Memorandum of Agreement
Between
Clallam County and City of Sequim

This Memorandum of Agreement between Clallam County, (hereinafter referred to as "the County"), and the City of Sequim, (hereinafter referred to as "the City"), provides for the inclusion and participation of the City in the newly created shellfish protection district as defined in RCW, Chapter 90.72 but only to the extent set forth herein. The shellfish protection district will be known as the Sequim – Dungeness Bay Clean Water District, (hereinafter referred to as "the Clean Water District").

WHEREAS, the creation of the Clean Water District is required by RCW Chapter 90.72, due to the Washington State Department of Health notification on April 28th, 2000, which officially downgraded the classification of the commercial shellfish growing area within Dungeness Bay.

WHEREAS, the legal boundaries of the Clean Water District, when established, includes the Dungeness Watershed and those waters influenced by it through the irrigation system, and other independent tributaries to the Strait of Juan de Fuca, from Bagley Creek east to and including the Sequim Bay Watershed. This encompasses the Dungeness and Graywolf rivers, the creeks of Bagley, McDonald, Matriotti, Meadowbrook, Cooper, Cassalery, Gierin, Bell, Johnson, Dean, Jimmycomelately, Chicken Coop and their tributaries. The boundaries are outlined in "Exhibit A" to this Agreement.

WHEREAS, the City and associated Urban Growth Area (UGA) boundaries lie within the Clean Water District boundary.

WHEREAS RCW Chapter 90.72 directs counties to coordinate and cooperate with cities within the district boundary in establishing shellfish protection districts and shellfish protection programs,

WHEREAS RCW Chapter 90.72.070 exempts District charges against facilities for waste water discharge where the facility has been permitted under the national pollutant discharge elimination system (NPDES), and assessed fees for waste water discharges thereunder, and

WHEREAS the City of Sequim has been permitted under the NPDES and pass an annual fee under such system.

NOW THEREFORE, it is mutually agreed that:

The County and the City will work cooperatively to address non-point pollution problems throughout the clean water district.

The City endorses the Clean Water Strategy for Addressing Fecal Coliform and other contaminants that may affect the quantity and/or quality of water in the Dungeness Bay Watershed as attached hereto as "Exhibit B" and incorporated by reference.

The County and the City will work cooperatively to develop programs that address proper operation and maintenance of on-site septic systems, agricultural and animal

keeping practices, stormwater management, water conservation, management of household (including lawn and garden) and small quantity generator chemicals and chemical waste, and other such programs as identified as having benefits to water quality, including ground and surface waters, shellfish, or salmonids.

Program Financing
Funding for the Clean Water District programs will be through grants and loans and additional Memoranda by mutual agreement.

The City of Sequim and the Board of County Commissioners shall mutually agree upon any fees, rates or charges, which would impact the City of Sequim residents, to fund Clean Water District programs.

Financing programs as allowed by RCW, Chapter 90.72.070 through county tax revenues, reasonable inspection fees and similar fees for services provided, and or reasonable charges or rates specified in the protection program shall not be assessed against the City of Sequim or against its residents, occupants or owners of land within the City of Sequim as presently constituted or after annexation into the City of Sequim, except as mutually agreed in writing.

This agreement shall remain in effect until terminated by either party with sixty (60) day notice. Termination of this agreement shall remove the City of Sequim from the shellfish protection district.

PASSED AND ADOPTED THIS 22nd DAY OF May, 2001.

City of Sequim

Bill Thomas, Mayor
On behalf of the City Council

Date: 3/26/01

Board of Clallam County Commissioners

Howard V. Doherty, Jr., Chair

Stephen P. Tharinger

Michael C. Chapman

ATTEST:

Trish Perrott
Clerk of the Board

Sequim City Clerk/TREASURER

Approved as to Form:

Christopher Melly, Chief Deputy
Prosecuting Attorney

Craig A. Ritchie, City Attorney

ORDINANCE NO. 706, 2001

An ordinance adding a new chapter 27.16 to Clallam County code creating the Sequim Bay - Dungeness Watershed Clean Water District, establishing its boundaries, and adopting a watershed protection program.

BE IT ORDAINED BY THE BOARD OF CLALLAM COUNTY COMMISSIONERS:

C.C.C. 27.16

Shellfish Protection District

Sections:

C.C.C. 27.16.01	Purpose
C.C.C. 27.16.02	Findings of Fact
C.C.C. 27.16.03	District Creation and Name
C.C.C. 27.16.04	District Boundaries
C.C.C. 27.16.05	Adoption of a Watershed Protection Program
C.C.C. 27.16.06	Adoption of a Nonpoint Pollution Plan Addressing Shellfish Bed Closures in Dungeness Bay
C.C.C. 27.16.07	Effective Date.

C.C.C. 27.16.01 Purpose The purpose of this chapter is to:

1. Create a shellfish protection district as required by RCW Chapter 90.72.
2. Establish the boundaries of the district.
3. Establish a district name.
4. Adopt a watershed protection program.
5. Adopt a nonpoint pollution plan for Dungeness Bay watershed

C.C.C. 27.16.02 Findings of Fact The Board of Clallam County Commissioners finds that the following facts require the need for adopting this ordinance:

1. The Washington State Department of Health on April 25th, 2000 officially downgraded the classification of the commercial shellfish growing area within Dungeness Bay, which is located on the Straits of Juan de Fuca in Clallam County.

2. RCW Chapter 90.72, "Shellfish District" directs the County to establish a District within 180 days of such a downgrade and establish a program to address the reason(s) for the downgrade.

3. It is important to protect shellfish, it is equally important to protect other beneficial uses of water. Recognizing this, the district will be called the Dungeness- Sequim Bay Watershed Clean Water District.

4. The Washington State Department of Health has determined that degradation of Dungeness Bay water quality is primarily due to nonpoint sources of water pollution.

5. The Clallam County Department of Community Development is responsible for providing management of on-site sewage systems and programs to remedy nonpoint surface pollution as it exists in unincorporated Clallam County.

