

EPA Puget Sound Watershed Management Assistance Grants  
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# Pierce County Shellfish Watersheds Project

## **Final Report**

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## **Executive Summary**

The Pierce County Shellfish Watersheds Project focused on improving and protecting water quality in the Key Peninsula/Islands Watershed, located in South Puget Sound. A number of shellfish growing areas in the watershed had undergone classification downgrades or were threatened due to declining water quality.

This project enabled the development of a more comprehensive and multi-faceted program to protect and improve water quality in the shellfish waters of Pierce County. This was accomplished through more comprehensive sanitary surveys, more extensive water quality sampling, implementing a septic system repair facilitator position, providing septic system operation and maintenance incentives to homeowners, helping to implement new septic system operation and maintenance regulations, implementing farm animal best management practices, and evaluating project activities.

The results of this project point out the importance of implementing local actions, through local partnerships, to help improve marine water quality in shellfish growing areas.

# Introduction

## Geography

The Pierce County Shellfish Watersheds project focused on the Key Peninsula/Islands (KPI) portion of the Key Peninsula/Gig Harbor/Islands Watershed (see the attached map). This, in turn, is a sub-basin of Water Resource Inventory Area 15, the Kitsap Basin. The watershed is primarily in unincorporated Pierce County, with a small area in the northern portion within unincorporated Kitsap County and a very small part within the City of Gig Harbor. The watershed is located within the usual and accustomed fishing and hunting grounds of the Puyallup Tribe of Indians, the Nisqually Indian Tribe, and the Squaxin Island Tribe.

The KPI Watershed covers approximately 114 square miles and is located in the Puget Sound Partnership's South Sound Action Area. The Key Peninsula is bounded on the west by Case Inlet and on the east by Carr Inlet. The Islands included in the project area include: Anderson, Cutts, Fox, Herron, Ketron, and Raft Islands. Much of the watershed consists of rolling hills and ridges, with bluffs that drop to Puget Sound. The area has a mild climate and receives approximately 50 to 55 inches of precipitation each year.

## Onsite Sewage Disposal

Except for a small wastewater treatment plant in the southwest portion of the watershed, the KPI Watershed is served exclusively by on-site sewage systems (septic systems). There are about 9,500 septic systems in the watershed. Many of these systems were installed prior to 1974 when installation regulations were instituted, and many of these systems are likely providing disposal but little treatment. Septic installation regulations have become more protective over the years.

## Shellfish Growing Areas

The Washington State Department of Health (DOH) 2013 Shellfish Growing Areas Annual Report identifies twelve shellfish growing areas within the KPI Watershed. These growing areas include: Anderson Island, Burley Lagoon, Drayton Passage, Filucy Bay, Fox Island, Henderson Bay, Oro Bay, Penrose Point, Rocky Bay, Vaughn Bay, West Key Peninsula, and Wyckoff Shoal.

Several of these shellfish growing areas have undergone classification downgrades due to declining water quality. Due to the downgrades, three shellfish protection districts were required to be formed, including the Burley Lagoon Shellfish Protection District, the Rocky Bay Shellfish Protection District, and the Filucy Bay Shellfish Protection District.

The Tacoma-Pierce County Health Department (Health Department) developed a water quality program for the shellfish watersheds that evolved out of successfully implementing more than eight grants from the late 1980s into the early 2000s. These grants were focused on improving water quality in specific threatened shellfish growing areas. Each grant was successful in

# Pierce County Shellfish Areas

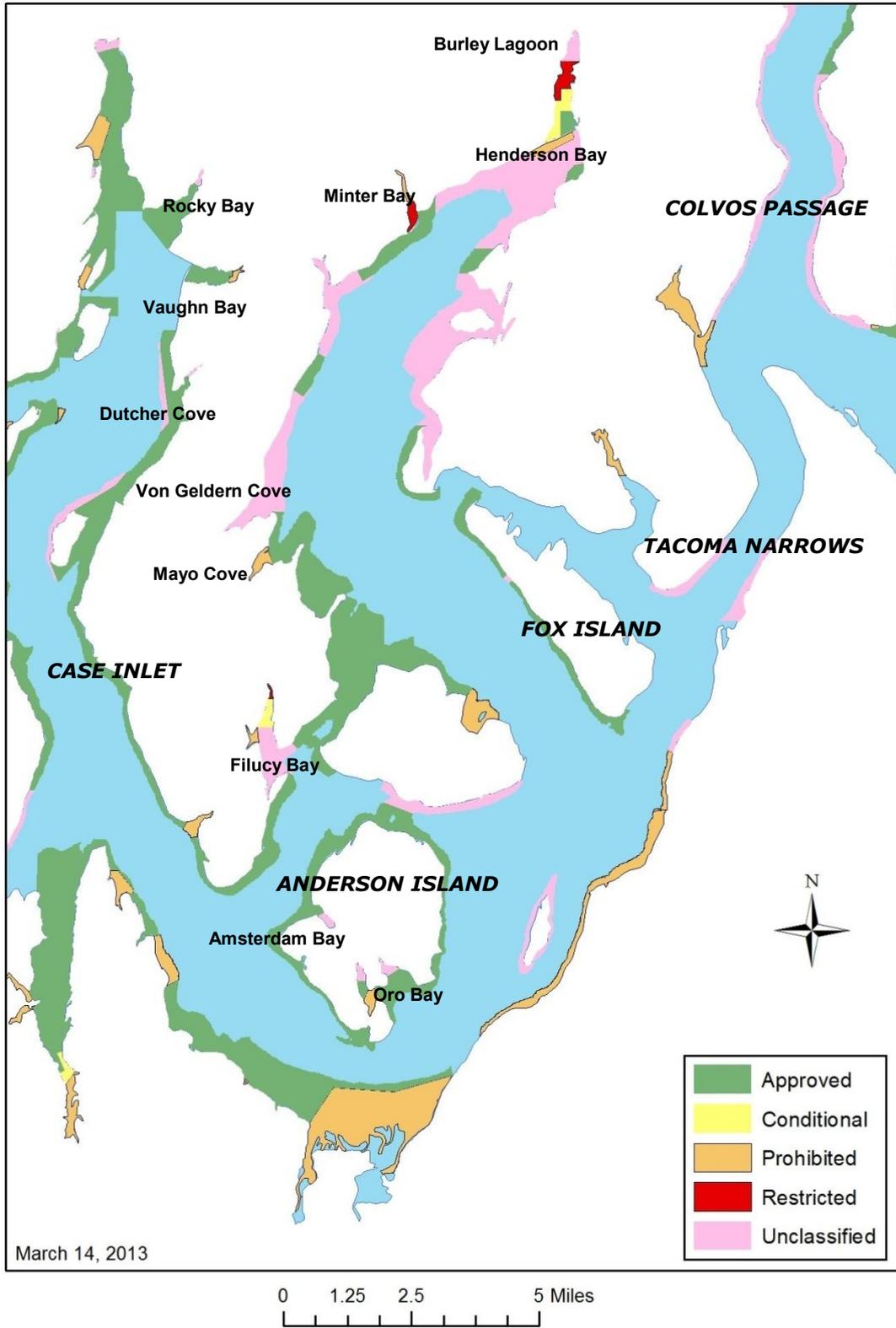


Figure 1. Map of project area

temporarily improving water quality in a shellfish area but it became apparent that an ongoing proactive approach was needed. These recognized temporary improvements led to a partnership between Pierce County Surface Water Management (SWM), Pierce Conservation District (PCD), and the Health Department to form the Pierce County Shellfish Partners team.

