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# Portage Bay Initial Closure Response Strategy

## *A Community Effort to Reclaim Lost Shellfish Resources*

### Executive Summary

**Introduction.** This is the initial response strategy for the closure of commercial shellfish beds in Portage Bay ("Bay"). (See Figure 1.) In August of 1997, the State Department of Health ("DOH") downgraded a portion of the Bay from *approved* to *prohibited*. This action was necessary to protect public health. Previous sampling of marine water showed concentrations of fecal coliform bacteria above what was safe according to the state water quality standards and National Shellfish Sanitation Program. Immediately following announcement of the closure, representatives of Local, Tribal, Federal, State governmental agencies and local community groups coalesced as a team to develop and offer this strategy for the correction of contamination to the Whatcom County Council.

**Goal.** The closure response team ("Team") set December 31, 1999 for reopening the commercial shellfish beds in the Bay. While recognizing this is an ambitious goal, we are confident it can be achieved through strategic actions carried out in partnership between public agencies and private landowners. This does not, however, mean all fecal coliform bacterial pollution will be eliminated by then. Instead, it means that the contamination will be reduced to meet water quality standards and the DOH is satisfied that future exceedences are unlikely given the programs that are then in place.

**Strategy.** For the most part, pollution will be reduced by voluntary actions fostered by technical assistance and education. An effective program for enforcement of existing and proposed laws will address those who are not so responsible. This strategy also recognizes immediate and long-term information needs to be met through a monitoring program. The focus is to reduce fecal coliform pollution from these sources:

- Agriculture
- On-site septic systems
- Sewage treatment plants, and
- Stormwater runoff.

This strategy assumes environmental benefits will result from actions already underway. It anticipates full and timely advantage will be taken of partnership opportunities that will arise between public agencies and private landowners. Many of the proposed actions are under way or will be taken soon through existing resources. However, to fully implement this strategy, the participating agencies will need some additional funding.

## Background

**Importance of the Shellfish Resource.** Washington state is a leading producer of clams and oysters, with an annual commercial wholesale value of about \$50 million. In Portage Bay this commercial resource has been valued at \$300,000 annually. Mr. Merle Jefferson, Director of the Lummi Nation Natural Resources Department, wrote to John Gillies of the USDA – NRCS supporting the Whatcom Conservation District's request to include Whatcom County in a Geographic Priority Area to garner additional financial assistance for local dairy producers:

*"the loss of Portage Bay shellfish beds has damaged the Lummi commercial, subsistence, and ceremonial harvest of clams and oysters. Shellfish and salmon are economically and culturally significant resources of our tribe, which the United States and its agencies have a trust responsibility to protect. In addition, U.S. Department of Agriculture grants funded a major expansion of our oyster hatchery in 1994. Oysters derived from that hatchery are seeded in the shellfish beds that have been affected, and similar nearby shellfish beds are threatened if the degraded water quality continues."*

The effect of the monetary losses suffered by the Lummi Nation ripples through Whatcom County's economy.

**Polluted Water Contaminates Shellfish.** Water quality is the most significant factor in determining whether clams, oysters, mussels and other shellfish are safe to eat. In polluted water, shellfish accumulate bacteria, viruses, or toxic substances. While the shellfish themselves may appear unaffected, those who eat them can become ill.

Some kinds of shellfish poisoning are caused periodically by naturally occurring bio-toxins such those that cause "red tide" or PSP. Increasingly, though, our shellfish are damaged by ongoing pollution. One of these common pollutants, fecal coliform, is the cause of the current restrictions on Portage Bay shellfish harvesting. Evidence has shown that the pollution in the Bay is a result of heavy bacterial loading from the Nooksack River Watershed.

**Fecal Coliform Standard.** Fecal coliform is a group of bacteria, which has been used for many years as a primary indicator of water quality. Among the bacteria in the fecal coliform group is *Escherichia coli* (*E. coli*) – strains of which can cause severe illness or death in humans who ingest it. Other disease causing bacteria, not part of the fecal coliform group, are often present where fecal coliform is found.

The geometric mean on the samples collected cannot be greater than 14 fecal coliform colonies per 100 milliliters ("ml"). with no more than 10% of the samples greater than 43 fecal coliform colonies per 100 ml. Between July 1992 and February 1997 at least 30 samples were taken from seven different sites within Portage Bay totaling over 210 samples. Two of these sites (11& 12) failed to meet water quality standards for fecal coliform and resulted in the downgrade. (See Figure 2.)