6. Dungeness Bay and Sequim Bay contain commercial and recreational shellfish growing areas in Clallam County.

Clean Water District Legal Boundaries

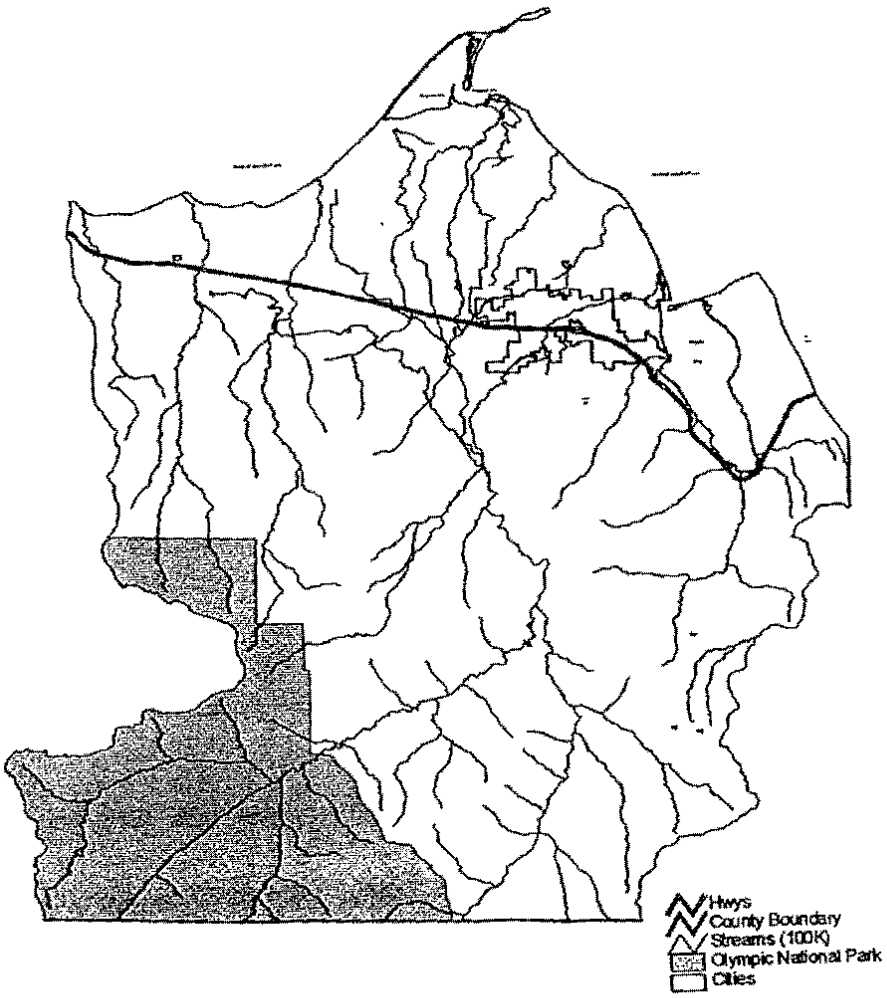


Exhibit A

Clean Water Strategy For Addressing Fecal Coliform in Dungeness Bay and Watershed

November 21, 2000
Final

Exhibit B

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I. Introduction

This document presents a strategy to address fecal coliform pollution in the Dungeness Watershed and Bay. The purpose of this strategy is to coordinate and guide actions that will ensure improvement and long-term protection of water quality. This strategy will be reviewed and updated periodically as needed.

II. Background

Over the past decade, Clallam County has experienced much of its growth in the unincorporated, rural areas of the county. This increased growth is creating pressures on water quality, particularly in the Dungeness Watershed where the relatively dry climate of the Olympic rainshadow attracts newcomers to the area. As a result of land-use changes and ongoing releases of fecal coliform into streams and ditches, water quality in both fresh and marine waters has deteriorated.

The symptoms of poor water quality are increasingly evident in the Dungeness Valley. Johnson, Bell, Cassalery, Matriotti, and Bagley creeks are on the Washington Department of Ecology's (Ecology), 303(d) list for bacterial contamination. Under the federal Clean Water Act, section 303(d), every two years Washington State has to submit to the US Environmental Protection Agency (US EPA) a list of surface water bodies that fall short of water quality standards and are not expected to improve within the next two years. Further, effective April 25, 2000, the Washington Department of Health (DOH) closed an area of Dungeness Bay to commercial shellfish harvesting because concentrations of fecal coliform bacteria exceeded the State and Federal water quality standard.

Water Clean-up Plan

As a result of the 303(d) listing of and high funding priority for Matriotti Creek, Ecology is conducting a Total Maximum Daily Load (TMDL) study, also called a water clean-up plan. The study identifies bacterial contamination in the freshwaters that flow into the bay. Ecology will use the results from the monitoring studies to develop a Water Clean-up Plan for the Dungeness watershed that will:

- outline the amount and sources of bacteria in specific reaches of the creek and river systems that either directly or indirectly empty into the bay,
- establish targets[1] for reducing bacteria in each creek and river containing sources of bacteria,
- identify actions necessary to reduce bacteria (and therefore, pathogens) in water,
- track and coordinate actions to correct pollution sources, and
- establish a monitoring plan to assess the effectiveness of these efforts.

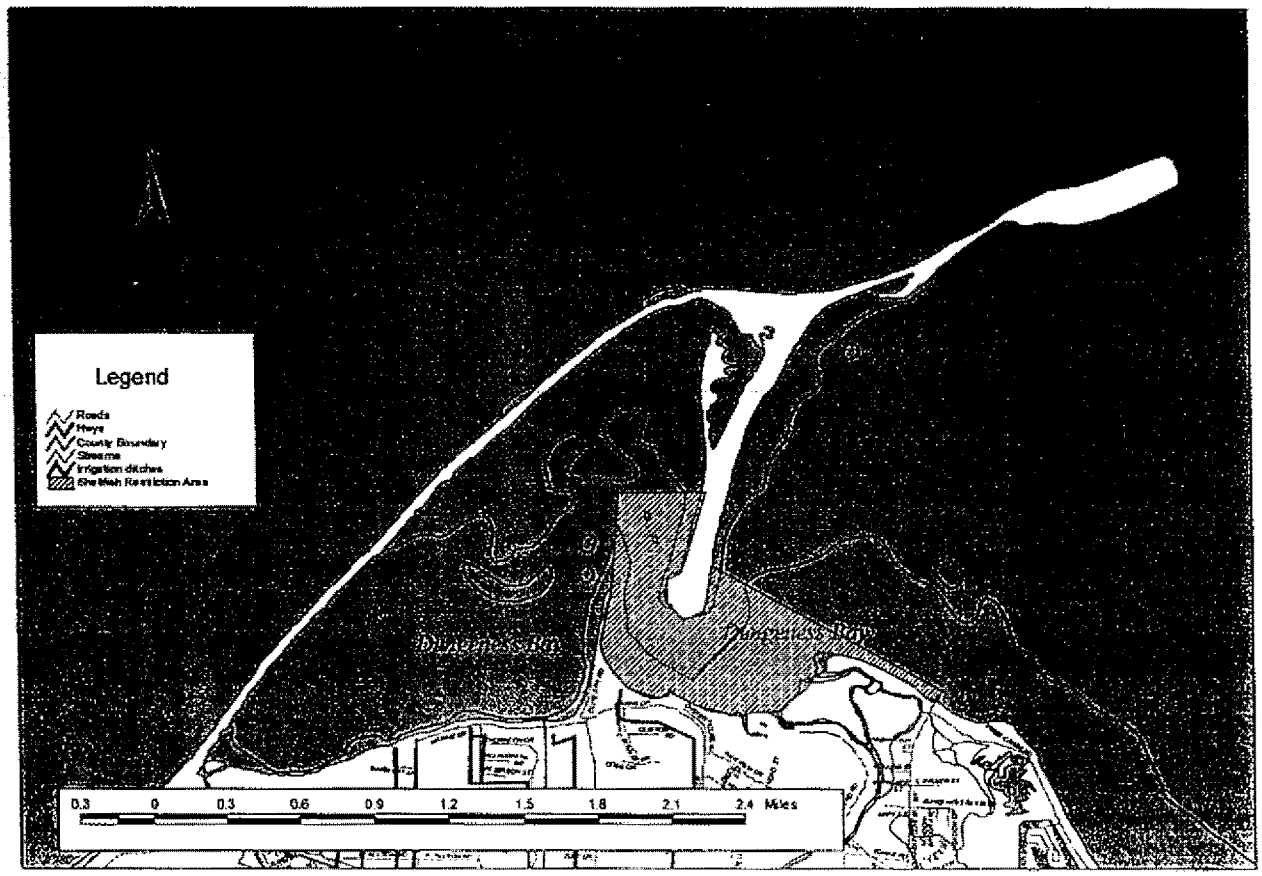
Ecology's Water Clean-up Plan will address the Federal law requirement, under the Clean Water Act, which requires States to identify sources of pollution in waters that fail to meet state water quality standards, and to develop Water Clean-up Plans to address those pollutants. Elements of this Clean Water Strategy will be integrated into Ecology's Water Clean-up Plan, as appropriate.