The Pierce County Shellfish Partners team has had much success but several shortcomings were recognized, including:

- The need to expand the focus of sanitary surveys
- Better tools to identify sources of bacteria
- A more efficient process to assist and track septic system repairs
- An increase in the number of septic system operation and maintenance inspections by licensed professionals
- Better communications with the community,
- A sustained funding source for local health departments to maintain efforts to improve marine water quality in shellfish growing areas
- Additional funding for agricultural best management practices

To address these needs, the Health Department applied for the Pierce County Shellfish Watersheds Grant in the Winter of 2009-2010, and was awarded the grant in the Summer of 2010.

## **Project Components**

The Pierce County Shellfish Watersheds Grant included eight tasks. The text below identifies each task then describes the work conducted to accomplish the grant deliverables.

### **Task 1) Expand the Scope and Focus of Sanitary Surveys**

This task expanded the sanitary surveys by increasing the geographical area covered and broadening the content of these inspections.

Shellfish Watersheds Program staff generally conduct a sanitary survey of each shellfish bay every six years. Sanitary surveys are generally done in the bays or other enclosed waters, and not along the open water areas, such as Carr Inlet or Case Inlet, unless a marine water quality problem is detected through DOH's sampling. The sanitary survey consists of visiting shoreline properties, identifying the residents' participation in recent operation and maintenance activities, and visually examining the property for an indication of a possible septic problem. If a problem is suspected, the septic system is tested, using a tracer dye, to determine if the system is failing

Historically, the sanitary survey visits included providing educational materials to each homeowner. Some of the materials included recreational shellfish harvesting, but the bulk of the information related to septic systems.

Brochures and flyers provided included:

- How to Inspect Your Septic Tank (TPCHD)
- Septic Sense, Scents, Cents (Washington Sea Grant)
- Keep Your Septic System FIT! (DVD by TPCHD)
- Guide to Safe Shellfish Harvesting in Pierce County (TPCHD)
- Gathering Safe Shellfish in Washington, Avoiding Paralytic Shellfish Poisoning (Washington Sea Grant)

The focus of the sanitary survey work originally expanded through a Stormwater Grant funded by Ecology to Pierce County in 2008-09. Through this grant, residents in two shellfish areas were sent a mailing that offered information and technical assistance on septic systems, healthy homes, drinking water quality and sampling, and natural yard care. Information and assistance were offered on topics in addition to septic systems in the belief that this might motivate more community members to request a site visit by project staff. The number of responses was less than desired but the property owners who did participate were very appreciative of the technical assistance. The most popular topics were natural yard care and drinking water sampling.

The Pierce County Shellfish Watersheds Project allowed further refinement of the sanitary survey process to provide a more comprehensive range of technical assistance and pertinent information. This work is demonstrated by the 2011 Rocky Bay sanitary survey. The site visits were conducted from January 2011 through July 2011, and included the following materials:

- Septic systems  
Additional information beyond the materials listed above includes:
  - Toilet leak test tablets
  - A “Septic System Grant and Loan Project” flyer
- Natural yard care practices
  - The brochure “5 Steps to Natural Yard Care”
  - The brochure “Soil & Mulch”
  - The brochure “Planning & Planting a Sustainable Landscape”
  - The brochure “Watering Wisely”
  - The brochure “Think Twice Before Using Pesticides”
- Use of “green” or less toxic household chemicals
  - The flyer “Green Cleaning Kit Recipes”
  - The flyer “Household Hazardous Waste Common Questions”
  - A list of additional brochures on specific aspects of household hazardous products and waste disposal
- Drinking water quality issues
  - The brochure “Do You Know How to Test Your Water for Bacteria?”
  - The brochure “Protecting Your Private Water Supply”

- Proper management of pet and/or agricultural waste
  - The brochure “Pets & Water Quality”

There was a concern raised that the survey was providing too much information by overloading people with brochures and fact sheets. Due to this concern, and through staff discussion, the survey materials were re-examined and a new approach was developed in early August 2011. Under the new approach, only the following materials were provided to households visited for a sanitary survey:

- The brochure “Septic Sense, Scents, and Cents”
- The brochure “How to Inspect Your Septic System”
- The fact sheet on the Septic Repair Grant and Loan Project
- A dye packet for water leak detection
- The general natural yard care fact sheet
- A fact sheet about the proper disposal of yard waste
- A fact sheet on less toxic household cleaning products, and
- The brochure “Pets & Water Quality”

In addition to providing the above noted packet of information, staff asked a series of questions to assess if the resident was interested in receiving additional information. The questions asked included:

- “Are you interested in additional information about septic systems? We can give you a DVD that explains how to maintain your type of septic system and have other helpful information”.
- “Do you have your own well? If so, are you interested water quality testing? We can test your water for bacteria at no cost”.
- “Would you like additional information on natural yard care?”
- “Would you like information on controlling pests? We have information on moles, aphids, slugs, ants, and other pests.”
- “Would you like additional information on household hazardous waste?”
- “Do you have any questions or concerns about mold?”<sup>1</sup>
- “If you have young children, would you be interested in information about lead paint?”<sup>2</sup> Also, we have a thorough brochure that discusses a variety of environmental health concerns that especially effect children.”
- Do you harvest shellfish off your beach or elsewhere in Pierce County? If so, we have a brochure we update yearly and also have an excellent brochure on Paralytic Shellfish Poison.
- Do you have questions about the disposal of pharmaceuticals?

If requested, additional materials were provided that were pertinent to the topics of interest.

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<sup>1</sup> and <sup>2</sup> - These questions were asked to make the visit more useful to the homeowner

Over the course of the project, expanded sanitary surveys incorporating the enhancements listed above were conducted along Minter Bay, Mayo Cove, and Burley Lagoon.

Project staff expanded the geographical area of focus of sanitary surveys to include properties that came to the attention of the Health Department from a variety of sources including – SWM, DOH, property owners, and reports from private sector septic professionals. In addition to finding failing septic systems, this work provided component details on septic systems for which the Health Department currently had no information. Some of this additional survey work was conducted on individual properties, including a residence on Case Inlet and a residence on Von Geldern Cove, but most of the work focused on the upland areas of the Rocky Bay Watershed and the Minter Bay Watershed. The extra upland area added approximately 20% more to the area originally projected to be surveyed.

