



## 1.0 INTRODUCTION

The San Juan County Conservation District received a grant from the Washington State Centennial Clean Water Fund administered by the Washington State Department of Ecology (DOE) in June of 2000. The grant project focuses on the identification and potential conservation of critical wetlands, riparian zones, instream habitats and intertidal regions in San Juan County. For this project, three target watersheds were identified based upon findings in the San Juan County Watershed Action Plan and Characterization Report (August 2000) and the support of the community. Target watersheds include False Bay Watershed (San Juan Island), West Sound Watershed (Orcas Island) and Swifts Bay Watershed (Lopez Island). The Swifts Bay Watershed in particular, was chosen based upon the involvement of local landowners in on-going efforts to restore and protect the Hummel Lake drainage corridor in the Swifts Bay Watershed.

Beginning in June of 2000, existing information and data about the Swifts Bay Watershed were collected and geographical information was mapped. A field survey was carried out to verify existing data and to gather additional land use information. In October of 2000 a public workshop was held to provide watershed landowners with a characterization of the natural features and land uses present in the Swifts Bay Watershed, and to establish restoration objectives for the watershed. This management plan is based upon those objectives.

## 2.0 THE SWIFTS BAY WATERSHED

### 2.1 OVERVIEW

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*Data and information on the current and historical conditions of natural resources in the Swifts Bay Watershed is limited and incomplete. What follows is a summary of available information.*

The Swift Bay Watershed is roughly 1500-acres located in the northern region of Lopez Island (**Map-1a & 1b: Watershed Maps**). Topography is level to gently sloping. The drainage basin is fed by a system of wetlands, ephemeral and intermittent streams, and includes Hummel Lake, the only fresh water lake on Lopez Island. The lake is approximately 37 acres and shallow, with a maximum depth of 3 meters. Basin drainage begins in a series of wetlands upstream of Hummel Lake and continues as a creek from Hummel Lake to an estuarine lagoon that outlets into Swifts Bay via a cement encased, steel floodgate.

The bay is fairly open and presumed to have good flushing. The bay contains extensive mudflats. The intertidal region contains native eelgrass (*Zostera marina*). The shoreline has been bermed to block wave action from damaging residences that line the upper shore.

## 2.2 SOILS

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Soil is a living resource made up of different sized mineral particles (sand, silt and clay), organic matter and numerous species of living organisms. Soils play a significant role in both protecting and impairing water quality. Soils aid in reducing contamination by filtering water as it moves through the ground into sub-surface aquifers. Conversely, removal of the protective, overlying vegetation accelerates soil erosion and leads to water quality degradation. Increased erosional runoff picks up soil particles, nutrients and other contaminants, carrying these contaminants to surface water resources (lakes, ponds and streams). This dynamic results in loss in soil nutrients and an increase in water turbidity and suspended solids, leading to sediment loading downstream and often leaving behind an environment that is less favorable for plant growth.

Identifying soil types (and associated soil characteristics) in the watershed is an important step in determining where and how water quality problems may occur through the type of land use and the way that natural resources are protected and managed. The soils classification and information presented in this document for the Swifts Bay Watershed is based on the current soil survey for San Juan County, published in 1962 by the United States Department of Agriculture, Soil Conservation Service. This soil survey report is dated and too general for site specific application; however, it remains widely used and does offer information about general soils placement on a relevant watershed scale. The existing soil survey will be updated beginning in the Fall of 2001 by the Natural Resource Conservation Service in cooperation with the San Juan County Conservation District and San Juan County. The new survey will provide more accurate identification of soils distribution and more specific delineation of soils placement. The following soils information is based on the 1962 soil survey report.

**BASIN SOILS:** Soils in the Swifts Bay Watershed have been formed from geologic and glacial deposits left in the area. The entire watershed contains a variety of soils, including over 20 individual soil types. Identifying the structure and drainage tendencies of differing soil types is a fundamental factor in minimizing water quality impacts, i.e., for on-site sewage treatment, aquifer recharge, and in anticipating areas prone to high erosion and runoff. To evaluate potential impacts to water quality, soil types in the watershed have been grouped into three generalized categories based on drainage characteristics. The categories are **Well Drained Soils** (Indianola Series Soils), **Moderately Drained Soils** (Roche Series Soils), and **Poorly Drained Soils** (Bow, Coveland, & Norma Soils, Orcas Peat & Semihamoo Muck). A generalized description of each is included below. *Map 2* shows general soils locations.

### WELL DRAINED SOILS – THE INDIANOLA SOILS:

The watershed contains a small percentage (5%) of Indianola Series Soils – approximately 60 acres in the northeast section of the watershed. The majority of these soils are well drained, sandy soils formed in glacial till. These soils are important in aquifer recharge. Runoff is slow and there is a slight hazard of water erosion.

### MODERATELY DRAINED SOILS – ROCHE SOILS:

The Roche Series Soils cover the majority of this watershed (70%). In natural conditions, these soils support the growth of forested lands and woodlands. Runoff from these soils is slow to medium. In places erosion may be severe if the soil is not protected by a cover of plants in the wetter winter months. These soils are extremely susceptible to compaction if compressed by heavy equipment when wet.

### POORLY DRAINED SOILS – BOW, COVELAND, NORMA, ORCAS & SEMIAHMOO:

These are the “hydric soils” in the watershed, meaning that these soils have poor drainage and will typically be wet for long enough periods during the year to support the growth of wetland plants (hydrophytes). This also means that areas containing these soils tend to be moist or ponded for varying periods. As one would expect, these soils are consistently associated with the known wetlands, floodzones, riparian zones and streams in the watershed. These soils, and the hydrologic features they support, serve an important function through stormwater retention and surface water purification. In addition, the wildlife habitat associated with well-vegetated wetlands, ponds, lakes and streams is greater in species richness.

## 2.3 WATER

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This watershed plan is concerned with surface water resources in the watershed -- in the condition and proper hydrologic function of wetlands, streams and lake bodies in the watershed, and in the water quality associated with these resources. Ground water is briefly discussed, especially in relation to salt water intrusion and water conservation. However, restoration activities will be focused primarily on the conservation and protection of surface water features.

Water resources in the Swifts Bay Watershed are supplied by precipitation (rainfall). Like the rest of San Juan County, most rainfall in the Swifts Bay Watershed falls seasonally from November to June. Estimated annual precipitation averages 20-25 inches, although actual precipitation may vary tremendously in any one year.

**HYDROLOGIC CYCLING:** Through the continual process of *hydrologic cycling* precipitation takes one of several paths as it reaches the watershed: 1) *runoff into surface waters*, 2) *filtration into sub-surface regions*, and 3) *return to the atmosphere through evapotranspiration*.

1) *Runoff* is accelerated on slopes and impervious surfaces. Rate of runoff is dependent on the amount of precipitation, the slope gradient, soil type, soil depth and vegetative cover. This means that measures to minimize contamination of surface runoff should be elevated in areas containing steep slopes (>30%), containing soils with high erosion potential or high runoff, containing shallow soils, and areas with reduced vegetative cover.

Regarding reduced vegetation, the slowing down and filtering of surface runoff through vegetation is most effective with a multi-storied plantscape (a vegetated area that contains trees, shrubs and ground cover). Woody roots (the root system of trees and shrubs) slows down surface water movement more than a grass cover alone. Therefore, multi-storied vegetation offers the highest runoff protection while a plantscape containing groundcover with no upper story plants offers lower runoff protection. However, this is not to say that groundcover by itself does not minimize water quality degradation. Ground cover plants are much more effective than bare soil in reducing the potential for surface contaminants to reach streams and lakes.