[1] Called "total maximum daily load" or TMDL

Shellfish Downgrade

For many years, Dungeness Bay has been certified by DOH as approved for commercial shellfish harvest. DOH routinely monitors water quality at 13 sampling stations within the bay. Three stations, #104, #105 and #113, fail federal standards for fecal coliform based on the past 30 water samples[2]. As a result, DOH has prohibited commercial shellfish harvest in approximately 300 acres of Dungeness Bay, effective April 28, 2000. The closure area extends north from the shoreline of Cline Spit to a piling (approximately 48° 09' 31.84' N, 123° 08' 57.62) and then extends east to the row of pilings near the end of Sequim-Dungeness Way, approximately one hundred feet from shore (See Figure 1). See Appendix A for a list of those parties presently affected by the shellfish downgrade.

Figure 1: Area in Dungeness Bay that is closed to shellfish harvesting.



[2] The standard for approved shellfish growing waters is fecal coliform geometric mean not greater than 14 organisms/100mL and an estimate of the 90th percentile not greater than 43 organisms/100mL.

III. Shellfish Downgrade Requirements

Under the 1994 *Puget Sound Water Quality Management Plan*, DOH is required to initiate a closure response process following the downgrade of a shellfish area. DOH convenes a Response Team consisting of state and local agencies, tribes, impacted shellfish harvesters and other interests. The Response Team identifies a lead agency and then the Team works together to develop and implement a strategy to restore water quality in the affected area. Clallam County has agreed to act as the lead entity to develop a response plan. This plan builds on the previous document, Dungeness Bay Shellfish Closure Prevention Response Strategy, developed in 1997 and 1998, as well as the Dungeness Bay Watershed Management Plan (adopted in 1994). This Clean Water Strategy for addressing fecal coliform in Dungeness Bay and its watershed has been written with the input and assistance from the Response Team, which includes:

- governmental agencies (Jamestown S'Klallam Tribe, Clallam Conservation District, Port of Port Angeles, Washington State Department of Ecology, Washington State Dept. of Health, Puget Sound Water Quality Action Team, WA Dept. of Fish and Wildlife, U.S. Fish and Wildlife Service),
- shellfish growers (Jamestown S'Klallam Tribe, NW Corner Oyster and Aqua Farm) scientific entities (Battelle Marine Lab),
- members of local watershed planning groups (Dungeness River Management Team, Marine Resource Committee),
- and private citizens.

Their letters of commitment to conducting actions mentioned in this Strategy are included in Appendix B. This Clean Water Strategy addresses fecal coliform in the freshwaters ditches, streams and river that flow into the marine waters of Dungeness Bay as well as the bay itself.

In addition, this shellfish restriction requires Clallam County to form a shellfish protection district pursuant to RCW 90.72.045. On October 11, 2000, a recommendation was made by the Dungeness River Management Team (DRMT) to the Clallam County's Board of Commissioners to call the shellfish protection district a "Clean Water District" and to have its boundaries be the same as the management area of the DRMT (see Appendix C for a copy of the letter). The DRMT management area includes the Dungenesss watershed and those waters influenced by it through the irrigation system, and the Sequim Bay watershed. See Figure 2 for approximate boundaries of the proposed Clean Water District.

The proposed Clean Water District boundary includes more streams than those streams directly impacting the shellfish resources in Dungeness Bay. Although this strategy is focused on addressing fecal coliform loading in the freshwater streams that drain directly into Dungeness Bay, it is anticipated that related strategies will be implemented or developed to address other water quality problems within the proposed Clean Water District. Other water quality problems in the Clean Water District include but are not limited to the following:

- Fecal coliform is also a problem in nearby streams/ditches that drain to the Strait of Juan de Fuca and Sequim Bay (Johnson, Bell, Cassalery, and Bagley creeks) and the extensive irrigation ditch system connects some of these bodies of water together. These streams are on Ecology's 303(d) list because they fail federal water quality standards. Monitoring by the Clallam Conservation District is showing that some irrigation ditches have water

samples with more than 200 fecal coliform colonies/100mL of water. This exceeds federal water standards and may pose an increase public health risk (see Section IV, under *Impacts from fecal coliform* for more details about public health risk).

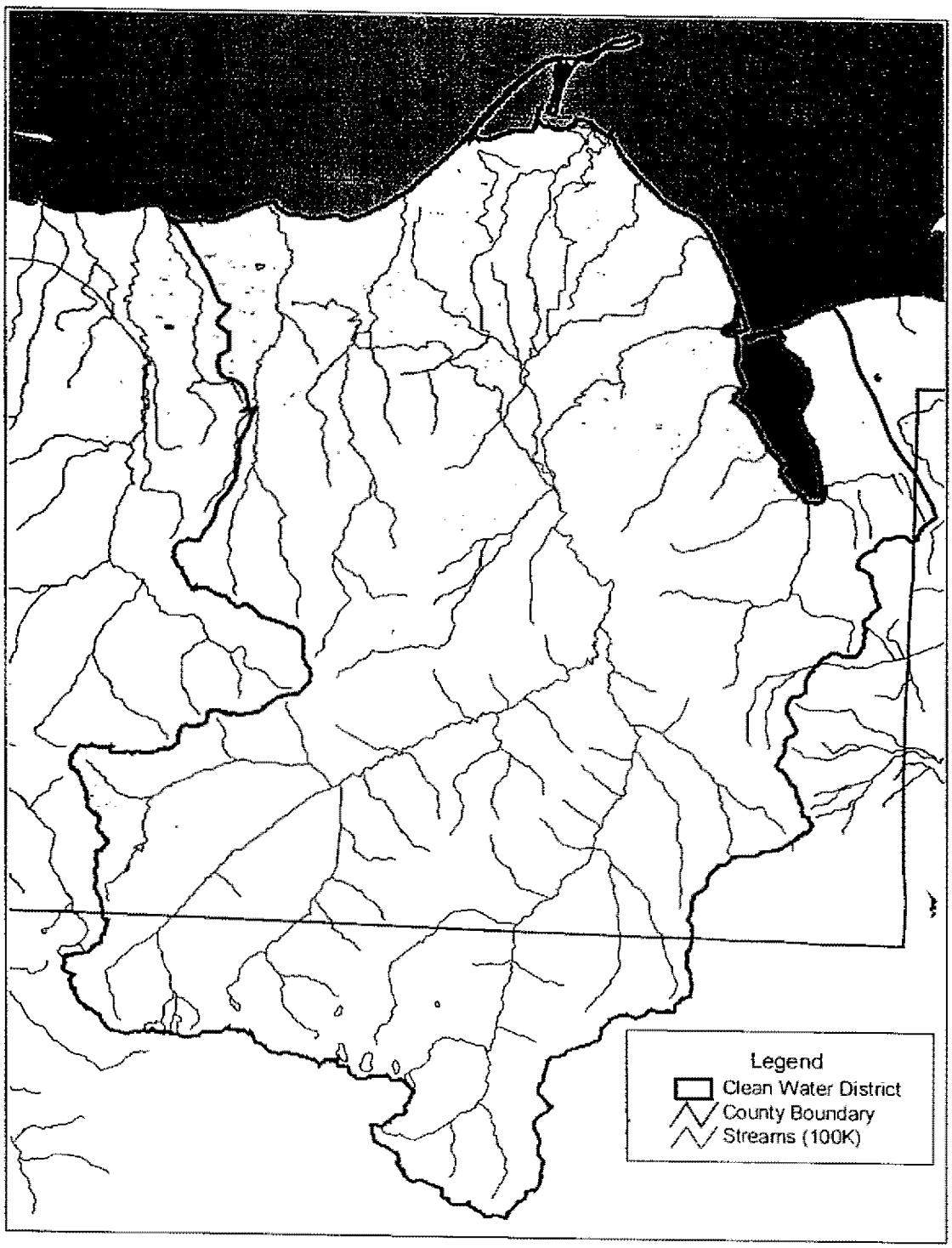
- Sequim Bay has several areas that are closed to shellfish harvesting for a variety of reasons. The three closed areas include: all of Washington Harbor (at the mouth of Bell Creek), the John Wayne Marina and Johnson Creek area, and a 300-yard radius around the end of the City of Sequim's wastewater treatment plant. In the sanitary survey prepared by DOH, the reasons for the closures are:
    - Boat traffic in the area
    - The John Wayne Marina
    - Non-point source pollution from the Bell Creek and Washington Harbor drainages, which would include Johnson Creek
    - Concerns about possible residual pathogens from previous (shallow water) Sequim sewage treatment plant outfall

