

**Marine Recovery Area Guidance:
Supplemental to the On-Site Sewage
System Management Plan Guidance
*for the Twelve Puget Sound Counties***

October 2006



PUBLIC HEALTH
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**Marine Recovery Area Guidance:
Supplemental to the On-Site Sewage System
Management Plan Guidance**
for the Twelve Puget Sound Counties

October 2006



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Executive Summary

This document provides guidance to the twelve Puget Sound local health jurisdictions in the identification and development of Marine Recovery Area strategies. It addresses data sources, data analysis, designation of Marine Recovery Areas, and implementation strategies.

This guidance is a companion document to the On-Site Sewage System Management Plan Guidance prepared by the Department of Health (DOH) dated June 2006, and fulfills requirements under RCW 70.118A. It is intended to address many of the challenges that local health officers will face when starting the plan-writing process for Marine Recovery Areas.

The purpose of the guidance is to assist local health officers in designating Marine Recovery Areas and implementing associated strategies. It is not intended to be prescriptive in approach, nor is it a generic cookbook for the development of Marine Recovery Areas. It is a resource to help build on the successes of each jurisdiction with an understanding that each county's plan will be different.

What resources are available to help implement the on-site sewage system (OSS) management plans? Under RCW 70.118A, the department shall enter into a contract with each of the Puget Sound local health jurisdictions to implement the plans. The contract must include state funding assistance to the local health jurisdiction from funds appropriated to the department for this purpose.

We wish to acknowledge the contribution of each person who provided assistance and direction in the preparation of both the On-Site Sewage System Management Plan Guidance and this document. Thank you.

Introduction

The 2006 Legislature passed 3SHB 1458 that became law effective June 7, 2006 following the Governor's signature on March 9. This law was subsequently incorporated into the Revised Code of Washington (RCW) as Chapter 70.118A.

This Marine Recovery Area Strategy Guidance is provided to assist local health officers in the Puget Sound region to comply with the requirement set forth in RCW 70.118A. It is a companion document to the On-Site Sewage System Management Plan Guidance developed by the Washington State Department of Health (DOH), dated June 2006. The On-Site Management Plan Guidance can be found at <http://www.doh.wa.gov/ehp/ts/ww/localplan-guidance.pdf>.

RCW 70.118A directs DOH to provide guidance to the local health officer in the following actions:

1. RCW 70.118A.040(3): Determinations made by the local health officer under this section, including identification of nitrogen as a contaminant of concern, will be based on published guidance developed by the department. The guidance must be designed to ensure the proper use of available scientific and technical data. The health officer shall document the basis for these determinations when plans are submitted to the department.
2. RCW 70.118A.070(6)(b): Identification of reasonable methods for finding unknown systems, and,
3. RCW 70.118A.070(6)(c): Development or enhancement of electronic data systems to enable an active management of all OSS within the jurisdiction with priority given to those located in Marine Recovery Areas.

In addition to the above requirements of RCW 70.118A, this document provides assistance in delineating MRA boundaries and establishing a Marine Recovery Area on-site sewage strategy.

The guidance describes where the local health officer can find the information needed to designate marine recovery areas. Text is included to guide the local health officer through the analysis of DOH Shellfish Program data, the Washington State Department of Ecology's 303(d) list (of water bodies that do not meet water quality standards, <http://www.ecy.wa.gov/programs/wq/303d/overview.html>) for low dissolved oxygen and fecal coliform, and a discussion of the scientific issues surrounding nitrogen as a contaminant of concern in marine waters. The intent of the guidance is to give the health officer information to aid in their determinations of Marine Recovery Areas. The guidance also includes in [Appendix B](#) a discussion of the responsibilities of both the Department of Health ("the department" or "DOH") and the Local Health Jurisdiction health officer ("LHJ") required by the statute. Links to additional information and references are included throughout the document.

Background

In July 2005, the State Board of Health added a new requirement in the revised On-Site Sewage Systems [WAC 246-272A](#) regulations. Washington's local health officers must plan for the development and management of all OSS within their jurisdiction. This

planning requirement clarifies and strengthens OSS management practices in sensitive areas as defined by the Areas of Special Concern under the previous regulation. More detailed planning requirements apply to the twelve counties bordering Puget Sound.

The new regulations require Puget Sound local health officers to:

- Develop or enhance an OSS database
- Identify sensitive areas within the jurisdiction
- Designate Marine Recovery Areas
- Identify Operation and Maintenance (O&M) requirements for sensitive areas
- Provide education and reminders
- Enforce OSS requirements
- Describe capacity to fund OSS plan

The 2006 legislation directed the Department of Health and the local health officers of the twelve Puget Sound counties to take further actions to reduce fecal coliform pollution and the degradation and loss of marine life in Hood Canal and other marine waters in Puget Sound caused by low-dissolved oxygen conditions. They directed the agencies to reduce the input of human-influenced nutrients, especially nitrogen, into marine waters.

Marine Recovery Areas (MRAs) must be designated when the local health officer determines that existing OSS are a significant factor contributing to concerns associated with the degradation of shellfish growing areas, marine waters listed by the Department of Ecology (Ecology) for low-dissolved oxygen levels or fecal coliform, or marine waters where nitrogen has been identified as a contaminant of concern.

The legislature directed the local health officers to develop an on-site strategy (due July 1, 2007) for marine recovery areas that must specify how they will do the following by July 1, 2012, and thereafter:

- Find existing failing systems and ensure that system owners make necessary repairs, and
- Find unknown systems and ensure that they are inspected and functioning properly, and repaired if necessary.

The marine recovery area on-site strategy will be incorporated into each local jurisdiction's on-site sewage program management plan (Plan). There may be advantages to preparing the strategy first so it can be used in the development of the management plan. After the Plan has been approved by the local board of health, the health officer must submit a copy of the Plan to DOH and to all entities responsible for land use planning and development regulations in the jurisdiction for review. DOH will review each Plan for completeness. To facilitate review and timely approval, we encourage local health officers to seek early involvement by DOH staff in the planning process and to submit a draft plan for review before presenting it to their local board of health. The department may grant an extension of twelve months where a local health jurisdiction has demonstrated substantial progress toward completing its on-site strategy.

RCW 70.118A Requirements Table

Requirements	Activities	Deadlines
<p>1</p> <p>Define MRA Boundaries</p> <p>RCW 70.118A.040</p>	<p>The local health officer shall propose an MRA where existing On-site Sewage Systems (OSS) are a significant factor contributing to concerns associated with:</p> <ul style="list-style-type: none"> • Threatened or downgraded Shellfish Growing Areas • Marine waters with low dissolved oxygen or fecal coliform • Marine waters where nitrogen has been identified as a contaminant of concern <p>Include areas with OSS that may affect water quality in bulleted areas listed above.</p>	<p>LHJ Deadline July 1, 2007</p>
<p>2</p> <p>Develop MRA OSS Strategy</p> <p>RCW 70.118A.050</p>	<p>By July 1, 2012, find:</p> <ul style="list-style-type: none"> • Existing failing OSS and repair • Unknown OSS and ensure that they are functioning properly 	<p>LHJ Strategy due July 1, 2007</p>
<p>3</p> <p>Requires O&M professionals to report on all failing systems found within MRAs</p> <p>RCW 70.118A.060</p>	<p>LHJ develops OSS electronic data systems and maintains records for all OSS within MRAs</p> <p>DOH will work with LHJs and the OSS industry to assist in the development of common forms for data sharing</p>	
<p>4</p> <p>DOH Responsibilities</p> <p>RCW 70.118A.070</p>	<p>DOH will:</p> <ul style="list-style-type: none"> • Review Management Plans for completeness • Within 30 days approve the MRA Strategy or suggest changes <p>DOH will assist LHJ in:</p> <ul style="list-style-type: none"> • Identifying methods for finding unknown OSS • Developing or enhancing OSS electronic data systems 	<p>LHJ Plans due to DOH by July 1, 2007</p>

Requirements	Activities	Deadlines
<p>5</p> <p>DOH contracts with LHJ to implement the Plan</p> <p>RCW 70.118A.080</p>	<p>The Plan will detail steps towards the progressive improvement of:</p> <ul style="list-style-type: none"> • Increasing the percentage of OSS represented in the database • Increasing the percentage of OSS receiving inspections within the appropriate service intervals • Finding failing OSS and making needed repairs • Finding and inspecting unknown OSS <p>A work group will be created for certification or licensing of maintenance specialists</p>	
<p>6</p> <p>Financial and Technical Assistance</p> <p>RCW 90.48.595</p>	<p>The Department of Ecology shall provide financial and technical assistance to local governments and tribal entities for OSS repair and replacement through local loan and grant programs.</p> <p>Priority will be given to low-income and financially distressed homeowners</p>	
<p>7</p> <p>3SHB 1458, Sec. 11</p>	<p>DOH reports to Legislature regarding progress made towards MRA designations and implementation of OSS strategies</p>	<p>DOH Deadline December 31, 2008</p>

MRA Designation

There are two main components considered when establishing Marine Recovery Areas: the marine areas as described in the statute and land areas with on-site sewage systems that may affect water quality in those marine areas. The first step to identifying MRAs is to utilize best available scientific and technical data in an analysis of potential geographic boundaries. The second step is to present data on both water quality and the status of on-site systems to community advisory groups for MRA designation. Once the MRAs have been identified, the on-site strategy will be developed and implemented. Analysis of the data and needs of the community will allow for the development of a strategy that best fits the jurisdiction.

MRA Designation Steps Table

Steps	Activities	Deadlines
<p>1</p> <p>Data Analysis</p>	<p>Gather and Analyze Scientific Data for Marine Shorelines within LHJ. Data sources include:</p> <p>State</p> <ul style="list-style-type: none"> Water Quality <ul style="list-style-type: none"> ▪ Shellfish Growing Areas ▪ 303(d) (fecal coliform and low dissolved oxygen) Marine Waters ▪ Nitrogen in Marine Waters (when available) <p>Local</p> <ul style="list-style-type: none"> Water Quality <ul style="list-style-type: none"> ▪ Streams and Creeks Land Use and Development <ul style="list-style-type: none"> ▪ Parcels ▪ Land Use ▪ OSS Permitting ▪ Operation, Monitoring and Maintenance ▪ Sewers and Storm Water Physical Geography <ul style="list-style-type: none"> ▪ Soils ▪ Topography ▪ Drainage ▪ Flood Zones ▪ Wetlands Other Sources <ul style="list-style-type: none"> ▪ USGS ▪ EPA ▪ Other national marine research data 	

Steps	Activities	Deadlines
<p>2</p> <p>Define Boundaries</p>	<p>Identify MRA Boundaries</p> <ul style="list-style-type: none"> ▪ Consider: <ul style="list-style-type: none"> ○ Watershed ○ Distance Buffer ▪ Establish MRA options ▪ Community involvement 	<p>July 1, 2007</p>
<p>3</p> <p>Develop Strategy</p>	<p>Develop MRA Strategy</p> <ul style="list-style-type: none"> ▪ Programmatic ▪ Individual Site Challenges 	<p>July 1, 2007</p>
<p>4</p> <p>Implement Strategy</p>	<p>Strategy Implementation</p> <ul style="list-style-type: none"> ▪ Find all OSS and identify failing systems within MRAs. ▪ Find unknown systems and ensure that they are inspected and functioning properly 	<p>July 1, 2012</p>

Step 1: Data Analysis

Gather and analyze available data for marine shorelines within the local health jurisdiction to determine what areas would benefit from a marine recovery area designation. These will include spatial and tabular data sets. Links to data sources can be found in [Appendix E](#). State agencies such as DOH and Ecology will have useful data; however, local data from planning agencies, public works, water quality assessment committees, and utility or other districts will also be important.

Data Sources Required in an MRA Analysis by RCW 70.118A

Three data sources required for consideration are:

- 1) Shellfish growing areas that have been threatened or downgraded by DOH,
- 2) Marine waters that are listed by Ecology for low-dissolved oxygen or fecal coliform (303(d) list), and
- 3) Marine waters where nitrogen has been identified as a contaminant of concern by the local health officer.

1). Shellfish growing areas that have been threatened or downgraded by DOH. Each growing area contains a series of sampling stations. Samples are collected over time from each station and tested for fecal coliform to determine water quality at those locations. The results of these fecal coliform tests drive the classification of the growing areas according to National Shellfish Sanitation Program (NSSP) standards. When these standards are not met, a shellfish growing area is downgraded to a lower category. The four classifications, from best to worse, are “Approved,” “Conditionally Approved,” “Restricted” and “Prohibited.”

If water quality at one or more sampling stations indicates worsening water conditions over time but has not yet exceeded NSSP standards, those sampling stations might receive a status of “Concerned” or “Threatened.” A “Threatened” status means that a portion of the growing area will be downgraded if water

quality does not improve or worsens. Threatened water quality at these stations is one of the considerations when determining MRAs.

Another consideration when determining MRAs is the downgrade of a growing area. When a portion of a growing area changes to a worse classification it is considered “Downgraded” and is included in the determination of a Marine Recovery Area. The Shellfish program publishes annual reports of growing areas listing all the downgrades and threatened areas for the year. Any growing area with a classification of “Conditionally Approved,” “Restricted,” or “Prohibited” should be considered in an MRA analysis with the understanding that a growing area with one of these designations would not automatically lead to an MRA. The history of the growing area should be examined by looking at Annual Reports and the sampling results leading to the classification. A growing area with a Prohibited classification might never be approved for harvesting regardless of OSS conditions upgradient.

For a discussion of Shellfish data see [Appendix E – Data Sources](#).

2). Marine waters that are listed by the Department of Ecology under section 303(d) for low-dissolved oxygen or fecal coliform. Another way marine waters may be identified as part of a Marine Recovery Area is if they are listed on the Department of Ecology’s 303(d) listing for low-dissolved oxygen or fecal coliform. Ecology maintains a Water Quality Assessment web page (<http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html>) that allows users to query the 2004 Integrated Water Quality Assessment listings which includes the 303(d) waters. This is the most recent listing. The 2006 report will be published in 2007. For a discussion of Ecology 303(d) data, see [Appendix E – Data Sources](#).

3). Marine waters where nitrogen has been identified as a contaminant of concern by the local health officer. [RCW 70.118A.040](#) (1)(c) directs the local health officer to propose a marine recovery area for those land areas where existing on-site sewage disposal systems are a significant factor contributing to concerns associated with marine waters where nitrogen has been identified as a contaminant of concern by the local health officer.

Unlike (1)(a) and (b), in [RCW 70.118A.040](#) (c) there are no statewide monitoring data for nitrogen in marine waters to help in the determinations of possible MRAs. The statute requires the local jurisdictions to make their best judgments about marine areas known to be at risk from nitrogen contamination and to consider the potential contribution from OSS to the problem. [Appendix C](#) summarizes the science of nitrogen in the environment, surface water pollution, human-related sources of nitrogen contribution, and research underway to guide policy. As these issues become clearer, it may be necessary for the local health officers to consider additional measures in their local plans and regulations. Until then, it is reasonable to focus efforts to identify MRAs on the shellfish growing area and 303(d) data.