Near the completion of the grant, staff also started preparing for sanitary survey work in Von Geldern Cove, since DOH recently classified this area as approved for commercial shellfish harvest. Von Geldern Cove has been added to the sanitary survey schedule and is expected to be surveyed in 2017.

We completed 133 sanitary surveys as part of this project and just missed our expected output of 140 surveys. However, our original goal was to complete 300 surveys and we ended up significantly under this number. This was due in part to the poor participation rate of property owners in the surveys. We tried to address this problem through repeated attempts to contact property owners:

- Multiple mailings to property owners
- phone calls,
- knocking on doors
- free drinking water sampling (grant dollars were not used to pay for water quality samples)
- we made available financial assistance to help cover repair costs for septic system failures identified through the survey.

Unfortunately, these incentives had only limited success at enticing people to participate in the surveys. In 2014 we are also offering gift cards from a local coffee shop to try and increase the participation rate.

Our approach to sanitary surveys is likely to evolve as we further implement the septic system Operation and Maintenance (O&M) program. Currently, a sanitary survey visit entails Health Department staff meeting with a property owner at their property, asking a series of questions about the septic system, and visually examining the ground surface for signs of surfacing sewage. This has been, and continues to be, a useful tool to identify failing septic systems. However, this work provides only a cursory inspection and is not as thorough as an O&M inspection conducted by a licensed professional. An O&M inspection examines the functionality of all components of a system.

Our department is moving towards regular O&M inspections of all septic systems, first within the Marine Recovery Area, and eventually throughout Pierce County. At this point, we are encouraging homeowners to get O&M inspections and are considering modifying our sanitary survey approach to help accomplish this. One approach we are discussing would be to review the septic system activity records in **OnlineRME.com** for all properties in a sanitary survey area, prior to starting the survey, and gathering O&M inspection reports for all systems having an O&M inspection within the past year. For any property where a deficiency was noted, staff would contact the property owner to see if they had addressed the issue and, if not, provide technical assistance to help address the deficiency. If no deficiency was noted, a letter would be sent from our staff to the property owner, noting that we are conducting survey work in the area but, since a recent O&M inspection had occurred, we would not need to inspect their septic system, and would offer to provide them with additional information on how they can help protect their living environment. We would also follow up with a visual examination of the property from the beach, to make sure there isn't surfacing sewage at the bulkhead or in the intertidal zone. This examination would be needed since an O&M inspection does not yet include a visual examination of adjacent cut banks or shoreline areas. This new approach may be utilized in a Pollution Identification and Correction (PIC) grant our department is currently conducting. The Pierce County Shellfish Watersheds Project has enabled us to obtain additional grant funds to improve the consistency and scope of O&M inspections.

## **Task 2) Increase Sampling Efforts to Detect Pollution Sources**

This task increased sampling both to identify water quality concerns and follow-up sampling throughout the KPI watershed. Sampling was conducted both for pollution source identification and to resample areas after septic repair work had been done.

A written Quality Assurance Project Plan (QAPP) received EPA approval in December 2010, and field sampling began in January 2011. Sampling was conducted through January 23, 2014. The original expectation was that 2,500 water samples would be collected. However, this number was later increased, through a grant amendment, to 2,650 water samples. This output was surpassed as, over the course of the project, 2,705 water samples were collected for fecal coliform and/or E. coli enumeration. The results were entered into EPA's STORET database and the Health Department's Surface Water Quality Access database. This database is linked to a GIS layer in Pierce County's *Countyview* GIS and is available to all Pierce County departments and partnering agencies.

In addition to bacterial analysis, limited nutrient sampling was conducted. The nutrient sampling was originally intended to assess the range of nitrate, ammonia, total kjeldahl nitrogen (TKN), and total phosphorus (TP) concentrations in effluent from failing septic systems. The scope was later expanded, via a grant amendment in May 2013, to also assess nutrient concentrations in streams with high fecal coliform counts. The original goal was to collect 25 sets of nutrient samples. Over the course of the project this goal was surpassed with 27 sets of nutrient samples being collected and analyzed.

The nutrient results did not provide as much useful information as originally hoped. All of the ammonia results were below the detection limit (1.0 mg/L), the nitrate results ranged from <0.2 mg/L to 2.3 mg/L, the TKN results ranged from <1.0 mg/L to 7.2 mg/L, and the TP results ranged from <0.01 mg/L to 0.86 mg/L. Prior to this project, staff had anticipated finding elevated ammonia results in flows associated with failing septic systems. However, all ammonia concentrations were below the detection limit. The only high nutrient concentration (TKN concentration of 7.2 mg/L) was from a failing septic system and this flow also had the highest TP concentration (0.86 mg/L). Due to miscommunication, not all nutrient sample sites were sampled for fecal coliform and replicate samples were not collected with the nutrient samples.

Based upon results from the 20 locations where both nutrient and fecal coliform sampling was conducted, there doesn't appear to be a pattern between nutrient concentrations and fecal coliform counts. The three locations with the highest fecal coliform counts (1,000 cfu/100 ml, 920/1,100 cfu/100 ml, 1,000 cfu/100 ml) had low to moderate nitrate concentrations (0.4 mg/L, 1.4 mg/L, 0.3 mg/L), low TKN concentrations (<1.0 mg/L, <1.0 mg/L, 1.4 mg/L), and moderate to fairly high TP concentrations (0.05 mg/L, 0.09 mg/L, 0.11 mg/L). The highest nitrate result was from a flow with a fecal coliform count of <20 cfu/100 ml, the highest TP result and TKN result were from a flow with a fecal coliform count of 91 cfu/100 ml.