2) The movement of precipitation through the ground into sub-surface regions and the depth or degree of lateral movement of water through sub-surface soils is dictated by the soil types and soil characteristics, i.e., moisture holding capacity or vertical permeability of the soils that are present. Water movement through sub-surface soils is complex and difficult to determine without hydrologic investigations that are beyond the scope of this plan. However, it can be inferred that areas in close proximity to surface water bodies are likely to be influenced more directly by sub-surface flow (through springs, seeps and water table transfer). This means that measures to minimize contamination of surface water should be elevated in areas adjacent streams, lakes, wetlands and marine waters. In practical terms, this is the “riparian zone” -- the transitional zone between uplands (drier areas) and surface water bodies (streams, lakes, lagoons).

Aquifer recharge is typically associated with specific soil types. Areas containing soils associated with aquifer recharge are shown on *Map 2*. This plan does not address groundwater recharge other than through the promotion of water conservation by identifying conservation management practices.

3) Precipitation reaching the watershed may be cycled back into the atmosphere through evapotranspiration -- evaporation and transpiration. In the San Juan Islands, evapotranspiration is the major influence in annual water loss; and is greatest during the summer months when air temperatures are higher, precipitation is minimal and plants are actively respiring (SJCHCS, 2000). Local water loss due to evapotranspiration has been estimated at 42 to 49 percent (EBASCO Services, Inc., 1990) and as high as 74 percent (Town of Friday Harbor, 1999) depending on landcover and topography. Irrigation activities tend to cause evapotranspiration in those areas to be greater than average natural rates. This plan is concerned with two primary issues relating to evapotranspiration. First, in areas with reduced vegetative cover more precipitation is reaching the ground. This means the water regime is altered to take on more water on the surface, and potentially results in increased runoff and flood potential. Second, there is potential loss of ground and surface

water through irrigation-evapotranspiration. These factors should be considered when identifying conservation management for areas with reduced vegetative cover and irrigated agriculture.

**GROUND WATER:** Aquifers in the Swifts Bay Watershed are composed of unconsolidated glacial drift lying over a mix of sedimentary and volcanic bedrock (USGS Salt Water Intrusion Report). Freshwater that recharges these aquifers moves downslope, eventually entering the ocean. (USGS SWIR). All landowners in the watershed rely on ground water for their drinking water source.

In the spring of 2000 the United States Geological Survey completed a study to determine the extent of, and the affects of saltwater intrusion is ground water on Lopez Island. Saltwater intrusion is the migration of saltwater into sub-surface freshwater reserves. Intrusion of seawater into freshwater resources can usually be attributed to 1) extraction of well water at a rate faster than infiltration can recharge the aquifer, or 2) drilling wells that are too deep and exceed the freshwater zone. The results of the USGS study show a trend of increasing chloride concentrations over a 16-year period. Efforts to protect water quality and conserve water use would help to maintain groundwater reserves. . . particularly in areas containing recharge soils.

**SURFACE WATER:** Surface water resources in the watershed include Hummel Lake, an associated system of small, intermittent and ephemeral streams, and a series of ponds, wetlands and floodplains. Mapping of these features was produced using data from San Juan County, the United States Geological Survey (USGS), & the Federal Emergency Mngmt. Agency (FEMA). (*Map 3*)

#### STREAMS-

The primary drainage channel draining the Swifts Bay Watershed runs intermittently, drying approxi-mately from June through December. Known channelized stream segments are listed below. (*Map 3*)

- A) In the early 1900s the PWA ditched the stream channel from Hummel Lake to at least the Ellis Tree Farm. This moved the original drainage to match the section line between sections 13 & 14.
- B) The stream channel immediately above Hummel Lake has been ditched as well. In this section of the stream, the ditched channel runs along the west side of Center Road for several hundred feet (distance unknown).
- C) The stream channel is dammed in the lower watershed between Cross Road and the saltwater lagoon. The pond produced by the dam holds a lot of water (storage capacity undetermined). The spillway on the right bank side of the dam is lined with, or more likely was excavated into hard clay. It is slowly eroding deeper (WDFW, 1999).
- D) At the base of the watershed, the stream channel meets an estuarine lagoon. However, the lagoon is cut off from regular marine influence by a tide gate that prevents most saltwater from entering. The stream channel drains from this lagoon through a grassy ditched outlet to a culvert below Port Stanley Drive. Water from here is conveyed to the tidal floodgate on the upper shore. Stream water

collected from the watershed enters Swifts Bay through this floodgate and may also be conveyed to marine waters through sub-surface seepage from the lagoon area.

## LAKES

Hummel Lake is the only fresh water lake on Lopez Island and, as such, it provides both, recreational opportunities for islanders and valuable wildlife habitat. The lake is approximately 37 acres (15 hectares), ranging from 1 to 3 meters in depth, and stores roughly 272 acre-feet of water (Downen, 2000; SJC Watershed Characterization Report, 1999).

There are two major surface water sources flowing into the lake. 1) Several small drainages and seeps drain to an extensive bog and floodplain approximately 15 to 20 acres in size on the southeast corner of the lake. 2) The primary stream (discussed in the previous section), which collects drainage from the upper watershed, enters the west side of the lake through a culvert under Center Road. Water leaves the lake on the north side through a culvert below Hummel Lake Road and enters a well developed fresh water marsh 15± acres in size.

## WETLANDS

In 1992, San Juan County carried out a wetland inventory that identified and mapped the location and general boundaries of some of the wetlands in the county. Wetlands were located by analyzing information from the 1977 National Wetlands Inventory mapping, the Washington Hydric Soils List, and 1991 color aerial photos of the county. Field verification was performed for some of the wetlands identified through this process. This inventory identifies 24 wetlands in the Swifts Bay Watershed, ranging in size and composition. (*Map 3*)

This information is not complete, but represents the data currently available. The 2001 San Juan County Soil Survey will provide important clarification and refinement for both the current County wetland inventory and County Soil Survey.

## LAGOON

A shallow saltwater lagoon is located at the base of the watershed. The lagoon and salt marsh total about 15± acres. The lagoon is approximately 5 acres (water storage capacity is unknown). The surrounding salt marsh is 10 to 12 acres. This lagoon is cut off from regular marine influence due to a tide gate that prevents most saltwater from entering. The salt marsh no longer undergoes tidal flushing and, therefore, no longer functions as a natural saltwater marsh.

## 2.4 LAND COVER & LAND USE

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Land cover and land use have everything to do with the quality and function of surface water resources. Land cover and the land use activities on a piece of land can work for or against the dynamic natural soil and water processes continually at work. Minimum effect or interference

of these processes is the goal in using conservation management practices. Through awareness and a conscious conservation approach to the land, disturbance to these natural processes can be minimized.

**LAND COVER:** Approximately 40-45% of the watershed is covered in forest and woodlands. Grasslands (pasture) cover 30 – 35% of the watershed. **Map 4** provides a visual representation of land cover distribution. An important factor here is the location of wetlands, streams and other natural surface water features in relation to land cover. In general, areas with less vegetative cover are effectively less protected from runoff problems due to the higher percentage of precipitation reaching the ground in these areas. Of particular concern are wetlands and streams with no protective vegetation buffer. Restoration or enhancement of these areas wherever possible, along with a raised awareness of the importance of ongoing protection of vegetative buffers bordering wetlands and streams, are two management approaches that will help to protect water quality and hydrologic functioning in the watershed.

