tulalip Creek and Battle Creek (also known as Mission Creek). Sturgeon and Quil Ceda Creeks drain the Quil Ceda drainage basin, in the southeastern part of the Reservation. Quil Ceda Creek is an important cultural resource for the Tribe and is affected by pollution and urban waste runoff. This creek is the largest on the Reservation, and was once the location of significant runs of salmon. Several small independent coastal drainages occupy the Reservation western and southern coast line (e.g. Spee-Bi-Dah, White Rock).

Water Quality and Quantity

The primary issues affecting the health of water resources on the Reservation is the loss of wetlands, pollution, hydrologic modification, and overuse. In order to protect water quality and quantity, it is critical to protect both groundwater and surface water resources. Ground and surface water resources on the Reservation also affect water quality in Tulalip Bay and Puget Sound, which in turn impact fish and shellfish resources.

To protect groundwater and surface water quality and quantity on the Reservation, including areas adjacent to the Reservation that have an effect on Reservation water resources, the following actions are recommended:

- Maintain and restore forest cover and canopies in all watersheds and stream basins to the maximum extent possible
- Protect critical groundwater recharge areas such as the Qva aquifer by purchase or regulatory action
- Protect streams, lakes, wetlands and their associated buffers from development
- Ensure that there is no net loss of wetlands function and acreage in the short-term and in the long-term; achieve a measurable gain of wetlands function and acreage
- Reduce pollution from point and non-point sources such as septic systems and stormwater runoff from developed and agricultural lands
- Provide adequate culverts and bridges at all road crossings
- Remove or minimize the impacts of in-stream structures (e.g. dams, utilities) that result in hydrologic modifications to surface water flow

Map 4-2 Drainage Basins

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Data Source:
Snohomish County GIS Department,
1996 Tulalip Watershed Management Plan
Tulalip Tribes Community Development,
Tulalip Data Services GIS

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- Develop a plan for the location and use of wells and other water use facilities to conserve groundwater supplies and stream flow on the Reservation

- Establish and enforce environmental protection measures that preserve or enhance streams, lakes, wetlands, and ground water and surface water quality and quantity

Natural Fish Resources

The Tulalip Reservation waters were historically rich in finfish and shellfish resources. These resources have been much reduced over the past century through the loss of habitats largely outside the Reservation boundary and because of historically poor resource management by state, county, and Federal agencies. Today, some of the most important fisheries habitats in Puget Sound are located within the Reservation Boundaries (e.g. Quilceda Estuary, undeveloped shorelines). These habitats along with wetlands, rivers, streams, lakes, and ponds within the Reservation still provide crucial habitat to those fisheries resources that remain. These resources still form an important part of the social, cultural, and economic fabric of the Tulalip Tribes. And these resources are dependent upon maintaining healthy water quantity and quality conditions, maintaining and improving wetland conditions, maintaining buffers and forest lands, and minimizing the impact of development. The protection and restoration of these remaining habitats within the Reservation can potentially serve as a catalyst to the recovery of fisheries resources in the greater Snohomish River region.

Freshwater and marine waters provide forage, shelter and spawning habitats to finfish (e.g. sturgeon, starry flounder) and shellfish resources used by the Tribal community. The Reservation is located at the northern boundary of the Snohomish River estuary. The estuary provides critical habitat to juvenile salmon, shellfish, forage fish, as well as other fin-fishes. The river, tidal channels, and wetlands provide forage, shelter, and nursery habitats to these species.

The eastern third of the reservation drains into Quilceda Creek and its tributaries. Streams and wetlands within this portion of the Reservation provide spawning and rearing habitats to naturally spawning salmon, including the Chinook salmon, bull trout, and steelhead trout which are listed as Endangered Species by the Federal government.

Streams, wetlands, and lakes within the Tulalip Creek and Battle Creek basins provide important habitat to resident cutthroat and rainbow trout. The use of these two basins by salmon has been eliminated for hatchery enhancement purposes. The quantity and quality of waters from Tulalip Creek, Battle Creek and smaller coastal drainages provide important freshwater sources to coastal shoreline environments important to shellfish, forage fish, and migrating salmon.

To minimize the impact of development on fisheries resources and their habitats the Tribe should:

- Avoid, minimize, and mitigate potential impacts to wetlands, streams, rivers, ponds, shorelines, and lakes
- Establish and enforce environmental protection measures that preserve, restore, and enhance fish habitats on the Reservation and associated riparian lands, and groundwater resources that supply or surround them
- Maintain adequate space (buffers) between developments and fish habitats
- Restore, rehabilitate, and enhance habitats required by finfish and shellfish resources utilized by the Tribal community

Hatchery

The Tulalip Tribes Bernie "Kai-Kai" Gobin Salmon Hatchery (Hatchery), located in the Reservation interior along Tulalip Creek, was built in 1980 and produces over eight million salmon every 12 to 18 months. The Hatchery relies on water from the east and west forks of Tulalip Creek and pathogen-free groundwater pumped from a well. The main rearing facility is located between the east and west forks of Tulalip Creek **(see Map 4-3)**. The Upper and Lower Tulalip Creek ponds - which are also a part of the Hatchery - are located at the Tulalip Bay area **(see Map 4-4)**.

Egg incubation and fish rearing require a reliable supply of cold, clean water. The incubation process utilizes well water exclusively. This well water source is vital to hatchery operations providing a constant supply of 48-degree water. Well water is mixed with creek water as needed to adjust temperatures and volumes in rearing troughs and ponds. Extraction of water from the aquifer for non-Hatchery related use could potentially deplete the aquifer supply available to the Hatchery.

The Hatchery program requires a reliable water source that is sustainable in quality and quantity. To maintain this water source, the critical watersheds and groundwater recharge zones must be protected and maintained. These include surface and ground waters located above and below the hatchery, including lakes, groundwater recharge zones, marsh lands, and grounds surrounding hatchery facilities. Maintaining a reliable clean water supply to the Hatchery may be threatened by development pressures in the Tulalip Creek Watershed.

Land alterations that are not adequately controlled within the watershed can cause a variety of potential problems. These problems include increased surface water temperatures, reduced stream flow volumes, reduced groundwater volumes, and increased pollution (which can be caused by failing septic systems, aging utility lines, livestock, pets, and fertilizers). These alterations include: surface water temperatures and

Map 4-3 Bernie Kai-Hai Gobin Hatchery Water Supply and Intake Ponds

0 250 500 1,000
Feet

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Data Source:
Tulalip Tribes Natural Resources Department,
Snohomish County GIS Department

Map Path: M:\GISData\Maps\Tulalip\Projects\CompPlan\2008\10-17-08\4-3_NorthernHatchery_Oct08.mxd

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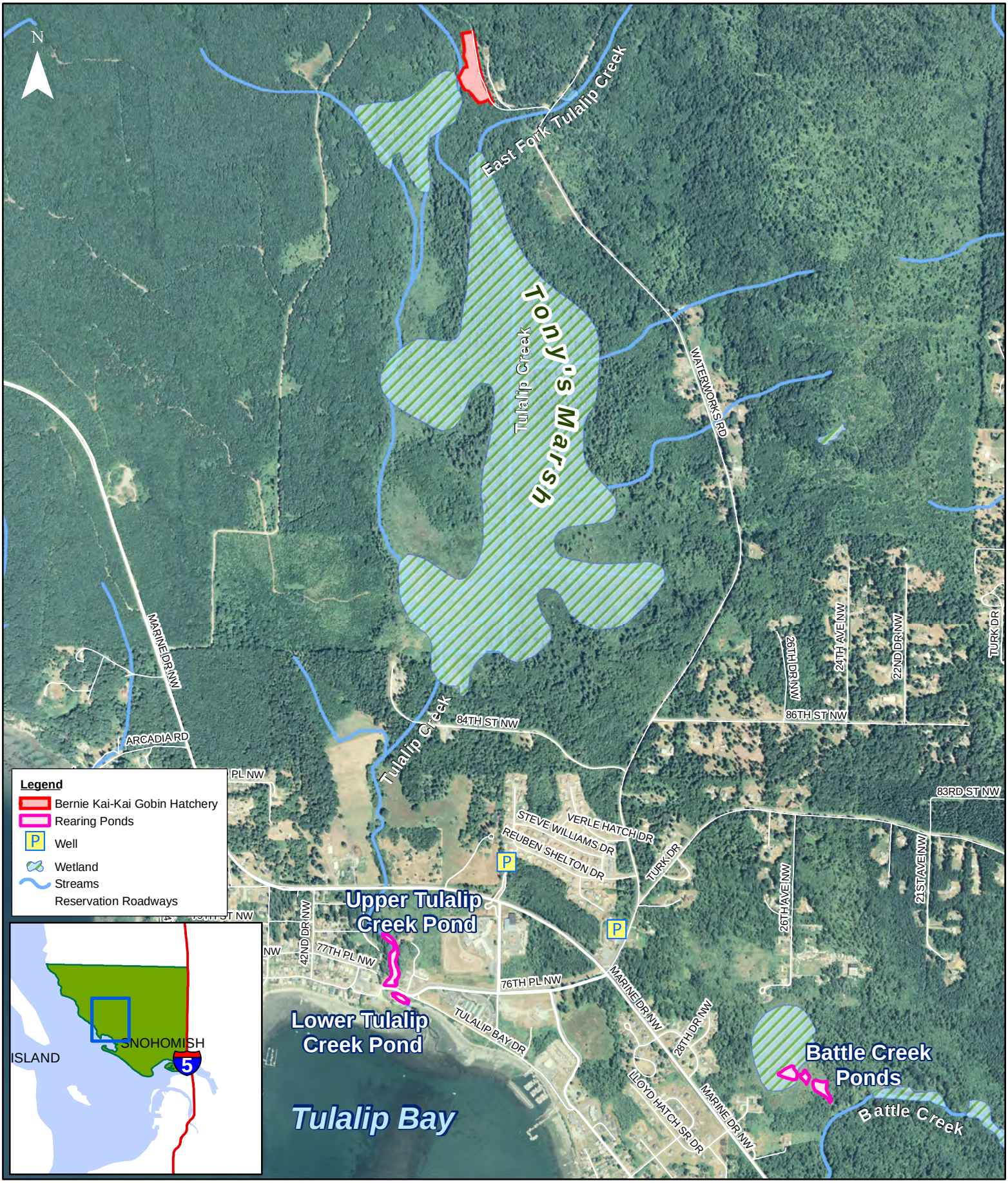