Local Sources of Data

Water Quality Monitoring Data

Local data resulting from the monitoring of streams and lakes for fecal coliform bacteria, dissolved oxygen, pH, and temperature will help define the boundaries of MRAs and aid in the identification pollution sources.

Land Use and Development

Information such as the type of land use (residential, recreational, forest, etc.), age of development, proximity to shoreline, and density will be important in an MRA analysis. Parcel data will be necessary to answer questions relating to land use and, by linking parcel data to permitting and O&M data, will allow a characterization of OSS use within the jurisdiction. Sewer data will help refine this OSS characterization.

Physical Geography

Where Land Use data pertains to the built environment, the Physical Geography data pertains to the natural environment. This type of information is related to soil types, drainage basins, wetlands, flood zones, topography, and other physical characteristics.

Other Sources of Data

Research is currently underway to assist in the identification of causes of degradation to Puget Sound. The Puget Sound Action Team (PSAT) maintains a website with links to all activities related to Puget Sound including these research projects. This can be found at http://www.psat.wa.gov/Programs/hoodcanal/hc_research.htm. Links to other data can be found in [Appendix G](#).

Step 2: Identification of MRA Boundaries

Once the local health officer has identified the marine shorelines where existing on-site sewage systems are contributing to concerns associated with shellfish growing areas, low dissolved oxygen, fecal coliform bacterial pollution, or nitrogen pollution, the upgradient areas likely to be the source of the pollution become the Marine Recovery Areas. The boundaries will be defined through an analysis of federal, state and local data as well as community involvement. The local health officer, after defining preliminary MRAs, will present to the community options and seek their advice and support.

Methods to establish the land areas with existing OSS that may affect the water quality in the impaired marine environment will be discussed in this step. Examples of different approaches are included in [Appendix F](#) to help the local health jurisdictions choose the methodologies that are likely to work best given their specific situations.

There are at least two general approaches to identifying land areas of the MRA: (1) selecting the watersheds that are upgradient of the impaired marine waters, and (2) buffering setbacks from the shoreline. With either approach, the LHJ can refine the area by using local datasets. The LHJ can use these alone, in combination with each other or with other methods as appropriate within the jurisdiction. Since MRA designation is an iterative process with the potential for adding more MRAs over time, an LHJ may wish to start with a targeted approach and expand as more resources become available or use a broad approach for one MRA and a targeted approach for a different MRA depending on individual cases.

Upgradient Watersheds

With this approach, the MRA designation begins with the watersheds (or drainage basin) upgradient from the identified marine waters. The area of an MRA is then created from the assessment of available geographic information, resulting in the MRA being smaller than the whole watershed(s).

Types of information to consider include geology and soils, natural drainage, land use (residential, agricultural, forestry), infrastructure (sewer utility boundaries), development age and density. Availability of useful local data sets will differ by jurisdiction. The EPA has developed a draft Watershed Planning Handbook as a resource for local jurisdictions. This document may be found at http://www.epa.gov/owow/nps/watershed_handbook.

The local health jurisdiction will have to decide which watershed data set is most appropriate for an analysis. Three watershed datasets are listed below with further discussion in the [Watershed GIS Data section of Appendix E](#).

Hydrologic Unit Code (HUC)

HUCs represent the watersheds of the United States by dividing and sub-dividing regions into successively smaller units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). The cataloging unit is a geographic area representing part of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature.

Water Resource Inventory Areas (WRIA)

These boundaries represent the administrative foundation of Ecology's business activities.

Watershed Administrative Unit (WAU)

WAUs are used in natural resource management on state and privately owned lands. Water Resource Inventory Areas (WRIAs) are the largest unit, BASINs are subunits of WRIAs, and WAUs are subunits of BASINs. However, this hierarchy does not hold true in all cases. WAU boundaries may cross WRIA lines.

Distance Buffering from Shoreline

With this approach, the Marine Recovery Area designation begins with identification of land areas that are a defined distance from the impaired marine waters. The distance is determined based on local knowledge of streams and other natural or manmade barriers and various datasets such as land use, sewer utility boundaries, density, soil characteristics, national forest land, topography and other appropriate data. The buffer distance can also be a phased approach whereby the MRA strategy addresses all parcels within an initial buffer of, for example 500 feet, of the shoreline. Then, after the shoreline survey is completed and corrections are made to any failing OSS, the LHJ reviews further water quality data to determine if additional work is needed further upgradient and the MRA boundary can be extended as necessary.

Community Involvement

Success of the planning activities will depend on the degree to which the impacted community is supportive of the efforts. Approaching the community and selecting the citizen committee representative of the issues will be the first step in gaining community involvement and support in the establishment of Marine Recovery Areas. The community can provide insightful knowledge and anecdotal stories can provide clues to problem areas.

When the marine shoreline is impacted by OSS within a watershed that crosses a political boundary, the community and the LHJ may wish to consider a regional approach to developing an on-site strategy with neighboring jurisdictions.

Step 3: Marine Recovery Area On-Site Strategy

Once a Marine Recovery Area is identified, [RCW 70.118A.050](#) requires the local health officer to develop and approve a Marine Recovery Area On-Site Strategy. The strategy is intended to guide the LHJ in developing and managing all existing on-site sewage disposal systems within MRAs in its jurisdiction. The strategy will specify how the local health jurisdiction will by July 1, 2012 find unknown and failing systems, and ensure that necessary repairs are performed.

The following two EPA publications provide guidance on the development of local management programs:

- The Draft Watershed Planning Handbook, which can be found at http://www.epa.gov/owow/nps/watershed_handbook
- Voluntary National Guidelines for Management of On-site and Clustered Wastewater Treatment Systems EPA: Pub number 832-b-03-001 March 2003 http://www.epa.gov/owm/septic/pubs/septic_guidelines.pdf

Another useful link is: <http://www.epa.gov/OWOW/NPS/index.html>

Identify unknown systems and inspect to ensure that they are not failing

Each year LHJs identify previously unknown systems through established practices. Information on these systems is added to the electronic permitting system and, over time, the percentage of unknown systems within the jurisdiction is reduced. In order to find all OSS within Marine Recovery Areas by 2012, the LHJ will need to develop a strategy. The strategy should operate programmatically for all parcels within the MRA as well as on the individual properties. It should direct the LHJ in a prioritization of activities with potentially high-risk situations taking precedence. The following outline lists the steps to address when developing an MRA on-site strategy:

- Within the newly defined MRAs, develop a known, assumed and unknown OSS data set using parcel data and permitting data.
- Identify property owners and request information regarding their OSS by mail. This may include as-builts, O&M records or utility bills.
- Prioritize the developed areas where OSS data is missing; for example, old homes close to shorelines or streams versus inland homes on large lots. Data such as drainage basins, sewer district boundaries, and other land use data will be useful in this prioritization.
- Update records as the new information becomes available. The On-Site Sewage System Management Plan Guidance (<http://www.doh.wa.gov/ehp/ts/WW/localplan-guidance.pdf>) addresses OSS and O&M record keeping activities necessary to maintain an OSS inventory within the jurisdiction. RCW 70.118A.060(2) states that an MRA OSS database must be compatible with all OSS data systems used throughout the local health jurisdiction. This will be important in facilitating the sharing of OSS information.

Community Involvement

The MRA Strategy addresses citizen participation via advisory committees, liaison groups or other public participation, and education efforts. These efforts include public meetings, direct mailings, press releases, newspaper articles, public information advertisements, community events (fairs, markets, etc.), workshops on on-site sewage system O&M, providing homeowners with copies of their OSS records, and providing technical advice and information brochures on OSS maintenance. [Appendix G](#) contains references and links to outside resources.

Sanitary Surveys

After the community agrees with the OSS Strategy, the LHJ will begin to conduct field assessment of existing OSS. Before conducting fieldwork, the objectives of the site visits (survey) must be defined. Is it to assure that sewage is not surfacing above ground or is it to provide a more extensive evaluation of location of components, type and functionality? Depending on the objectives, fieldwork may include door-to-door sanitary surveys, resident interviews, education, dye testing as necessary, and surface water monitoring to identify failing systems and provide base data for measuring success. Fecal coliform contamination from other sources such as stormwater runoff and animal waste (including from hobby farms) would be useful information for further investigation.

Operation, Monitoring and Maintenance Strategy

O&M data will be necessary to manage OSS within the MRA. The O&M Strategy will address data maintenance in relation to ensuring that OSS are not failing within the MRAs. Data maintenance includes: report collection, data entry, verification of data accuracy, ensuring that data is shareable, mechanisms in place to recover costs, linking O&M reports to parcel data, and the ability to follow-up with problems that are identified. O&M data will also be useful in the performance evaluation of O&M providers within the jurisdiction.

Resources

Identify what resources will initially be available and what additional resources are needed to implement the activities described in this part of the Plan, including preparing the MRA OSS strategy. Describe how partnerships within the community, including both the private and public sector, PUD or management district formation, local tax assessment, and other funding sources (such as state and local), might be adopted.

Step 4: Implementation

Contract

Following approval of the MRA On-Site strategy by the local jurisdiction and the department, the LHJ shall begin to implement the strategy. DOH shall enter into a contract with each LHJ to include state funding assistance to implement the strategy. The contract must require that, within an MRA, the LHJ will show improvement in:

- finding failing systems and making repairs;
- finding, inspecting and repairing unknown systems;
- entering OSS in the electronic data system;
- and increasing the number of OSS that have had required inspections.

Reporting

For the purpose of reporting to the legislature in December 2008, each LHJ will be asked to provide the following information to DOH:

- The status of on-site strategies;
- The status of OSS location, identification, and inclusion within electronic data systems, including estimates of remaining OSS within MRAs that have not been identified or included within electronic data systems;
- The progress of and capacity of LHJs to identify OSS within MRAs and to ensure that failing systems are repaired and that all systems are operated and maintained in compliance with board of health standards;
- Regulatory, statutory, and financial barriers to implementation; and
- Recommendations to successfully implement the plan.

Appendices

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Appendix A – Chapter 70.118A RCW

On-site sewage disposal systems — marine recovery areas

<http://apps.leg.wa.gov/RCW/default.aspx?cite=70.118A&full=true>

70.118A.010

Findings — Purpose.

The legislature finds that:

- (1) Hood Canal and other marine waters in Puget Sound are at risk of severe loss of marine life from low-dissolved oxygen. The increased input of human-influenced nutrients, especially nitrogen, is a factor causing this low-dissolved oxygen condition in some of Puget Sound's waters, in addition to such natural factors as poor overall water circulation and stratification that discourages mixing of surface-to-deeper waters;
- (2) A significant portion of the state's residents live in homes served by on-site sewage disposal systems, and many new residences will be served by these systems;
- (3) Properly functioning on-site sewage disposal systems largely protect water quality. However, improperly functioning on-site sewage disposal systems in marine recovery areas may contaminate surface water, causing public health problems;
- (4) Local programs designed to identify and correct failing on-site sewage disposal systems have proven effective in reducing and eliminating public health hazards, improving water quality, and reopening previously closed shellfish areas; and
- (5) State water quality monitoring data and analysis can help to focus these enhanced local programs on specific geographic areas that are sources of pollutants degrading Puget Sound waters.

Therefore, it is the purpose of this chapter to authorize enhanced local programs in marine recovery areas to inventory existing on-site sewage disposal systems, to identify the location of all on-site sewage disposal systems in marine recovery areas, to require inspection of on-site sewage disposal systems and repairs to failing systems, to develop electronic data systems capable of sharing information regarding on-site sewage disposal systems, and to monitor these programs to ensure that they are working to protect public health and Puget Sound water quality.

70.118A.020

Definitions.

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

- (1) "Board" means the state board of health.
- (2) "Department" means the department of health.
- (3) "Failing" means a condition of an existing on-site sewage disposal system or component that threatens the public health by inadequately treating sewage, or by creating a potential for direct or indirect contact between sewage and the public. Examples of a failing on-site sewage disposal system include:

- (a) Sewage on the surface of the ground;
 - (b) Sewage backing up into a structure caused by slow soil absorption of septic tank effluent;
 - (c) Sewage leaking from a sewage tank or collection system;
 - (d) Cesspools or seepage pits where evidence of ground water or surface water quality degradation exists;
 - (e) Inadequately treated effluent contaminating ground water or surface water; or
 - (f) Noncompliance with standards stipulated on the permit.
- (4) "Local health officer" or "local health jurisdiction" means the local health officers and local health jurisdictions in the following counties bordering Puget Sound: Clallam, Island, Kitsap, Jefferson, Mason, San Juan, Seattle-King, Skagit, Snohomish, Tacoma-Pierce, Thurston, and Whatcom.
- (5) "Marine recovery area" means an area of definite boundaries where the local health officer, or the department in consultation with the health officer, determines that additional requirements for existing on-site sewage disposal systems may be necessary to reduce potential failing systems or minimize negative impacts of on-site sewage disposal systems.
- (6) "Marine recovery area on-site strategy" or "on-site strategy" means a local health jurisdiction's on-site sewage disposal system strategy required under RCW 70.118A.050. This strategy is a component of the on-site program management plan required under RCW 70.118A.030.
- (7) "On-site sewage disposal system" means an integrated system of components, located on or nearby the property it serves, that conveys, stores, treats, or provides subsurface soil treatment and dispersal of sewage. It consists of a collection system, a treatment component or treatment sequence, and a soil dispersal component. An on-site sewage disposal system also refers to a holding tank sewage system or other system that does not have a soil dispersal component. For purposes of this chapter, the term "on-site sewage disposal system" does not include any system regulated by a water quality discharge permit issued under chapter 90.48 RCW.
- (8) "Unknown system" means an on-site sewage disposal system that was installed without the knowledge or approval of the local health jurisdiction, including those that were installed before such approval was required.

70.118A.030

Local health officers to develop a written on-site program management plan.

By July 1, 2007, the local health officers of health jurisdictions in the twelve counties bordering Puget Sound shall develop a written on-site program management plan to provide guidance to the local health jurisdiction.

70.118A.040

Local health officers — Determination of marine recovery areas.

- (1) In developing on-site program management plans required under RCW 70.118A.030, the local health officer shall propose a marine recovery area for those land areas where existing on-site sewage disposal systems are a significant factor contributing to concerns associated with:
 - (a) Shellfish growing areas that have been threatened or downgraded by the department under chapter 69.30 RCW;
 - (b) Marine waters that are listed by the department of ecology under section 303(d) of the federal clean water act (33 U.S.C. Sec. 1251 et seq.) for low-dissolved oxygen or fecal coliform; or
 - (c) Marine waters where nitrogen has been identified as a contaminant of concern by the local health officer.
- (2) In determining the boundaries for a marine recovery area, the local health officer shall assess and include those land areas where existing on-site sewage disposal systems may affect water quality in the marine recovery area.
- (3) Determinations made by the local health officer under this section, including identification of nitrogen as a contaminant of concern, will be based on published guidance developed by the department. The guidance must be designed to ensure the proper use of available scientific and technical data. The health officer shall document the basis for these determinations when plans are submitted to the department.
- (4) After July 1, 2007, the local health officer may designate additional marine recovery areas meeting the criteria of this section, according to new information. Where the department recommends the designation of a marine recovery area or expansion of a designated marine recovery area, the local health officer shall notify the department of its decision concerning the recommendation within ninety days of receipt of the recommendation.