Much of the forested land is harvestable timber (SJC Watershed Characterization Report, 1999). Stewardship of forested lands during harvest or conversion is important, especially near surface water features. The drainage system in this watershed is small and less capable of managing sediment loading than larger stream and river systems. (Sediment loading is sediment carried to a water body through storm runoff). Restoration and conservation management practices should include methods for protecting the vegetated borderlands of wetlands and streams in forested areas.

**LAND USE:** For the purposes of this plan, three primary land uses in the watershed are discussed; agricultural, residential, and forestry land use. Roads and driveways are also discussed for their role in collecting and conveying surface runoff within the drainage basin. Determining what land uses are occurring in the watershed is done by observing designated land use codes. Land use codes are broad land use categories used by the County Assessor for taxing purposes. These land use codes can also be used as a tool in natural resource management to examine the distribution and extent of land uses over a large area, like a watershed. This is helpful in determining what types of restoration activities and conservation management practices are needed and appropriate in connection with the natural land covers and types of land uses in the watershed as a whole.

## **AGRICULTURE**

Approximately 30% of the watershed – nearly 500 acres, is currently used for agriculture. Grazing and pasture land for cattle and sheep make up the majority. Restricting animals access into streams and wetlands is a critical factor in maintaining water quality and in protecting the physical structure of these resources. Preventative conservation practices in these areas should focus on pasture management and manure management.

Much of the riparian vegetation bordering streams and wetlands on agricultural lands in the watershed has been removed. Under natural conditions much of the land in agricultural use would be wetlands. Hydric soils are prevalent in these areas. (**Map 2**) As would be expected, most of

these wetlands have been drained or altered. Restoration or enhancement of vegetative buffers, where needed, around streams and wetlands on agricultural lands will be important for maintaining water quality in these areas. Also, it may be beneficial for conservation technicians to work with landowners in assessing site drainage in areas where wetlands and soils have been ditched and drained, for improving drainage processes and to enhance natural or artificial wetlands in these areas.

## RESIDENTIAL

Nearly 40% of the watershed is in residential use. A primary issue associated with residential land use is on-site septic performance. Water contamination due to on-site septic failure is one of the leading non-point pollutants in the county as a whole. Soils play a major role in the effectiveness of septicage treatment. Proper installation and maintenance of septic systems are equally critical in preventing contamination of surface water resources. Other “residential” activities of consequence include vegetation clearing (of course), grading, road building and soil compaction through development activities. The cumulative effect of these activities on a watershed scale can have a significant affect on surface water systems (wetlands, streams, lakes and receiving marine waters). Restoration and conservation recommendations should include hands-on education and assistance for landowners in septic maintenance and needed system upgrades. Public education and training for land owners and land movers (contractors, developers) that covers soils behavior or how soils respond to various land activities would be beneficial.

## FORESTRY

Forestry land use designations in the watershed include Designated Forest Land (DFL) and Open Space –Timber (OST). About 10% of the watershed is categorized as DFL or OST land. Both designations require that a certain acreage of land remain in forest production. Timber harvest like any land use practice of scale can be friendly or unfriendly (environmentally sound or harmful) depending on how that land use is carried out. Conservation management programs and education for landowners on lands designated for timber production as well as lands in forested cover not in a timber harvest program should be a component of restoration activities in the watershed.

## ROADS AND DRIVEWAYS

One landscape feature easily overlooked, but very important in water drainage and water quality management is roads and driveways. These impervious (non-porous) surfaces cover a surprisingly large proportion of the landscape, even in rural areas. Roadway ditches basically function as feeder streams, transporting runoff from the road and land and often draining directly into streams and lakes. When maintained properly (not cleared or mowed too often) these "vegetation ditches" act as biofiltration, trapping pollutants (U.W. Urban Stormwater Management). Public roads and road right-of-ways (where the drainage ditch is located) are maintained by the Public Works Department. Private roads are not. Landowners have a lot of influence in how well roadside drainages work – or whether they even exist on private roads and access drives. It would be valuable information and educational for landowners to identify and inventory roadway drainage patterns and assess their effectiveness in the watershed. Carrying out restoration and stewardship projects would be a logical next step.

## 2.5 CONSERVATION EASEMENTS & PRESERVATION LAND

Land protection through preservation or conservation easements is a viable option for landowners who wish to set aside or restrict certain uses in important resource areas like riparian habitats bordering streams and wetlands. Landowners can receive financial benefit for land that is placed in a “conservation easement” or land bought through “fee-simple” purchase. The San Juan Preservation Trust, a private land trust organization, and the San Juan County Land Bank have both worked with landowners in purchasing and protecting natural resources in the watershed. The County’s Open-Open Space Program also works to maintain qualifying areas of land in a natural state for reduced taxes. Land preservation is a very effective method for protecting critical surface water resources and lands bordering these.

Over 20% (340± acres) of land in the watershed lies in preservation status. This is an unusually high percentage and implies that landowners in the watershed value the natural features and processes. *Map 5* shows parcels that are all or partly held in conservation status. Continuing this trend in the watershed will be included in restoration and conservation goals.

## 2.6 WATER QUALITY

In May of 1997, preliminary water quality testing was carried out by San Juan County (SJC) as a part of the development of the SJC Watershed Action Plan. Three sampling sites were located in the Swifts Bay Watershed. Sites include L22: Hummel Lake, L27: stream inlet into the saltwater lagoon, and L22: at the creek outlet that drains the lagoon into Swifts Bay. Testing parameters included the measurement of **fecal coliforms** -- associated with animal and/or human wastes; **pH** -- acidity/ alkalinity. . .critically important to all fish and aquatic life; **total suspended solids (TSS)** -- indicates amount of sediment loading, too much of which can have many adverse effects on aquatic systems; **dissolved oxygen (DO)** -- the right amount is critically important to all fish and aquatic life; and **temperature** -- critical to sustaining aquatic life. The table below shows the results of this testing compared to the allowed limits for these measurements. (*See Map 6 for test sites*)

### 1997 WATER QUALITY TESTING

Test Site	Fecal v allowed #	pH v allowed #	TSS v allowed #	DO v allowed #	Temp v allowed #
L22	2/100mL v 50/100	6.9v 6.5-8.5	3.2/100mL v 50/100	23mg/L v >7mg/L	12.1 C v ≤ 13 C
L27	23/100mL v 50/100	9.1v 6.5-8.5	20.0/100mL v 50/100	211mg/L v >7mg/L	27.2 C v ≤ 13 C
L21	8/100mL v 50/100	8.8v 6.5-8.5	22.5/100mL v 50/100	211mg/L v >7mg/L	26.5 C v ≤ 13 C

Hummel Lake (L22) was in range for all parameters. The samples taken from the freshwater input into the lagoon (L27), and the creek outlet from the lagoon into the bay (L21) exceeded State

thresholds for pH and for temperature. Both, temperature and pH are highly critical in sustaining freshwater aquatic organisms. *See Map 6.*

In 1999, a water quality monitoring program was carried out by the Huxley College of Environmental Studies (Western Washington University) at selected freshwater and marine sites throughout the county to provide an overview of current water quality conditions. One sampling site was in the Hummel Lake drainage located on Cross Road, 0.4 km west of Port Stanley Road, on the north end of the culvert. Monitoring was performed March, 1999, through February, 2000. This site was found to have “marginal water quality. The site was dry from June through December, 1999. Temperature and pH measurements met Class AA standards. Water quality problems included high fecal coliform counts (Class C or lower), low dissolved oxygen concentrations (Class B), and high total phosphorus concentrations”. (Wiseman, Matthews, & Vandersypen, 2000).