  The south portion of the Sequim Bay State Park tidelands is conditionally approved for shellfish harvesting, which means that this area may be seasonally closed by DOH due to increased boat usage and septic system pumping.

- In Agnew, there is documented evidence that wells used for drinking water are contaminated with nitrates and coliform bacteria. In July 1999, elevated levels of nitrate and total coliform bacteria were detected in several individual drinking water wells and in one public water system. Since then, Clallam County Environmental Health has investigated 32 wells, and has found 13 to exceed the safe drinking water standards for coliform bacteria and/or nitrates as defined by the United States Environmental Protection Agency (EPA). Clallam County obtained grant money from Ecology to monitor the groundwater in Agnew in 2001.

- Carlsborg, adjacent to Agnew, is a rural community facing the demands of growing residential and industrial development. With no centralized sewage collection system, Carlsborg's coarse soils overlaying an unprotected shallow drinking water aquifer, is of particular concern with regard rising nitrate concentrations in the groundwater. Extensive monitoring conducted in the early 1990's demonstrated rising nitrate levels in the Carlsborg area. The report generated from the results of this effort, *Sequim-Dungeness Groundwater Protection Strategy* (1994) recommended that the "continued systematic monitoring of groundwater for nitrates, chlorides, hydrocarbons, and water levels on a 3-5 year basis" was necessary to monitor trends and to evaluate the success of pollution prevention strategies. Unfortunately, there has been little monitoring of problem. However, Clallam County obtained grant money from Ecology to monitor the groundwater in 2001.

Figure 2: Clean Water District Boundaries

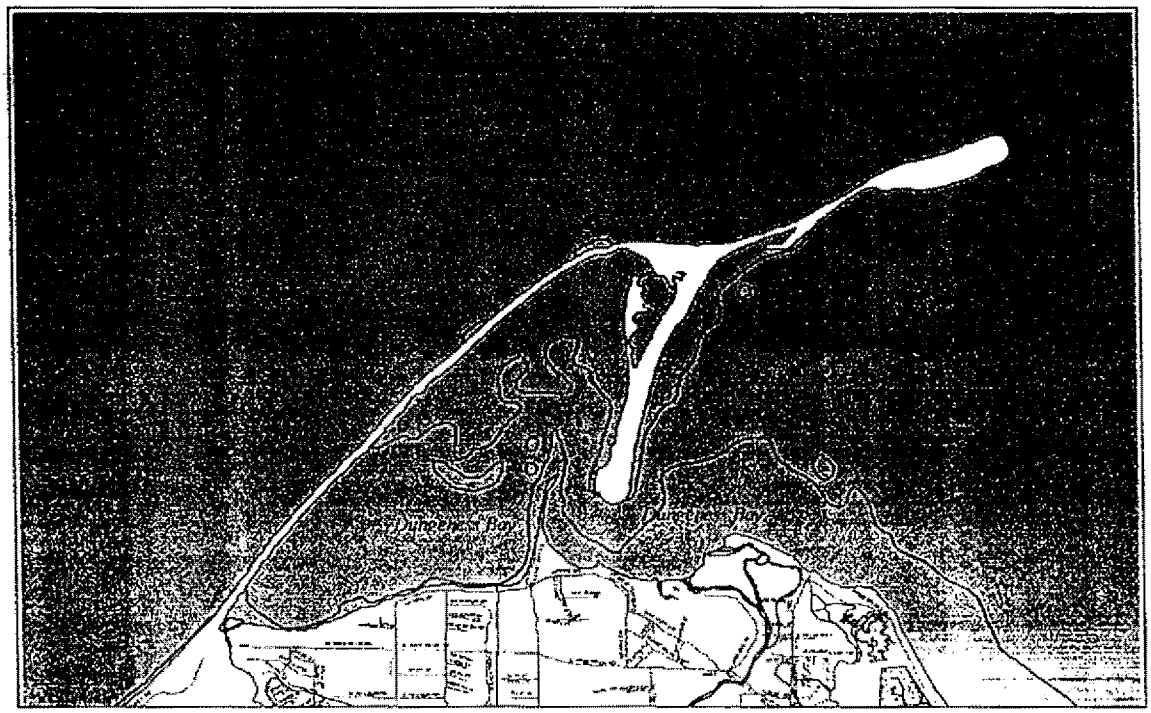


IV. Ecosystem at risk

A critical estuary, Dungeness Bay supports eelgrass beds as well as populations of shellfish, fin fish, marine mammals and birds. The bay includes a national wildlife refuge, which is a critical stopping point on the Pacific Flyway for migratory birds. It is a tourist destination of great economic importance in Clallam County. It is an important location for recreational harvest of crab and clams as well as the source of commercial harvest of crab, and the site of two commercial shellfish farms. Three Native American Tribes have Treaty rights to harvest finfish and shellfish within Dungeness Bay.

Dungeness Bay is located along the south shore of the Strait of Juan De Fuca approximately 20 miles east of Port Angeles. A hook shaped sand spit, extending approximately five miles northeast along the shoreline, forms the bay. Dungeness Bay (see Figure 3) is divided into an inner and outer bay by a 1.3-mile long offshoot of the sand spit that extends southward back towards the shoreline (Graveyard Spit), and another spit that extends northward from the shoreline (Cline Spit). The Dungeness River drains to the bay. Matriotti and Hurd Creeks are tributaries to the lower Dungeness River. Meadowbrook creek and slough enter the outer portion of Dungeness Bay, east of the mouth of Dungeness River. In addition, a few irrigation ditches and a small stream discharge directly into inner Dungeness Bay.