The principal source of freshwater into the Bay is the discharge of the Nooksack River. (Comprehensive Study of Water and Related Land Resources, Appendix III, Hydrology and Natural Environment) Sampling of the Nooksack River below the bridge at Mount Baker Highway as well as several of its tributaries intersecting below that point, are impaired by excess levels of fecal coliform. Nearly 40% of the monthly samples collected by the state Department of Ecology in the lower Nooksack River between 1993 to 1996 exceeded the established water quality standards for a Class A stream (100 fecal coliform colonies/100ml). Other studies show similar results.

## Pollution Sources and Strategies

**Key Sources of Fecal Coliform Pollution.** The DOH identified six potential sources of fecal coliform pollution in its August 1997 report: Sanitary Survey of Portage Bay ("Report"). In considering that report plus those provided by its members, the Team weighed the relative contributions of fecal coliform bacteria from each those sources. It deliberated upon what measures were available to eliminate or reduce discharges from the respective sources and the costs/benefits attendant to each. From this, the Team concluded that the downgrade could be most effectively, efficiently and promptly reversed by addressing four key sources of pollution.

These are:

- Agriculture
- On-site septic systems
- Sewage treatment plants, and
- Stormwater runoff.

The Team felt that given what it knew about wildlife and industrial as potential sources of fecal coliform pollution it could not recommend remedial action at this time. Both sources are viewed by the DOH in its Report as low potential contributors to water quality impacts in the Bay given the lack of evidence to the contrary. The Team recommends that wildlife data should be recorded in the course of water quality monitoring when significant concentrations are observed. There are a number of facilities in the watershed regulated under the NPDES *general* or *industrial permits*. It will be useful to screen out those with no potential for contributing to the Bay fecal coliform problems.

**Control Agricultural Sources** - Improper dairy waste management is identified as the largest potential contributor of fecal coliform pollution in the Nooksack watershed by the DOH and the Team. More than one-half million gallons per day of manure is produced by about 50,000 cows on 200 dairy farms within the basin. This number does not include young stock. The amount of dairy waste produced each day in the Nooksack watershed on a bacterial loading basis is equivalent to 1 million people.

The Team recommends not only a commitment to provide education, technical and financial assistance to livestock farmers large and small but also, to an effective enforcement program. Experience demonstrates the importance of enforcement activities by the EPA and the DOE to inspire adherence to practices that protect water quality. Such a program includes the continued presence of the EPA and DOE with Whatcom County assuming a higher profile.

The County should take three steps in this regard. First, it should actively enforce the Critical Areas Ordinance by providing funding to support an inspector in the field dedicated to that purpose. Second, it should prohibit by ordinance the spreading of liquid manure at the wrong time (e.g. to corn stubble post-harvest through the following February) and in a sloppy manner (e.g. to a stream, creek, river or a public right-of-way). Third, it should enter into a Memorandum of Understanding ("MOU") with the Environmental Protection Agency ("EPA") and State Department of Ecology ("DOE"). Through this MOU the agencies would clarify their respective jurisdictions, coordinate efforts and make referrals from one another. This would avoid duplication or omissions in inspection activities.

Detailed technical studies on the effects of Best Management Practices (BMPs) on fecal coliform levels and/or research into alternative dairy waste management techniques will continue to be valuable. WSU Cooperative Extension has been and will continue to be active in conducting such research and demonstration projects. The Whatcom Conservation District

and the Northwest Indian College have expressed interest in developing specific projects and seeking grant funding for them as well

Partners in this response strategy include the USDA Natural Resources Conservation Service, Whatcom Conservation District, WSU Cooperative Extension, Environmental Protection Agency, Department of Ecology, Whatcom County, and individual farm owners.

**Control Sewage Treatment Plant Sources.** Sewage treatment plants (“STP’s”) operated by the cities of Everson, Lynden and Ferndale are known sources of fecal coliform. In monthly averages, the daily discharged wastewater from these facilities must not exceed 200 fecal coliform colonies/100 ml. Sampling by Department of Ecology for the “total maximum daily load” (TMDL) study indicates that permitted average amounts are exceeded on individual days. The Team recommends review of discharge (NPDES) permits with a recommendation for tighter changes in upcoming permits under renewal. This will be done with existing resources.

**Control Failing On-site Septic Systems Sources.** Failing on-site septic systems (“OSS’s”) especially in the Marietta area are an additional potential source of fecal coliform contamination to Portage Bay. The Team recommends that the Whatcom County Department of Health conduct a survey of OSS in this area and require repair of failures.