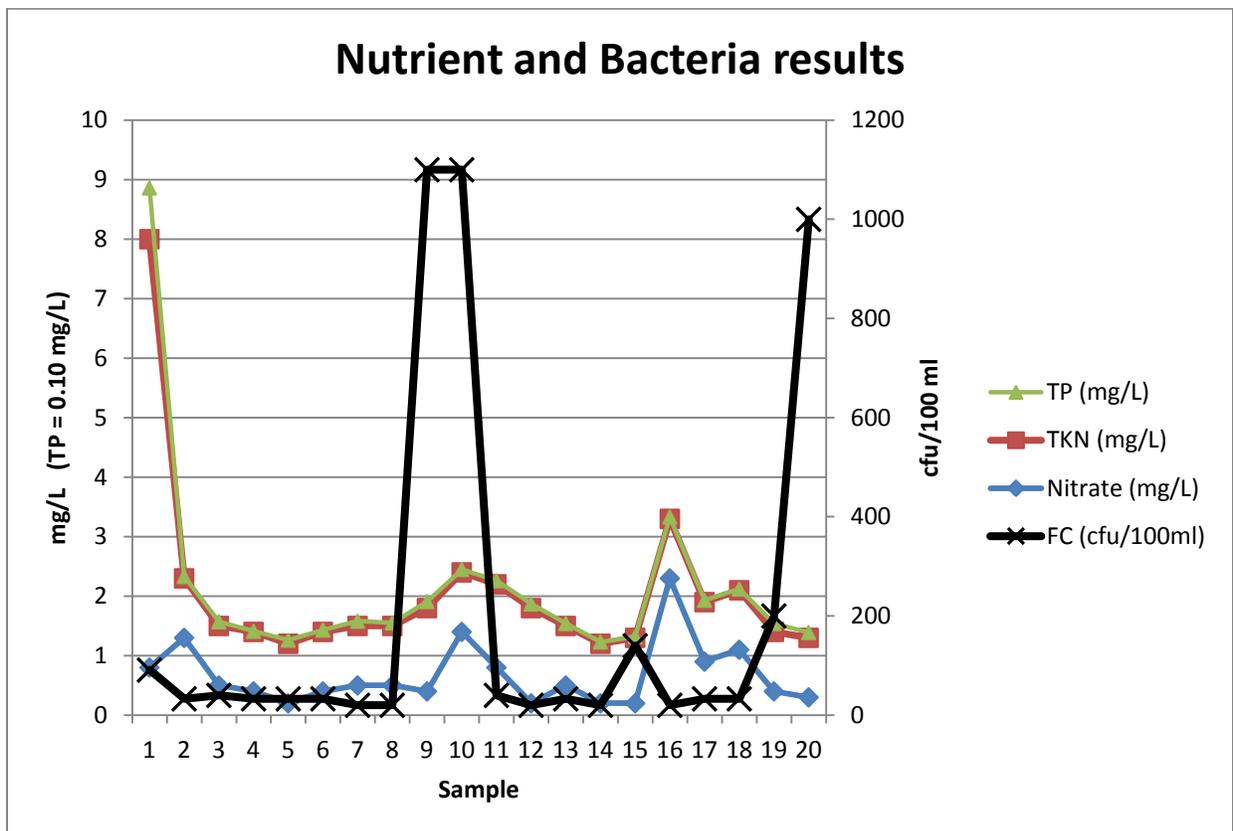


Figure 2. Nutrient and Bacteria results

Field pH, conductivity, and temperature were measured, and flows were measured or estimated, during shoreline evaluations to assess the usefulness of these parameters in identifying pollution sources.

The water quality data collected as part of this project, and meeting QAPP criteria, were submitted to EPA on July 23, 2014 in a format compatible with the STORET database. Certain data were excluded from the EPA data set because they did not meet the Data Quality Objective. Excluded data included the nutrient samples, because no replicate samples were collected. However, the nutrient sample results, bacteria replicate results, and the review of the replicate results are included on the Project CD, which has been provided to the EPA grant officer.

### **Task 3) Implement a Septic System Repair Facilitator Position**

To ensure timely resolution of repairs, a full-time Septic System Repair Facilitator position (SRF) was developed to facilitate the process of identifying and repairing septic system failures within the KPI Watershed. This person bridged the functions of the surface water, on-site sewage and code enforcement programs to provide a single point of contact for property owners with a failing septic system.

Once a concern or potential “failure” was identified the SRF assessed the site conditions and the status of the septic system. This process began with either a letter or a site visit to the suspect property to inform the property owner of the concern. A brochure (included on the Project CD) was given to the property owner to explain why we were investigating the site and how the investigation would likely proceed.

A dye test or other relevant testing was conducted as needed at the suspect property to determine if a septic system repair was necessary. If a repair was needed, the SRF discussed the problem with the property owner, described options for resolution and served as the liaison between the property owner and the On-site Sewage and Code Enforcement programs. In consultation with On-site Sewage and Code Enforcement staff, the SRF communicated to the property owner the department’s requirement for a remedy, the timeframe for repairs and consequences for failing to address the needed repair(s) in the stated timeframe.

A total of 25 failing septic systems were identified over the course of the project. Twenty two of these failures have been repaired and the other three are still in the repair process. Table 1 provides information about each of the failures.

Table 1. Failing Septic Systems Identified and Corrected

<u>Address</u>	<u>ID Number</u>	<u>Date Identified</u>	<u>Type of Failure</u>	<u>Date Corrected</u>
109xx Larson Rd, AI	9255000234	8/6/2010	Direct Discharge	7/28/2011
92xx Dana Dr. NW	0221051002	8/18/2010	Surfacing Sewage	1/12/2011
47xx 185th Ave Ct KPN	0021221037	10/18/2010	Outhouse	3/14/2011
159xx Conboy Loop	3170000040	12/14/2010	Surfacing Sewage	8/22/2012
58xx Reynolds Rd KPN	3290000150	1/4/2011	Surfacing Sewage	9/6/2011

14xx Leschi Place, FI	2725000028	3/9/2011	Surfacing Sewage	8/31/2011
174xx S. Vaughn Rd	0021023016	4/19/2011	Surfacing Sewage	Posted, Vacant
68xx 152nd St. Ct. NW	0122132051	5/31/2011	Surfacing Sewage	9/20/2012
78xx SR 302	7860000430	6/30/2011	Surfacing Sewage	Posted, Vacant
58xx Key Pen Hwy S	0020234012	8/10/2011	Surfacing Sewage	8/13/2012
48xx 185th Ave Ct KN	5415000091	9/15/2011	Surfacing Sewage	10/3/2011
67xx 152nd St Ct	0122132070	10/11/2011	Surfacing Sewage	10/23/2012
2xx Delano Road KPS	0020021004	10/25/2011	Surfacing Sewage	11/30/2011
11xx Key Pen Hwy S	0021351051	11/3/2011	Gray Water	1/23/2013
188xx Bayview Road	0022344045	11/16/2011	Surfacing Sewage	2/17/2012
116xx 186th Ave KPN	0022274030	2/22/2012	Component Failure	10/25/2012
110xx 186th Ave KN	9009600030	5/2/2012	Surfacing Sewage	5/13/2013
114xx Dahlgren Rd	0119093005	6/11/2012	Surfacing Sewage	8/30/2012
126xx 122nd Ave KN	0122291034	10/3/2012	Surfacing Sewage	11/13/2012
178xx Hall Rd KPN	0021022101	2/13/2013	Surfacing Sewage	In process
10xx 149th Ave	0345000040	5/30/2013	Surfacing Sewage	In process
48xx 185th Ave Ct KN	5415000091	7/16/2013	Power Off	7/17/2013
51xx Key Pen Hwy	0020144009	7/22/2013	Surfacing Sewage	9/13/2013
153xx Goodrich Rd	0122141078	10/14/2013	Surfacing Sewage	5/2/2014
151xx State Hwy 16	0122133075	1/14/2014	Surfacing Sewage	In process

Upon completion of this grant, the SRF position was evaluated. After much deliberation, it was decided to eliminate this position. The primary reason for eliminating the SRF position was to maintain a consistent protocol for all repairs, and maintain a fair and efficient process given ongoing limited resources. Even during the project, some repairs in the project area were handled by the SRF, some were addressed by Code Enforcement staff (generally upland and not near a stream), and a few were managed by On-site Sewage staff (generally failures found by septic professionals during an Operation and Maintenance (O&M) inspection or tank pumping). Reviewing the repair process, it was apparent that somewhat different timelines and approaches were utilized, depending on which program worked on the repair.