Figure 3: Dungeness Bay



In the upper Dungeness River, Mount Deception is the highest point in the Dungeness River's watershed and forms the southwestern boundary. The watershed topography includes three distinct areas: mountains, foothills, and the coastal fan adjoining the bay and the Strait of Juan de Fuca. The mountain area includes steep, forested lands within Olympic National Park and Olympic National Forest. The agricultural and residential areas in the northern portion are gently rolling to nearly flat.

Approximately one hundred and seventy-two miles of canals and laterals (irrigation ditches) flow through the Dungeness watershed, diverting water from the Dungeness River to agricultural and residential lands. The City of Sequim supplements its groundwater municipal supply with Dungeness River water. Watershed residents also use groundwater for their drinking water. The Dungeness watershed contains a diverse array of land uses and vegetative cover. Land uses include pasture, hayland, and cropland on both commercial and small farms, medium and low density residential development scattered throughout the lower watershed, private, public and public trust (State) forestland in the upper watershed, as well as a large portion of the Olympic National Forest and Olympic National Park.

Tourism, agriculture, retirement income, fisheries and forestry make up the economic base of the watershed area, with an emphasis on tourism and agriculture. Over 40% of homes in the area are located on or near a water body, whether it be the Strait of Juan de Fuca, streams, wetlands or irrigation ditches. In all cases, residents enjoy the water resources of the watershed, whether for aesthetics, drinking water, benefits from industrial-use and agriculture, fishing, boating, wildlife viewing or watering their gardens. Water resources and associated benefits are an integral part of their lives.

Impacts from fecal coliform pollution

There are a variety of different impacts from fecal coliform pollution in the watershed and bay, ranging from increased public health risk to decreased economic potential. Most importantly, fecal coliform pollution presents an increased health risk to residents and visitors to the area. Fecal coliform is a type of bacterium found in the feces of warm-blooded animals (e.g., humans, birds, and livestock). Most fecal coliform bacteria are not harmful but their presence is used to indicate the potential for a variety of disease-carrying microorganisms, known as pathogens. These pathogens are also transported in human and animal feces and can cause illnesses in humans ranging from stomach upset to more serious diseases like hepatitis and typhoid. Increased amounts of fecal coliform in surface water indicate an increased chance that pathogens are in the water. Humans are exposed to pathogens when wading or swimming in water and when we eat contaminated shellfish. When in water, people are exposed to pathogens when water is swallowed (via splashing or hand to mouth contact) or when water comes into contact with open cuts or wounds. Pathogens enter into the shellfish (oysters, clams and mussels) as they filter the water for food. There is concern that some people will continue to harvest shellfish in the closed area, either unaware of the posted closure or simply ignore the closure signs. These people will have an increased risk of disease if they eat shellfish.

Fecal coliform counts in the freshwater streams have often been more than double the Clean Water Act standard[3] (based on preliminary data from the Washington State Department of Ecology[4]), which sets the standard for surface waters for the protection of public health and public enjoyment of the water and the propagation and protection of fish, shellfish and wildlife. In counties with swimming beach standards, beaches are closed when fecal coliform counts are above 200 fecal coliform colonies/100mL of water. In 1999 and 2000, ditch and stream waters have often exceeded 200 fecal coliform colonies/100mL of water, particularly around Matriotti Creek.

There are direct commercial impacts from the closure of an area of Dungeness Bay. These include:

- Loss of productivity of all tidelands farmed by Northwest Corner Oyster Company,
- Loss of one third of the area farmed for shellfish by Jamestown Seafood, Inc., including the loss of the company's wet storage, where shellfish may be held for a short time before sent to market, and
- Reduction in the lease value of tidelands owned and leased out by the Port of Port Angeles and the Washington State Department of Natural Resources.

In addition, the shellfish closure results in a loss of harvest opportunity by residents and visitors, due to the official closure of the Port of Port Angeles tideflats at the Dungeness boat ramp. Members and guests of three private organizations (San Juan Duck Club, Dungeness Beach Association, and Dungeness Farms) with tidelands no longer have the opportunity to harvest shellfish. Finally, high counts of fecal coliform in the streams, river and bay tarnishes the reputation the Dungeness Bay and Dungeness River as "pristine", which could affect tourism to the area.

V. Goals of the Clean Water Strategy

The goals of this strategy are:

- To protect public health
- To identify and correct sources of bacterial contamination associated with human activities that are impacting water quality of Dungeness Bay
- To restore and maintain water quality in the freshwater ditches, streams and river and in marine waters within the bay
- To re-open areas closed to commercial shellfish harvest and prevent future closures
- To continue to harvest shellfish for commercial, subsistence and recreational purposes
- To protect habitat for shellfish and other wildlife species

[3] The lower Dungeness River and its tributaries are considered Class A waters by Ecology and for these waters, fecal coliform counts cannot exceed the geometric mean of 100 colonies per 100 mL of water and not have more than 10% of the samples obtained for calculating the geometric mean exceed 200 colonies per 100 mL of water.
[4] This preliminary data was collected between October, 1999 and August, 2000 as a part of Ecology's Water Clean-up Study. High counts of fecal coliform ranged between 210 to 5400 colonies per 100 mL of water.

VI. Assessment of Fecal Coliform Sources

Determining the sources of fecal coliform bacteria in our water is difficult because the bacteria may be coming from many different sources. Humans, livestock, pets, birds and marine mammals all contribute some amount of bacteria to the streams and bay. Examples of possible fecal coliform sources include:

- Livestock and pets defecating in and near ditches, streams, rivers and along the edge of the bay;
- Septic systems failing near ditches, streams, rivers and along the edge of the bay;
- Wildlife in the freshwater and marine environment;
- Uncontrolled untreated stormwater from farms, lawns, and impervious surfaces (e.g., pavement).