70.118A.050

Marine recovery area on-site strategy.

- (1) The local health officer of a local health jurisdiction where a marine recovery area has been proposed under RCW 70.118A.040 shall develop and approve a marine recovery area on-site strategy that includes designation of marine recovery areas to guide the local health jurisdiction in developing and managing all existing on-site sewage disposal systems within marine recovery areas within its jurisdiction. The on-site strategy must be a component of the program management plan required under RCW 70.118A.030. The department may grant an extension of twelve months where a local health jurisdiction has demonstrated substantial progress toward completing its on-site strategy.
- (2) An on-site strategy for a marine recovery area must specify how the local health jurisdiction will by July 1, 2012, and thereafter, find:

- (a) Existing failing systems and ensure that system owners make necessary repairs; and
- (b) Unknown systems and ensure that they are inspected as required to ensure that they are functioning properly, and repaired, if necessary.

70.118A.060

Local health officer duties — Electronic data systems.

In a marine recovery area, each local health officer shall:

- (1) Require that on-site sewage disposal system maintenance specialists, septic tank pumpers, or others performing on-site sewage disposal system inspections submit reports or inspection results to the local health jurisdiction regarding any failing system; and
- (2) Develop and maintain an electronic data system of all on-site sewage disposal systems within a marine recovery area to enable the local health jurisdiction to actively manage on-site sewage disposal systems. In assisting development of electronic data systems, the department shall work with local health jurisdictions with marine recovery areas and the on-site sewage disposal system industry to develop common forms and protocols to facilitate sharing of data. A marine recovery area on-site sewage disposal electronic data system must be compatible with all on-site sewage disposal electronic data systems used throughout a local health jurisdiction.

70.118A.070

Department review of on-site program management plans — Assistance to local health jurisdictions.

- (1) The on-site program management plans of local health jurisdictions required under RCW 70.118A.030 must be submitted to the department by July 1, 2007, and be reviewed to determine if they contain all necessary elements. The department shall provide in writing to the local board of health its review of the completeness of the plan. The board may adopt additional criteria by rule for approving plans.
- (2) In reviewing the on-site strategy component of the plan, the department shall ensure that all required elements, including designation of any marine recovery area, have been addressed.
- (3) Within thirty days of receiving an on-site strategy, the department shall either approve the on-site strategy or provide in writing the reasons for not approving the strategy and recommend changes. If the department does not approve the on-site strategy, the local health officer must amend and resubmit the plan to the department for approval.
- (4) Upon receipt of department approval or after thirty days without notification, whichever comes first, the local health officer shall implement the on-site strategy.

- (5) If the department denies approval of an on-site strategy, the local health officer may appeal the denial to the board. The board must make a final determination concerning the denial.
- (6) The department shall assist local health jurisdictions in:
 - (a) Developing written on-site program management plans required by RCW 70.118A.030;
 - (b) Identifying reasonable methods for finding unknown systems; and
 - (c) Developing or enhancing electronic data systems that will enable each local health jurisdiction to actively manage all on-site sewage disposal systems within their jurisdictions, with priority given to those on-site sewage disposal systems that are located in or which could affect designated marine recovery areas.

70.118A.080

Department to contract with local health jurisdictions — Funding assistance — Requirements — Revised compliance dates — Work group.

- (1) The department shall enter into a contract with each local health jurisdiction subject to the requirements of this chapter to implement plans developed under this chapter, and to develop or enhance electronic data systems required by this chapter. The contract must include state funding assistance to the local health jurisdiction from funds appropriated to the department for this purpose.
- (2) The contract must require, at a minimum, that within a marine recovery area, the local health jurisdiction:
 - (a) Show progressive improvement in finding failing systems;
 - (b) Show progressive improvement in working with on-site sewage disposal system owners to make needed system repairs;
 - (c) Is actively taking steps to find previously unknown systems and ensuring that they are inspected as required and repaired if necessary;
 - (d) Show progressive improvement in the percentage of on-site sewage disposal systems that are included in an electronic data system; and
 - (e) Of those on-site sewage disposal systems in the electronic data system, show progressive improvement in the percentage that have had required inspections.
- (3) The contract must also include provisions for state assistance in updating the plan. Beginning July 1, 2012, the contract may adopt revised compliance dates, including those in RCW 70.118A.050, where the local health jurisdiction has demonstrated substantial progress in updating the on-site strategy.
- (4) The department shall convene a work group for the purpose of making recommendations to the appropriate committees of the legislature for the development of certification or licensing of maintenance specialists. The work

group shall make its recommendation with consideration given to the 1998 report to the legislature entitled "On-Site Wastewater Certification Work Group" as it pertains to maintenance specialists. The work group may give priority to appropriate levels of certification or licensure of maintenance specialists who work in the Puget Sound basin.

70.118A.090

Chapter to supplement chapter 70.118 RCW.

The provisions of this chapter are supplemental to all other authorities governing on-site sewage disposal systems, including chapter 70.118 RCW and rules adopted under that chapter.

THIRD SUBSTITUTE HOUSE BILL 1458 (as passed by the House February 11, 2006)

Sections 1 through 9 comprise Title 70 RCW 118A.010 to 118A.090. Sections 10, 11 and 12 are not included in Title 70 RCW but relate to Marine Recovery Areas <http://www.leg.wa.gov/pub/billinfo/2005-06/Pdf/Bills/House%20Passed%20Legislature/1458-S3.PL.pdf>

Sec.10

A new section is added to chapter 90.48 RCW to read as follows:

The department shall offer financial and technical assistance to local governments and tribal entities in Puget Sound counties to establish or expand on-site sewage disposal system repair and replacement through local loan and grant programs. The programs must give priority to low-income and financially distressed homeowners.

Sec. 11

- (1) The department of health shall report to the appropriate committees of the senate and house of representatives by December 31, 2008, on progress in designating marine recovery areas and developing and implementing on-site strategies for such marine recovery areas.
- (2) The report shall include information on:
 - (a) The status of on-site strategies in each county covered by sections 2 through 9 of this act;
 - (b) The status of on-site sewage disposal system location, identification, and inclusion within electronic data systems in each county, including estimates of remaining on-site sewage disposal systems within marine recovery areas that have not been identified or included within electronic data systems;
 - (c) Areas for which shoreline surveys have been completed by the department;

- (d) The progress of and capacity of local health jurisdictions to identify on-site sewage disposal systems within marine recovery areas and to ensure that failing systems are repaired and all systems are operated and maintained in compliance with board of health standards;
 - (e) Regulatory, statutory, and financial barriers to implementing the on-site strategy; and
 - (f) Recommendations that will assist local health jurisdictions to successfully implement plans.
- (3) Local health jurisdictions shall provide information and data requested by the department of health in developing the report, and the department shall append all reports or information that the local health jurisdictions request to be included in the report.

Sec.12

Sections 1 through 9 of this act constitute a new chapter in Title 70 RCW.

Appendix B – Summary of DOH and LHJ Responsibilities

DOH has responsibility in the following areas:

1. Develop Guidance
70.118A.040
Local health officers — Determination of marine recovery areas.
 - (3) Determinations made by the local health officer under this section, including identification of nitrogen as a contaminant of concern, will be based on published guidance developed by the department. The guidance must be designed to ensure the proper use of available scientific and technical data. The health officer shall document the basis for these determinations when plans are submitted to the department.
2. In consultation with the local health officer, propose marine recovery areas:
70.118A.040
Local health officers — Determination of marine recovery areas.
 - (4) After July 1, 2007, the local health officer may designate additional marine recovery areas meeting the criteria of this section, according to new information. Where the department recommends the designation of a marine recovery area or expansion of a designated marine recovery area, the local health officer shall notify the department of its decision concerning the recommendation within ninety days of receipt of the recommendation.
3. Review Plans and Approve Strategies:
70.118A.070
Department review of on-site program management plans — Assistance to local health jurisdictions.
 - (1) The on-site program management plans of local health jurisdictions required under RCW 70.118A.030 must be submitted to the department by July 1, 2007, and be reviewed to determine if they contain all necessary elements. The department shall provide in writing to the local board of health its review of the completeness of the plan. The board may adopt additional criteria by rule for approving plans.
 - (2) In reviewing the on-site strategy component of the plan, the department shall ensure that all required elements, including designation of any marine recovery area, have been addressed.
 - (3) Within thirty days of receiving an on-site strategy, the department shall either approve the on-site strategy or provide in writing the reasons for not approving the strategy and recommend changes. If the department does not approve the on-site strategy, the local health officer must amend and resubmit the plan to the department for approval.
4. Assist the LHJs:
70.118A.070
Department review of on-site program management plans — Assistance to local health jurisdictions.

- (6) The department shall assist local health jurisdictions in:
 - (a) Developing written on-site program management plans required by RCW 70.118A.030;
 - (b) Identifying reasonable methods for finding unknown systems; and
 - (c) Developing or enhancing electronic data systems that will enable each local health jurisdiction to actively manage all on-site sewage disposal systems within their jurisdictions, with priority given to those on-site sewage disposal systems that are located in or which could affect designated marine recovery areas.

5. Contract with the LHJs
70.118A.080

Department to contract with local health jurisdictions

- (1) The department shall enter into a contract with each local health jurisdiction subject to the requirements of this chapter to implement plans developed under this chapter, and to develop or enhance electronic data systems required by this chapter. The contract must include state funding assistance to the local health jurisdiction from funds appropriated to the department for this purpose.

6. Assist in the development of electronic data systems and work with industry to develop common forms.
70.118A.060

Electronic data systems.

In a marine recovery area, each local health officer shall:

- (2) Develop and maintain an electronic data system of all on-site sewage disposal systems within a marine recovery area to enable the local health jurisdiction to actively manage on-site sewage disposal systems. In assisting development of electronic data systems, the department shall work with local health jurisdictions with marine recovery areas and the on-site sewage disposal system industry to develop common forms and protocols to facilitate sharing of data. A marine recovery area on-site sewage disposal electronic data system must be compatible with all on-site sewage disposal electronic data systems used throughout a local health jurisdiction.

7. Convene a work group on certification of O&M specialists
70.118A.080

Work group.

- (4) The department shall convene a work group for the purpose of making recommendations to the appropriate committees of the legislature for the development of certification or licensing of maintenance specialists. The work group shall make its recommendation with consideration given to the 1998 report to the legislature entitled "On-Site Wastewater Certification Work Group" as it pertains to maintenance specialists. The work group may give priority to appropriate levels of certification or licensure of maintenance specialists who work in the Puget Sound basin.

8. Report to the legislature:

Sec. 11 [from 3SHB 1458]

- (1) The department of health shall report to the appropriate committees of the senate and house of representatives by December 31, 2008, on progress in designating marine recovery areas and developing and implementing on-site strategies for such marine recovery areas.
- (2) The report shall include information on:
 - (a) The status of on-site strategies in each county covered by sections 2 through 9 of this act;
 - (b) The status of on-site sewage disposal system location, identification, and inclusion within electronic data systems in each county, including estimates of remaining on-site sewage disposal systems within marine recovery areas that have not been identified or included within electronic data systems;
 - (c) Areas for which shoreline surveys have been completed by the department;
 - (d) The progress of and capacity of local health jurisdictions to identify on-site sewage disposal systems within marine recovery areas and to ensure that failing systems are repaired and all systems are operated and maintained in compliance with board of health standards;
 - (e) Regulatory, statutory, and financial barriers to implementing the on-site strategy; and
 - (f) Recommendations that will assist local health jurisdictions to successfully implement plans.

Local Health Officers have responsibility in the following areas:

1. Designate marine recovery areas:

70.118A.040

Local health officers — Determination of marine recovery areas.

- (1) In developing on-site program management plans required under RCW 70.118A.030, the local health officer shall propose a marine recovery area for those land areas where existing on-site sewage disposal systems are a significant factor contributing to concerns associated with:
 - (a) Shellfish growing areas that have been threatened or downgraded by the department under chapter 69.30 RCW;
 - (b) Marine waters that are listed by the department of ecology under section 303(d) of the federal clean water act (33 U.S.C. Sec. 1251 et seq.) for low-dissolved oxygen or fecal coliform; or

- (c) Marine waters where nitrogen has been identified as a contaminant of concern by the local health officer.
 - (2) In determining the boundaries for a marine recovery area, the local health officer shall assess and include those land areas where existing on-site sewage disposal systems may affect water quality in the marine recovery area.
 - (4) After July 1, 2007, the local health officer may designate additional marine recovery areas meeting the criteria of this section, according to new information. Where the department recommends the designation of a marine recovery area or expansion of a designated marine recovery area, the local health officer shall notify the department of its decision concerning the recommendation within ninety days of receipt of the recommendation.
2. Develop and approve an MRA On-Site Strategy:
70.118A.050
Marine recovery area on-site strategy.
- (1) The local health officer of a local health jurisdiction where a marine recovery area has been proposed under RCW 70.118A.040 shall develop and approve a marine recovery area on-site strategy that includes designation of marine recovery areas to guide the local health jurisdiction in developing and managing all existing on-site sewage disposal systems within marine recovery areas within its jurisdiction. The on-site strategy must be a component of the program management plan required under RCW 70.118A.030. The department may grant an extension of twelve months where a local health jurisdiction has demonstrated substantial progress toward completing its on-site strategy.
 - (2) An on-site strategy for a marine recovery area must specify how the local health jurisdiction will by July 1, 2012, and thereafter, find:
 - (a) Existing failing systems and ensure that system owners make necessary repairs; and
 - (b) Unknown systems and ensure that they are inspected as required to ensure that they are functioning properly, and repaired, if necessary.
3. Require reporting of failing systems and develop and maintain an OSS data system:
70.118A.060
In a marine recovery area, each local health officer shall:
- (1) Require that on-site sewage disposal system maintenance specialists, septic tank pumpers, or others performing on-site sewage disposal system inspections submit reports or inspection results to the local health jurisdiction regarding any failing system; and

- (2) Develop and maintain an electronic data system of all on-site sewage disposal systems within a marine recovery area to enable the local health jurisdiction to actively manage on-site sewage disposal systems. In assisting development of electronic data systems, the department shall work with local health jurisdictions with marine recovery areas and the on-site sewage disposal system industry to develop common forms and protocols to facilitate sharing of data. A marine recovery area on-site sewage disposal electronic data system must be compatible with all on-site sewage disposal electronic data systems used throughout a local health jurisdiction.

4. Submit the Plan with the MRA strategy to DOH:
70.118A.070
Department review of on-site program management plans — Assistance to local health jurisdictions.
 - (1) The on-site program management plans of local health jurisdictions required under RCW 70.118A.030 must be submitted to the department by July 1, 2007, and be reviewed to determine if they contain all necessary elements. The department shall provide in writing to the local board of health its review of the completeness of the plan. The board may adopt additional criteria by rule for approving plans.