In addition, the Lopez High School’s Environmental Science Class completed some water quality monitoring of Hummel Lake in the 1999-2000 school year. They collected samples at three different times to measure dissolved oxygen, light transference, calcium and sulfate ions, total nitrogen, pH, biochemical oxygen demand, coliform, and turbidity. They did not identify any significant pollution or trends through these sampling efforts.

## 2.7 LAKE ENVIRONMENT

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**PLANTS:** The lake contains a dense, extensive aquatic plant community. The littoral zone (light penetrating area next to shore) is dominated by coontail (*Ceratophyllum demersum*), extending to 2 meters deep and choking much of the lake in summer months (Downen and Muller, 2000). Most of the shore is lined with common cattail (*Typha latifolia*) and bulrush (*Scirpus sp.*). Yellow water lily (*Nuphar sp.*) occurs extensively along the south side of the lake, and non-native reed canary grass (*Phalaris arundinacia*) and nightshade (*Solanum sp.*) are encroaching along much of the lake margin. (Downen and Muller, 2000). Frequent algae blooms occur regularly in the lake. The non-native and invasive reed canary grass and nightshade may need to be addressed through weed control.

**FISH:** Rainbow trout (*Oncorhynchus mykiss*) were first introduced into Hummel Lake in the 1930's. Prior to this there were no known native sportfish in the lake (Washington Dept. of Fish & Wildlife, 2000). In the 1980's, as part of a standard trout management program the Washington Dept. of Fish & Wildlife (WDFW) began stocking several warmwater species in the lake (due to the intensive management required to maintain quality trout populations under environmental conditions not prime for trout). Warmwater species stocked by the WDFW included bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*) and channel catfish (*Ictalurus punctatus*). A stock assessment study conducted in the fall of 1998 shows that the lake is currently populated with largemouth bass, bluegill, brown bullhead and rainbow trout. Of the fish sampled,

more than 90% were largemouth bass and bluegill. Brown bullhead accounted for 2% and rainbow trout accounted for 2% of the sample.

**RIPARIAN HABITAT:** Riparian vegetation surrounding the lake is in good shape. On the west side of the lake surface water collected from the upper watershed has been channelized and enters the lake through a culvert under Center Road. Riparian vegetation here is non-existent. Two flood zone regions directly north and east of the lake are well vegetated. The flood zone lying to the north of the lake is a well established fresh water marsh and is currently held in conservation (Open-Open Space) status. The condition of the flood zone to the east has not been studied, but this area appears to be wooded and fairly in tact. The lower end of the floodzone contains a bog.

**RESOURCE ASSESSMENT:** The lake edge is well vegetated and appears to be in good condition. Keeping the lakeshore well vegetated with grasses, sedges, shrubs and trees should be a high priority. Structurally, the lake appears to be in good shape (WDFW--Aug,1999), however, assessment work would need to be done to verify this. The lake shows signs of high productivity. Aquatic plant growth dominates the littoral zone (light penetrating area next to shore). Frequent blooms of green and blue-green algae have been occurring regularly in the lake for many years that suggests high primary production and possible system enrichment (nutrient rich runoff into lake) (Downen, 2000). *Warmwater Enhancement Options* recommended by the WDFW are included in **Appendix A**.

## 2.8 STREAM ENVIRONMENT

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**STREAM HABITAT:** There is no known comprehensive data about the plants, animals, instream habitat and stream channel conditions in the stream corridor. Glimpses of the stream system from roadside viewing offer pieces of information and the WDFW has visited the area investigating the potential for fish spawning/passage. However, this information does not provide the thorough data needed for making restoration or management decisions about the physical condition of the stream and drainage system as a whole.

Following a 1999 field study, the WDFW noted that the slow erosional process occurring in the earthen dam (between Cross Road and the Lagoon) would eventually undermine the end of the dam and may cause the pond to drain. The pond stops all downstream flow of gravel and sand. Over time the channel downstream may have become “starved” of new material and cut ever deeper, & steeper.

**RIPARIAN HABITAT:** Much of the wetland and riparian habitat associated with the stream system above Hummel Lake has been altered. Approximately 95% to 98% of the wetland habitat and riparian vegetation has been removed and replaced with grasses. Below the lake, wetlands and riparian areas are approximately 75% vegetated and contain tree canopy. The remaining 25% has minimal to no riparian vegetation and tree canopy. Most of this area is now kept in pasture grass.

There are portions of the stream that have been channelized, and protective vegetation canopy has been removed. In the lower region of the watershed, nearing Swifts Bay, stream flow is diverted through a small dam. Beyond this point protective riparian cover is reduced as the channel meets a dry salt marsh and salt water lagoon. A flood gate holds tide water from entering the marsh area, so this area no longer functions as a tidal salt marsh.

**RESOURCE ASSESSMENT:** The stream condition is generally unknown. Baseline information is needed. Stream habitat restoration or enhancement projects may be recommended depending on conditions found during baseline data collection.

## **2.9 WETLAND ENVIRONMENT**

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**FRESH WATER WETLANDS:** Many wetlands in the watershed have been ditched and drained for agricultural uses. In the upper watershed, above Hummel Lake, over 90% of wetland vegetation appears to have been removed and replaced with grasses. In the lower half of the watershed, below the lake, wetlands are approximately 75% vegetated. Most of this area is now kept in pasture grass as well. There are an unknown number of dug ponds that may or may not be connected to surface water resources.

**RESOURCE ASSESSMENT:** In general, wetlands in the watershed are greatly altered. Enhancement of wetland vegetation wherever possible would benefit wetland functions and wildlife habitat. Updated soils information (through to 2001 NRCS soil survey update) will aid in more thoroughly locating and assessing wetlands in the watershed.

## **2.10 MARINE ENVIRONMENT**

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**MARINE HABITAT:** Swifts Bay is a fairly open marine embayment with extensive mud shores. The intertidal region contains native eelgrass (*Zostera marina*) and kelp beds. The beach is a popular shellfishing area. Fishing, shrimping and crabbing occurs offshore.

**SALT WATER LAGOON:** The estuarine lagoon is situated in the lower watershed and conveys watershed surface drainage from the upland to the bay. The lagoon is cut off from tidal influence by a cement-encased, steel tidal flood gate at the top of the shoreline. The shoreline has been bermed to block wave and tidal action from reaching houses lining the shore. The lagoon is surrounded by salt tolerant marsh vegetation; however, the salt marsh no longer receives tidal flushing.

There are fish in the lagoon and the outlet channel. Interestingly, the outlet channel where the fish were observed has a gravel bed and receives some tidal flushing. These fish are thought to have been stickleback (Buchanan, 1999). The lagoon has escalating algae blooms, possibly through the influence of nearby aging septic systems.

**RESOURCE ASSESSMENT:** The lagoon and salt marsh are not functioning in their natural state due to the shoreline berm that blocks tide and wave action from reaching shoreline houses. Baseline information is needed on the lagoon to assess conditions over time. Water levels and flow rates should be monitored as should water quality. In earlier testing, temperature and pH both measured high (over state thresholds). Increasing algae blooms are also a problem. Septic systems in this area may be failing due to age and due to poor soils inhibiting proper septage treatment.

Restoration goals should include one or more public forums to allow shoreline owners to discuss and share ideas and identify objectives for the lagoon, marsh and shoreline system. Providing public education and raising public awareness of the workings and the value of a natural estuary would aid decision making and promote conservation practices. If possible, through this process landowners should determine restoration or enhancement plans. In particular, the tidegate may need upgrading, both for storm drainage capacity and to improve possible fish passage. There would be a benefit to marine species and birds by allowing tidal flushing into this lagoon. There would be a change in the plant community, and in the quality and quantity of water in the lagoon. There may be a benefit to juvenile salmonids living in the nearshore -- their origin would be the Frazier River, Vancouver Island, or possibly northern Washington rivers like the Nooksack, Samish, and Skagit (Buchanan, 2000).