Map 4-4 Bernie Kai-Kai Gobin Hatchery Water Supply and Rearing Ponds

0 0.125 0.25 0.5
Miles

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Data Source:
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flow volumes, ground water flows, increased levels of pollutants (caused by failing septic systems, aging utility system, livestock, pets, and use of fertilizers), and water temperature increases due to logging and wood cutting activities removing the shade canopy upstream.

Shorelines and Tidelands

Shorelines are important because they provide water access, natural fisheries, wildlife habitats, and scenic beauty. Tribal tidelands are reserved by the Federal government for the use and benefit of the Tribe. Protection of these tidelands is essential to preserve the use of the Reservation as a homeland for the Tulalip people and preserve its use for Treaty fishing activities.

Tribal culture is closely tied to shorelines. Pre-historic village and longhouse sites, shell middens, and burial grounds are found along Tulalip's shoreline. Today, fishing and many other cultural activities take place near the water's edge.

The Tulalip Bay area is the administrative and cultural center of the Reservation Community, and functions as a unique multi-use area with many shoreline dependent activities. Over the past several decades, residential development has filled in much of the buildable land along Tulalip shorelines. Many beach communities are comprised of houses built on small lots with septic systems and accessory structures such as bulkheads, beach access structures, and docks that encroach onto Tribal tidelands. This has had an incremental but profound effect on water quality, fish and wildlife habitat, and Tribal members' ability to access, use and fish along Reservation shorelines. Along the Reservation's southwest coast, one of the most notable impacts to shorelines is the development of cliff-top home sites above the shore. The Tribe is developing a shoreline management plan to address these shoreline conditions.

Forest Resources

Tribal members are dependent on the forests and the resources they provide for subsistence, income, and ceremonial purposes. Tribal forestry operations include plantation maintenance, tree harvesting, tree planting (reforestation), and road building services. Revenue from Tribal logging helps provide paying jobs that support families. Forest plants and wildlife provide food and fiber for subsistence and traditional activities.

Reservation forests provide recreation and spiritual refuge from the outside world. Tribal life-styles have always been closely linked to the forests. Historically, the Reservation was almost completely forested. Giant Fir, Hemlock and Cedar trees were the predominant species. However, only a few scattered old growth trees remain standing; mostly along cliffs, on steep hillsides, and in wetlands areas.

The Tulalip Tribes currently manages a number of tree plantations established ten to twenty years ago. These tree plantations are irreplaceable as natural areas that may be

used for traditional plant and berry gathering or simply to recreate an unspoiled area free from development.

Map 4-5 shows the age and areas of Tribally-owned timber stands on the Reservation. These areas often have other land uses (such as residential, recreational, and commercial), but are Trust lands that also have timber on them. Harvesting varies based on the nature of other land uses in the area. For example, hazardous trees are removed from the land leased by the Port Susan Camping Club when necessary. Some of the areas on the Map are exclusively Tribal forestry lands. Many of these Tribal timberlands have zoning designations that limit development in these areas.

The Tribe owns large tracts of forested lands that can be efficiently managed. There are also many Fee Simple land holdings adjacent to Tribal resource land that, if developed, could cause impacts. Acquiring Fee Simple land holdings adjacent to Tribal forests to consolidate ownership will preserve the forest cover, make forest management more efficient, and reduce development pressure.

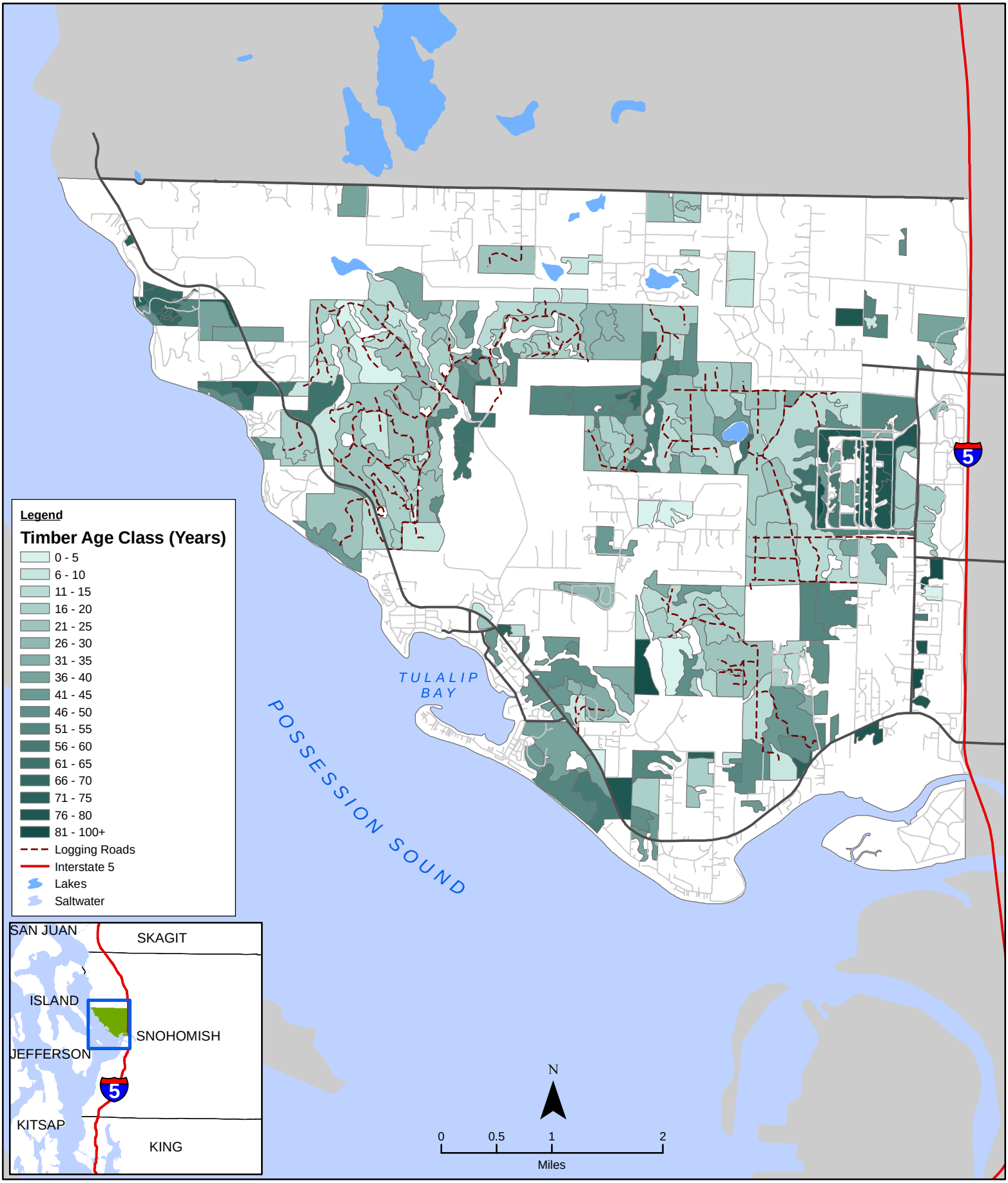
The outlook for forestry on-Reservation is generally positive. About 4,000 acres of Tribal Trust and Individual Native Trust land are managed and maintained for forestry. The plan is to log only 80 to 100 acres annually. At this logging rate, the Tribe's forestry resources can be sustained indefinitely based on a 50-year tree growth cycle.