The staff person who served as the SRF will remain with the Surface Water Program and continue to identify failing septic systems. However, once a failure has been identified, the site will be referred to the Code Enforcement Program for further action. Quarterly meetings are scheduled to be held with Code Enforcement, Surface Water, and On-site Sewage staff to review the status of all failures in the Key Peninsula.

#### **Task 4) Maintenance Incentives to Homeowners for Improved O&M Activities**

This task provided support and encouragement for voluntary homeowner participation in periodic operation and maintenance inspections of their septic systems. In the Marine Recovery Area (MRA), which is a priority area with more stringent septic system operation and maintenance standards, property owners were encouraged to voluntarily comply through a

program of financial incentives to cover a significant portion of the cost to improve access to septic tanks with risers to the ground surface, system inspection and/or septic tank pumping. The MRA includes all of the Key Peninsula and the portion of the Burley Lagoon Watershed that is on the Gig Harbor Peninsula.

A total of 64 homeowners utilized incentive monies to have an O&M inspection, septic tank pumping, and/or the installation of risers. Twelve different septic service companies provided these services.

The Septic Care Incentive Program was created as a result of the feedback received from our Key Peninsula community septic advisory group members. The members were vocal about the barriers of high cost to maintaining their septic systems. The program was an effort to address this barrier.

We sent out the incentives to a subset of randomly chosen homes served by pressure distribution and gravity septic systems in the Key Peninsula. Our incentive mail-outs contained educational brochures, an informational letter, an application form, and a list of participating companies.

The program required septic professionals to provide savings to homeowners at the time of payment and then receive reimbursed from the Health Department. Training involved in getting the participating 12 companies to submit proper paperwork and teaching the procedures was a challenge. Additionally, once the training was completed, the marketing and advertising involved in getting residents to recognize the benefits and take advantage of the savings was time-consuming.

To get the word out about the Incentives Program, we published two ads in the Key Peninsula Newspaper, announced the program benefits at community groups, provided information through sanitary survey visits, had the Incentive forms available in local settings (i.e., library), and used social media (i.e., Facebook) to raise interest. We later decided to have the Incentive Forms available online ([www.tpchd.org/incentive](http://www.tpchd.org/incentive)) for easier accessibility to those interested.

After a slow start, the program was more successful than originally anticipated. Sixty four property owners utilized the incentive funds instead of the 48 originally anticipated. One reason the program was successful was the availability of additional funding. Due to the availability of the original EPA funding, additional funds were able to be added, through other grants, to expand the promotion and implementation of the Incentives Program. The other funding sources are able to support the Incentives Program at least through October 2014. This is enabling many additional property owners to have an O&M inspection, tank pumping as needed, and risers installed as needed, utilizing these monies.

There remains a persistent challenge in educating the community about the importance of septic maintenance. People's fear of finding problems with their systems, along with the lack of trust in government and the septic industry, has been, and will likely continue to be, a barrier to incentive programs and other efforts to implement routine septic system inspections by licensed professionals.

## **Task 5) Assist with O&M Regulation Implementation and Residential Pollution Prevention**

This task utilized education and outreach staff to develop and implement a social marketing campaign. The social marketing was based on research and existing Puget Sound Partnership materials. This campaign's goal was to engage and inform community members about septic system operation and maintenance requirements implemented to protect public health and water quality. Septic system operation and maintenance inspections are an important tool in protecting water quality in this area, but at the same time are expensive and are not routinely considered as necessary by the majority of community members.

As part of the community outreach efforts the Health Department conducted a variety of workshops. The workshops included topics to both motivate participation and to help community members better understand the connections between their daily activities and watershed stewardship.

- The Shoreline Living Workshop (9/22/12) was intended to provide information to residents about how they affect the shoreline in positive and negative ways. There were booths with displays and activities, with participants visiting stations at their own pace.
- The Homeowner Advisory Group Workshop (6/21/12) was a precursor to the formation of a citizen advisory group to provide guidance on Social Marketing. The information provided in this workshop was intended to make sure all participants would have the same basic information about septic system operation, maintenance and impacts of failing systems upon the environment.
- The Natural Yard Care Workshop in Key Peninsula (8/7/13) was intended to provide information to home gardeners about practices they could adopt to both keep their gardens healthy and reduce the amount of fertilizers and pesticides. This workshop was offered in the mid-afternoon (2:30-4:30 PM) in hope that seniors and retired residents who are home gardeners would be interested and find the time convenient.
- The Septic Workshop (9/13/13) featured presentations by five septic system professionals about different aspects of septic system operation and maintenance. Presentations included: "Homeowner resources and requirements", "Gravity and Pressure systems", "Septic design", "Dos and Don'ts", "Basic homeowner troubleshooting". The presentations were led by septic system professionals and regulators.

Five advertisements were published in the Key Peninsula Newspaper that promoted septic system O&M and additional water quality protection measures. There were two basic themes, protecting the living environment and septic maintenance.

- "We are surrounded by water, too." [with an image of goldfish in a bowl] and "Clean water. Happy clams. Great chowder." [with an image of twelve little neck clams],
- "Did you ever wonder where it goes from here?" [with an image of ceramic toilet with lid up], all make connections between clean water and health.

- “What will you do with the money you save?” [with an image of a piggy bank atop \$100 bills], and “Out here, there’s two other things you can flush” [with an image of a roll of toilet paper], both describe septic maintenance tips and inform residents about Septic Maintenance Incentives. Copies of the advertisements are included on the Project CD.

Several articles supporting environmental stewardship appeared in the Key Peninsula News online and print editions, including “Good water quality means good quality of life” [<http://keypennews.com/index.php/rss-feed/item/166-good-water-quality-means-good-quality-of-life>] and “Health department incentive program saves money, protects environment” which appeared in the January, 2014, print edition. Both of these articles contained information about how important clean water is, and steps residents can take to protect water quality.