**Control Stormwater Runoff Sources.** Stormwater runoff is a source of fecal coliform pollution in the Nooksack River drainage. In urban areas, pet waste and other non-agricultural sources are the primary sources. In rural areas, stormwater can carry bacteria from agricultural operations, non-commercial farms or on-site septic systems.

Affected municipalities, including the County, are required to develop stormwater management plans. This process appears to be on track. In advance of implementation of those plans, there is a need for mapping of known stormwater outfalls to aid the response strategy. The Team recommends the prompt completion of this mapping

## Sampling in the Nooksack River and its Tributaries

**Assessing Overall Pollution Loads to the Nooksack River.** As a requirement of the federal Clean Water Act, the DOE is conducting a Total Maximum Daily Load (“TMDL”) study. This will help the DOE and the Whatcom County community determine how best to reduce pollution (of all types) in the Nooksack River and tributaries. Monthly sampling at 20 sites along the Nooksack River, from Nuggett’s Corner to Portage Bay, began in March 1997 as part of this TMDL study. When sampling is concluded in March 1998, the data will be thoroughly analyzed. It will identify the fecal coliform bacteria reductions needed to meet Class A water standards at all points of the Nooksack River. The TMDL study will help better quantify the relative contributions of fecal coliform from the potential sources identified in the DOH Report.

**Recent Monitoring Results.** Figure 3 presents fecal coliform concentrations at selected TMDL monitoring sites. From preliminary TMDL sampling data, some *general inferences* can be made.

- Fecal coliform counts increase in the Nooksack River from Everson to the mouth in average figures of 25 fecal coliform colonies/100 ml at Everson to 122 fecal coliform colonies/100 ml at the mouth.
- Average fecal coliform colony counts for some tributaries have been much higher – 510 fecal coliform colonies/100 ml. in Kamm Creek, 620 fecal coliform colonies/100 ml in Fishtrap Creek, and 490 fecal coliform colonies/100 ml in Tenmile Creek.

- The most substantial increase of fecal coliform colony counts in the Nooksack occurs between Lynden and Ferndale.
- Fecal coliform colony counts appear to level off between Ferndale and Marine Drive, except during storm events.
- Tributaries surrounded by substantial dairy activity continue to greatly exceed Class A fecal coliform colony concentration standards.
- Sewage treatment plants and storm water are second to agriculture as fecal coliform colony bacterial inputs.
- Samples collected at the Everson, Lynden and Ferndale sewage treatment plants have contained fecal coliform colony counts above 200 fecal coliform colonies/100ml. The worst recorded single exceedence occurred in June at the Lynden STP with 800,000 fecal coliform colonies/ml.
- During storm events, already high fecal coliform counts in tributaries can increase 1-2 orders of magnitude. For example, during a 12-hour period of the October 30, 1997 storm, fecal coliform counts increased:
  - at the mouth from 375 to 1050 fecal coliform colonies/100ml;
  - at Ten Mile and Fishtrap Creeks between 1000 and 6000 fecal coliform colonies/100 ml.

This illustrates that fecal coliform counts and stream flows can vary dramatically in a matter of hours. It also illustrates that increased runoff can result in increased fecal coliform counts during a fairly typical storm event. This is especially true for Portage Bay as the Nooksack River dumps an increased volume of more contaminated water into the bay. In order to acquire a greater understanding of these events, the TMDL study has been expanded to include increased storm sampling.

**Current Monitoring Efforts.** The following water sampling and monitoring activities are already underway:

- The TMDL study will yield important information about pollution sources to the Nooksack, and the river's capacity for assimilating fecal coliform. The yearlong sampling regime for the TMDL will conclude in March 1998, with data analysis being conducted the remaining part of the year.
- The Northwest Indian College will be conducting a study through the year 2000 that will build upon the work of the TMDL study to see how fecal coliform bacteria are transported.
- DOH monthly monitoring will continue in Portage Bay.
- The Nooksack Tribe has been monitoring reaches in Anderson, Kamm, Fishtrap and Bertrand creeks and the main stem of the Nooksack River for fecal coliform bacteria in conjunction with the TMDL sampling.
- 'Spot' sampling between major storm events and on other occasions has been useful when potential runoff occurs from land application of manure. Increased sampling is needed to better define and locate those areas within the sub-basin that have consistently high counts.