 - (3) Within thirty days of receiving an on-site strategy, the department shall either approve the on-site strategy or provide in writing the reasons for not approving the strategy and recommend changes. If the department does not approve the on-site strategy, the local health officer must amend and resubmit the plan to the department for approval.

 - (4) Upon receipt of department approval or after thirty days without notification, whichever comes first, the local health officer shall implement the on-site strategy.

5. Contract with DOH
70.118A.080
Department to contract with local health jurisdictions.
 - (1) The department shall enter into a contract with each local health jurisdiction subject to the requirements of this chapter to implement plans developed under this chapter, and to develop or enhance electronic data systems required by this chapter. The contract must include state funding assistance to the local health jurisdiction from funds appropriated to the department for this purpose.

 - (2) The contract must require, at a minimum, that within a marine recovery area, the local health jurisdiction:
 - (a) Show progressive improvement in finding failing systems;
 - (b) Show progressive improvement in working with on-site sewage disposal system owners to make needed system repairs;
 - (c) Is actively taking steps to find previously unknown systems and ensuring that they are inspected as required and repaired if

necessary;

- (d) Show progressive improvement in the percentage of on-site sewage disposal systems that are included in an electronic data system; and
- (e) Of those on-site sewage disposal systems in the electronic data system, show progressive improvement in the percentage that have had required inspections.

6. Provide information to DOH for the legislative report

Section 11 (3) [from 3SHB 1458] Local health jurisdictions shall provide information and data requested by the department of health in developing the report, and the department shall append all reports or information that the local health jurisdictions request to be included in the report.

Appendix C – Marine Nitrogen

Chapter 70.118A.040 RCW, (1)(c) directs the local health officer to propose a marine recovery area for those land areas where existing on-site sewage disposal systems are a significant factor contributing to concerns associated with marine waters where nitrogen has been identified as a contaminant of concern.

Unlike Shellfish Growing Areas and 303(d) listings, there are no statewide monitoring data systems for nitrogen in marine waters to help in the determinations of possible MRAs. The statute requires the local jurisdictions to make their best judgments about marine areas known to be at risk from nitrogen contamination and to consider the potential contribution from OSS to the problem.

In order to understand why the legislature wants local health jurisdictions to consider the marine waters, especially in Hood Canal, it is necessary to understand how on-site sewage systems may contribute to environmental degradation. As these issues become clearer, it may be necessary for the local health officers to consider additional measures in their local plans and regulations.

Groundwater

Contamination of groundwater with nitrates is a problem in many parts of the U.S. and is widely documented. Human health concerns from nitrates in groundwater used as a drinking water source primarily focus on methemoglobinemia (Blue Baby Syndrome). The U.S. Environmental Protection Agency has established a federal drinking water standard of 10 milligrams per liter (mg/L) for nitrate. Washington State's drinking water quality standard is also 10 mg/L. Public water systems are required to sample for nitrate on a regular basis. More information on nitrate in drinking water is available at <http://www4.doh.wa.gov/dw/publications/publications.cfm?action=pubdetail&type=subject&PubId=218> and information on nitrate in drinking water supplies can be found at the Department of Health website Washington State's Source Water Assessment Program (SWAP) [Washington's Source Water Assessment Program \(PDF 66 KB\)](#).

Nitrogen in the Environment

Nitrogen exists in many forms. It is a common element constituting 78% of the earth's atmosphere. In its gaseous state nitrogen is inert, and in another state, it is an essential constituent of amino and nucleic acids, the building blocks of life for all living organisms. Nitrogen is a constituent in human sewage. The principal forms of nitrogen with regard to onsite wastewater treatment and soil-groundwater interactions are organic nitrogen, ammonia/ammonium ion ($\text{NH}_3 / \text{NH}_4^+$), nitrogen gas (N_2), nitrite (NO_2^-), and nitrate (NO_3^-). Nitrate, because of its mobility in groundwater, is the form of nitrogen that is the primary focus of concerns in marine waters. (For more information, see the DOH Report to the Puget Sound Action Team regarding nitrogen-reducing technologies available at http://www.psat.wa.gov/Publications/hood_canal/n_reducing_technologies.pdf.)

The Nitrogen Cycle shows the interrelationship of the environment and nitrogen products. The transformation of nitrogen compounds occurs through the following mechanisms: *Nitrogen fixation* is the conversion of nitrogen gas into nitrogen compounds for assimilation by plants. *Ammonification* is the biochemical degradation of organic nitrogen into ammonia or ammonium ion by bacteria that use organic carbon in building cell tissue. Within an onsite wastewater system, Ammonification of organic

nitrogen in the human waste stream occurs within the septic tank. *Synthesis* is the conversion of ammonium ion or nitrate into plant protein (organic nitrogen). *Nitrification* is the biological oxidation of ammonium ion to nitrate by bacteria. The reaction is usually very rapid when oxygen is available. Because of this, it is rare to find nitrite levels higher than 1.0 mg/L in water. *Denitrification* occurs when nitrate is transformed to nitrogen gas under conditions where dissolved oxygen is absent (called anoxic conditions) by heterotrophic bacteria (those that use organic carbon for building cell tissue).

Surface Water Pollution with Nitrogen

When nitrogen compounds are discharged to surface waters in high concentrations, the most prominent deleterious effect is *eutrophication*. Excess nitrogen, primarily in the form of nitrates, can cause the stimulation of plant growth, resulting in algal blooms or overgrowth of aquatic plants. This affects the receiving water resulting in odors, accumulation of biomass, dissolved oxygen depletion due to biomass decay, and loss of fish and shellfish. See the Preliminary Assessment and Corrective Action Plan at http://www.psat.wa.gov/Publications/PACA_html/paca_human.htm for a more detailed discussion of this process as it affects Hood Canal.

The oxidation of organic nitrogen and ammonia/ammonium ion to nitrate (through nitrification) can exert a significant oxygen demand on the receiving water, (known as the nitrogenous biochemical oxygen demand or NBOD). The NBOD, can deplete oxygen from the water body. The rate of nitrification is dependent on several environmental factors, which include the population of nitrifying bacteria, temperature, alkalinity, and availability of dissolved oxygen.

What is the water quality problem in Hood Canal?

Hood Canal is a natural, glacier-carved fiord more than 60 miles long, which forms the westernmost waterway and margin of the Puget Sound basin. It is located in Jefferson, Kitsap, and Mason Counties. The Hood Canal watershed is all the land from which water flows to the canal. It encompasses a highly interactive system that is dependent upon the continuing cycle of clean water and nutrients to sustain its biological character.

Significant fish kills in Hood Canal in 2002 and 2003 heightened awareness of hypoxia problems. The Hood Canal Coordinating Council (<http://www.hccc.wa.gov/>) obtained funding through the Department of Ecology and Puget Sound Action Team to enhance its program of water quality protection and improvement by promoting enhanced onsite sewage treatment. The Council completed the Preliminary Assessment and Corrective Action Plan (PACA) http://www.psat.wa.gov/Publications/hood_canal/HC_PACA.pdf. The PACA Plan roughly estimates the human contributions of nitrogen to Hood Canal. However, the current understanding of the causes of (and solutions to) low dissolved oxygen problems is uncertain.

The Department of Ecology's report: "Washington State Marine Water Quality, 1998 through 2000" (<http://www.ecy.wa.gov/biblio/0203056.html>) summarizes marine water quality data for stations in Puget Sound, Grays Harbor, and Willapa Bay. Five indicators of marine water column environmental condition were evaluated. For the Puget Sound region in general, water quality appeared to be reasonably good; however, there were several locations where water quality was reduced, due to low dissolved oxygen concentrations, fecal coliform contamination, or an indication of sensitivity to eutrophication based on stratification or nutrient conditions.

Areas most sensitive to water quality problems are generally those with high runoff, low mixing, and anthropogenic inputs of nutrients and sewage. Climate, stratification and flushing are further variables compounding the difficulty assessing the impact of humans on water quality in Hood Canal. Further information is available at:

<http://wa.water.usgs.gov/projects/hoodcanal/> and from Puget Sound Action Team's Hood Canal Dissolved Oxygen Program at <http://www.hoodcanal.washington.edu/aboutHC/brochure.html>

A narrated slide show about Hood Canal and the processes involved with the lack of oxygen, presented by Jan Newton, Ph.D, Principal Oceanographer Applied Physics Laboratory, University of Washington, Principal Investigator for the Hood Canal Dissolved Oxygen Program's Integrated Assessment and Modeling Study, is found at: <http://www.hoodcanal.washington.edu/aboutHC/scienceprimer.jsp?perPage=1&startIndex=0&View=&keyword=EDUPPT>. This slide show describes the scientific understanding of the issues and includes an introduction to the Hood Canal low oxygen issue, the monitoring and survey data, possible hypotheses for the situation observed, a strategy for dealing with this issue, and the scientific study underway.

As the principal investigator for the HCDOP, Jan Newton answered two questions:

If there are no marine nitrogen water quality data can low dissolved oxygen (from the 303 (d) data) be used to indicate excess nitrogen?

Her short answer is no. Low DO implies that an organic load is causing an oxygen debt not destroyed by mixing of the water column. The organic load needed nitrogen input at some point, but it could be remote in time or space. For example, carcass loading could cause a localized oxygen debt from POC/PON loading. Inorganic nitrogen load can also cause an organic load that result in a localized oxygen debt, but if the water column is well mixed, excess nitrogen loads may not result in an oxygen debt. West Point Wastewater Treatment Plant is a good example of nitrogen loads entering the water at a place that is well mixed and where phytoplankton are light-limited, not nutrient-limited. In summary, low DO needs organic load with a source of N at some point. Nitrogen load won't always result in low DO, and low DO can also be from a remote area, i.e., from upwelling of deep water or ocean input.

If an area has low DO, for whatever reason, would limiting the amount of nitrogen added by people be likely to help, hurt or have no effect?

“It would not hurt. It may have a large effect, or it may have little to no effect. If the low DO is from carbon loads or changes to input waters, the N reduction may not have an effect. If N is limiting and the input is of a scale that is significant, then it would have an effect. I know of no reason that it could be bad.”

Marine Water

USGS has estimated the nitrogen loading and groundwater discharge to Hood Canal and their July 22, 2006 presentation is available at <http://wa.water.usgs.gov/projects/hoodcanal/data/HC072206LHCWC.pdf>. Supporting documentation is found at USGS Scientific Investigations Report 2006–5106 Freshwater and Saline Loads of Dissolved Inorganic Nitrogen to Hood Canal and Lynch Cove, Western Washington at <http://pubs.usgs.gov/sir/2006/5106/>.

Appendix D – OSS Definitions

Assumed OSS (for the purpose of inventorying OSS)

“An assumed OSS has no records but through GIS analysis an OSS can be assumed to exist on a parcel.”

The “Assumed” category of OSS falls between the Known and the Unknown. It is an estimate or best guess where there are no permitting records but some data exists to indicate an OSS is likely present. Some assumed OSS are generated through more robust methodology than others. For example, a parcel that is not within a sewer district boundary and has some assessed improved value might be thought to have an OSS and is assigned an Assumed OSS. Another parcel data set might include a Land Use code that indicates the parcel has an inhabited structure. An Assumed OSS assigned to this parcel would be more reliable than the former example. An Assumed OSS is more valuable than an Unknown OSS for mapping and analysis purposes but this type of data is not necessarily reliable. This definition is intended to distinguish between those records for which identified OSS are known to exist and records that are generated from some process which may be prone to error. Maps created showing Assumed OSS should indicate where OSS are calculated.

Conforming System (Chapter 246-272 WAC)

“Conforming system” means any on-site sewage system, except an experimental system, meeting any of the following criteria:

- (a) Systems in full compliance with new construction requirements under this chapter; or
- (b) Systems approved, installed and operating in accordance with requirements of previous editions of this chapter; or
- (c) Systems or repairs permitted through departmental concurrence by the waiver process which assure public health protection by higher treatment performance or other methods.

Known OSS (interpretation from [RCW 70.118A.020](#))

“Known system means an OSS that was installed with the knowledge or approval of the local health jurisdiction. Known OSS include conforming and nonconforming systems.”

OSS (Chapter 246-272A WAC),

"On-site sewage system" (OSS) means an integrated system of components, located on or nearby the property it serves, that conveys, stores, treats, and/or provides subsurface soil treatment and dispersal of sewage. It consists of a collection system, a treatment component or treatment sequence, and a soil dispersal component. An on-site sewage system also refers to a holding tank sewage system or other system that does not have a soil dispersal component.

Unknown OSS (this is a new definition from [RCW 70.118A.020](#))

“Unknown System means an on-site sewage disposal system (or OSS per WAC 246-272A) that was installed without the knowledge or approval of the local health jurisdiction, including those that were installed before such approval was required.”

Appendix E – Data Sources

Below is a discussion of data useful in an MRA Analysis and links to data sources.

When looking for GIS data pertaining to Washington State, a good place to start is the Washington Geographic Information Council web site (<http://wagic.wa.gov/>). Along the top of the page are five main links: “Home,” “About WAGIC,” “GIS-Related Information,” “Washington Geospatial Data” and “WAGIC Info. Clearinghouse.” The “GIS-Related Information” page contains links to other sources of data such as the Washington State Geospatial Data Archive. The “Washington Geospatial Data” page lists data by source such as the Department of Natural Resources and the Department of Health. The “WAGIC Info. Clearinghouse” button links to a search engine for spatial data.

Another good source of some local, state and federal data is Geodata.gov (<http://gos2.geodata.gov/wps/portal/gos>); however, finding appropriate data through this source can be challenging because of the large amount of data available. Using the search tool, local data may be located or the user might browse maps for ideas relating to the presentation of data and analysis results.

Watersheds (Drainage Basins)

Watersheds will be important when evaluating those land areas that drain to impaired marine waters. Below are three examples of watershed data sets. There are a few differences between these watershed data. The local health jurisdiction is advised to evaluate metadata and each data set with existing local data and decide which watershed data better represents drainage within their jurisdiction.

Watershed GIS Data

HUC – Hydraulic Unit Code

Explanation: <http://water.usgs.gov/GIS/huc.html>

Data: <http://www.reo.gov/gis/data/gisdata/index.htm>

Metadata: http://www.reo.gov/gis/projects/watersheds/REOHUCv1_3.htm

WAW – Watershed Administrative Units

Data: <http://www3.wadnr.gov/dnrapp5/cgi-bin/gisdata/nfoa12-09-03.cgi?id=4094>

Metadata: <http://www3.wadnr.gov/dnrapp6/dataweb/metadata/waw.htm>

WRIA – Water Resource Inventory Areas

Data: <http://www.ecy.wa.gov/services/gis/data/hydro/wria.zip>

Metadata: <http://www.ecy.wa.gov/services/gis/data/hydro/wria.htm>

Other Watershed Data

U.S. Environmental Protection Agency's *Surf Your Watershed*

(<http://www.epa.gov/surf/>) is an easy way to access collected reports and URLs relating to watersheds.

U.S. Geological Survey's *Science in Your Watershed* web site

(<http://water.usgs.gov/wsc/>) site is a good resource for scientific information organized by watershed.