Forestlands should be protected because of the timber resource and because forest cover is extremely important in maintaining the quality of ground and surface waters as well as providing important habitat for wildlife. The following would assist in keeping the forests healthy and management efficient:

- Keep housing developments away from the forest edges to reduce secondary impacts from all terrain vehicles, horses, poaching, fire, and trespassing on forestlands
- Consolidate development to reduce the pressure on tree plantations
- Maintain forest roads
- Acquire Fee Simple holdings adjacent to Tribal forests to consolidate the ownership pattern

Wildlife & Plant Communities

The Tulalip Reservation is composed of a variety of physical features and environments, which creates a remarkable diversity of plants and animals on- and near-Reservation. The presence and balance of native plant species, especially those traditionally important to Tribal culture, should be preserved. Tribal members utilize many native plants for food, fiber, dyes, clothing, medicine, tools, and for spiritual and ceremonial purposes. These



Map 4-5 Tribal Forest Lands

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Data Source:
Tulalip Tribes Forest Management Plan
Tulalip Data Services GIS Dept

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include the Western Red Cedar, Ironwood, Devil's Club, Licorice Fern, Sword Fern, wild berries, Nettles, Tulle, Marsh Tea, Skunk Cabbage and a host of other species either consumed or turned into usable products.

Areas that have unique and diverse native plant communities on the Reservation should be preserved for their irreplaceable special characteristics. These areas include:

- Quil Ceda Estuary
- White Rock (an open and forested wetland on Mission Hill)
- Tony's Marsh (a forested peat fen in the Tulalip Creek basin)
- Ross Lake
- Battle Creek III wetland (forested peat fen on Battle Creek)
- Old forest grove on the former Boeing site (forested stands older than 100 years)
- Older coastal forest patches in the Tulare and Port Susan Camping Club area and the parcel in the northwestern corner of the Reservation
- Marsh tea bog
- Eelgrass beds throughout Tribal tidelands

The Tribe is actively pursuing restoration projects on and off the Reservation. The former Boeing Test site and the off-Reservation Qwuloolt Property on Ebey Slough, located in the city of Marysville, are examples of significant salmon habitat restoration efforts which will serve as examples for future restoration projects in the region. Tulalip should continue to invest in its native plant restoration program. The Tribe has its own native plant nursery that supplies plant materials to these restoration sites. The nursery will also increasingly play a role in growing culturally significant plants for re-introduction into native habitat.

Animal species of primary importance to Tribal members include: Orcas, salmon, steelhead, bottom fish, baitfish, shellfish, deer, elk, bears, bobcats, cougars, otters, beavers, muskrats, wolves, waterfowl, eagles, hawks, ravens, herons, owls, and grouse. All of these, except elk and wolves, have been observed recently on-Reservation or in adjoining waters. Some species such as Bald Eagles and Blue Herons have been the subject of specific preservation plans, including designated habitat areas. Several eagle territories can be found on the Reservation.

The majority of wildlife areas, as shown on **Map 4-6,** are within the boundaries of the Tribe's forestry lands. The four categories differ in their ability to handle pressures associated with development. These categories are as follows:

- **Wildlife Areas** - These areas are identified as general wildlife habitat. Most wildlife areas could handle some pressure from development activities and still retain most or all of the habitat functions for the species of wildlife currently present. These areas do need to be assessed for the kinds of development that could potentially occur.

- **Wildlife Corridors** - Wildlife corridors are areas that facilitate the movement of wildlife throughout the Reservation. Some of the corridors also act as general wildlife habitat. Most wildlife corridors could handle development pressure, but need to be assessed based on the type of development and the ability to maintain the function of a corridor.

- **Hunting Boundary** – These areas are designated for Tribal hunting lands within the Reservation. Development within the hunting boundary would conflict with hunting activities throughout the entire designated area. Development should therefore be restricted from occurring within the hunting area.

- **Essential Upland Habitat Areas**– These areas are identified as essential upland habitat for a species to persist within the Reservation boundaries. These areas are not likely to tolerate development and still maintain quality habitat.

Population growth and development pressure on resident plants and animals are negatively impacting these resources. Plants and animals are either displaced or destroyed whenever the land is cleared and developed. The proximity of human population to wildlife areas can also result in attacks on humans and pets.

To minimize the impact of development on wildlife and ecosystems the Tribe should:

- Protect yet undeveloped lands or fully mitigate any loss of lands to development

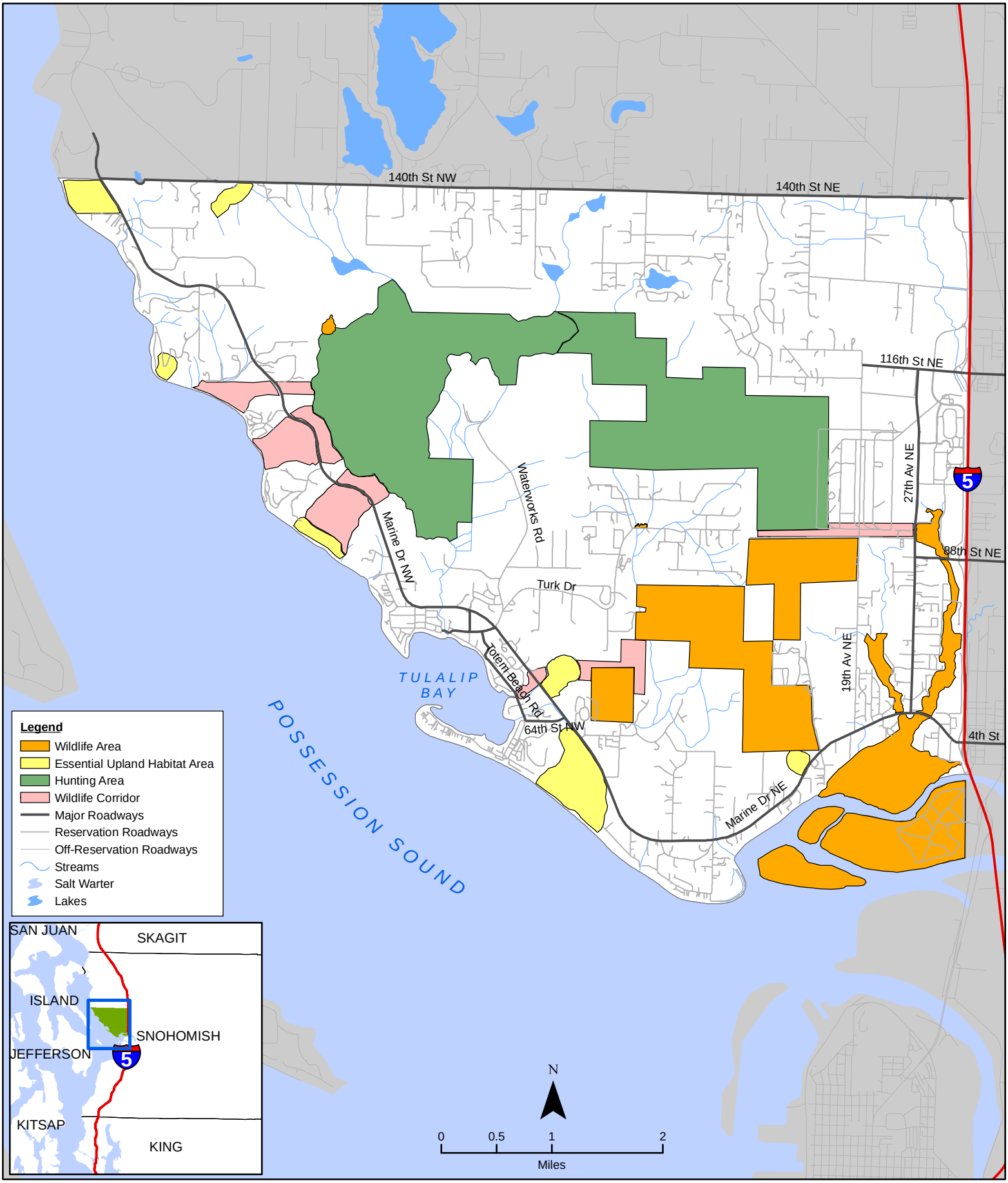
- Establish and enforce environmental protection measures, especially those that preserve or enhance streams and wetlands

- Preserve connections between habitat areas to allow for the natural movement of animal species

- Acquire tracts to enlarge habitat and create habitat connections for wildlife

- Create adequate space between development and native ecosystems and wildlife habitat

- Develop a plan to control and eradicate invasive species



Map 4-6 Wildlife Areas of Concern

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Data Source:
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Mineral Resources

A number of small sand and gravel pits (32 acres of "Mining" areas in **Map 2-4**) are located on-Reservation and are used for construction of local roads and buildings. The older pits, which were sited prior to substantive land use regulations, may conflict with other neighborhood uses. Some pits were used as garbage dumps after useful material was extracted and pose future potential environmental problems. Any future pit siting and production should be closely regulated to ensure positive benefit without severe environmental consequences.