**Future Monitoring Needs.** A monitoring program is necessary to measure two things. First, it must measure the effectiveness of the Portage Bay Closure Response Strategy. Second, must measure the effectiveness of pollution limits set by the year 2000 under the TMDL process. A monitoring plan should include indicators of water quality, shellfish health, land use, education effectiveness, and regulatory actions. It is expected that the Portage Bay strategy will be constantly evaluated and adjusted according to information yielded from an

ongoing monitoring program. Without monitoring, there will be no way to measure the effectiveness of resources spent on implementation.

The Team recommends that monitoring of the Portage Bay Closure Response Strategy be coordinated by the committee established to implement the closure response strategy. The committee should also be responsible for maintaining a database, interpreting and summarizing data of monitoring reports, and evaluating trends.

## **Portage Bay Closure Response Team**

**Lead Agency.** The Whatcom Conservation District served as lead agency for the development of this initial closure response strategy. Its responsibilities included, among other things, meeting facilitation and coordination, record keeping, document preparation and dissemination.

**Closure Response Team.** The following agencies and groups participated in the development of this strategy:

<b>AGENCY</b>	<b>CONTACT PERSON</b>
EPA	Steve Bubnick
Lummi Nation	Michael Cochrane
Nooksack Indian Tribe	Chris Woodward
Puget Sound Water Quality Action Team	Stuart Glasoe
State Department of Ecology	Joan Pelley
State Department of Health	Don Lennartson
USDA – NRCS	John Gillies
Whatcom Conservation District	George J. Boggs
Whatcom County	
Health	Regina Delahunt
Planning & Development Services	Jeff Griffin
Whatcom County Dairy Federation	Bob VanWeerdhuizen
WSU Cooperative Extension	Dave Grusenmeyer

Special thanks to Dawn Bekenyi for her invaluable administrative support

OBJECTIVES & TASKS	TIMELINE	ASSIGNMENT	FUNDED	SOURCE	UNFUNDED	SOURCE
<b>Objective 1: Control Agricultural Sources</b>						
<b>A. Provide Technical/Financial Assistance to Farms</b>						
Task 1.1: Provide Financial Assistance to 45 Dairies to implement manure management plans	July 1997 - June 1999	Natural Resources Conservation Service (NRCS) Whatcom Conservation District (WCD)	\$1,000,000 \$446,000 \$1,446,000	Federal - EQIP State - WCD Grant Producer Match		
Task 1.2: Provide Technical Assistance to 80 Dairies to develop manure management plans	July 1997 - June 1999	NRCS & WCD	\$350,000 \$325,000	Federal - NRCS * State - WCD Grant		
Task 1.3: Provide technical assistance to small/non-commercial farmers and landowners to develop conservation plans.	July 1997 - June 1999	WCD	\$30,000	State - WCD Grant	\$60,000	General Fund Shellfish/Clean Water District funds
<b>B. Implement Whatcom County Critical Areas Program and Other Clean Water Legislation</b>						
Task 1.4: Conduct farm inspection program. Refer farmers to Conservation District to develop conservation plans when required by the critical areas ordinance. Refer BMP and farm plan violations to County enforcement officer when necessary. Enforce compliance with approved conservation plans. Enforce compliance with BMPs for small farms.	1998 & 1999	Whatcom County			\$230,000	General Fund Shellfish/Clean Water District funds
Task 1.5: Assist farmers develop conservation plans consistent with CAO requirements. Approve, condition, disapprove plans.	1997-98	WCD	\$35,000	97/98 County Budget	\$35,000	General Fund Shellfish/Clean Water District funds
Task 1.6: Reach a cooperative agreement between the EPA, DOE and WC regarding their respective enforcement activities.	March 1998	EPA, DOE & WC	With existing staff	Respective Budgets		
Task 1.7: Adopt Manure Management Ordinance	ASAP	WC	With existing staff	97/98 County Budget		
Task 1.8: Reach a cooperative agreement between the EPA, DOE and WC regarding their respective enforcement activities.	March 1998	EPA, DOE & WC	With existing staff	Respective Budgets		
<b>Objective 2: Control Stormwater Sources</b>						
Task 2.1: Complete the regulatory review begun in 1997.	Will complete in March 1998	Whatcom County	\$5,000	97/98 County Budget		
Task 2.2: Use results from Task 2.1 to continue development of a Comprehensive Stormwater Program to comply with the County Comprehensive Plan, Puget Sound Water Quality Plan, and Department of Ecology requirements.	1998-1999	Whatcom County	\$20,000	97/98 County Budget		
<b>Objective 3: Control STP's and OSS's Sources</b>						
Task 3.1: A formal On-site Sewage (OSS) survey should be completed in the Marietta, Rural Ave, and Country Lane area.	Immediately	WC Health Department Lummi Tribe	With existing staff	97/98 County Budget		
Phase 1: Residences along Marine Drive in Marietta should be surveyed immediately. (Approx. 30)						