These articles were intended to lay the groundwork for messaging about the connection between environmental stewardship and quality of life. It is important to make a link between the environment and the individual in order to promote activities by that individual to improve the environment in which they live, work and recreate. This tact is new to the Health Department and many other local agencies. Much work on social marketing and community outreach needs to be completed in order to identify successes in citizens making and accepting that link.

## **Task 6) Farm Animal Care Best Management Practices**

To complete this task the Health Department worked with the Pierce Conservation District (PCD). This task included soil sampling to help farms determine the correct fertilizer application rates and mixtures. Recommendations were provided based on lab results, site conditions and property goals. The purpose of this effort was to reduce nutrient loading to area surface and ground waters. Farm owners who received free soil sampling were asked if they were interested in working with the PCD to identify and implement best management practices to protect or improve water quality.

Thirty soil samples were collected and analyzed during the project and recommendations were provided to the property owners based on the lab results, site conditions and property goals. PCD conducted follow up work, contacting the landowners who were provided with soil sampling, to determine the effectiveness of services and implementation of recommendations. All landowners were found to be implementing the recommendations. Production levels at these properties will be monitored in 2013 and 2014.

This task included providing limited cost share funding for implementing best management practices. Four properties that developed a water quality plan also received cost share funding to assist with implementing manure management systems (manure removal or manure containment structures).

The PCD staffed 12 events to provide the public with information on soil sampling, nutrient management, farm Best Management Practices (BMPs), and opportunities for cooperation. Six hundred and seventy two people were reached through these events.

The PCD also updated their GIS farm database over the course of the project as new properties were identified and inventoried. All properties identified as higher priority sites were contacted at least twice by mail to offer technical assistance or confirm any self-initiated BMP implementation.

## **Task 7) Project Evaluation**

This task helped the Health Department assess the effectiveness of the project measures. Evaluation measures considered a variety of data sources to assess the outcomes described below. The Health Department's existing septic system database was utilized to ascertain the time required to resolve a detected failure. "Time-to-resolution" during and prior to the project period was evaluated, while trying to account for case complexity. Property owners with failing septic systems were surveyed to assess their satisfaction with the repair process to learn how to better meet their needs. When possible, staff collected water samples downstream of newly repaired septic systems to determine if fecal coliform counts had returned to background conditions.

The effectiveness of prevention activities was evaluated by surveying property owners receiving outreach through sanitary surveys. Homeowner knowledge, beliefs, and behaviors regarding septic systems and household actions were assessed using a questionnaire that was mailed out approximately three to six months after the survey was conducted. The evaluation activities are detailed in the report, "Evaluation Report for the Pierce County Shellfish Watersheds Project", which is included in Appendix A.

## **Task 8) Project Management**

Under this task, the project manager ensured that work was accomplished in a timely and professional manner, reports were submitted as required, and records were retained for the required period of time.

The project manager at the Health Department changed from Jim Hoyle to Brad Harp on May 3, 2011. On April 17, 2013 the Health Department made a request to EPA, which was subsequently approved, to amend the following grant contract items:

- Extend project completion date from December 31, 2013 to March 31, 2014. The extension was requested to complete tasks but no additional funding was requested.
- Task 1: Reduce the number of sanitary surveys from 300 to 140 due to poor public participation.
- Task 2: Increase the number of water quality samples collected from 2,500 to 2,650.
- Modify the criteria for nutrient sampling to include flows with bacteria at levels greater than or equal to 200 cfu/100 ml.

All FEATS reports were submitted on time. However, with the project management transition, 18 months of MBE/WBE reporting were omitted. This omission was discovered during a routine state audit. Back copies of the MBE/WBE reports were submitted to Mr. Greg Luchey at EPA in April of 2013. The remaining MBE/WBE reports accompanied each of the subsequent FEATS reports.

At the time of project management transition the Health Department had multiple grants and projects in place to address marine surface water quality. Historically these projects were not coordinated in any fashion. When Mr. Harp began management of the grant a strategic plan was developed to document and plan marine surface water work tasks within the Health Department. Additionally, the Health Department, Pierce County Surface Water Management, and Pierce Conservation District (AKA the Pierce Shellfish Partnership) developed a long range strategic plan to coordinate efforts, seek funding, and improve water quality.

All tasks were completed by the March 31, 2014 project end date and record retention has met requirements.

## **Partnering**

Project partners included the PCD and SWM. PCD took the lead for Task 6, Farm Animal Care Best Management Practices and an interagency agreement was developed to transfer funding to PCD. Funding from SWM to the Health Department supported the work used as match for the project.

## **Outputs and Outcomes**

The outputs and outcomes were identified through the development of a logic model for this project. The logic model is included in the Project CD, along with a number of other items developed as part of this project. A list of the information included on the Project CD is in Appendix A. A detailed summary of the outputs and outcomes is provided in Appendix B, "The Evaluation Report for the Pierce County Shellfish Watersheds Project". The goal to prevent future shellfish area downgrades and upgrade at least 5% of the shellfish growing area in Pierce County by the end of the project was not met. However, there was an increase of approximately 2% of shellfish growing area and improvement of marine water quality in Pierce County over the course of the project, which indicates the project has had a beneficial impact, just not to the extent anticipated. A recent decline in water quality at one marine water station in Vaughn Bay indicates that further work is needed. A Strategic Plan (included on the Project CD) has been developed by the Pierce County Shellfish Partners and a new Pollution Identification and Correction Grant has been awarded to the Health Department to fund some of the new needed activities.

### Project Anticipated Outputs:

- Projected: Approximately 2,250 water samples collected  
Actual: 2,705 water samples were collected
- Projected: 140 site visits as part of the sanitary surveys  
Actual: 133 sanitary surveys were conducted
- Projected: Approximately 24 failing septic systems identified and repaired  
Actual: 25 failing septic systems were identified and repaired
- Projected: At least four workshops promoting household actions to protect water quality  
Actual: Four Workshops were held
- Projected: 5,000 property owners reached regarding the O&M program  
Actual: 8,000 property owners were reached regarding the O&M Program
- Projected: 48 property owners receiving maintenance incentives  
Actual: 64 property owners received maintenance incentives
- Projected: At least 30 soil samples collected and analyzed  
Actual: 30 soil samples were collected and analyzed
- Projected: Four farms receiving cost share with implementing manure management  
Actual: Four farms received cost share for implementing manure management
- Projected: GIS layer with number of sampling locations and number of samples analyzed  
Actual: The GIS layer has been developed, along with the sampling locations and sampling results

### Project Anticipated Outcomes:

- **12% increase in number of failing septic systems detected and repaired in the KPI Watershed.**

This outcome was not met. There was a 4.3% decrease in the number of failing septic systems detected and repaired from the start of the project (2010) compared to at the end of the project (2013). This is likely due to a number of reasons, one of which is that the Septic Repair Grant and Loan Project was very active in 2010 but was nearly out of funds in 2013. When the septic repair funds were available, many property owners self reported there failing septic system.