In order to make best use of the Reservations mineral resources the Tribe should:

- Locate and assess the quality and volume of mineral deposits on the Reservation
- Identify mineral extraction and refining sites with the greatest potential where the operation would inconvenience the least number of residents and cause the least amount of harm to the environment
- Locate any new residential development away from potential extraction sites
- Encourage Tribal ownership of any potential mineral extraction and refinement operations
- Require rehabilitation of mineral resource extraction sites to as naturally a functioning condition as possible after extraction is compete

Environmentally Sensitive Areas

Map 4-7A through **Map 4-7E** shows the general location of environmentally sensitive areas on the Reservation. A major purpose of this Plan is to protect these sensitive areas from development that results in an adverse impact to the environment. Protection of these sensitive areas can be accomplished through regulations, policies, and ordinances that require avoidance, minimizing damage, and mitigation as a condition of development permits.

The following are environmentally sensitive areas on the Reservation, some of which include buffers which limit development around them:

- Tidelands
- Class 1 Streams
- Class 2 Streams
- Critical Value Wetlands

- High Value Wetlands
- Moderate Value Wetlands
- Lakes, Ponds, and Springs
- Potential Landslide Areas
- Steep Slopes (equal to or greater than 15%)
- Essential Plant and/or Animal Habitat
- Marine Shorelines
- Hydric Soils

There are other areas that are not environmentally sensitive areas but should still be managed with care such as Tribal forests, wildlife areas, wildlife corridors, hunting areas, and aquifer recharge areas (displayed on **Map 4-8**). These areas require effective stewardship in order to retain their value in fulfilling unique environmental and Tribal functions.

Natural Hazards and Hazardous Areas

In 2005, a Landslide Inventory and Geologic Mapping Study was completed to help identify geologic hazards along the Reservation coastal bluffs. **Map 4-9** shows landslide activity levels along the shoreline including Hermosa Beach, Tulalip Shores, Spee-Bi-Dah, Tulare Beach, and Sunnyshores. In this map, "Active" areas show recent landslide activity and "Dormant" areas are slide areas that do not show recent activity but may be reactivated by increased moisture in the soil due to precipitation or poor stormwater management practices. In order to prevent the further loss of land and damage to property along these bluffs, it is important to develop wisely by avoiding development, retaining vegetation along the top of the bluff, requiring adequate setbacks, and diverting site runoff away from the bluff.

The 2006 Tulalip Tribes Tribal-/State-level Hazard Mitigation Plan guides future efforts on the Reservation to effectively and efficiently mitigate natural hazards. This plan identifies a number of hazards relating to the Reservation including:

- Hazardous Materials
- Earthquakes
- Tsunamis/Seiches

Map 4-7A Slopes Greater Than 15 Percent

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Oct 17, 2008

Data Source:
Tulalip Tribes Community Development,
Tulalip Data Services GIS
Tulalip Department of Natural Resources

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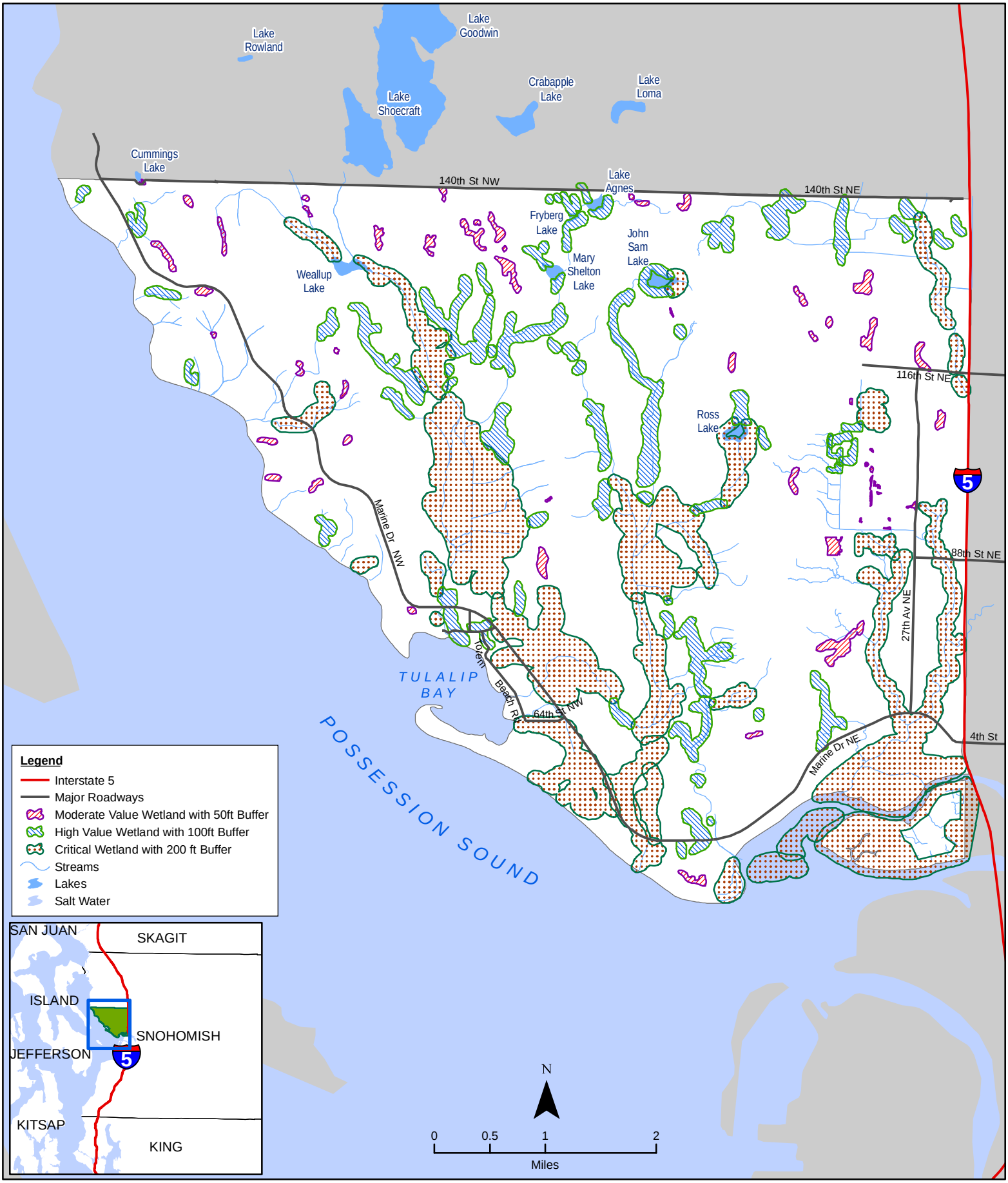

Map 4-7B Wetland Classifications

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Data Source:
Tulalip Tribes Community Development,
Tulalip Data Services GIS
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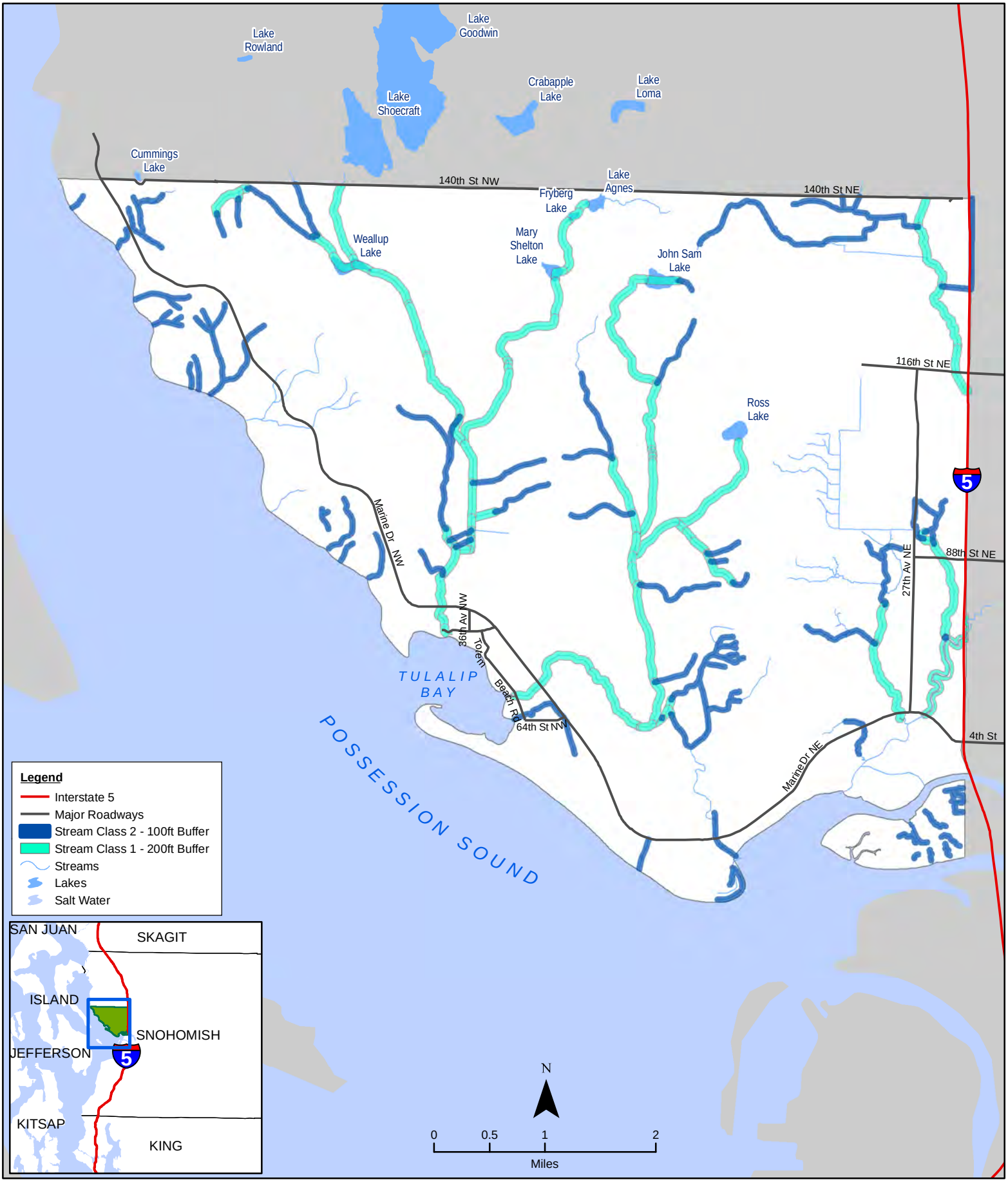