## **3.0 RESTORATION GOALS, OBJECTIVES, & RECOMMENDATIONS**

**R**estoration is the reestablishment of the structure and function of an ecosystem. *Conservation Management* is an approach to land management that aims at sustainability of natural resources over time through the use of conservation practices.

*Restoration*, as defined in this document, includes a broad range of actions and measures designed to enable critical wetlands, streams and intertidal habitat in the Swifts Bay Watershed to return as closely as possible to pre-disturbance conditions. Implicit in this definition is that ecosystems are naturally dynamic. It is therefore not possible to recreate a system exactly. However, it is possible to reestablish and maintain over time the general structure, function and dynamic processes of these important hydrologic features through specific restoration activities and long-term conservation practices designed to improve the Swifts Bay and Hummel Lake ecosystem.

The goals and objectives outlined in this plan can be achieved through targeted restoration activities and conservation management techniques.

### **PLAN GOALS:**

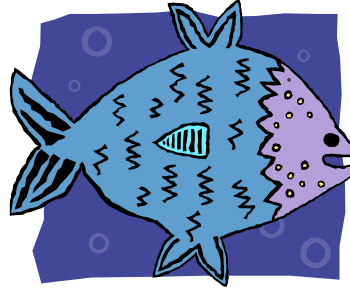
- A. Restore and sustain to the extent possible, the natural processes, functions and biological integrity of the fresh water streams, wetlands, flood zones, and riparian habitat in the Swifts Bay Watershed.
- B. Institute a cooperative, education-based conservation management program in the Swifts Bay Watershed, to effect on-going landowner monitoring and stewardship of the surface water resource features in the watershed.

### **SUMMARY OF AVAILABLE DATA:**

*Baseline data on the important hydrologic features in the watershed – lake, streams, wetlands, fresh water marsh and saltwater marsh and lagoon – are limited. Several recent studies have been published, cited below, but comprehensive baseline information is needed on water quality and in-stream biology for restoration implementation to be successful and lasting.*

*KNOWN STUDIES INCLUDE:*

- *The Natural Resource Conservation Service is currently performing a county wide soil survey that includes identification of hydric soils and wetland vegetation, which began in the fall of 2001. This study, in particular, will be extremely useful in locating wetlands and identifying specific soil distribution in the watershed. (NRCS; began fall, 2001)*
- *The Washington Department of Fish & Wildlife (WDFW) report assessing fish stocks and fish habitat in Hummel Lake (Downen & Mueller, 2000).*
- *The San Juan County Conservation District developed a forest stewardship plan for the Hummel Lake Preserve, a 40± acre parcel adjoining the lake to the south. (June, 2000)*
- *The United States Geological Survey published the results of a study that looked at whether seawater intrusion is affecting ground water on Lopez Island (USGS; April, 2000)*
- *The WDFW assisted the Conservation District and concerned citizens in assessing the lake and stream for potential wild salmon habitat (August, 1999)*
- *The Army Corps of Engineers: Hummel Restoration, Lopez Island – report on background, environmental summary, and conclusions (Jeff Dillion, Fisheries Biologist; August, 1998)*
- *Hummel Lake Water Quality Assessment -- Includes issues and history of water quality, components of water quality, improvements, regulatory context, and conclusions (Amy Sewell; December, 1997)*
- *The Puget Sound BioSurvey, a firm specializing in habitat and wildlife assessment performed a site assessment for the San Juan County Land Bank concerning a 34 acre parcel adjacent the lake to the south (PS BioSurvey; July, 1996)*



## **PLAN OBJECTIVES:**

**Objective #1** – Maintain water quality in Hummel Lake and the associated stream system through volunteer-based water quality monitoring, and restoration projects, working with landowners and volunteer stewards in the watershed

**Objective #2** – Restore and protect a vegetated riparian zone around Hummel Lake and along the stream corridor from Hummel Lake headwaters to Swifts Bay, working with streamside and lakeside landowners, volunteer stewards and local land preservation groups

**Objective #3** – Identify, restore and protect the quality and function of wetlands and floodplains in the watershed, working with landowners and volunteer stewards in cooperation with the Natural Resource Conservation Service, San Juan County and local preservation groups

**Objective #4** – Improve and maintain stream and lake habitat from the headwaters of Hummel Lake to Swifts Bay, working with streamside and lakeside landowners in cooperation with appropriate state and local experts

**Objective #5** – Identify and improve land use practices contributing nonpoint source pollutants into the Swifts Bay Watershed ecosystem, working with landowners

**Objective #6** – Minimize impacts and protect the natural function and dynamics of the Swifts Bay salt water lagoon, salt marsh, shoreline and intertidal zone through landowner education and stewardship and through the identification of potential restoration or enhancement strategies for the saltwater lagoon and salt marsh.



## PLAN RECOMMENDATIONS & ACTIONS

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### OBJECTIVE #1

***Maintain water quality in Hummel Lake and the associated stream system through volunteer-based water quality monitoring, and restoration projects, working with landowners and volunteer stewards in the watershed***

#### **Discussion**

Long-term water quality monitoring will establish baseline information and enable restoration participants to determine if contaminants are reaching surface waters and, if so, indicate what contaminants are present. Water quality monitoring should include standard testing parameters for water quality indicators in fresh water.

#### *Biological Testing --*

Water monitoring programs based on chemical and physical variables alone are not sufficient to identify or address all surface water problems. Ambient biological assessments are important because they directly measure the condition of the resource at risk and may detect problems that other methods miss or underestimate. Due to limiting physical structure and low flow, this stream system appears incapable of supporting anadromous fish (*fish that live a portion of their life in salt water and return to fresh water to spawn*). However, the biological condition of the stream system as an aquatic environment is an important component of the overall function and value of the drainage basin and receiving waters (Swifts Bay) as a whole. Therefore, it is recommended that preliminary biological testing be carried out in the drainage corridor as a screening for determining whether on-going biological monitoring is warranted. Protocols and assessment criteria should be developed to identify goals of biological testing specific to this stream system.

#### *Water Quality Education --*

Water quality education should be a component of the water quality program and should be based on preliminary information gained through monitoring of the Swifts Bay drainage basin. Education should include public education forums and in-the-field training workshops that teach landowners and land managers how to identify and correct activities or conditions that are contributing to water quality degradation on their property.

Using the information obtained through ongoing monitoring, landowners and Conservation District staff should work together to identify the sources of contamination and establish specific conservation management measures that work to minimize degradation of water quality. Maintaining water quality will improve conditions in Hummel Lake and the salt water lagoon in the lower watershed, as well as benefiting overall water resource functions in the watershed.

## **OBJECTIVE #1 – RECOMMENDATIONS & ACTIONS:**

### **Recommendation 1.1: Landowner & Volunteer Monitoring**

The Conservation District should work with landowners and interested volunteers to carry out water quality monitoring activities in the watershed. *Appendix C* shows streamside and lakeside parcels. To carry out this volunteer work the District should coordinate training for the participants of the program.

#### **Action --1a:**

Identify landowners on the stream corridor and lake interested in monitoring stream and lakeside conditions and water quality on their property.