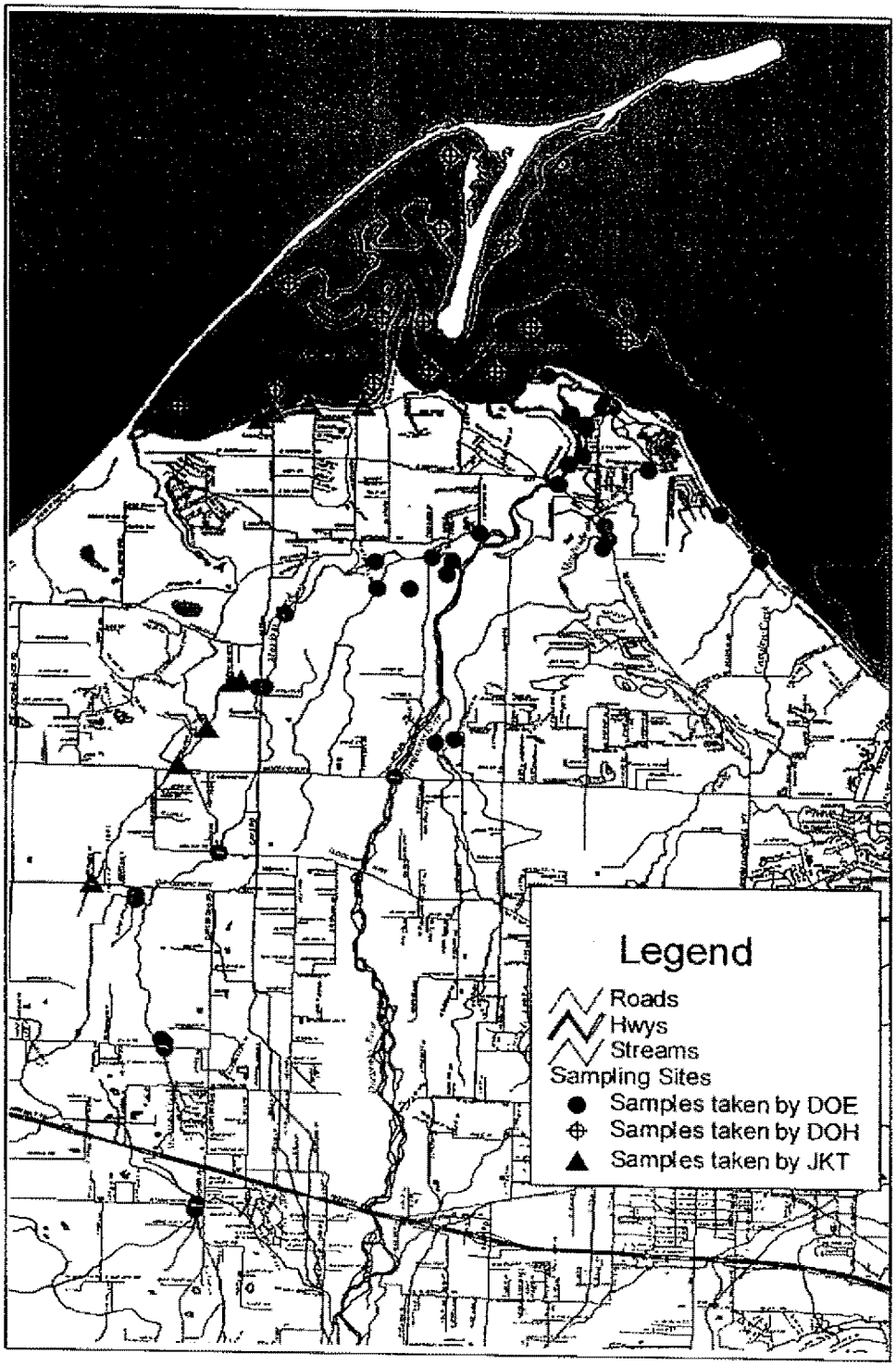
Although not considered a pollution source, the lack of native vegetation along ditches and stream banks limits the landscape's ability to filter contaminated run-off.

Several efforts are ongoing to identify pollution sources. Starting in 1998, the Jamestown S'Klallam Tribe, Clallam County, Clallam Conservation District, State Departments of Ecology, and Health joined together to coordinate and increase fecal coliform monitoring of the watershed. The streams and river were sampled for fecal coliform on the same day as the marine waters of the bay were sampled. Freshwater was sampled for fecal coliform in the Dungeness River, Matriotti Creek, Mud Creek, Hurd Creek, and Meadowbrook Creek and Slough (see Figure 4 for locations of sampling stations). Ecology will use this information in developing their Water Clean-up Plan. Preliminary findings from Ecology indicate that high fecal coliform counts tend to occur around areas with poor animal-keeping practices and also occur during the irrigation season. These findings still need to be analyzed statistically. In addition, there are stream reaches with high fecal coliform counts that flow through mostly residential areas. On-site systems will be evaluated for their input of fecal coliform in these areas as well other potential sources. Over the next year, Ecology will be drafting its Water Clean-up Plan, which may shed additional light on fecal coliform sources in the watershed.

Further, in June 2000, two programs were instituted to help determine bacterial loading into the bay. The Jamestown S'Klallam Tribe began a circulation study of the inner bay. This study will track the movement of freshwater from the river into the bay under various tidal regimes and wind conditions. The movement of freshwater in the bay, as a conduit for fecal coliform transport, is important because preliminary data from Ecology indicates Clean Water Act violations for fecal coliform in Matriotti Creek (a tributary to the Dungeness River), and Meadowbrook Creek, all of which flow into the bay.

The second program focuses on the irrigation ditch system in the watershed. The Clallam Conservation District started monitoring water quality in several irrigation ditches using the Streamkeepers volunteer monitoring program. The results of this monitoring effort will help identify which ditches are the most problematic and will be the basis for determining the highest priority ditches for piping. Initial sampling results show that some irrigation ditches have high counts of fecal coliform that exceed Clean Water Act standards.

Figure 4: Locations of Fecal Coliform Sampling Stations



Note: DOE – Washington State Department of Ecology
DOH – Washington State Department of Health
JKT – Jamestown S'Klallam Tribe

VII. Overall Strategy

The overall strategy for identifying, addressing and removing sources of fecal coliform will build on previous and current technical assessments mentioned previously in this document. Actions resulting from this strategy will be coordinated with the Dungeness River Management Team (DRMT). The strategy has four components that address:

- Pollution source identification and remediation,
- Public outreach,
- Long-term water quality protection, and
- Additional assessment needs.

The timely implementation and effectiveness of the strategy elements discussed below is heavily dependent on funding and personnel availability.

Pollution Source Identification and Remediation

Potential fecal coliform sources existing within the Dungeness Bay watershed include agricultural practices, on-site sewage treatment and disposal, storm water runoff, and wildlife. It can be a difficult task to identify and control fecal coliform sources in the freshwater ditches, streams and river, since they are almost always in motion. Water sampling of streams sometimes indicate high counts of fecal coliform on one day and on another day, there may not be very high counts of fecal coliform in the water. There are two main reasons for this intermittent pattern of fecal coliform presence. First, the release of fecal coliform into the water is intermittent. For example, livestock and horses in the water will add fecal coliform to the water more often with large numbers in the stream and only occasionally with only one or two animals in the stream. Septic systems that are failing near or directly connected (illegally) to the ditch or stream, will pulse untreated water into the stream or ditch as water is used by the residents of the house. Wildlife are present in different areas of the watershed at different times. Second, natural variability adds another layer of complexity in determining the exact location of fecal coliform inputs to water. Ditches, streams, the Dungeness River and bay are constantly in motion, moving water (and things in the water) around the environment. Environmental conditions in water bodies also change by the month, season and year.

Controlling or remediating sources of fecal coliform in the watershed will be closely linked with water quality sampling results and observation of the land uses in the area. Most likely, there will be different pollution sources affecting different ditches and streams. In one area, the fecal coliform sources may be failing septic systems and in another area, the source may be horses in the stream. The most effective approach to controlling fecal coliform sources will be to start in areas with high fecal coliform counts and remove the obvious sources of fecal coliform, moving towards the less obvious sources (using additional assessments if necessary). Livestock and horses with access to the water are one of the more obvious fecal coliform sources, because it can be easily determined in the field. Failing septic systems are less obvious, unless there is a pipe directly discharging to the stream. However, failing septic systems present a greater human health risk, because of the greater number of human pathogens associated with the human waste bacteria.

The following actions will be necessary to identify individual sources of bacterial contamination:

- Evaluate pasture management and animal waste management practices on all commercial and recreational farm sites within the Dungeness Bay watershed that have the potential to impact surface water.
- Conduct on site inspections of suspect sewage treatment and disposal systems capable of discharging to surface water. Apply additional investigation techniques (e.g., dye tracing, charcoal packets, or additional fecal coliform testing) where appropriate.
- Review land-use changes and assess the adequacy of regulatory protections.
- Locate and map storm water collection system discharge points. Test storm water discharge for fecal coliform bacteria.
- Identify areas where resident or migratory populations of waterfowl or marine mammals concentrate. Determine water quality impacts using appropriate water, sediment, and hydrographic evaluations.