Map 4-7C Stream Classifications

Tulalip Data Services
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Oct 17, 2008

Data Source:
Tulalip Tribes Community Development,
Tulalip Data Services GIS
Tulalip Department of Natural Resources

Map Path: M:\GISData\Maps\Tulalip\Project\CompPlan\2009\05-11-09\4-7C_StreamClassifications-05-11-09.mxd

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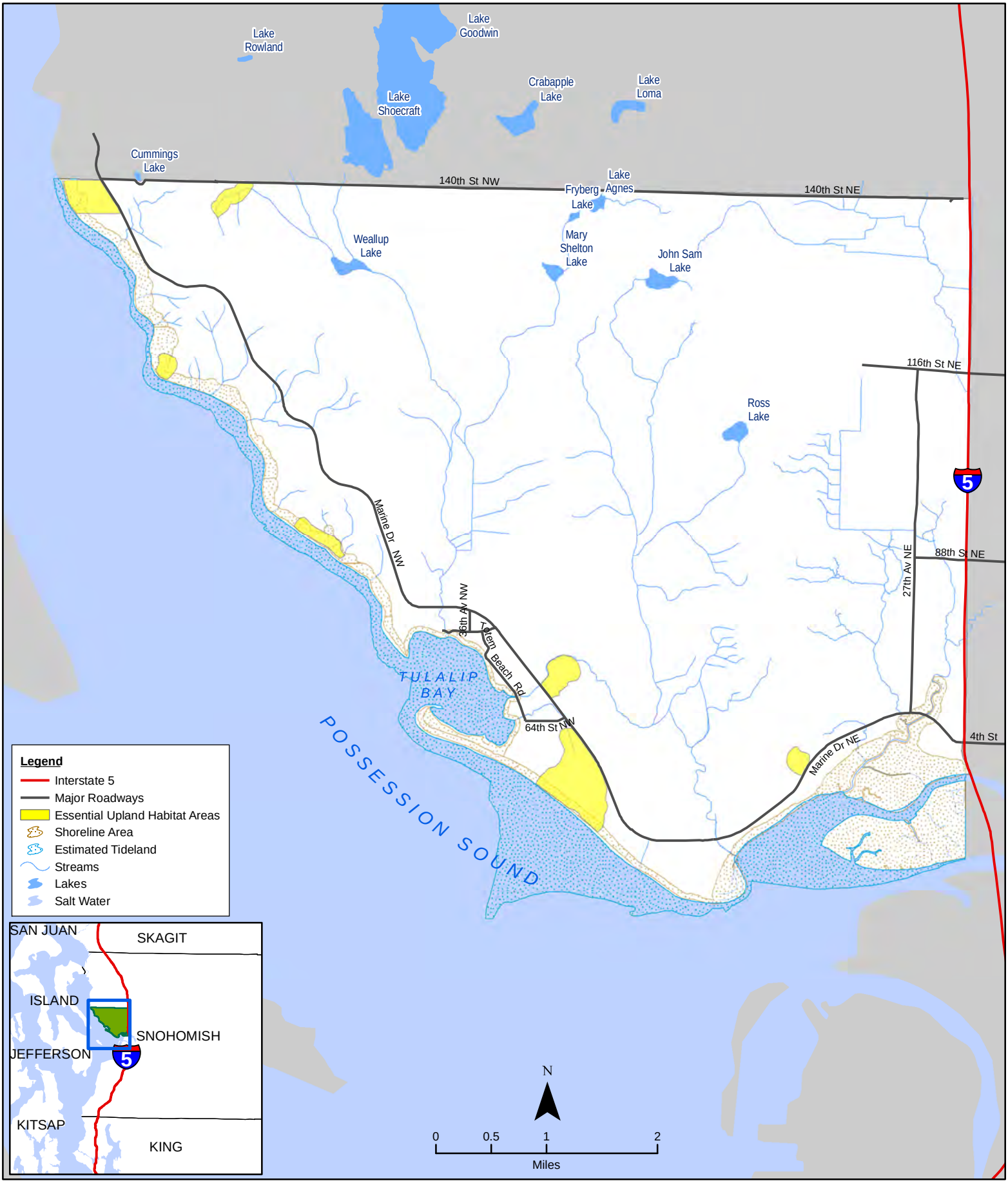

Map 4-7D Essential Upland Habitat Areas and Shorelines

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Oct 17, 2008

Data Source:
Tulalip Tribes Community Development,
Tulalip Data Services GIS
Tulalip Department of Natural Resources

Map Path: M:\GISData\Maps\Tulalip\Project\CompPlan\2009\05-11-09\4-7D_CriticalHabitatsShorelines-0-11-09.mxd

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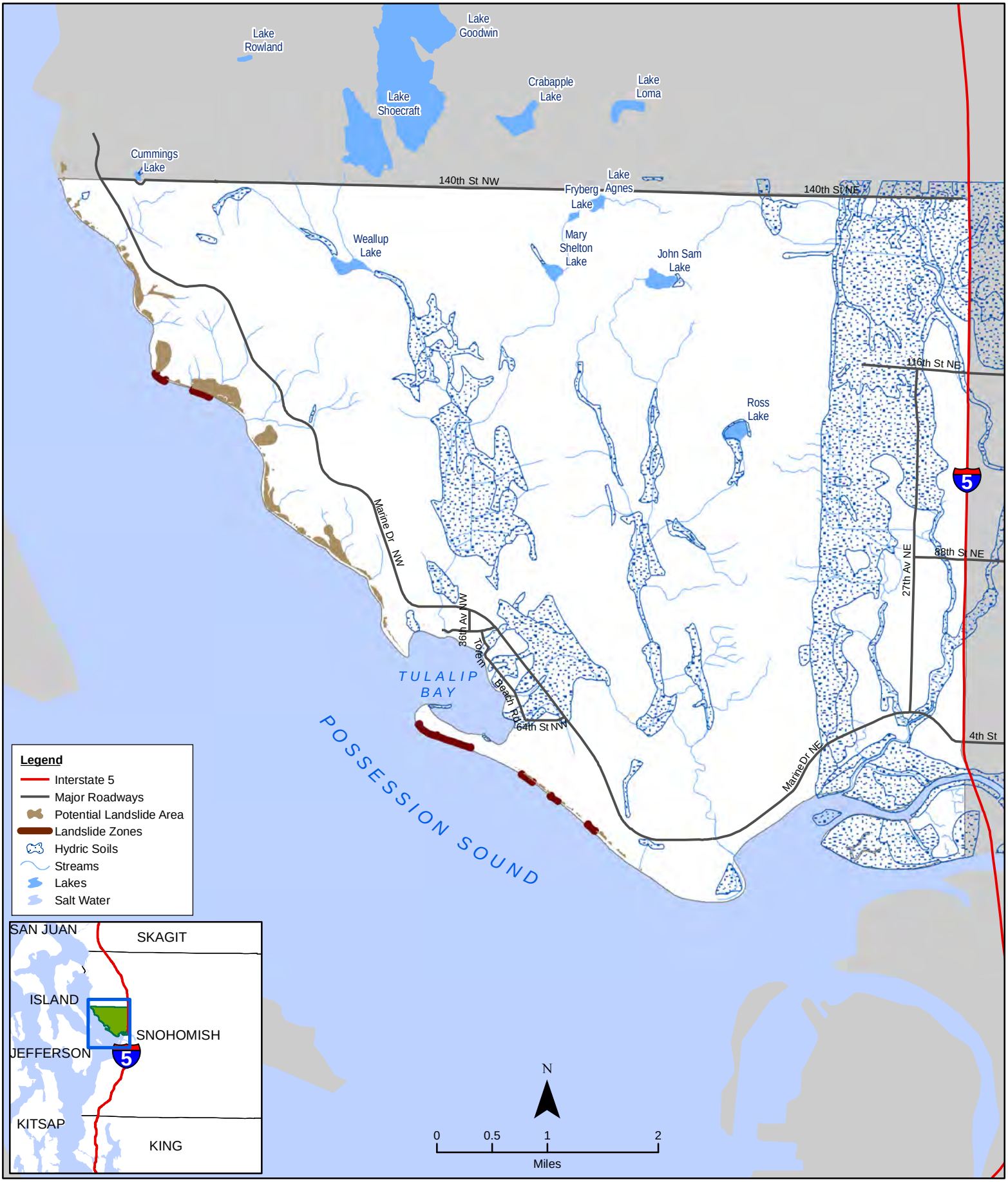