OBJECTIVES & TASKS	TIMELINE	ASSIGNMENT	FUNDED	SOURCE	UNFUNDED	SOURCE
Phase 2: Formal OSS Survey be completed at all remaining residences (approx. 150) in the Country Lane/Rural Ave area.	February 1999	WC Health Department			\$25,000	General Fund Shellfish/Clean Water District funds
Task 3.2: Apply for DOE OSS grant funding to assist homeowners with repair of failing OSS.	September 1998	WC Health Department	With existing staff	97/98 County Budget		
Task 3.3: Apply for State Revolving Fund (SRF) low interest loan program to assist homeowners with repair of failing OSS.	January 1998	WC Health Department	With existing staff	97/98 County Budget		
Task 3.4: Adopt a formal OSS enforcement policy to ensure adequate enforcement of regulations regarding repairs of failing OSS.	January 1998	WC Health Department	With existing staff	97/98 County Budget		
Task 3.5: In development of the County OSS Operations and Maintenance Program insure that consideration is given to areas such as the Nooksack drainage which have a potential impact on shellfish resources so that the resulting program ensures preventative O & M in these areas.	December 1998	WC Health Department	With existing staff	City of Bellingham Interlocal Agreement		
Task 3.6: Distribute OSS maintenance reminders to property owners in the Nooksack River drainages of North Fork 10-1, Middle Fork 10-2 and South Fork 10-3.	December 1998	WC Health Department	With existing staff	City of Bellingham Interlocal Agreement		
Task 3.7: Ensure that all residences within public sewer service areas are either connected to public sewer or that any existing OSS are adequately functioning.	December 1998	WC Health Department, City of Ferndale, City of Lynden, Lummi Water and Sewer	With existing staff		\$5,000	General Fund Shellfish/Clean Water District funds
Task 3.8: Review STP Records & Report on performance relative to compliance with existing permits	December 1998	DOE				
Task 3.9: Make recommendations as to changes in operation for future permits for STPs		DOE				
Task 3.10: Review STP Q/A & Q/C plans and make recommendations for improvement.		DOE				
Task 3.11: Review Q/A & Q/C data of STP operations through closure response period.	February 1998 to December 1999	DOE & WCDOH				
<b>Objective 4: Monitor Water Quality</b>						
Task 4.1 Conduct Fecal Coliform Transport Sampling Project (Mainstem to Bay)	1998-1999	Northwest Indian College	\$60,000	EPA Grant		
Task 4.2 Conduct Portage Bay Sampling	1998-1999	State Department of Health				
Task 4.3 Conduct Water Quality Monitoring in Nooksack Basin Including Fecal Testing/Pilot Projects	1998-1999	Partnership of Nooksack & Lummi Tribes, WCD & DOE			\$150,000	General Fund Shellfish/Clean Water District funds
<b>Objective 5: Establish Education/Outreach Program</b>						
Task 5.1: Hire an Education/Outreach Coordinator	1998 & 1999	WSU-Cooperative Extension, WCD			\$123,000	General Fund Shellfish/Clean Water District funds



OBJECTIVES & TASKS	TIMELINE	ASSIGNMENT	FUNDED	SOURCE	UNFUNDED	SOURCE
Task 5.2: Develop an Education & Outreach Program for Dairy Producers	February 1998	WSU-Cooperative Extension WCD			See task 5.1 above	See task 5.1 above
Task 5.3: Implement an Education & Outreach Program for Dairy Producers	February 1998 WSU-Cooperative Extension	WSU-Cooperative Extension WCD			See task 5.1 above	See task 5.1 above
Task 5.4: Develop an Educational/Involvement Program for general public and agencies.	May 1998	WSU-Cooperative Extension WCD			See task 5.1 above	See task 5.1 above
Task 5.5: Implement an Educational/Involvement Program for general public and agencies.	Ongoing	WSU-Cooperative Extension WCD			See task 5.1 above	See task 5.1 above
<b>Objective 6: Establish Funding District and Program</b>						
Task 6.1: Identify general funding options and create shellfish protection district.	February 1998	Whatcom County WCD	\$2,000	97/98 County Budget State -- WCD Grant		
Task 6.2: Analyze options, determine preferred approach and develop draft program describing boundaries, budget, projects/services, rate structures and other details.	May 1998	Whatcom County, WCD, County Council, Water Resources Council	\$2,000	97/98 County Budget State -- WCD Grant		
Task 6.3: Solicit public review and develop administrative procedures for billing, accounting, reporting, etc.	August 1998	Whatcom County, WCD, County Council, Water Resources Council	\$2,000	97/98 County Budget State -- WCD Grant		
Task 6.4: Revise and adopt final district and program.	September 1998	Whatcom County, WCD, County Council, Water Resources Council	\$1,000	97/98 County Budget State -- WCD Grant		
Task 6.5: Administer, periodically evaluate and, as necessary, revise the program. Report progress to elected officials and the public.	Ongoing	Whatcom County, WCD, County Council, Water Resources Council			\$15,000	General Fund Shellfish/Clean Water District funds
<b>Totals</b>			<b>\$ 3,724,000</b>		<b>\$643,000</b>	