The following steps are being taken to address source control for specific reaches of the streams:

1. Problem areas are identified using water quality data and field investigation.
2. The Response Team identifies potential sources (e.g., livestock access, potential failing septic systems, captive wildlife) within each problem area.
3. Potential sources are investigated by Clallam County, Clallam Conservation District, Jamestown S'Klallam Tribe, or Ecology (depending on the nature of the source).
4. Confirmed sources will be removed or remediated by landowners with assistance from Clallam County Environmental Health, Clallam Conservation District, or Ecology. Clallam Conservation District has a Memorandum of Agreement (MOA) with Ecology and an Memorandum of Understanding (MOU) with Clallam County that specify how alleged water quality violations associated with agricultural activities will be handled.

Specifically, the following actions will be necessary to control or remediate fecal coliform sources:

- Develop and implement farm plans and best management practices to address improper animal waste and pasture management practices. Assist in the restoration of riparian and marine shoreline areas damaged through improper agricultural practices.
- Assist in the repair or replacement of failing on-site sewage treatment and disposal systems. Provide technical assistance in developing community solutions to on-site sewage treatment and disposal problems.
- Install storm water treatment systems where needed. Continue with piping of irrigation and storm water ditches where appropriate.

Public Outreach

Since an informed public is essential to maintain public health and safety and to minimize human impacts on water quality, public outreach should be continuous and directed towards specific audiences. The following will be considered:

- Conduct initial outreach to assure that the public is adequately informed about the shellfish closure, upland water quality violations, and associated public health risks.
- Information on water quality, shellfish resources and source removal (fecal coliform) should be provided for the public each quarter, at a minimum.
- Methods and venues for public outreach should be evaluated for effectiveness and expected audience.
- The Clallam County Environmental Health's current public education campaign on proper use and maintenance of on-site septic systems should continue.
- Septic maintenance, stormwater management, riparian management and water conservation information should be directed to homeowners with the final building permit.
- Realtors should be informed about the importance of septic maintenance in purchase or sales contracts.
- Education on animal waste management to small farms and hobby farm owners.
- Stormwater public education to encourage residents to protect water quality impacts from activities on their properties.
- Information on appropriate land use practices should be directed to watershed residents, particularly those with property adjacent to waterbodies.
- Clallam Conservation District outreach programs that target commercial and noncommercial farms should be continued.

Long Term Water Quality Protection

Long term water quality protection can only be achieved if funding is available for permanent programs to monitor and to address the impacts of watershed land use.

- Perform ongoing freshwater monitoring in key locations, and follow-up monitoring to determine if remediation efforts were effective.
- Continue marine quality monitoring.
- Begin a county wide on-site sewage system operation and maintenance program to prevent failing septic systems in the Clean Water District.
- Facilitate an understanding among watershed residents about the natural water cycle and their impact on it.
- Encourage watershed residents to become or continue to be effective watershed stewards.
- Find stable funding for water quality clean-up activities and public outreach. The Dungeness Bay shellfish area downgrade requires the formation of a clean water district under RCW 90.72. This district could be used to secure funding for a long-term surface water protection and monitoring program.

Additional assessment needs

Additional assessments may prove necessary or useful in determining sources of fecal coliform to surface water (i.e., ditches, streams, river, bay), particularly in areas where the obvious

pollution sources have been controlled and water quality has not improved. These actions include (but are not limited to):

- Apply RNA/DNA analysis for source identification of fecal coliform
- Conduct additional statistical analysis of water quality data
- Analyze existing water quality data (marine and freshwater) spatially using GIS mapping
- Develop an on-site system database specific to the needs of determining contamination sources within the Dungeness watershed, including age and type categories of existing septic systems, with GIS mapping
- Determine water quality impacts from storm water
- Map stormwater conveyance systems using GIS
- Update farm inventory for Dungeness Bay watershed area
- Obtain additional information/data on wildlife populations and their usage of the bay
- Investigate the interaction between marine sediment and pathogen/fecal coliform retention or regrowth within the bay
- Conduct analysis of ulvoid mat presence and its relationship to water quality and shellfish resources in Dungeness Bay
- Conduct additional sampling of specific stream reaches (yet to be identified)
- Establish a long-term monitoring program for water quality in the watershed

VIII. Response Team Membership and Coordination with other Watershed Planning Groups

Below is a table listing the Response Team members (as of 8/1/00) and their affiliations. The Response Team will coordinate activities with other planning groups, such as the Dungeness River Management Team (DRMT) and the Marine Resources Committee (MRC). Various members of the Response Team participate on these planning groups. The Response Team also serves as a subcommittee to the DRMT and will advise the DRMT of its progress and activities.

Table 1: Shellfish Response Team Members

Name	Affiliation
Tania Busch-Weak	Clallam County Environmental Health Division
Andy Brastad	Clallam County Natural Resources Division
Valerie Wilson	Clallam County Natural Resources Division
Joe Holtrop	Clallam Conservation District, DRMT
Vacant (current contact is Jim Bay)	**City of Sequim**
Lyn Muench	Jamestown S'Klallam Tribe, MRC
Lori Delorm	Jamestown S'Klallam Tribe
Don Melvin	WA Dept. of Health
Harriet Beale	Puget Sound Water Quality Action Team, MRC
Jeannette Barreca	WA Dept. of Ecology
Chris Hempleman	WA Dept. of Ecology
Debbie Sargeant	WA Dept. of Ecology
Lisa Rozmyn	WA Dept. of Ecology
Virginia Clark	DRMT, Watershed Resident
Matt Heins	Tideland Manager, CCD, Watershed Resident
Joe Schmitt	MRC
Kevin Ryan	US Fish and Wildlife Service
Pam Sanguinetti	US Fish and Wildlife Service
Dana Woodruff	Battelle Marine Sciences Lab.
Cliff Commeree	NW Corner Oyster and Aqua Farm
Herb Armstrong	NW Corner Oyster and Aqua Farm
Ken Sweeney	Port of Port Angeles
Anne Shaffer	WA Dept. of Fish & Wildlife, MRC

IX. Actions to be taken and projected timelines

The attached tables outline actions that should be taken to further assess pollution sources, remove/remediate pollution sources and direct effective public outreach. Table 1, titled Dungeness Bay Action Plan, lists actions to which entities have committed. Table 2, titled Proposed Actions without Adequate Funding, lists actions that could be taken given adequate funding for personnel and equipment.