303(d) Marine waters listed by ecology for low-dissolved oxygen or fecal coliform

Ecology's *Washington State's Water Quality Assessment* webpage

(<http://www.ecy.wa.gov/programs/wq/303d/index.html>) describes the 303(d) listings and provides related links. One of the links on this webpage is to the integrated

report which includes the 303(d) listings (<http://www.ecy.wa.gov/programs/wq/303d/2002/2002-index.html>). When using the query tools, select “Category 5” as one of the parameters to select only 303(d) records.

There are two ways to query the 303(d) listings: use the “simple query tool” or the “interactive mapping tool.” The simple query tool does not include “County” as a parameter so the only way to find 303(d) listings within a jurisdiction is to use the WRIA or the Townships and Ranges. This will require multiple queries. The interactive mapping tool allows the user to query a geographic region by Marine Water Body or County but there is no way to show only fecal coliform or dissolved oxygen. These are useful tools that allow a user to browse the 303(d) listings. However, for a more detailed analysis the GIS data will be necessary.

Questions regarding the 2002/2004 proposed assessment may be directed to:

Ken Koch
Water Quality Program
WA Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600
(360) 407-6782
Email: 303d@ecy.wa.gov

303(d) Data

303(d) GIS data may be downloaded from <http://www.ecy.wa.gov/services/gis/data/data.htm>. It is at the top of the data download page and named “2004 Washington Water Quality Assessment/303(d) List.” Click on “Metadata” to learn more about the data set or click on “Download” to download the zip file containing GIS data in a Shapefile format. Using a GIS application, the data can be displayed showing only 303(d) listings for fecal coliform and low dissolved oxygen. The resulting polygons will include freshwater 303(d) listings. These can be removed from consideration by selecting only those areas intersecting Puget Sound. The Puget Sound hydrography GIS data can be obtained from a variety of locations, including the Department of Natural Resources here: <http://www3.wadnr.gov/dnrapp6/dataweb/dmmatrix.html>. County water quality data can supplement the 303(d) data and provide additional information to assess trends and to help identify sources.

Shellfish Growing Areas

Another of the criteria evaluated when designating MRA is Shellfish Growing Areas that have been downgraded by DOH or are threatened.

The Department of Health places shellfish growing areas in a “Threatened” or “Concerned” status based on an assessment of threats to the growing area’s classification. This assessment is based on the identification of pollution sources that may impact public health, and/or how close a water sampling station’s bacteria levels are to the National Shellfish Sanitation Program’s (NSSP) standards. The latter has been the most common. The NSSP prescribes two methods to evaluate fecal coliform levels at water sampling stations to classify growing areas: Systematic Random Sampling (SRS) and Adverse Pollution Conditions (APC). Both use a

minimum of the last 30 samples. With the SRS method, the 90th percentile cannot exceed 43 fc/100mL. With the APC method, no more than 10% of the samples can exceed 43 fc/100mL. If any of these standards are exceeded, no shellfish can be directly harvested from the area of that station.

A Threatened status is assigned in SRS growing areas when a water sampling station's 90th percentile is between 30 and 43 fc/100mL. In APC growing areas, a threatened status is assigned if more than 6.6% of the samples have exceeded 43 fc/100mL. A Concerned status is assigned where a water sampling station's 90th percentile is greater than 20, but less than 30. DOH provides this information to county governments so that corrective actions can take place before water quality at the listed stations fails the shellfish standards.

The Growing Area Classification Program evaluates all commercially harvested shellfish growing areas in Washington State to determine their suitability for harvest. If a Shellfish Growing Area has a status of "Conditionally Approved," "Restricted" or "Prohibited" then it is considered Downgraded and must be considered in an MRA analysis.

A growing area's classification is determined by conducting a "sanitary survey," a three-fold process consisting of:

- A shoreline survey, which identifies pollution sources that may impact water quality. The program evaluates sewage treatment plants, onsite sewage systems, animal farms, drainage ways, and wildlife;
- Marine water sampling to determine fecal coliform bacterial levels in the marine water; and
- Analysis of how weather conditions, tides, currents, and other factors may affect the distribution of pollutants in the area.

A growing area may be classified as **Approved** when the sanitary survey shows that the area is not subject to contamination that presents an actual or potential public health hazard. An Approved classification authorizes commercial shellfish harvest for direct marketing.

A growing area may be classified as **Conditionally Approved** when it meets Approved criteria, but only during predictable periods. For example, during dry weather a growing area may meet Approved water quality standards, but after a certain amount of rain falls (termed a "rainfall event") the water quality declines. In this example, the Conditionally Approved area is temporarily closed to harvest after a rainfall event. The length of closure is predetermined for each Conditionally Approved area, and is based on water sample data that show the amount of time it takes for water quality to recover and again meet Approved criteria. Once that time period has elapsed, the area is reopened.

A **Restricted** classification is used for areas that do not meet water quality standards for an Approved classification, but the sanitary survey indicates only a limited degree of pollution from non-human sources. Shellfish harvested from Restricted growing areas cannot be marketed directly. They must be "relayed" to Approved growing area waters for a specified amount of time, allowing shellfish to naturally cleanse themselves of contaminants before they are harvested for market.

A growing area must be classified as **Prohibited** when the sanitary survey indicates that fecal material, pathogenic microorganisms, or poisonous or harmful substances may be present in concentrations that pose a health risk to shellfish consumers. Growing areas adjacent to sewage treatment plant outfalls, marinas, and other persistent or unpredictable pollution sources are classified as Prohibited. Growing areas that have not undergone a sanitary survey are also classified as Prohibited. Commercial shellfish harvests are not allowed from Prohibited areas.

Once classified, all active commercial shellfish growing areas are regularly monitored. Marine water samples are collected throughout the year. Shoreline surveys are conducted less frequently, but each year dozens of commercial shellfish growing areas are surveyed. During those surveys, all potential pollution sources that may impact water quality are evaluated.

The purposes of continued water sampling and shoreline surveys are to ensure that growing areas continue to meet the standards associated with their classification, to modify classifications when needed, and to notify the responsible agencies about identified and potential pollution sources.

Some of the text above relating to Shellfish Growing Areas can be found at <http://www.doh.wa.gov/ehp/sf/grow.htm>.

Shellfish Data

Three GIS datasets (Commercial Growing Areas, Threatened Growing Areas and Sampling Stations) and the Annual Growing Area Review from the Shellfish program will be useful in a Marine Recovery Area analysis.

Commercial Growing Areas

The DOH GIS Data website (<http://ww4.doh.wa.gov/gis/gisdata.htm>) includes Shellfish and other data.

Growing Areas Data: <ftp://ftp.doh.wa.gov/geodata/layers/growingareas.zip>

Growing Areas Metadata:

<http://ww4.doh.wa.gov/gis/metadata/growingareas.htm>

Water Quality Sampling Stations and Threatened Shellfish Growing Areas

These data are not posted on a web site at this time. They can be obtained from the Department of Health by calling the Environmental Health Help Desk at (360) 236-3113 or by emailing HelpDeskEH@doh.wa.gov.

The name “Threatened Shellfish Growing Areas” implies that this GIS data is polygonal; however, it is actually point data. These are Water Quality Sampling Stations that receive a status of “Threatened” and this status does not necessarily apply to the entire growing area containing the station. A growing area may be Approved and would not be considered in an MRA analysis but it might contain a Threatened station that would require further investigation for land areas contributing to the Threatened status.

The Annual Shellfish Growing Area Report

Each year, the DOH Shellfish Program reviews sanitary conditions in each shellfish growing area. Water quality data and potential pollution problems are reviewed and a brief report for each growing area is written. The report can be found at <http://www.doh.wa.gov/ehp/sf/growreports.htm> and includes

Early Warning System (EWS) reports, summarized by county. They identify water quality sampling stations as Threatened or Concerned where “Threatened” stations are those threatened with downgrades in classification due to declining water quality or identified pollution sources and “Concerned” stations are those where there are some concerns with the sanitary conditions. A summary of Shellfish Areas listed as Threatened or Concerned can be downloaded from

<http://www.doh.wa.gov/ehp/sf/Pubs/gareports/06threatenedlist.pdf>.

Marine waters where nitrogen has been identified as a contaminant of concern

There are no statewide monitoring data for nitrogen in marine water. For a discussion of nitrogen contamination see [Appendix C](#).

Hydrography

State hydrographic data may not contain detail necessary for a local analysis and may have to be augmented with local knowledge.

Department of Natural Resources

The DNR data download web page:

<http://www3.wadnr.gov/dnrapp6/dataweb/dmmatrix.html>

DNR maintains Water Body and Water Courses GIS data. The watercourses would be useful in identifying potential surface water sources of contamination. Download data by county and unzip the compressed file. Watercourses will be named “WC.e00” and water bodies will be named “WBWS.e00.”

Hydrography Data: <http://www3.wadnr.gov/dnrapp6/dataweb/hydrod.html>

Hydrography Metadata:

http://www3.wadnr.gov/dnrapp6/dataweb/metadata/WA_Hydro_Data_Dic.htm

United States Geological Survey

The USGS hosts the National Hydrography Dataset (NHD) which contains surface water features. The main web page for this data is <http://nhd.usgs.gov>.

The NHD is downloaded by watershed subregion from

<ftp://nhdftp.usgs.gov/SubRegions/High/>. It will be necessary to first know the 4 digit watershed code. To find this number go to

<http://cfpub1.epa.gov/surf/locate/index.cfm> and search by county under “Find Place” on the left of the page. Under the list of Watersheds by County note the first four digits of the watershed. Download all surface water features within this subregion. The USGS NHD Frequently Asked Questions

(http://nhd.usgs.gov/nhd_faq.html) offers detail that will help the local jurisdiction decide if the NHD data will suit their hydrographic needs.

Local Data

Data created locally will be valuable in an MRA analysis. This may include hydrography, wetlands, parcels, sewer districts, soils and other data sets.

Appendix F – Analysis Processes

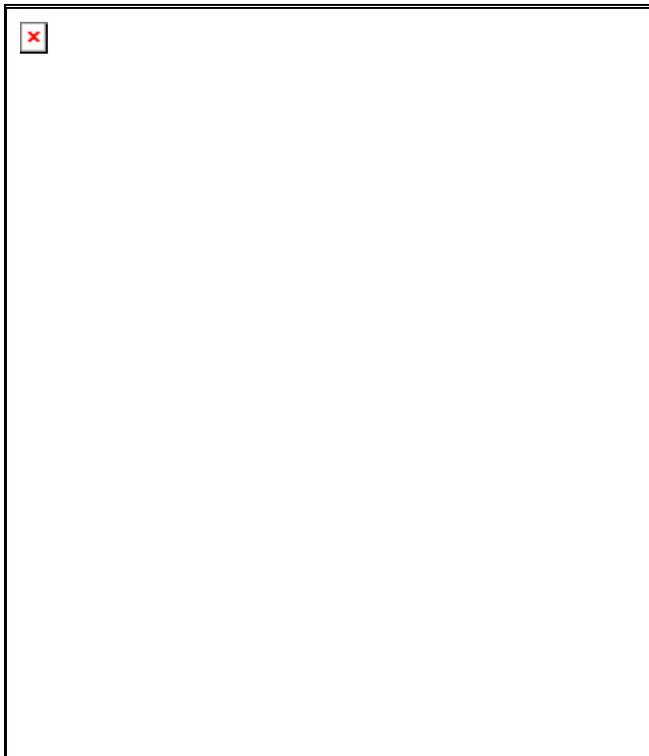
This appendix discusses potential processes in an MRA analysis. In the examples below, Kitsap County parcel, hydrographic, shellfish, and 303(d) data are used. Local data were not considered and the illustrations should be considered as process examples only and not a complete analysis.

When examining marine water quality data, it will be important to consider the reason water is listed as impaired. For example, an area may be on Ecology’s 303(d) listing for Low Dissolved Oxygen or Fecal Coliform for reasons unrelated to on-site sewage systems. Likewise, a Shellfish Water Quality Sampling Station may have a Threatened status or a Growing Area may be downgraded for reasons unrelated to on-site sewage systems. To make this determination, the data’s attributes and metadata should be examined. If marine water is impaired for reasons relating to on-site sewage treatment systems, the next step would be to determine what upgradient land areas should be included in the Marine Recovery Area. Local water quality and land use data will be important in this determination.

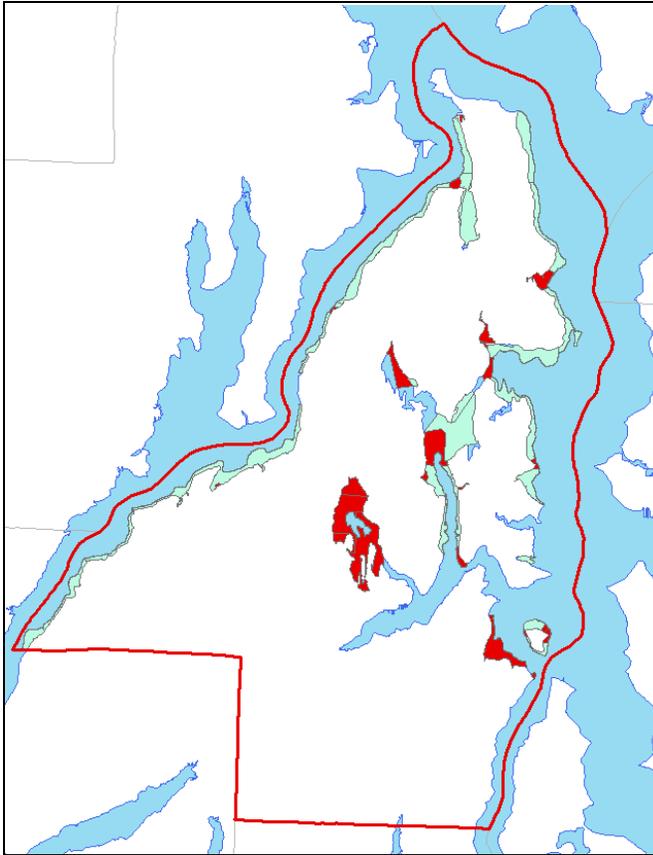
The Local Health Jurisdictions may use a variety of processes in their analysis of Marine Recovery Areas. Below are examples of some possible processes. These examples do not represent all options and should not limit the LHJs as they approach the project.