\* Assumes current staffing levels at the Lynden NRCS Field Office.

Figure 1: Area Map

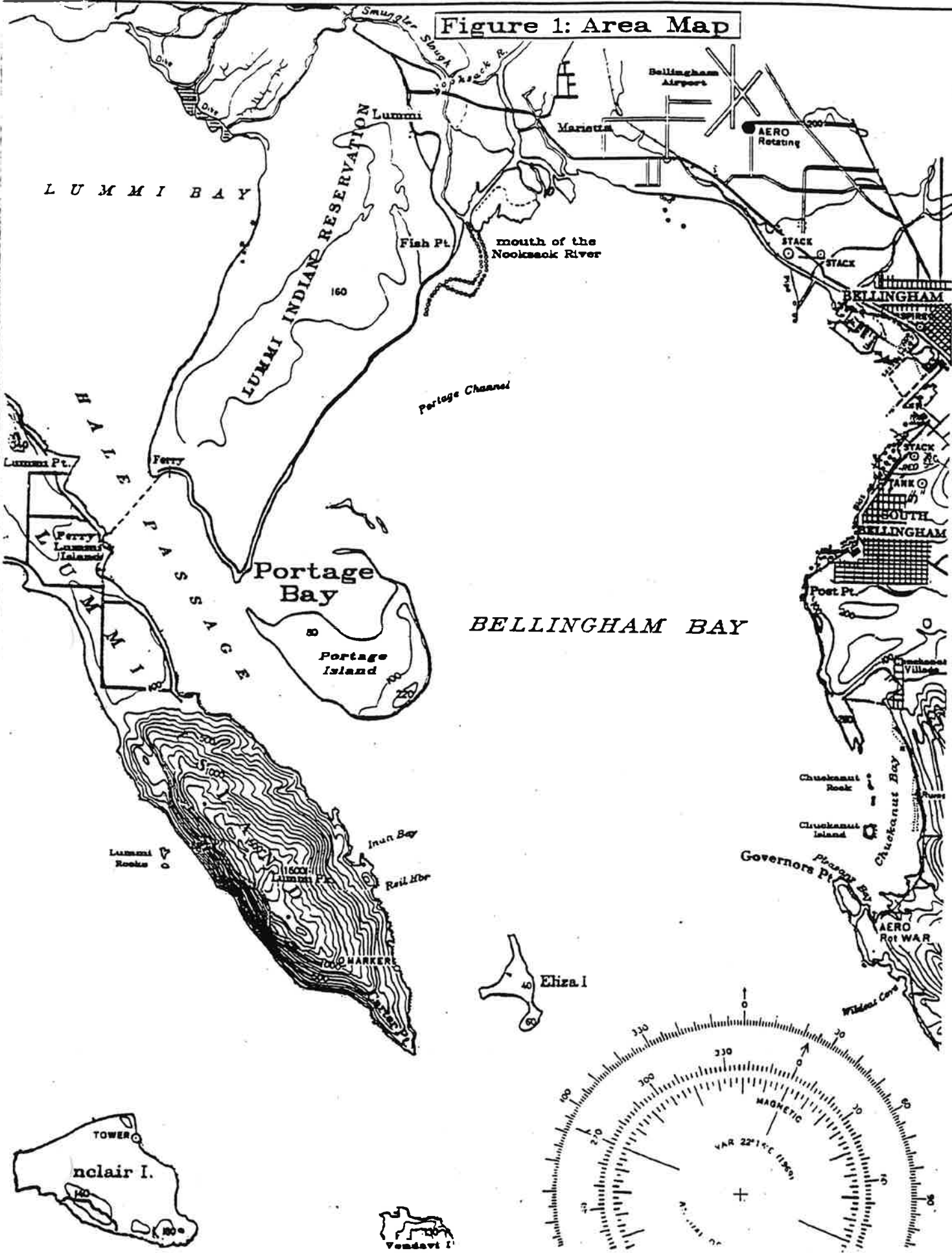