Table A: Dungeness Bay Action Plan*

Action	Assignment	Timeline	Funded?	Funding Source
Administration & Coordination				
Establish closure response team	DOH	Completed		
Develop closure response strategy	CC	Final doc. In Nov. 2000		
Coordination with DRMT	Response Team	Ongoing		
Coordination with TMDL study	Response Team	Ongoing		
Formation of a Protection District	CC	December 2000		
Pollution Source Removal or Mitigation				
Irrigation ditch piping to reduce input of pollutants to surface water	CCD, Water Users Assoc.	Fall 2000-Spring 2002	Yes	Conservation Commission
Riparian restoration and fencing to stabilize stream banks and reduce the movement of pollutants	CCD	Ongoing	Partially (inadequate)	CCWF (WCC&DOE)
Develop and implement dairy nutrient management plans	CCD	Ongoing	Partially	Conservation Commission
Develop and implement farm plans specifying best mgnt. practices	CCD	Ongoing	Partially (inadequate)	CCWF (WCC&DOE)
On-site septic system investigations	CC	Ongoing	Partially	CC General Fund
Development of On-site O&M Program	CC	Ongoing	Partially	CCWF
Ecology enforcement action	DOE	As needed	Yes	DOE

CC: Clallam County
JKT: Jamestown S'Klallam Tribe
DOE: WA Dept. of Ecology
WCC: Washington Conservation Commission
CCD: Clallam Conservation District
USFWS: US Fish and Wildlife Service
DOH: WA Dept. of Health
PSWQAT: Puget Sound Water Quality Action Team
MRC: Clallam Co.'s Marine Resource Committee
WDFW: WA Dept. of Fish and Wildlife
CCWF: Ecology's Centennial Clean Water Fund

* This table lists only ongoing and planned actions. Other possible actions, mentioned in Section IV, will be added to this table when such actions are shown to be crucial to source identification and removal, public outreach and/or funding becomes available.

Table A: Dungeness Bay Action Plan* (continued)				
Action	Assignment	Timeline	Funded?	Funding Source
Public Outreach				
Announcement of Shellfish Restriction in local papers	CC	Completed March 2000	Yes	CC
On-site maintenance education program	CC	Ongoing	Until 2001	CCWF
Shellfish Workshop	MRC	Winter/Spring 2000/2001	Yes	NW Straits Commission
County Fair Booth – water quality, shellfish resources, on-site maintenance	CC, CCD	August 17-20, 2000	Partially	Conservation Commission
Dungeness River Festival Booths – shellfish, water quality, on-site maintenance, and riparian protections	CC, CCD, Ecology	September 29&30, 2000	Partially	JKT
Poster presentation of shellfish resources and restrictions at Feiro Marine Laboratory	CC, Feiro Marine Life Center	2001	Yes	CC and Feiro Marine Life Center
Quarterly newsletters mailed to watershed residents about Clean Water District, associated strategies and stewardship activities	CC	1st newsletter scheduled for December 2000	Yes	CCWF
Public Meeting	CC	January/February 2001	Yes	CCWF, PSWQAT
Small focus workshops on fecal coliform problem	CC, JKT	March-June 2001	Yes	PSWQAT, EPA
Direct septic maintenance information to homeowners with the final building permit	CC	Ongoing	Partially	CC General fund
Inform development professionals (e.g., realtors, banks) about the importance of septic maintenance in purchase and sales contracts	CC	Ongoing	Partially	CC General fund

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Table A: Dungeness Bay Action Plan* (continued)				
Action	Assignment	Timeline	Funded?	Funding Source
Source Assessment				
Total Maximum Daily Load Study (TMDL) for Matriotti, Meadowbrook and Dungeness River & Bay	DOE	Summer 2001	Yes	DOE, JKT
Marine water quality sampling	DOH, JKT	Ongoing	Yes	DOH, EPA
Water quality sampling of irrigation ditches	CCD	May 2000 to March 2002	Yes, partially	WCC/CCWF
Circulation Study of Dungeness Bay	JKT	Summer 2001	Yes	CCWF
Compilation of existing data on water quality into a MS Access database	CC, JKT, CCD	Database developed by 9/30/00; ongoing afterwards	Partially?	CCWF, Battelle
Spatial analysis of water quality data using GIS	CC, JKT, CCD	ongoing	Partially	CC General Fund
On-site system database with GIS mapping, starting with problem areas identified with water quality data	CC	Database framework dev. by 9/30/00	Partially	CC General Fund
Update inventory of stormwater detention facilities by parcel #	CC	December 2000	Yes	CCWF
Update small farm inventory	CCD	Completed 6/00	Partially	WCC/CCWF
Information/data on wildlife populations and usage with the bay	USFWS	Ongoing	Yes	USFWS
Additional sampling of specific stream reaches	JKT	As needed	Yes	EPA
Ulvoid mat presence and its relationship to water quality and habitat declines	WDFW	Ongoing	Partially	WDFW, CC, MRC

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DOE: WA Dept. of Ecology
WCC: Washington Conservation Commission
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Table B: Proposed Actions without Adequate Funding

Action	Timeframe	Priority
Source Removal or Mitigation		
Increase funding to provide technical assistance to high priority farms, identified as such by the CCD farm inventory	Immediate	High
Bring in funding to increase resources for septic system repairs/replacements	Immediate	High
Seek stable funding to implement an on-site system inspection & maintenance program	Immediate	High
Adopt and implement a stormwater management program	1-3 years	Med.
Seek funding for land conservation easements to protect water quality and habitat	2-5 years	Low
Develop stormwater management facilities	>5years	Low
Public Outreach		
Provide info. on land use practices to small-scale farms	Immediate	High
Increase outreach on land use practices (e.g., application of pesticides and herbicides, environmental stewardship) to all watershed residents	Immediate	High
Provide information on near shore and upland interactions to all watershed residents	Immediate	Med.
Provide information to pet owners on how they can prevent water contamination	Immediate	Med.
Participate in phone survey to determine effectiveness of methods and venues for public outreach.	1-2 years	Med.
Source Assessment		
Seek funding to conduct RNA/DNA analysis of fecal coliform at specific sites, if current assessment studies warrant a more detailed investigation	Immediate	High
Continue ongoing freshwater monitoring in key locations, and follow-up monitoring to determine if remediation efforts were effective	Immediate	High
Continue to develop on-site system database for entire Dungeness Bay Watershed specific to operation and maintenance needs	Immediate	High
Incorporate farm inventory information into database and GIS	Immediate	Med.
Increase monitoring to determine water quality impacts from storm water	Immediate	Med.
Research the interaction between marine sediment and pathogen/fecal coliform retention or regrowth with the bay	1-3 years	Med.
Map stormwater conveyance systems using GIS	2-5 years	High
Record and map land-use changes	2-5 years	Med.

Appendix A
List of Parties Currently Affected by the Shellfish Downgrade

The following is a list of users of Dungeness Bay affected by the Shellfish Downgrade.

A. Commercial shellfish harvesters:
   Shellfish Farms: Jamestown Seafood
   Northwest Corner Oyster Company
   Oyster and Clam Harvesters:
   Jamestown S'Klallam Tribe
   Lower Elwha S'Klallam Tribe
   Port Gamble S'Klallam Tribe

B. Subsistence harvesters: The three S'Klallam Tribes

C. Recreational harvesters: Local citizens and out-of area visitors

D. Tideland owners: Those who lease out tidelands for revenue:
   WA Dept. of Natural Resources (DNR)
   Port of Port Angeles
   Tideland owners/managers for recreational shellfish use:
   US Fish & Wildlife
   WA Dept. of Fish & Wildlife
   DNR
   Port of Port Angeles
   Clallam County
   San Juan Farm Duck Club
   Dungeness Beach Association
   Dungeness Farms
   Private tideland and affected upland owners: various landowners along Marine Drive, the North Olympic Land Trust, and Dungeness Town.

E. Residents of and visitors to the Dungeness watershed