#### **Action – 1b:**

Train landowners and volunteers in water quality sampling and stream / lake survey. Training should include, but is not limited to, covering the standard water quality indicators for fresh water and the stream corridor and lake monitoring activities listed below:

#### **Water Quality Indicators:**

- pH (alkalinity / acidity)
- dissolved oxygen
- temperature
- total suspended solids
- fecal coliforms
- total phosphorus
- salinity
- nitrate

#### **Stream Corridor:**

- Collecting water quality samples
- Measuring stream flow
- Baseline stream study (*measuring and drawing a cross-section of a section of the stream, mapping stream habitat and describing stream bed substrate*)
- Storm event flow monitoring

#### **Hummel Lake:**

- Collecting water quality samples
- Monitoring water level
- Measuring turbidity and water clarity
- Testing/monitoring algae

### **Recommendation 1.2: Monitoring Program**

The Conservation District should seek assistance in developing the water quality monitoring program for the Swifts Bay Watershed. Guidance should be sought in determining water quality monitoring protocols and data assessment and management procedures. This program will most likely be carried out as part of a countywide water quality monitoring program.

**Action 1-c:**

Consult the San Juan County Health & Community Services Dept. (HCSD), the Department of Ecology and the University of Washington Friday Harbor Labs (UW Labs) for assistance in developing the water quality monitoring protocols.

**Action 1-d:**

Investigate the possibility of water quality analysis through the UW Labs.

**Action 1-e:**

Once funding for this program is secured, establish a M.O.U. (memo of understanding) between participating groups outlining expected involvement activities, dates and products.

**Action 1.3: Water Quality Education**

The Conservation District should offer landowners water quality education specific to conditions in the watershed. This education should be presented through a variety of forums, including public education workshops and in-the-field training demonstrations that teach landowners and land managers how to identify and correct activities or conditions that are contributing to water quality degradation on their property.

**Action 1-f:**

Identify water quality topics to be offered. As a starting point, educational topics may include:

**Water Quality Education Topics:**

- Water conservation techniques
- Erosion control techniques
- Septic system maintenance
- Pasture management
- Animal waste management
- Woodlot management
- Stream corridor management

**Action 1-g:**

Consult state and local agencies and other appropriate groups/individuals for assistance in teaching and training seminars for landowners that cover water conservation and water pollution control.

**Action 1-h:**

Enlist volunteer landowners interested in volunteering their land as demonstration sites for performing these field trainings.

**Action 1.4: Funding Resources**

The District should apply for funds to assist landowners in implementing water quality improvement activities, including the purchase of testing equipment and lab analysis.

**Action 1-i:**

Seek funding to finance the water quality monitoring program.

**Action 1-j:**

Seek funding to purchase testing equipment for water quality monitoring. Potentially, this could be accomplished through cooperative purchase with relevant groups or schools.

**Action 1-k:**

Seek funding opportunities to assist landowners in implementing the practices they learn through water quality training demonstrations.

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## **OBJECTIVE #2**

***Restore and protect a vegetated riparian zone around Hummel Lake and along the stream corridor from Hummel Lake headwaters to Swifts Bay, working with streamside and lakeside landowners, volunteer stewards and local land preservation groups***

### **Discussion**

The riparian zone is a transitional area between upland (dry land) areas and aquatic environments (streams, lakes, ponds, etc.). Riparian zones serve several critical functions in the watershed, including the trapping of eroding soils, filtering contaminated surface runoff, stormwater retention (reduced flooding) and wildlife habitat. Riparian buffers are also aesthetically pleasing and are likely to increase property values.

Small streams, in particular, are sensitive and react quickly to changes in the riparian zone. A small intermittent stream (that dries up in the summer), such as the Swifts Bay Watershed stream is as important to buffer and care for as are larger, perennial streams. Even though the streambed will be dry for extended periods and appears relatively out of the influence of land use activities, the next hard rain will flush contaminants and eroded soils into the streambed and on into receiving marine waters.

Restoring and protecting, to the extent possible, a riparian buffer around Hummel Lake and along the stream corridor from the Hummel Lake headwaters to Swifts Bay will serve to improve water quality and minimize future surface contamination into streams, lakes and wetlands.

## **OBJECTIVE #2 – RECOMMENDATIONS & ACTIONS:**

### **Recommendation 2.1: Riparian Zone Education & Training**

The Conservation District should coordinate a series of educational workshops and hands-on demonstrations about the riparian zone for landowners in the stream and lake corridor. Educational workshops should offer a primer on riparian zones -- their value and function. Training workshops and hands-on demonstrations should follow with practical, hands-on applications of riparian restoration and maintenance. Training should include a “how-to” session on designing, establishing, and maintaining a properly functioning riparian buffer.

### **Action 2-a:**

Plan two riparian zone primers in the watershed (one stream, one lake) that cover general information about the functions and values of riparian areas, and the benefits of restoring and protecting these regions as streamside, lakeside and bayside buffers.

**Action 2-b:**

Identify demonstration topics for riparian enhancement, restoration and maintenance training. Plan a series of hands-on training demonstrations for landowners using site-specific examples at selected locations in the watershed. As a starting point, topics may include:

**Riparian Zone Training Topics:**

- Assessing the existing riparian zone
- Identifying goals for riparian restoration
- How to maintain a healthy riparian buffer
- How to enhance an existing riparian buffer
- How to maximize the riparian area for wildlife

**Action 2-c:**

Consult state and local agencies and other appropriate groups/individuals for assistance in teaching and training demonstrations for landowners about riparian zones and riparian buffers.

**Action 2-d:**

Enlist landowners interested in volunteering their land as demonstration sites for performing riparian field assessment and management trainings.

**Action 2-e:**

Identify landowners interested in learning how to maintain a healthy riparian buffer, and work with landowners to initiate a riparian maintenance program on their land to ensure the riparian area remains intact and undisturbed. As a starting point, the following guidelines can be used.

**Regular riparian evaluation and maintenance should include:**

- } Initial habitat mapping of the riparian zone that includes existing vegetation and, if applicable, proposed restoration vegetation. If possible, take pictures to document the present state of the riparian area.
- } Periodically walk the buffer to monitor conditions.
- } When necessary, remove invasive and noxious plants to reduce competition among plants and help control invasion of the area. Replant preferred species, if necessary.
- } *For agricultural lands:* When necessary, level off eroded soils that have been trapped by the buffer.

- ] *For grass buffers:* Harvest grass buffers for livestock feed to remove nutrients trapped by the buffer.
- ] *For restored or replanted buffers:* control grasses from overtopping tree and shrub seedlings for the first three years of growth.
- ] *For restored or replanted buffers:* protect woody seedlings from local wildlife with protective sleeves for the first three years of growth.

### **Recommendation 2.2: Riparian Buffer Design & Restoration**

The Conservation District should work with landowners in the stream and lake corridor interested in re-establishing or enhancing a protective riparian buffer on their own property, or in working on group restoration efforts within the watershed. *Refer to Appendix-B for a Sample Riparian Buffer Design.*

#### **Action 2-f:**

Identify landowners in the watershed interested in designing and proceeding with a riparian restoration or enhancement project.

#### **Action 2-g:**

Establish a “quick-list” of recommended steps landowners can use for evaluating the existing riparian area on their land and to assist them in determining restoration activities to improve and protect riparian habitat. Consult the Washington Department of Fish & Wildlife, the Natural Resource Conservation Service and/or other appropriate authorities on the subject.

#### **Action 2-h:**

Work with lakeside landowners and the Friends of Hummel Lake to identify options for riparian enhancement that helps to shade the lake shoreline along with other ecologically sound methods for decreasing algae blooms in the lake.

#### **Action 2-i:**

Work with interested landowners to properly design a riparian buffer for their property stream, pond or wetland.

#### **Action 2-j:**

Assist landowners in implementing buffer restoration designs. Help landowners coordinate plant orders, locate and schedule volunteers, plantings and fencing installation.