Map 4-7E Landslide Areas and Hydric Soils

Tulalip Data Services
(360)716-5157
gis@tulaliptribes-nsn.gov

Oct 17, 2008

Data Source:
Tulalip Tribes Community Development,
Tulalip Data Services GIS
Tulalip Department of Natural Resources

Map Path: M:\GISData\Maps\Tulalip\Project\CompPlan\2009\05-11-09\4-7E_LandslidesHydricSoils-05-11-09.mxd

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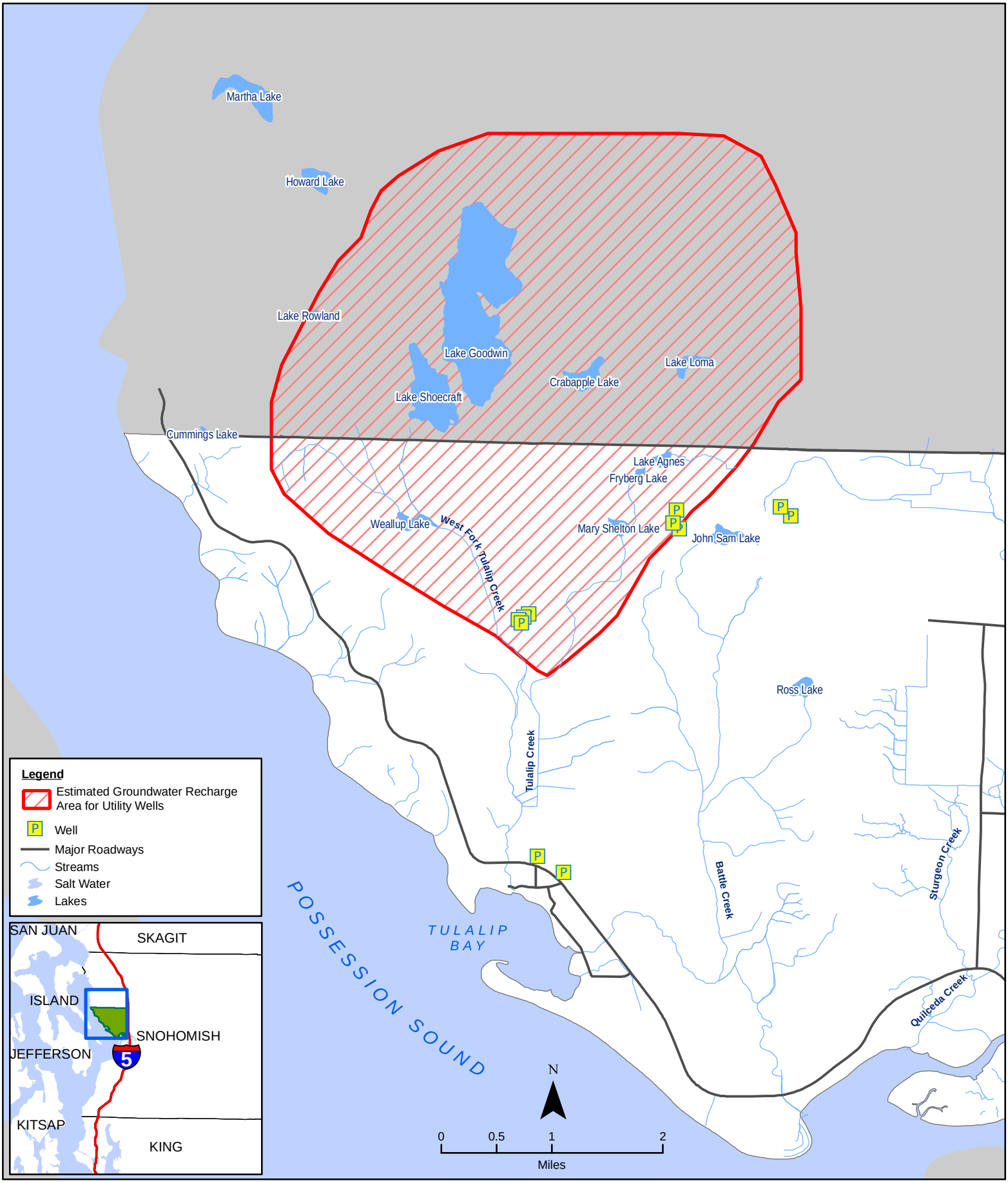

Map 4-8 Estimated Groundwater Recharge Area for Utility Wells

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gis@tulaliptribes-nsn.gov

Oct 17, 2008

Data Source:
Tulalip Tribes Natural Resources Dept.,
Snohomish County GIS Dept.

Map Path: M:\GISData\Maps\Tulalip\Project\CompPlan\2008\10-17-08\4-8_GroundwaterRechargeArea_Oct08.mxd

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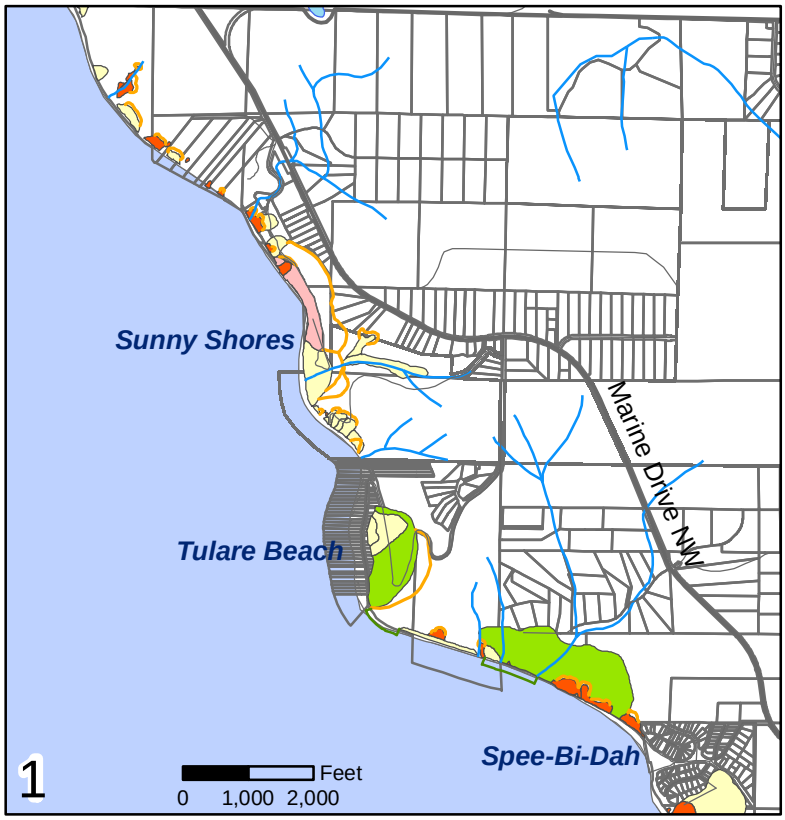