Figure 2: Sampling Station Map

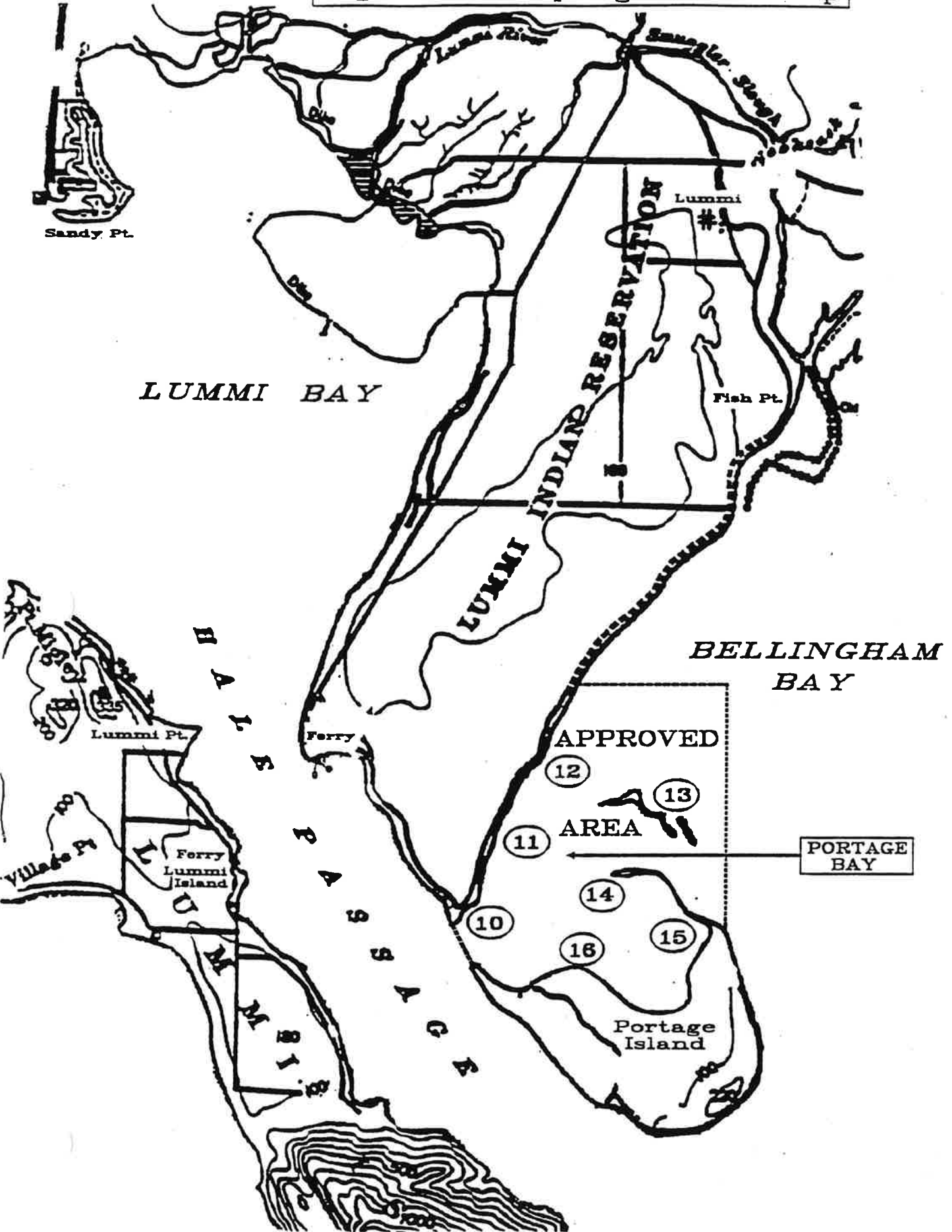
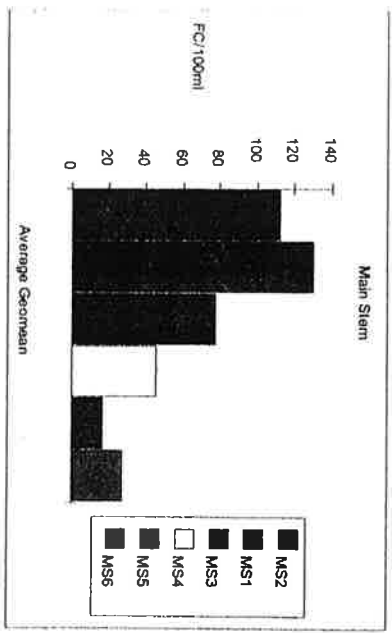
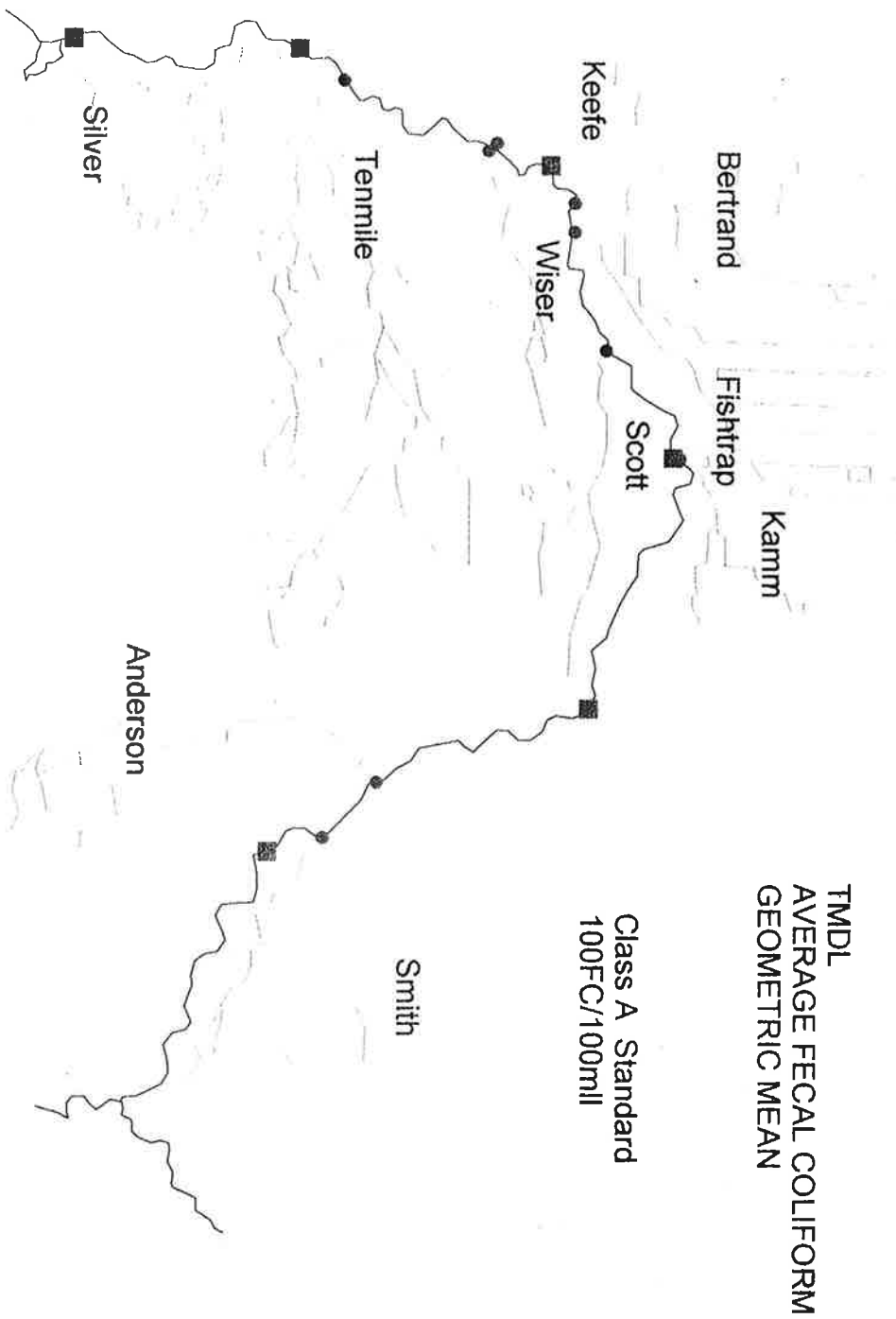


Figure 3: Fecal Coliform Concentrations at Selected TMDL Sites



■ MAIN STEM SITES.shp  
 Tribs.shp  
 ● TRIBUTARY SITES.shp  
 ▽ Nooksack.shp