### **Recommendation 2.3: Riparian/Aquatic Preservation & Stewardship**

The Conservation District should work cooperatively with watershed landowners, local land preservation groups, and regional land protection organizations to bring about preservation and stewardship of critical riparian and aquatic environments.

**Action 2-k:**

Plan a public workshop to work with watershed landowners to designate an “Aquatic Stewardship Zone” in the watershed. Watershed landowners and the Conservation District should work together with appropriate aquatic habitat management organizations (i.e., Puget Sound BioSurvey, Washington Dept. of Fish & Wildlife, SJ Preservation Trust) to identify the appropriate boundaries and stewardship management guidelines for an Aquatic Stewardship Zone according to the goals of landowners in the watershed. *A proposed Aquatic Stewardship Zone map is presented in Appendix-C for discussion.*

**Action 2-l:**

Coordinate a Riparian/Aquatic Preservation & Stewardship Exhibition/Forum that brings together watershed landowners and land preservation organizations to offer landowners direct information about their options for preserving and protecting riparian and aquatic environments on their land. This event could also include a tour of preservation and trust lands for landowners to get a first-hand look at land managed under some of these programs. Organizations and programs presented at this forum should at least include the following:

- } **San Juan Preservation Trust**  
*Conservation Easements Program*
- } **San Juan County Land Bank**  
*Conservation Easements Program*  
*Fee-Simple Acquisitions Program*
- } **San Juan County Open Space Program**  
*Open-Open Space Program*
- } **Natural Resource Conservation Service**  
*Conservation Reserve Program,*  
*Stewardship Incentive Program,*  
*Wildlife Habitat Incentive Program*
- } **Washington Dept. of Natural Resources**  
*Forest Riparian Easement Program*

**Action 2.4: Funding Resources**

The District should apply for funds to assist landowners in riparian restoration, enhancement and maintenance projects. Appendix C contains a list of funding sources for consideration.

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**OBJECTIVE #3**

***Identify, restore and protect the quality and function of wetlands and floodplains  
in the watershed, working with landowners and volunteer stewards  
in cooperation with the Natural Resource Conservation Service,  
San Juan County and local preservation groups***

**Discussion:**

Wetlands are transitional areas between upland (dry) areas and aquatic environments (lakes and streams). There are three qualifying features that define a “wetland”. These are: hydrology, hydric soils and hydrophytes. Wetland “hydrology” means there is standing water or saturated soil for a required portion of the year. Wetland soils, or “hydric soils” means that the soils that are present are classified as hydric soils and/or the soils show signs of saturation (such as “mottling”, which is a rust colored mineral reaction in the soil caused from a lack of oxygen for an extended period of time--which means the soil was saturated long enough to produce the mottling). Lastly, “hydrophytes” means plants that grow in water or saturated soil all or part of the time. These three parameters are used to identify and delineate (locate the boundaries of) wetlands.

Wetlands serve many functions including water storage, purification of pollutants, ground water recharge and wildlife habitat. Thus a loss of wetlands results in a reduction of water quality, increased flooding and wildlife species decline (particularly birds).

**OBJECTIVE #3 – RECOMMENDATIONS & ACTIONS:**

**Recommendation 3.1: Wetland / Flood Plain Identification & Assessment**

The Conservation District should coordinate a series of educational workshops and hands-on demonstrations about wetlands, ponds, bogs and floodplains for watershed landowners. Educational workshops should include general information about natural wetlands and demonstrations on how to determine whether a wetland is present. Education should also be offered on enhancing and protecting wetlands, ponds and floodplains within areas used for agricultural, forestry and residential.

**Action 3-a:**

Plan two or more wetland workshops for watershed landowners & other interested individuals in the watershed that cover general information about the natural functions and values of fresh water wetlands, & the how wetlands can be protected and maintained in conjunction with agricultural, forestry & residential land use activities.

**Action 3-b:**

Consult the Dept. of Ecology, the Natural Resource Conservation Service, and the Dept. of Natural Resources for assistance in conducting wetland education workshops.



## **OBJECTIVE #4**

***Improve and maintain stream and lake habitat from the headwaters of Hummel Lake to Swifts Bay, working with streamside and lakeside landowners in cooperation with appropriate state and local experts***

### **Discussion:**

The stream channel is the section of the stream system that transports flowing surface water down stream. The “instream habitat” is the aquatic habitat within the stream channel that provides the physical and biological requirements of residing aquatic organisms. Physical characteristics include stream substrate, and stream bank and channel configuration. The biological component – stream biota, includes a variety of organisms, such as: bacteria, algae, microinvertebrates (< 0.02 in. in size, i.e., nematodes), macroinvertebrates (mayflies, stoneflies, worms), higher order plants and vertebrates. The condition of the stream channel and instream habitat influences water quality. This area also plays an important role in the ecology of the watershed. Wildlife and birds find shelter and food near and in stream water. Aquatic insects feed on the leafy materials that fall into the stream and they in turn, become food for fish, birds, small mammals and amphibians. These creatures attract large predators like eagles, herons, and foxes.

The stream channel in the Swifts Bay drainage basin is a small, shallow channel with intermittent flow. The stream is believed not to support fish. Streams such as this are especially vulnerable to the scouring effects of peak storm events. There is no known comprehensive baseline data about the physical and biological conditions of instream habitat in this stream system. Accordingly, the recommendations for instream habitat in the Swifts Bay Watershed are based on these factors. Assessment and improvement of instream habitat will aid in enhancing water quality and stabilizing stream structure, and will contribute to greater species richness.

## **OBJECTIVE #4 – RECOMMENDATIONS & ACTIONS:**

### **Recommendation 4.1: Stream Channel Baseline Study & Assessment**

The Conservation District should work with landowners and volunteers to perform a baseline survey of the stream channel and instream habitat in the watershed. The Conservation District should consult the WDFW for guidance in selecting appropriate survey parameters.

#### **Action 4-a:**

Identify baseline study protocols, outlining parameters and conditions to be studied. Data management and data presentation should also be considered. Consult relevant sources and agencies, including the WDFW for guidance and in obtaining or devising an appropriate stream survey datasheet. At a minimum, the study parameters should include:

- } Stream Bed Character

- Pools, riffles, and runs*
- } Stream Substrate
  - Silt/Clay/Mud; Sand; Gravel; Cobble*
- } Stream Bank Character
  - Width of stream channel*
  - Shape of stream channel*
  - Bank slope*
- } Streamside cover & condition of riparian zone
- } Instream vegetation
- } Stream shading
- } Stream alterations or structures

**Action 4-b:**

Identify landowners interested in participating in the study. Locate additional volunteers to help perform the baseline study. Ideally, this study will be carried out as one comprehensive system-wide study, however, if need be, the study can be performed parcel by parcel. This will depend on the level of landowner interest and available time.

**Action 4-c:**

Assess the conditions found during the baseline study and identify areas of the stream channel where restoration or enhancement may be warranted. Determine instream enhancement or restoration needs for degraded stream areas.

**Recommendation 4.2: Stream Channel Enhancement**

The Conservation District should work with landowners and volunteers to enhance and maintain the stream channel and instream habitat in areas where structure and function appear compromised. The Conservation District should consult the WDFW, the DOE and other appropriate agencies and organizations for guidance in identifying procedures and practices appropriate for instream restoration work. Local, state and/or federal permits may be required depending on the activities proposed.

**Action 4-d:**

Hold one or more educational workshops to familiarize landowners and other interested individuals with the aquatic ecosystem and the importance of maintaining instream habitat. Workshops should include field demonstrations.