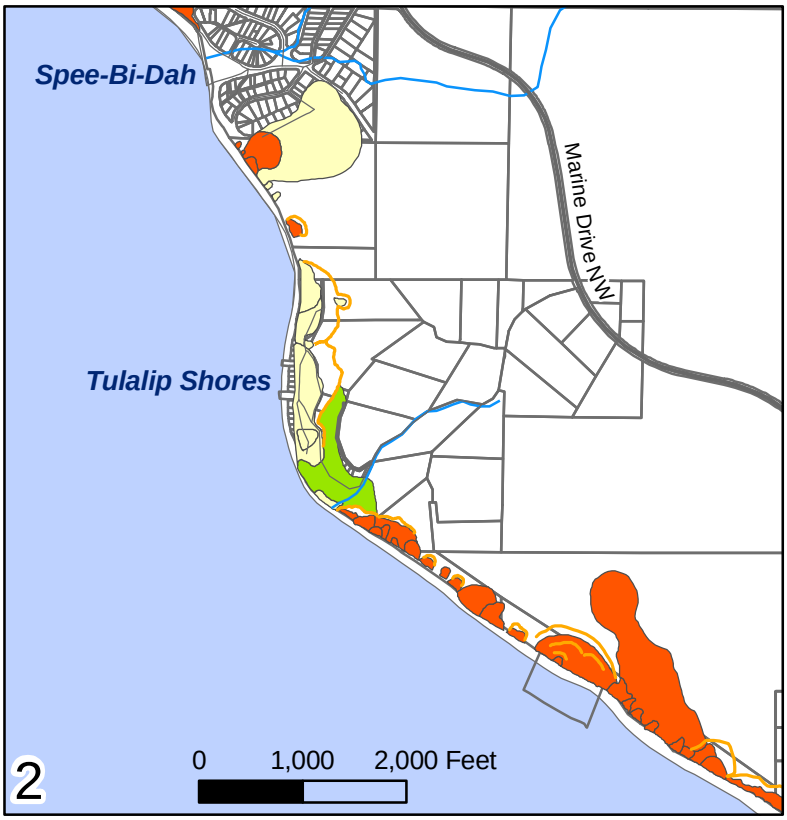

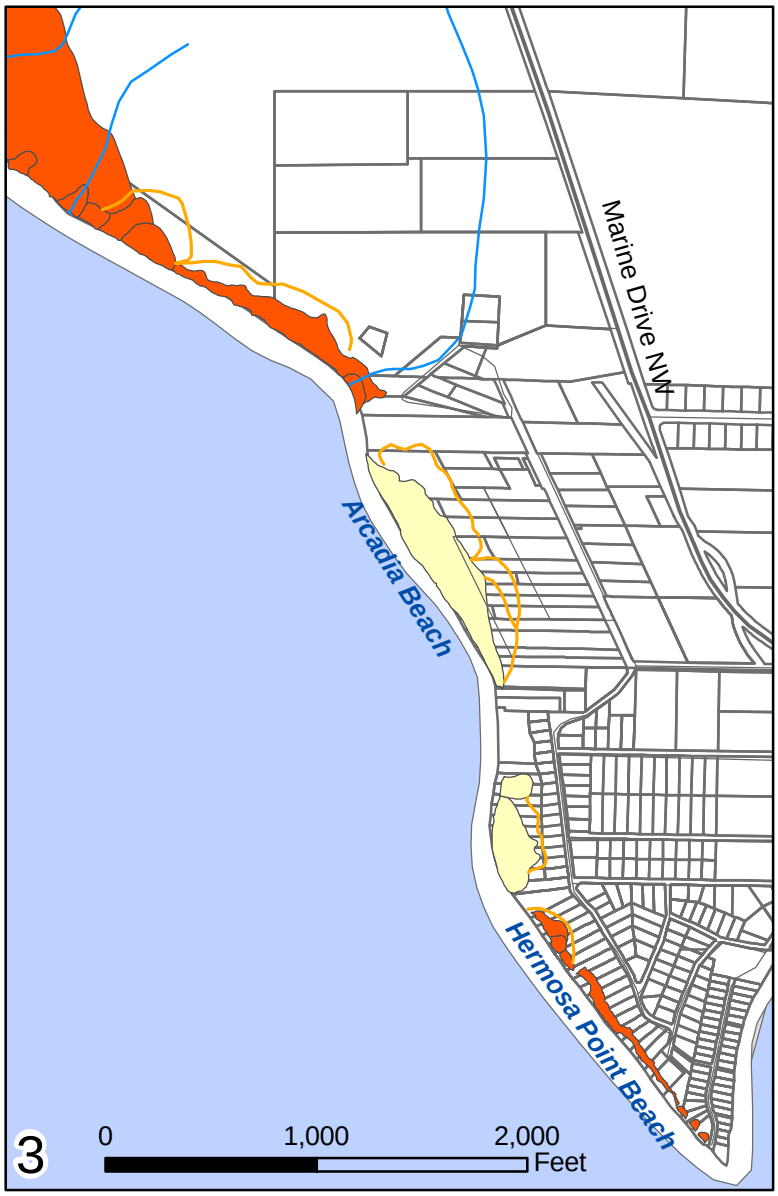

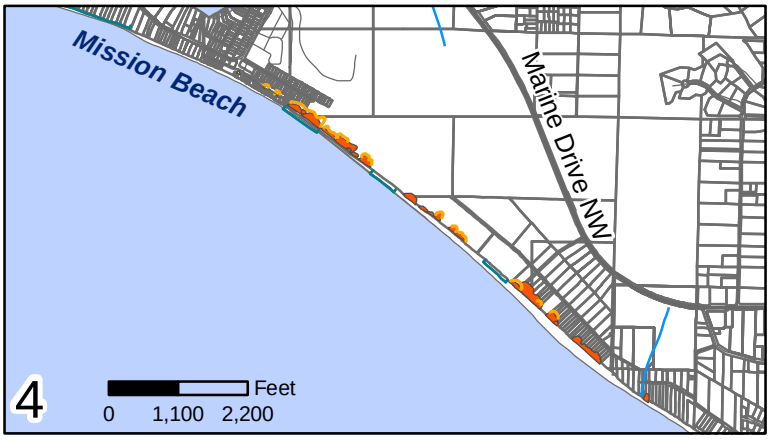

Map 4-9 Landslide Activity Levels

Tulalip Data Services
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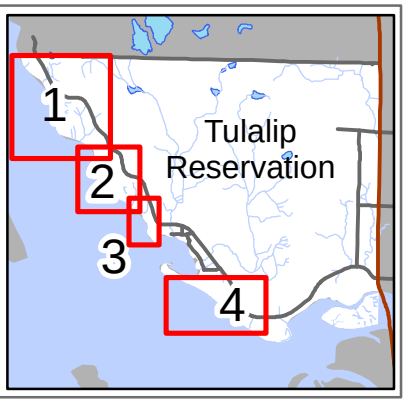
Data Source: May 11, 2009
Tulalip Tribes Community Development,
Tulalip Data Services GIS

Map Path: M:\GISData\Maps\Projects\CompPlan\2009\4-9_PD_LandslideActivity_05-11-09.mxd

Landslide Head Scarp
Streets
Landslides
Streams
Level of Activity
Lakes
Active
Parcels
Dormant
N
Dormant/Active
Relict



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- Floods
- Landslides/Mass Movements
- Severe Weather
- Wildfires

The goals of this hazard mitigation plan are to:

- Protect people, property and the natural environment
- Ensure continuity of critical economic and public facilities and infrastructure
- Promote and protect Tribal sovereignty and identity
- Increase public awareness of natural hazards and involvement in hazards planning

Septic Systems

If septic systems are improperly located or not maintained, there are potential damaging effects to human health and ground and surface water quality. The disadvantage to sewer systems, however, is that properly-functioning septic system drainfields can provide recharge to the aquifers.

Map 4-10 shows areas of soil capacity on the Reservation in terms of suitability for septic systems. As the map shows, most of the Reservation is not suitable for septic systems, unless special measures are adopted in design and construction.

In contrast to septic systems, sewer systems redirect water from local wells to focused treatment facilities outside of the aquifer recharge area and discharge to surface waters that flow to the nearshore area rather than being re-infiltrated to the source aquifers. There are advantages and disadvantages to both septic and sewer systems. Due to the general unsuitable soil capability of most areas on the Reservation, community water and sewer systems must be considered to serve high-density housing.

Air Quality

Pollutants that diminish air quality on the Reservation come from both natural and man-made sources. Natural sources of population include: dust and smoke from wildfires, dust storms, and volcanic activity, none of which are common to the Reservation or its surrounding air-shed. Man-made sources of pollution include: stationary activities such

as utilities, manufacturing, and industry; as well as mobile activities such as cars, trucks, boats, gas-powered lawn mowers, recreational vehicles, planes, and trains.

Current Air Quality Conditions

For most of the year, outdoor air quality on and near the Reservation is rated as "good", based on annual data collected on and adjacent to the Reservation, by both the Tulalip Tribes and state agencies. In 2004, air quality on the Reservation and surrounding vicinity was "good" but for over 87 days air quality was qualified as "moderate" or "unhealthy" for sensitive populations. This trend may continue, due to Tulalip's increasing urbanization and proximity to rapidly urbanizing Snohomish County. As population levels increase, the number of cars on the road increase, and with traffic congestion increases and higher levels of particulate matter (PM), ozone and air toxics are reported. The levels of PM also peak on the Reservation during winter months when weather inversions occur more frequently and when wood smoke levels increase. These peaks in PM are of particular concern for people with asthma.