Watershed Approach

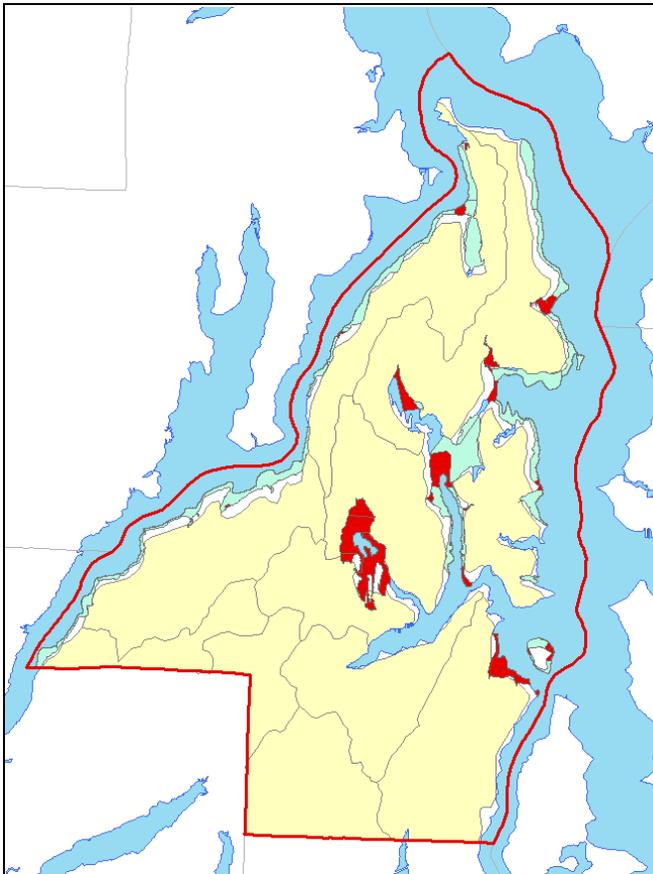
In this approach, all parcels within watersheds adjacent to impaired marine waters are selected. Parcels may then be eliminated from the selection where it is improbable they are related to the impairment.



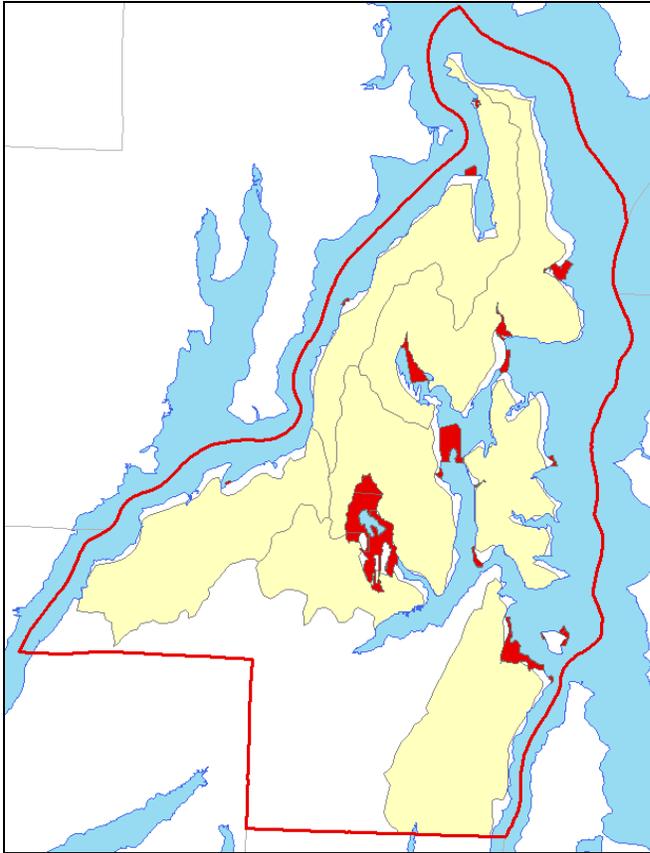
Kitsap Local Health Jurisdiction
Boundary and Puget Sound.



Kitsap County Shellfish Growing areas that have been “Approved” are green. “Conditionally Approved,” “Restricted,” and “Prohibited” are red and will be considered in an analysis.

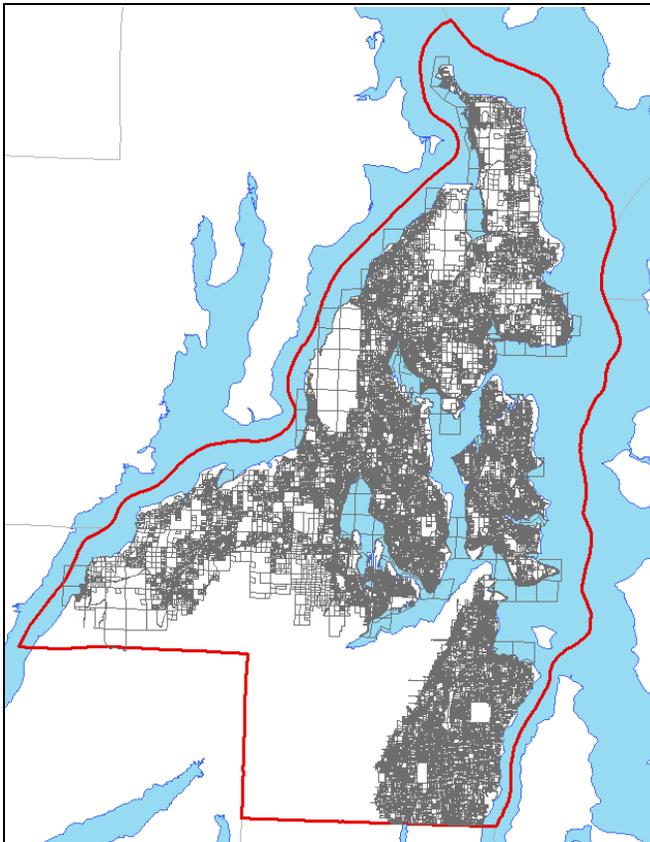


Shellfish Growing Areas and Hydrologic Unit Code (HUC) - 6 Basins. Note the interface between the Puget Sound and HUC. The boundaries do not perfectly align. This won't be an issue if we keep this in mind in a later process. Also, Blake Island State Park in the Southeast is not considered in this HUC data set. This will not be an issue in this analysis because there are no residential parcels on the island.



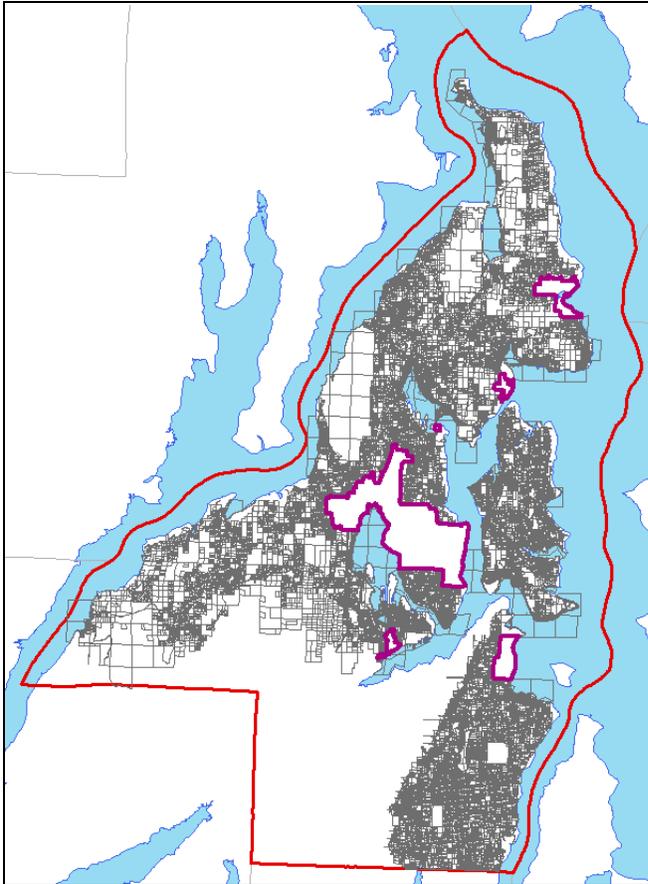
Only those HUC-6 basins intersecting ““Conditionally Approved,” “Restricted,” and “Prohibited” growing areas are considered. Some of these HUCs could be removed from consideration if the growing areas are not Approved because of issues unrelated to On-site Sewage Systems.

Because the boundaries of the HUCs and Growing areas are not coincident, a buffer of 1,500 feet is used in the selection process.



Kitsap County Parcels intersecting selected HUC-6 watersheds.

Total Number of Parcels: 86,266



Kitsap County Parcels intersecting selected HUC-6 watersheds, not including parcels intersecting sewer district boundaries. Some of the parcels intersecting the sewer district have OSS, but for the purpose of prioritization these parcels might not be considered initially.

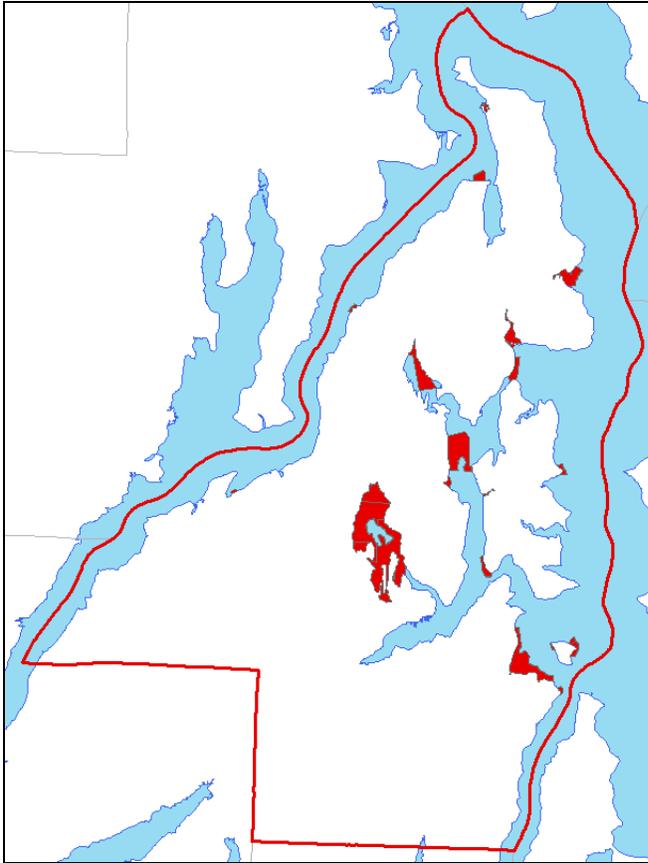
Total Number of Parcels: 67,489

Buffer Approach

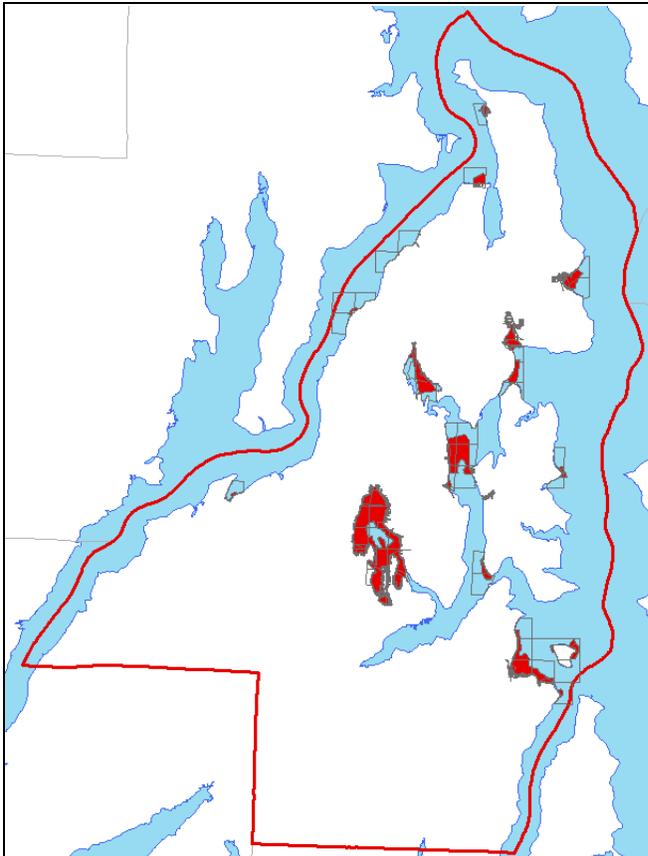
In this approach, distances are used instead of watersheds. For example, the local health officer may decide to designate parcels within 500 feet from impaired marine waters and 100 feet from streams and creeks terminating at impaired waters as an MRA. Buffering may also be used as a method to prioritize areas for education or enforcement. All parcels within a watershed may comprise a Marine Recovery Area but parcels adjacent to shoreline may be a priority for surveys. More than one buffer distance may be used. All parcels within 1,500 feet of impaired waters may comprise the Marine Recovery Area but those adjacent to impaired waters would be included in the first wave of surveys, those within 500 feet in the second wave, those between 500 and 1,000 feet in the third wave, etc.

When using a buffer approach, consider the origin of the buffer distance. The origin of a buffer from the marine shoreline might be the mean high water level; however, the Local Health Jurisdiction will likely be unsatisfied with the available hydrographic data in this application. At a local scale, the State or Federal agency data can be rough and probably not created with a level of detail the LHJ will need for this analysis. Still, the LHJ should examine the available data and make this determination. If no suitable data exists, the LHJ may want to consider using the marine edge of the GIS parcel data. This boundary was likely determined through a defensible surveying process.

In this example the Downgraded Shellfish Growing Areas are buffered enough to intersect the closest parcels. All parcels that intersect the buffer are selected and comprise some portion of the Marine Recovery Area.

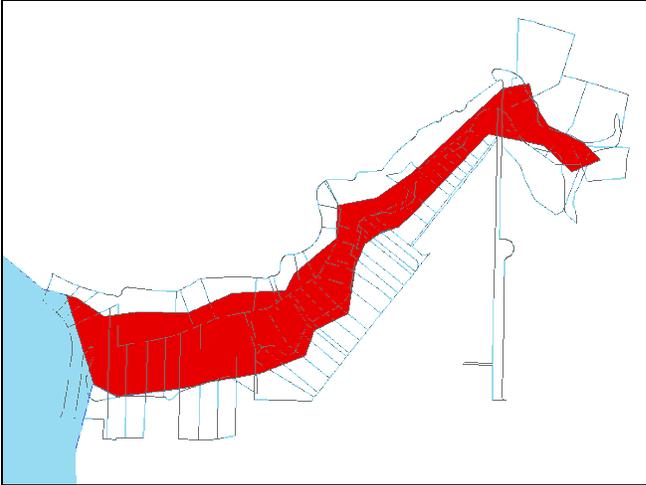


Kitsap Local Health Jurisdiction and Downgraded Shellfish Growing Areas.