**Action 4-e:**

Identify landowners interested in improving degraded instream habitat and stream channel conditions on their property.

**Action 4-f:**

Consult the WDFW and the DOE for guidance in carrying out instream enhancement projects. Using this information, coordinate enhancement projects with landowners and volunteers.

**Action 4-g:**

Investigate funding sources for volunteer-based stream enhancement projects.

**Recommendation 4.3: Lake Habitat Enhancement**

The lake shows signs of high productivity. Shallow water and nutrient rich water is promoting frequent algae blooms. Low dissolved oxygen concentrations in the lake have been identified as a major stressor to trout populations and a possible cause of winter fish kills occurring in the lake (WDFW, Hummel Lake Files, unpublished data, 2000). The Conservation District should work with the Friends of Hummel Lake and lakeside landowners in cooperation with the WDFW to identify options for managing algae growth and improving dissolved oxygen levels in the lake.

**Action 4-h:**

Meet with the Friends of Hummel Lake and the WDFW to identify options and further develop previously discussed options for increasing oxygen in the lake and/or decreasing algae blooms.



## OBJECTIVE #5

### *Identify and improve land use practices contributing nonpoint source pollutants into the Swifts Bay Watershed ecosystem, working with watershed landowners*

#### **Discussion:**

The Swifts Bay Watershed contains a mix of agricultural, forestry and residential land uses. Each of these land use categories will commonly include vegetation removal, surface drainage modifications, road building and other activities that undoubtedly contribute to the production of nonpoint pollution.

*Nonpoint source pollutants* are contaminants that run over, wash off, or seep through the ground into receiving watercourses from no defined point source. One of the most important pollution variables in nonpoint pollution is *flow*. In non-irrigated areas the loading of contaminants into a small stream (such as the Swifts Bay stream channel) tends to be proportional to the amount of runoff (Terrell & Perfetti, 1996). Runoff, in turn, varies with conditions -- amount and rate of rainfall; intensity of a storm event; soil type, condition and slope; vegetative cover; land use; etc. Water quality monitoring will help to identify which types of land use applications may be contributing to water quality degradation and to what degree. But, much can be achieved through preventative, conservation management practices carried out by landowners in their day-to-day land use activities.

*Conservation Management* is an approach to land management that aims at sustainability of natural resources over time through the use of conservation practices. Properly planning and implementing common land use activities can greatly minimize water quality degradation and disturbance of the ecological structure and function of streams, lakes and wetlands in the watershed. Nonpoint pollution in particular can be effectively reduced through site specific conservation practices that approach the landscape as a holistic system. Conservation management techniques and practices in the watershed will work to reduce the production of nonpoint pollution and the incidence of nonpoint contaminants reaching surface water bodies.

#### **Recommendation 5.1: Conservation Management Program**

The Conservation District should work with watershed landowners on a site-specific basis to identify effective conservation techniques. Conservation management planning should target the three primary land uses in the watershed: agricultural, forestry and residential land uses.

#### **Action 5-a:**

Identify landowners in the watershed interested in establishing a farm conservation plan, a forest stewardship plan or a residential conservation plan for their property. Also, identify volunteers available to assist in conservation management projects, i.e., fence building,

streamside planting, etc. On initial contact with landowners a preliminary timeline and expected start date should be established. Also, during conservation management site assessments, if possible, riparian and instream habitats on streamside parcels should be evaluated for potential enhancement or restoration activities.

**Action 5-b:**

Identify conservation techniques for residential sites. *Farm conservation planning and forest stewardship planning performed by the Conservation District is based on guidance received from the Natural Resources Conservation Service (NRCS). Residential conservation planning will need to have parameters established for conservation techniques for residential uses.*

**Action 5-c:**

Identify volunteers available to assist in conservation management projects, i.e., fence building, streamside planting, etc.

**Action 5-d:**

Work with interested landowners to perform conservation management planning for farm, forest and residential sites. In general, the process will include a Conservation District staff member performing the following:

- Π Site visit to the property
- Π Identification of landowners goals and priorities, *e.g., to save money by improving pasture productivity & decrease the purchase of feed supplements*
- Π Resource inventory and assessment
- Π Narrative of site findings summarized for landowner
  - Summary of resource concerns*
  - Suggestions for conservation management practices*
- Π Discussion of site findings and recommendations with landowner
- Π Written summary of landowners decisions on conservation management implementation (for landowners and conservation district)

**Action 5-e:**

Conduct follow-up site visits to determine the landowners level of satisfaction with the conservation management plan and the effectiveness of the conservation techniques in use.

**Recommendation 5.2: Conservation Management & “BMP” Education**

The Conservation District should carry out a series of educational workshops and demonstrations covering generalized information about “best management practices” – what they are and how to implement them. Education should also be offered through field demonstrations covering conservation management techniques that address site-specific issues in the watershed.

**Action 5-f:**

Provide a series of educational workshops that covers general information about “best management practices” (BMPs) and that offers specific BMP techniques for issues common on agricultural, forested, residential and stream side lands.

**Action 5-g:**

Identify landowners interested in addressing site-specific issues on their property by using their property as a demonstration site for conservation management techniques performed as an educational demonstration workshop.

**Action 5-h:**

Consult appropriate local and regional groups/individuals to assist in training demonstrations for landowners that cover conservation techniques.



## OBJECTIVE #6

***Minimize impacts and protect the natural function and dynamics of the Swifts Bay salt water lagoon, salt marsh, shoreline and intertidal zone through landowner education and stewardship and through the identification of potential restoration or enhancement strategies for the saltwater lagoon and salt marsh***

### **Discussion:**

The salt water lagoon and salt marsh in the upper shore of Swifts Bay is cut off from tidal flushing by a steel tidegate. As the tide comes up, the water closes the door back against the culvert end. A tight enough seal is formed, preventing most saltwater, and most fish and invertebrates from entering the lagoon. While the door is closed against the tide the water level builds up on the freshwater side because the water cannot escape. In the summer, there is little if any freshwater flow out of this gate because the stream entering the lagoon goes dry or nearly so. Surface water draining from the watershed is held back by the tidegate until the tide drops and the water stacked against the inlet side of the flap gate pushes the gate open enough for the lagoon to drain.

It would be very beneficial to involve landowners on the shoreline and those surrounding the lagoon in a discussion about issues and options for the lagoon and salt marsh. Algae blooms appear to be increasing in the lagoon (landowner comment, 2001). In addition, the culvert and flap gate may not be large enough to adequately drain the flow during high winter rain events, which may induce flooding (San Juan County, 2000).

Shoreline education and public forums to promote community discussion about the condition and functioning of the marine features in this area would be beneficial and would help identify landowner goals on the shoreline. From these discussions, restoration and/or conservation management actions can be established.

### **Recommendation 6.1: Estuarine & Shoreline Education & Stewardship**

The Conservation District should carry out a series of educational workshops and discussions about the salt marsh, salt water lagoon, the shoreline and intertidal zone. Education should also be offered through field demonstrations covering conservation management techniques that address site-specific issues in the lagoon and shoreline region of the watershed.

#### **Action 6-a:**

Provide one or more educational workshops targeting shoreline owners that covers the processes and condition of the salt water lagoon, salt marsh and the shoreline.

#### **Action 6-b:**

Work with shoreline and lagoon landowners to identify stewardship practices to help protect the water quality and the physical integrity of the lagoon and salt marsh.

**Action 6-c:**

Work with landowners to identify their preferences for restoring the estuarine functions of the lagoon and marsh. With landowner support, investigate options for restoring some of these functions through increased tidal flushing into the lagoon and other approaches.