- **25% decrease in the time it takes to repair a failing septic system in the KPI Watershed.**

This outcome appears to have been met. The mean time to resolution for a repair in 2010 was 288.4 days and the mean time to resolution for a repair in 2013 was 111.2 days, for a 61.4 % reduction. However, two of the 2010 repairs still have some unresolved issue and nine of the 2013 repairs still have some unresolved issue to the exact percent reduction cannot be calculated at this time. Even so, it appears that the outcome to have a 25% reduction in resolution time has been met.

- **75% of property owners with failing septic systems will be satisfied with their repair experience.**

This outcome was met, with 100% of questionnaire respondents expressing satisfaction with their repair. However, the response rate to the questionnaire was low, with only 10 questionnaires being returned of the 41 mailed (24.3% return rate).

- **For 100% of identified failing septic systems, fecal coliform counts downstream yet near the property will improve following system repair.**

This outcome was met. Twenty five failing septic systems were identified over the course of the project and 22 have been repaired. The remaining three are still in the repair process. For the 22 repaired systems, 16 had no flow upon completing the repair and the other six had lower fecal coliform counts downstream following system repair.

- **75% of property owners who received a sanitary survey visit can name one way that household actions can contribute to water pollution; 10% report changing a household action (data source: survey mailed to property owners three months after receiving a visit).**

Both parts of this outcome appear to have been met. Depending upon how the survey responses are analyzed, between 67% and 95% of property owners who received a sanitary survey visit could name one way that household actions can contribute to water pollution.

- **100% of property owners who received O&M incentives will take the action for which the incentive was awarded (i.e. installing risers, inspecting or pumping) in the following year (data sources: property owner self-report and service data from professional septic maintenance companies).**

This outcome was met since the incentives program was designed to provide reimbursement following completion of the action- no money was provided prior to accomplishing the action.

- **20% of property owners in the KPI Watershed will inspect their septic tank as frequently as required by the new O&M regulation (data sources: property owner survey data and service data from professional septic maintenance companies).**

This outcome was met, with 28% of property owners in the KPI area who are in the O&M Program being current on their inspections.

- **Improved marine water quality in the shellfish waters monitored by DOH (data source: DOH water quality sampling).**

This outcome has been met, with an overall decline (water quality improvement) in the Geometric Mean Value (GMV) from 4.13 cfu/100 ml to 3.56 cfu/100 ml, but there are a couple of areas (Rocky Bay and Vaughn Bay) that showed a localized slight decline in water quality.

- **Improved water quality in tributaries to shellfish growing areas (data source: Health Department shoreline evaluations water quality sampling).**

It appears that this outcome has been met but there was much variation from area to area and there were also differences between the Health Department dataset and the SWM dataset. Part of the difficulty is the datasets include many results that were less than the detection limit. These data work fine for their primary purpose of identifying sources of bacteria but are less useful for trend analysis. The Health Department dataset showed an overall water quality improvement with GMVs decreasing from 47.3 cfu/100 ml to 39.3 cfu/100ml. The SWM dataset showed an overall water quality decline with GMVs increasing from 23.8 to 25.9 cfu/100 ml. However, both datasets showed a water quality improvement with decreases in the overall 90<sup>th</sup> percentiles.

## **Reflections and Moving Forward**

The EPA grant, while limited in funding and time, was an excellent stepping stone to improve marine water quality efforts in the South Puget Sound. Funding from the EPA allowed our department's Environmental Health program to progress to a point where we could integrate additional grant and local funding to build a program that can effectively address marine water contamination. Foundations were put in place for sampling protocol, enforcement efforts, and interagency teamwork.

However, as with most projects, funding is the key factor in allowing this work to move forward. Without EPA funding our ability to leverage other monies would have been severely restricted. During this grant period hundreds of acres of shellfish harvesting shoreline was reopened, partnerships were solidified in the effort to address declining water quality, protocols for sampling and investigating marine shorelines were developed, and an incentive program for septic system improvements was implemented.

**However, all this activity and improvement is jeopardized by the ongoing lack of funding. If anything comes out of this grant, the recognition of successful efforts by local governments must be acknowledged, and the need for permanent funding for these successful efforts must be established.**

### **What worked:**

- Natural Yard Care Workshops

- O&M incentives initially had a slow start but gained momentum as the grant progressed. Funding was coupled with additional incentive monies from the Washington State Department of Health.
- Task 6 Best Management Practices were implemented successfully on four small farms with the assistance of the Pierce Conservation District. Additionally 30 soil samples collected to meet grant deliverable requirements.
- Staff was able to use a septic repair grant and loan project to provide repair funding for a number of failing septic systems over the grant period. Grant work enabled our staff to more effectively work with shoreline property owners and educate them on funding opportunities.
- This grant enabled us to formalize and refine our water quality protection and improvement efforts in the shellfish watersheds of Pierce County. This included developing the flow charts and descriptions of activities that were included in our Pollution Prevention, Identification, and Correction Manual. This manual is included on the Project CD.
- The Health Department, along with SWM and PCD, were able to further build the Pierce County Shellfish Partners effort into a stronger, more effective team. This was conveyed in presentations given at the 2014 Salish Sea Conference in Seattle and at the 2014 Washington State Environmental Health Association's annual conference. Copies of both presentations are included on the Project CD.

**What did not work:**

- SRF position: The position worked to a degree but due to a number of factors outside of our control the position was not as effective as we hoped. See Task 3 final report section for details.
- Although we met our target output, we did not find as many failing septic systems as we anticipated near the end of the grant. However, we believe the number of failing septic systems identified will eventually increase as more types of septic systems are brought into the O&M program and receive routine inspections by licensed professionals. One reason a larger number of failures were identified earlier in the project is that we had sufficient septic repair grant and loan money early in the grant cycle, wherein a significant number of property owners self-reported their system failures. Towards the end of the project we had utilized nearly all of the septic repair funds, which resulted in fewer property owners stepping forward to report their failing septic system. New septic repair funding opportunities are now available and it is likely that more property owners will self-report their failing septic systems.
- We continue to struggle with a low participation rate for our sanitary surveys. We have attempted to address this through a number of avenues, including sending out post card notices about the survey, putting the letters into "plain talk", phoning residents, going door to door, and offering incentives such as a free drinking water sample and a gift

card for a local coffee shop to survey participants, but still have not made significant progress. The cause(s) of the declining participation rate is not known but is likely due to government mistrust and in part to the struggling economy.

- Normal or “the usual” means of communicating with citizens is not working. A concerted effort to become a more familiar positive presence in the community is absolutely necessary.