Management and Regulations of Air Quality

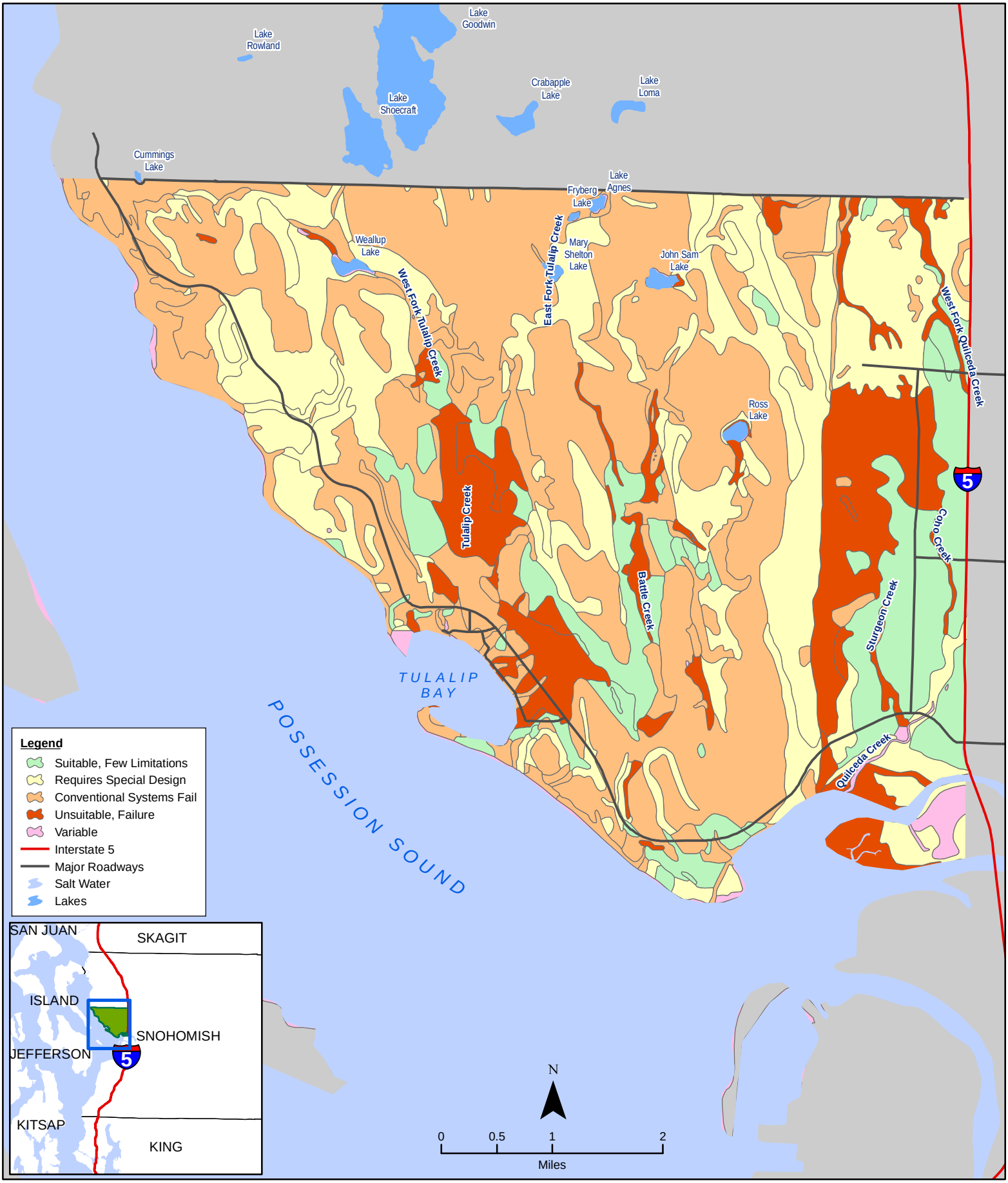
Beginning in 1993, the Tulalip Tribes initiated an air quality and monitoring plan establishing a baseline program for protection of air quality on the Reservation. Local and regional air monitoring data indicated that none of the National Ambient Air Quality Standards (NAAQS) were violated. However, PM from outdoor burning and woodstoves is identified as an area of concern in the monitoring plan and so became a focus of the Tribal air monitoring program. In 1996, Tulalip established an ambient air monitoring program, focusing on particulates. Tulalip's goal was to characterize air quality on the Reservation, compare Reservation air quality with regional trends, and track changes over time.

The Reservation and surrounding area is presently in compliance with national ambient quality standards. In 2005, the U.S. Environmental Protection Agency (EPA) adopted the Federal Air Rule for Reservations that will be implemented and enforced on reservations throughout Washington, Oregon, and Idaho. The implementation of the Federal rules will be carried out in conjunction with Tulalip Air Quality and Natural Resources staff, who are currently responsible for program development and enforcement.

Threats to Air Quality

In view of existing conditions and trends, the following air quality issues should be monitored and addressed, as they represent threats to air quality and human health on the Reservation:

- Particulate matter from wood stoves and outdoor burning
- Interstate 5 and local traffic generating ozone, nitrogen dioxide, and carbon monoxide



Map 4-10 Soil Capability for On-Site Septic Systems

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Oct 17, 2008

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TDS does not make any guarantees or warranties concerning the accuracy of the information contained in the geographic data.
TDS assumes no liability or responsibility for errors or inaccuracies.

Data Source:
Tulalip Tribes Natural Resources Dept.,
Conservation Service (NRCS), USDA

Map Path: M:\GISData\Maps\Tulalip\Project\CompPlan\2008\10-17-08\4-10_SoilCapabilitySeptic_Oct08.mxd

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- Tribal homes have been identified as having indoor air problems with molds and allergens as primary problems, and other contaminants including lead paint and particulates from uncertified wood stoves

- Emissions from sporting boats, fishing boats, commercial diesel vessels, and other marine vessels in Puget Sound and Tulalip Bay

Environment Goals and Policies

Goal EN 1: **Protect and restore Reservation marine, surface, and groundwater quality.**

Policy EN 1-1: Require buffers and setbacks from rivers, streams, wetlands, lakes, ponds, and beaches that are based on best available science.

Policy EN 1-2: Protect groundwater, rivers, streams, wetlands, lakes, ponds, and shorelines from unauthorized fill and stabilization activities.

Policy EN 1-3: Ensure "no net loss" of wetlands function and acreage, and promote a measurable gain of wetlands function and acreage.

Policy EN 1-4: Utilize best management practices to protect and restore the quality and quantity of surface water on the Reservation.

Policy EN 1-5: Ensure standards for design and location of on-site septic systems and individual wells.

Policy EN 1-6: Protect and restore critical groundwater recharge areas by purchase, regulatory action, and public education.

Policy EN 1-7: Protect groundwater supplies in rural areas through large lot zoning.

Policy EN 1-8: Discourage residential, commercial, sand and gravel mining, or any use deemed a threat to groundwater sources within critical groundwater recharge areas, important wildlife or fish habitat, or on steep slopes.

Policy EN 1-9: Maintain and restore forest cover to the maximum extent possible in all stream basins.

Policy EN 1-10: Ensure adequate culverts and bridges at all road crossings.

Policy EN 1-11: Minimize the impacts of in-stream structures or utilities dams and other structures that create hydrologic modifications to surface water flow.

Policy EN 1-12: Establish and enforce environmental protection measures that preserve or enhance streams, lakes, wetlands, water quality, groundwater supplies and stream flow.

Policy EN 1-13: Coordinate surface and groundwater needs with water utility providers within and adjacent to the Reservation boundaries.

Policy EN 1-14: Encourage the use of low impact development methods when reviewing and permitting development activities.

Policy EN 1-15: Promote water conservation measures to protect surface and groundwater resources.

Goal EN 2: **Locate development in non-hazardous locations.**

Policy EN 2-1: Discourage development in shoreline hazard areas such as unstable and erosion prone bluffs, spits and beaches, landslide zones, and frequently-flooded areas.

Policy EN 2-2: Evaluate geotechnical characteristics, and potentially-require a geotechnical report, to ensure safe construction for any development proposed on a slope greater than 15%.

Policy EN 2-3: Require buffers and setbacks from the top or bottom of any slopes greater than 45% for any new construction.

Policy EN 2-4: Restrict new construction on slopes of 45% or greater.

Policy EN 2-5: Ensure that new construction proposed on soils that may be destabilized during an earthquake is designed safely.

Policy EN 2-6: Guide development away from areas that are hazardous.

Policy EN 2-7: Provide land slide hazard and site stability information to the Tribal membership and public to assist in evaluating where development should take place.

Goal EN 3: **Protect fish and wildlife habitat on the Reservation.**

Policy EN 3-1: Preserve the interior of the Reservation by minimizing new access roads.

Policy EN 3-2: Protect and maintain natural shoreline processes that support the complex and diverse habitats and species found in the shoreline environment.

Policy EN 3-3: Restrict structures and activities that interfere with shoreline processes, habitat, resource harvest, and other shoreline dependent Tribal uses.

Policy EN 3-4: Consider wildlife needs when making development decisions such as wildlife corridors, protection of nesting and roosting trees, and retention of native vegetation.

Policy EN 3-5: Create adequate space between development and native ecosystems and wildlife habitat.

Policy EN 3-6: Develop a plan to control and eradicate invasive species.

Goal EN 4: **Protect and enhance air quality on the Reservation.**

Policy EN 4-1: Evaluate air quality conditions on the Reservation through ambient air quality monitoring on Tribal lands.

Policy EN 4-2: Implement methods for mitigating emissions, and ensuring compliance with applicable Federal and Tribal air quality standards.

Policy EN 4-3: Evaluate future land uses and activities to determine impacts to air quality and human health.

Policy EN 4-4: Promote land uses on the Reservation, such as forestry, which have a positive impact on air quality.

Policy EN 4-5: Encourage human health by reducing exposure to air pollutants in homes, schools and workplaces, by promoting "Built Green" standards for use in construction materials and methods Reservation-wide.