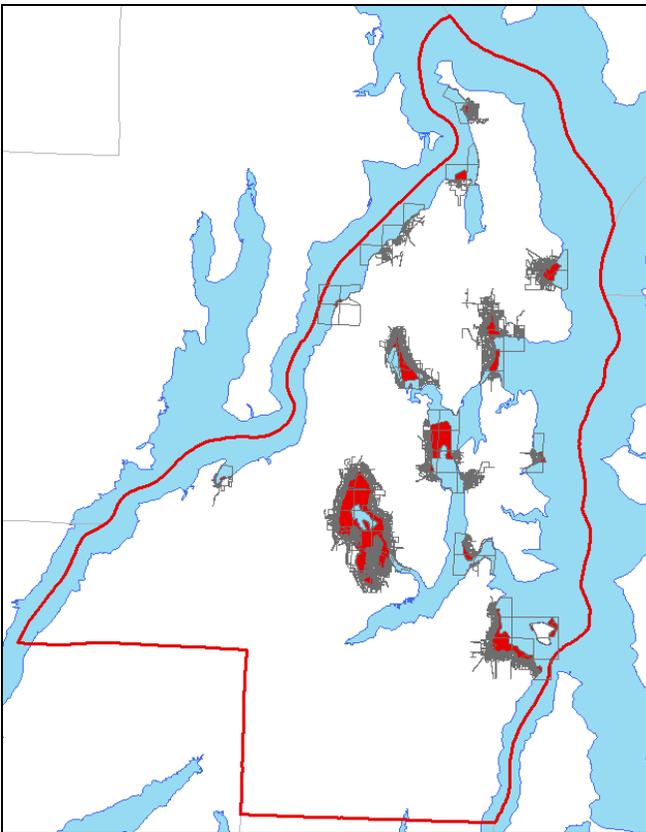
All parcels within 10 feet of a Downgraded Shellfish Growing Area are selected.

Total Number of Parcels: 2,474



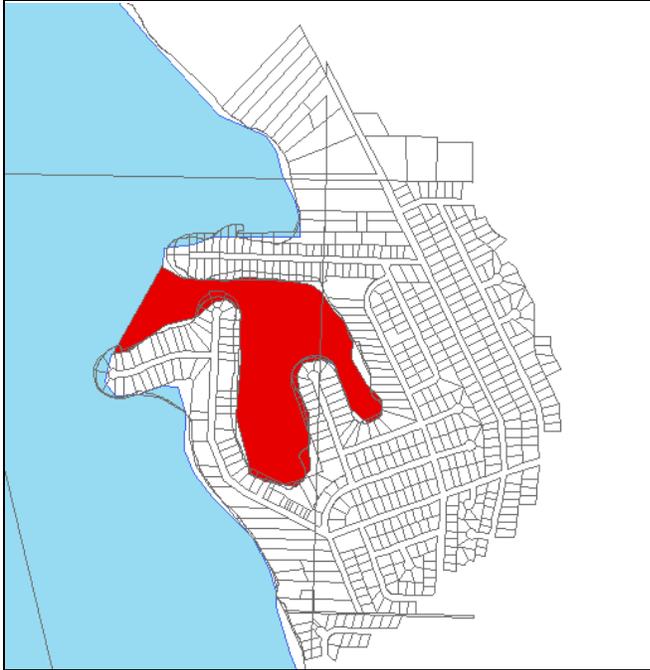
An example of selected Kitsap County parcels within 10 feet of Downgraded Shellfish Growing Areas.

The buffer distance can be manipulated to capture the parcels that have the potential to affect marine waters. In the following scenarios, all parcels in Kitsap County that are within 1,500 feet from downgraded shellfish growing areas are selected.



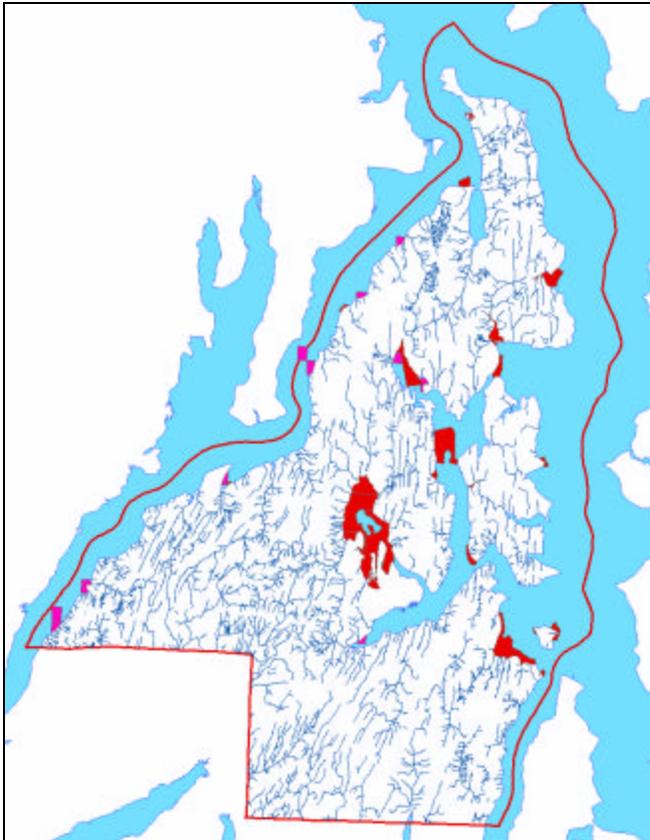
Downgraded Shellfish Growing Areas in Kitsap County with a 1,500 foot buffer.

Total Number of Parcels: 15,848

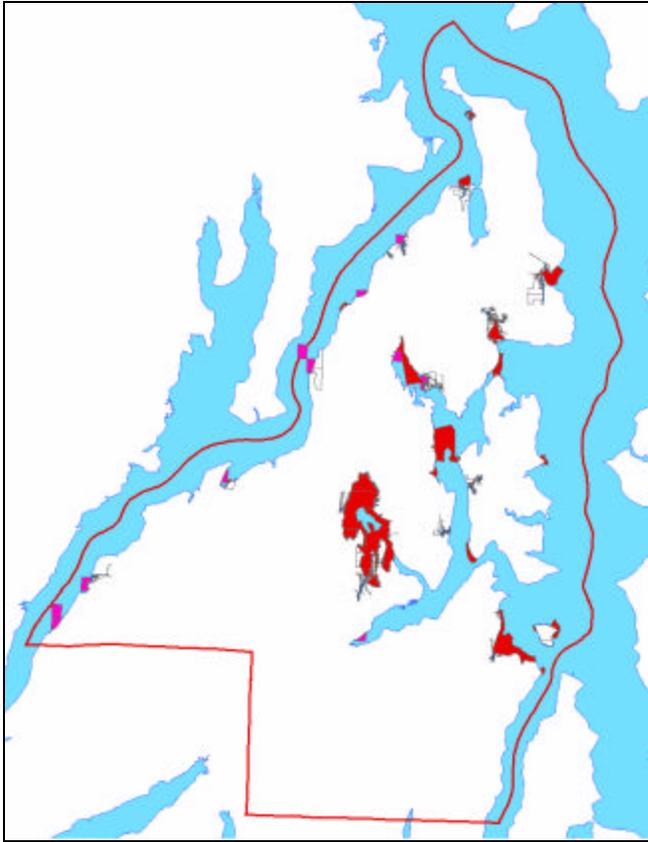


An example of selected Kitsap County parcels within 1,500 feet of Downgraded Shellfish Growing Areas.

In the next example, Kitsap County parcels will be selected based on their proximity to 303(d) marine waters (for fecal coliform and low dissolved oxygen) and streams that intersect the 303(d) waters and Downgraded Shellfish Growing Areas.

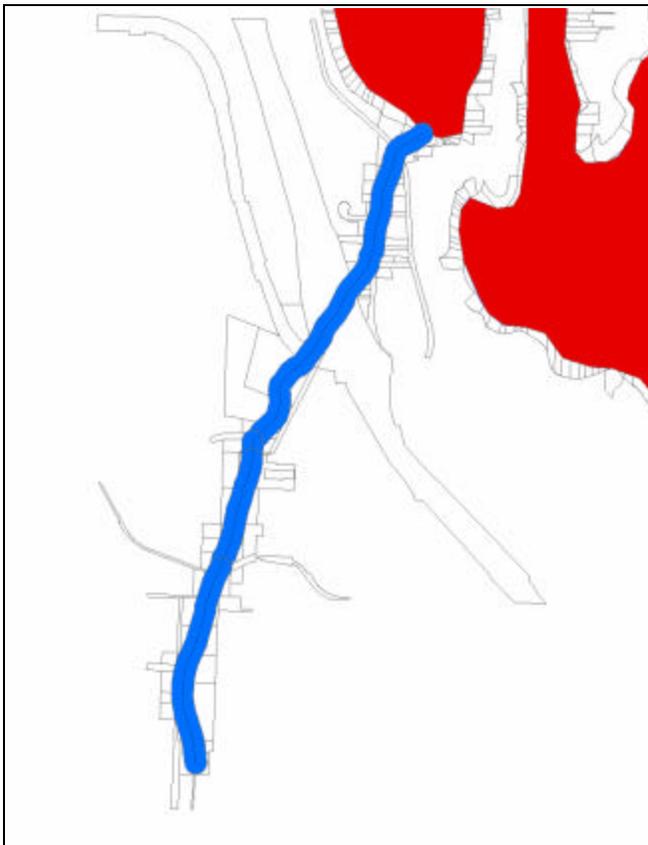


303(d) (fecal coliform and low dissolved oxygen) Marine Waters, Downgraded Shellfish Growing Areas, and Department of Natural Resources Water Courses in Kitsap County

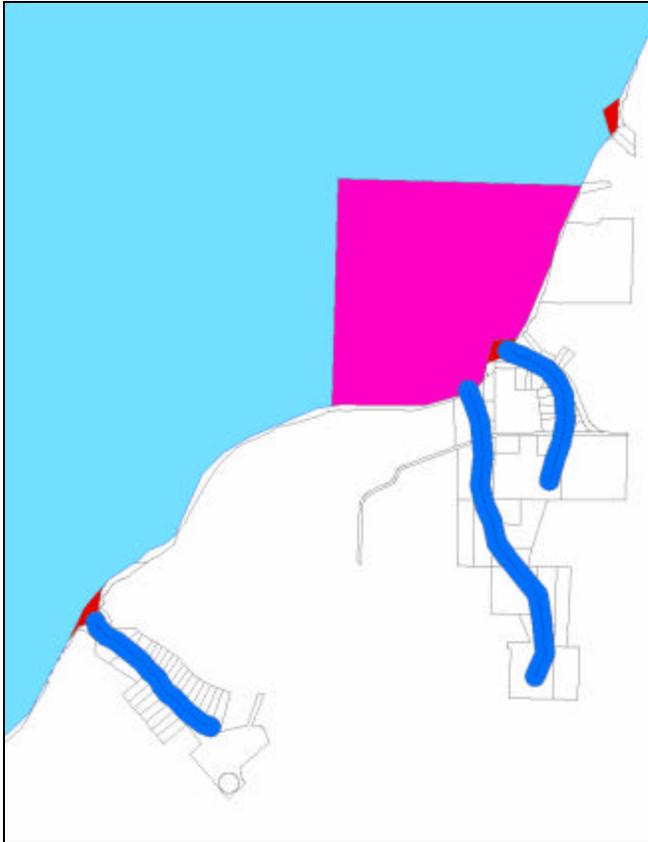


Streams (DNR data) intersecting 303(d) marine waters and Downgraded Shellfish Growing Areas are selected. These selected streams are then buffered 100 feet. All parcels intersecting buffered streams, or are adjacent to 303(d) waters or downgraded shellfish growing areas, are then selected.

Total Number of Parcels: 3,429



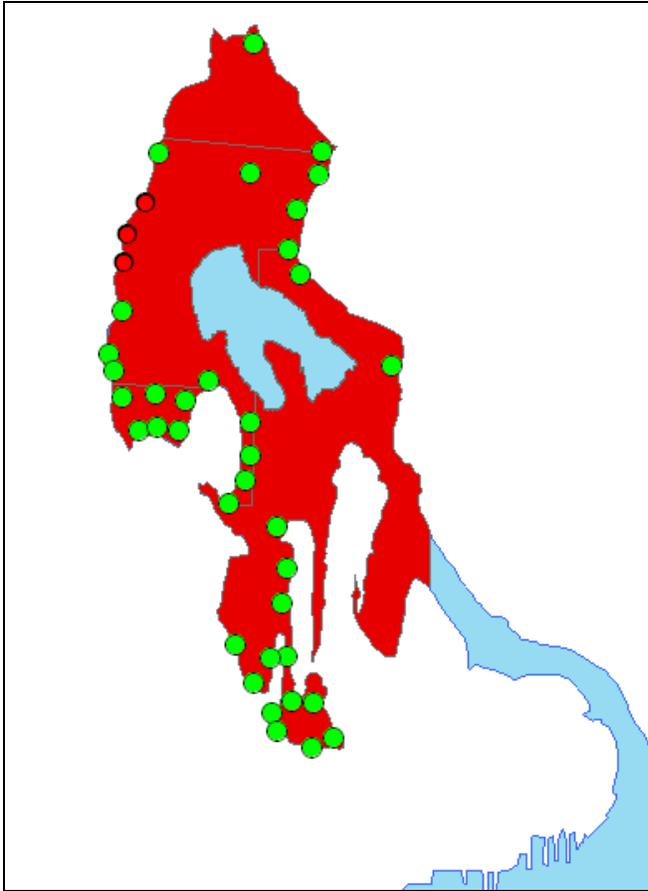
An example of Kitsap Parcels along a stream intersecting Downgraded Shellfish Growing Area.



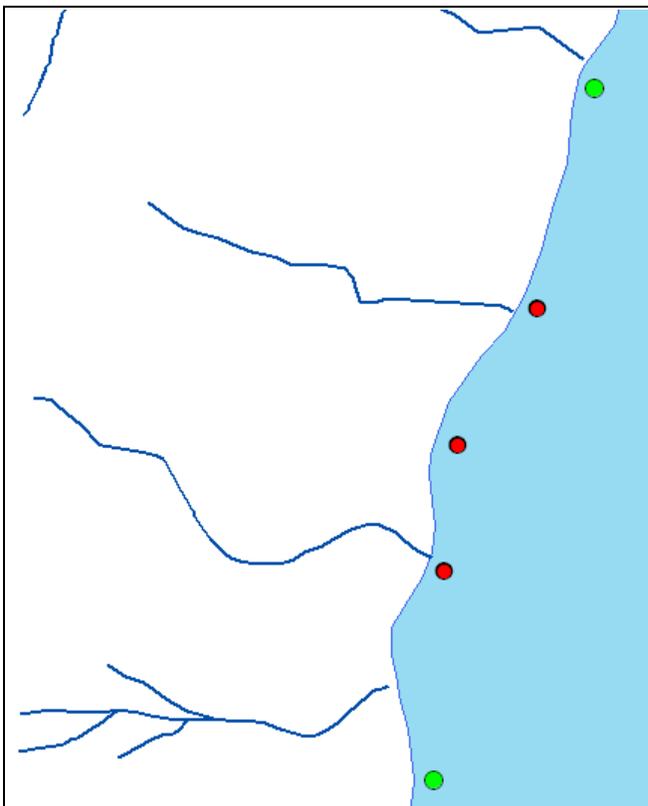
An example of Kitsap parcels bordering 303(d) waters and Downgraded Shellfish Growing Areas and along streams intersecting those areas.

Downgraded Shellfish Growing Areas are red and 303(d) waters are pink.

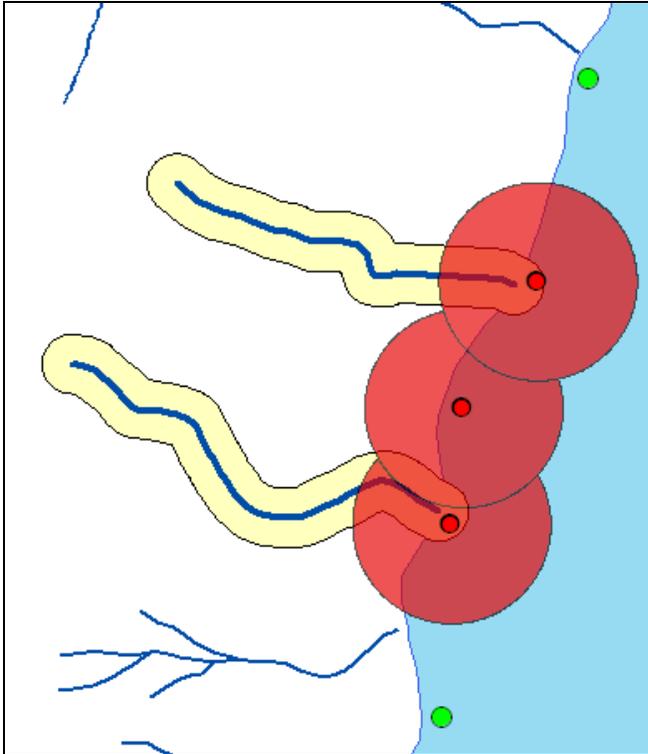
In the example on the next page, we will narrow our focus to sampling stations in Dyes Inlet. In this example the Dyes Inlet Growing Area has a classification of “Conditionally Approved” and three Water Quality Sampling Stations have a status of “Threatened.” To prioritize efforts, it may be beneficial to consider the environment around these threatened stations first and then other land areas impacting the growing area.



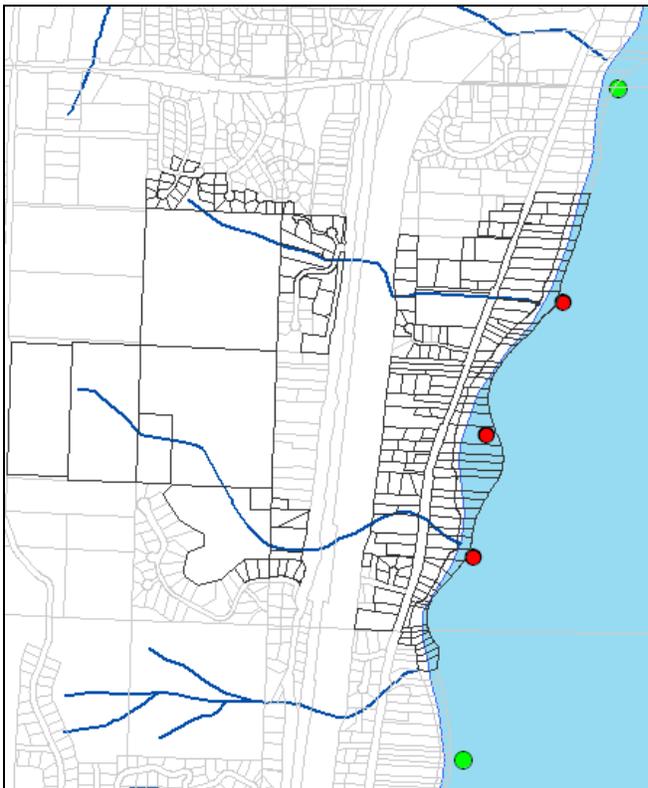
Dyes Inlet in Kitsap County is Conditionally Approved (red) with three threatened sampling sites (red points with black border) and all other sampling stations (green).



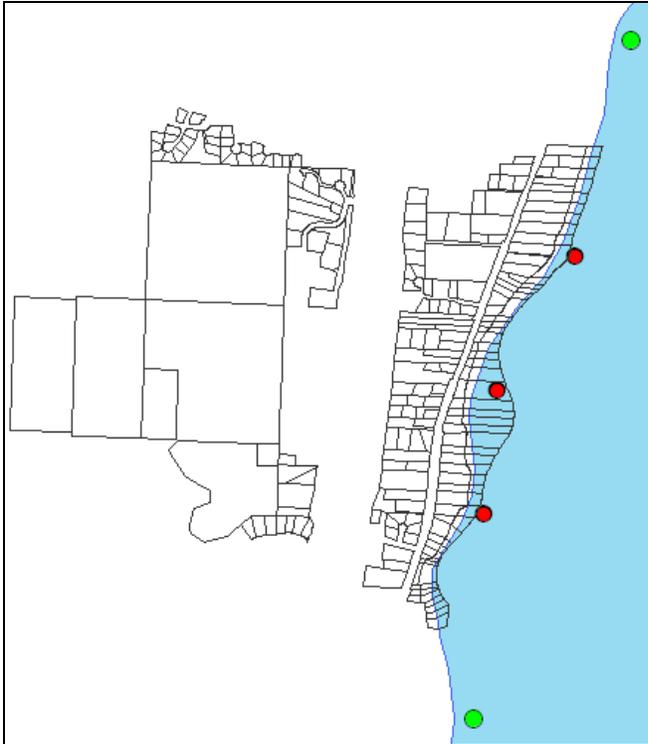
Water Quality Sampling Stations (Threatened are red, others are green) and Department of Natural Resources streams in Dyes Inlet.



Two streams in the area of interest are buffered 100 feet (yellow) and the three Water Quality Sampling Stations with a Threatened status are buffered 1,000 feet (transparent red).



Parcels intersecting the buffers are selected. Stream water quality data would be useful in this application. If the data suggest that conditions upgradient are not factors contributing to the threatened status of the sampling stations, then the stream buffer size might be adjusted.



Total number of parcels (does not include transportation right-of-way):
369

By going through this type of data analysis, the number of parcels can be reduced.

A combination of approaches will likely be appropriate. The determination of the MRA land areas will evolve through the participation of interested parties. The LHJ should involve members of the public, the on-site and shellfish industry, and others early in this process.

Appendix G – Links to Further Information

This appendix includes links to references, information, and examples that may help in an MRA analysis. It is organized into three subsections: U.S. Environmental Protection Agency, Washington State agencies, and local agencies.

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Draft Watershed Planning Handbook

The EPA has developed a draft Watershed Planning Handbook that should be helpful to local health jurisdictions as they develop and implement watershed plans to meet water quality standards and protect water resources. It was designed to help any organization undertaking a watershed planning effort, and it should be particularly useful to persons working with impaired or threatened waters. The handbook is more specific than other guides with respect to guidance on quantifying existing pollutant loads, developing estimates of the load reductions required to meet water quality standards, developing effective management measures, and tracking progress once the plan is implemented.

http://www.epa.gov/owow/nps/watershed_handbook

Watershed Resources

The EPA maintains a link to Watershed tools and resources.

<http://www.epa.gov/OWOW/watershed/>

Nonpoint Source Pollution Success Stories

Threats to Watersheds include nonpoint source pollution. The EPA provides a webpage with links to success stories, funding opportunities, and publications. The success stories include discussions of Portage Bay and Dungeness River where on-site sewage systems contributed to high levels of bacteria.

<http://www.epa.gov/OWOW/NPS/index.html>

This Nonpoint Source Success Stories web site features projects receiving grant funds from the section 319 program that have achieved documented water quality improvements.

Section 319 Program: <http://www.epa.gov/owow/nps/cwact.html>

Section 319 Success Stories: <http://www.epa.gov/owow/nps/Success319/>

STATE AGENCIES

State of Washington Department of Community, Trade and Economic Development (CTED)

Designating and Protecting Critical Areas

Under the Watershed Planning Act of 1998, all jurisdictions are encouraged to form voluntary, locally driven, collaborative planning units to conduct assessments of water resources and determine how to balance the competing demands for water within a watershed. This was established because of the many competing interests involved and because the dynamics of water need to be understood in the context of an entire watershed. As assessments are completed, choices will be made about priorities, allocations, projects, and land uses.

http://cted.wa.gov/portal/alias_cted/lang_en/tabID_412/DesktopDefault.aspx

The 1998 Watershed Planning Act encourages the formation of Water Resource Inventory Areas (WRIA).
<http://cted.wa.gov/DesktopModules/CTEDPublications/CTEDPublications/View.aspx?tabID=0&alias=CTED&lang=en&ItemID=897&MId=944&wverson=Staging>

Washington State Department of Ecology

Water Quality Stream Stations

Washington State Department of Ecology monitors water quality at many stream stations and publishes results by watershed.
http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html

Washington State Department of Health

On-site Management Plan Guidance document

<http://www.doh.wa.gov/ehp/ts/ww/localplan-guidance.pdf>.

Marine Biotoxin and Vibriosis

An assessment of marine biotoxin and vibriosis monitoring data for marine waters off the jurisdiction's shorelines may be helpful. Paralytic shellfish poisoning (PSP) from algae blooms can result from eating molluscan shellfish and vibriosis (*Vibrio parahaemolyticus*, a type of bacteria) can result from eating inadequately cooked shellfish. A combination of warm temperatures, sunlight and nutrient-rich waters can cause rapid algae blooms, independent of human sources. Research is underway and local health should track findings as they are published. Additional information is available at the DOH Shellfish Biotoxin Program website; <http://www.doh.wa.gov/ehp/sf/BiotoxinProgram.htm>

Washington State Legislature

Revised Code of Washington (RCW)

The Revised Code of Washington (RCW) is the compilation of all permanent laws now in force as enacted by the Washington Legislature.

Listing of all RCW Titles

<http://apps.leg.wa.gov/RCW/>

Specific RCWs that may be useful:

36.36 - Aquifer protection areas

RCW 36.36 allows county formation of an aquifer protection area including ones that address on-site system discharges.

<http://apps.leg.wa.gov/RCW/default.aspx?cite=36.36&full=true>

70.118 - On-site sewage disposal systems

RCW 70.118 addresses failing OSS, additives and alternate systems

<http://apps.leg.wa.gov/RCW/default.aspx?cite=70.118&full=true>

70.118A - On-site sewage disposal systems — marine recovery areas

RCW 70.118A authorizes enhanced local programs relating to OSS within Marine Recovery Areas.

<http://apps.leg.wa.gov/RCW/default.aspx?cite=70.118A&full=true>

Washington Administrative Code (WAC)

The Washington Administrative Code (WAC) — regulations adopted by various Washington agencies to carry out the laws passed by the Washington Legislature.

Listing of all WAC Titles

<http://apps.leg.wa.gov/WAC/>

Specific WACs that may be useful:

246-272A - On-site sewage systems

WAC 246-272A regulates OSS in an effort to minimize public exposure to OSS sewage discharges

<http://apps.leg.wa.gov/WAC/default.aspx?cite=246-272A>

LOCAL AGENCIES

Puget Sound Partnership

Launched in December 2005, the mission of the Puget Sound Partnership is to develop a 15-year plan to solve problems found in the Puget Sound.

<http://www.pugetsoundpartnership.org/>

Hood Canal Dissolved Oxygen Program (HCDOP)

A science primer presentation on Hood Canal processes that are involved with the lack of oxygen provides background on a complicated issue.

<http://www.hoodcanal.washington.edu/aboutHC/scienceprimer.jsp?perPage=1&startIndex=0&View=&keyword=EDUPPT>

Below are just a few examples of some of the work by local jurisdictions in Puget Sound leading to a healthier environment.

Jefferson County:

JMAP

JMAP is an Internet mapping application providing users the ability to browse Jefferson County spatial data including streams, wetlands, critical aquifer recharge areas, and others.

http://maps.co.jefferson.wa.us/Website/mspub/viewer.htm?mapset=temp_e sa

King County:

Stream Monitoring

King County conducts monthly monitoring on streams and rivers throughout the county. Routine baseflow parameters include temperature, dissolved oxygen, turbidity, total dissolved solids, pH, conductivity, and nutrients (ortho-phosphate, total phosphate, ammonia-nitrogen, nitrate+nitrite-nitrogen, total nitrogen). Water samples are cultured for bacteria counts (both fecal coliform and *Enterococcus*) as well. Trace metals were analyzed in storm water samples from 1986 to 2002 in addition to the parameters listed above for baseline monitoring. Monitoring data are published on a county web site.

<http://dnr.metrokc.gov/wlr/waterres/streamsdata/samplesites.htm>

Links from this site include King County, Central Puget Sound and Sammamish watershed maps and information.

Kitsap County:

O & M, The Good, The Bad and The Ugly

Jerry Deeter, Director, Kitsap Health District, presented "O & M, The Good, The Bad and The Ugly" at the 13th Northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 19-20, 2003, at the University of Washington, Seattle. The paper summarizes the need for better on-site system operation and maintenance, describes key elements of an effective O&M program, and provides examples and references. The key elements include funding, effective rules and regulations, education, data collection and program flexibility with new information. The full report will be available on this Web site: <http://www.doh.wa.gov/ehp/ts/WW/pubs-ww-tech.htm> .

Water Quality Program

The main focus of the Water Quality program is to protect public health by identifying Kitsap County surface waters impaired by bacterial contamination, prioritizing them for clean-up, and conducting pollution identification and correction projects to identify and correct sources of pollution.

http://www.kitsapcountyhealth.com/environmenta_health/water_quality/wq_in dex.htm

Water Quality Trend Monitoring Plan

Kitsap County Health District, *Water Quality Trend Monitoring Plan, Streams and Marine Waters*, November 2005. The plan determines ongoing, long-term water quality trends for marine waters and streams in Kitsap County. It also details the goals, objectives, and methodologies of the trend monitoring program and serves as a guide to Health District monitoring staff. The report can be obtained at:

http://www.kitsapcountyhealth.com/environmenta_health/water_quality/docs/MonitoringReportDocs/monitoring_plan_stream_marine.pdf

Upper Hood Canal Restoration Project

The *Upper Hood Canal Restoration Project* is an example of a comprehensive program to identify and correct sources of Fecal Coliform bacteria pollution impacting surface and marine waters.

http://www.kitsapcountyhealth.com/environmenta_health/water_quality/docs/upper_hood_canal_final_report.pdf

Pollution Identification and Correction Program

The *2006 Priority Area Work List for the Pollution Identification and Correction Program* is an example of a comprehensive program to identify and correct sources of fecal coliform bacteria pollution impacting surface and marine waters.

http://www.kitsapcountyhealth.com/environmental_health/water_quality/docs/pic_priority_list.pdf

Thurston County:

Henderson Watershed Protection Area

In November 2005, the Thurston County Board of Health created the Henderson Watershed Protection Area (HWP). The purpose of the HWP is to reduce the amount of fecal bacteria pollution in Henderson Inlet that is coming from failing septic systems. The program establishes more rigorous maintenance and inspection requirements for all septic systems within the boundaries of the watershed protection area to ensure that septic systems are working properly. The program goes into effect in 2007, and will be phased in over a 3-year period.

<http://www.co.thurston.wa.us/health/ehrp/henderson.html>

Shellfish Protection Program: <http://www.co.thurston.wa.us/shellfish/>