### **Thoughts:**

- A fully functioning and successful program to address poor marine water quality will never be established unless we get buy-in from local community members. Local agencies must have a positive relationship with area citizens, and the idea of environmental stewardship must become accepted by the community. Changing communication tactics is an important area of concentration that must be addressed. Time and time again throughout most of the grant period we encountered citizens wary of our activities. The thought of spending thousands of dollars and of more government control was prevalent in our conversations with shoreline property owners and community members.
- We continue to address the relationship between our pollution identification and correction (PIC) efforts in the shellfish areas and our septic system O&M program. As our O&M program expands and more septic systems are routinely being inspected by licensed professionals, our sanitary survey needs should decline. Also, since an O&M inspection is generally more comprehensive than a sanitary survey visit, we don’t want sanitary survey visits to distract or discourage homeowners from getting an O&M inspection.
- We need to identify how our PIC work best integrates with the Illicit Discharge Detection and Elimination (IDDE) work being conducted by Pierce County Surface Water Management in the urban areas of Pierce County.
- We continue to search for better tools to identify sources of bacteria. The current approach, based upon water quality sampling for fecal coliform, is time-consuming and expensive.
- There is still a great need for stable funding. We have received annual funds from Pierce County but these funds don’t fully support our water quality work in the shellfish areas, and are not guaranteed into the future. Also, our partners are not fully funded and their efforts are instrumental, as identified in the Pierce County Shellfish Partners Strategic Plan, to reach our vision of “Governments and stakeholders are actively working together to improve water quality in the shellfish watersheds of Pierce County.”

**Overall:**

- Things to tackle in the future:
  - Stewardship message
    - Look to how other entities get out their messages without “telling” the community what’s best for them.
  - Growing population
    - How do we protect and improve water quality in the future with a growing population in the Pacific Northwest/ Pierce County?



# **Appendix A**

## Information on the Project CD



A Project CD was developed that includes many of the products developed through this project. A few additional items are included on the CD that were finalized through other grant projects but could not have been developed without the Pierce County Shellfish Partners Project.

Items on the CD include:

- Project Final Report
- Evaluation Report
- Project Logic Model
- Replicate Results Table
- Notes on Replicate Results
- Nutrient Results Table
- Pollution Identification and Correction Protocol
- Septic Repair Facilitator Brochure
- Septic Repair Financial Assistance Fact Sheet
- Advertisements in the Key Peninsula News newspaper
- Pierce County Shellfish Partners Strategic Plan
- Salish Sea 2014 Presentation
- Wash. State Environmental Health Association 2014 Conference Presentation



## **Appendix B**

### The Evaluation Report for the Pierce County Shellfish Watersheds Project



EPA Puget Sound Watershed Management Assistance Grants  
EPA Project Number PO-00J12301

# Pierce County Shellfish Watersheds Project Evaluation Report August 2014

Tacoma-Pierce County Health Department  
Environmental Health Division  
Frank DiBiase, Public Health Manager  
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## **Introduction**

The Pierce County Shellfish Watersheds Project focused on improving and protecting water quality in the Key Peninsula/Islands Watershed, located in South Puget Sound. This is an important shellfish area, both for recreational and commercial harvest and the Pierce County Shellfish Partners team has been actively identifying and addressing sources of bacteria pollution.

This was a very large project and included a number of evaluation activities to assess the success of the project in meeting the projected outputs and outcomes. The evaluation measures considered a variety of data sources, including:

- Health Department's primary database that contains septic system activities
- water quality results collected by Health Department staff during the project
- water quality results collected by the Washington State Department of Health
- water quality results collected by Pierce County Surface Water Management (SWM)
- surveys conducted following project activities

This report has the project outcomes and goals in italicized text, followed by the evaluation summary of activities and findings for that outcome or goal in standard text.

### **Septic System Failure Identification and Repair**

*Project Outcome: 75% of property owners with repaired systems will be satisfied with their repair experience.*

For the septic repair evaluation, a questionnaire (a copy is included in the Appendix) was developed to determine property owners' level of satisfaction with the repair process. The questionnaire was mailed to property owners who had their failing septic system repaired in the year prior to the project commencing to provide a baseline and then the questionnaire was mailed each quarter to property owners with repairs completed the previous quarter on the Key Peninsula and Islands (KPI) area.

A total of 21 pre-project questionnaires were returned of the 58 mailed (36.2% return rate), and only 10 post-repair questionnaires were returned during the project of the 41 mailed (24.3% return rate). Only 25 of the 41 failures that occurred during the project period were identified or addressed by the Septic Repair Facilitator as part of the project. The other 16 failures were handled by the Code Enforcement Program or the On-site Sewage Program.

Of those who responded to the survey, responses were overall, positive. The outcome, "75% of property owners with repaired systems are satisfied", was exceeded, with 100% of the respondents satisfied with their repair, and most rated themselves as "very satisfied" with the repair. This is an excellent outcome. Future work might include identifying why or what

aspects of the repair were satisfying. It might be valuable to score repair companies by a standard set of criteria to help identify top repair companies.

The majority (75%) of respondents were residential property owners. Sixteen of the respondents (64%) reported that they initiated the repair on their own, as opposed to initiating the repair due to a complaint or survey. This finding suggests residential property owners are aware and knowledgeable about their septic system and know what to look for when it comes to septic failure. Future work could examine ways to reach a broader population, capturing people who are less informed about septic systems. Perhaps stronger community partnerships could be formed to educate those people who are uninformed about the details of proper septic maintenance, such as through outreach to homeowners associations and realtor agencies.

An unexpected finding was the respondents' limited knowledge about the details of what a septic repair entails. As an example, the majority of respondents stated that 1) the cost of the repair was higher than expected, and 2) the time it takes for a repair was longer than expected. Both the quantitative and qualitative analyses of the survey reflected this finding. It should also be noted that many respondents indicated a lack of awareness that financial assistance in the form of low-interest loans and grants were available to help support their repair. On the other hand, respondents indicated staff was clear, courteous and helpful. A more clear understanding of the root of the knowledge barrier about the repair cost and time-frame is needed. In the future, it may be helpful for staff to verbally repeat the process at least three times to the resident. Research suggests hearing a message three times will improve recall of that message at a later point in time.

Although respondents indicated a sense of feeling uninformed by staff on the aforementioned issues, an overwhelming majority of respondents reported staff:

- were courteous and helpful
- conveyed who to contact with questions
- answered their questions appropriately
- clearly conveyed why the repair was needed

Future communication from staff to property owners regarding specifics on the varying range of costs, possible funding options, and potential time it takes for a septic repair, would be beneficial for property owners to have more clear expectations about what a septic repair entails. Both quantitative and qualitative analyses of the survey reflect this finding. In addition, survey results from the question, "How well residents felt staff informed them about the process", were fair. This indicates an opportunity for staff to message critical points in a way that will help ensure the property owners learn and understand issues relating to cost and time of a septic repair.

*Project Outcome: a 25% reduction in time for resolution of failing septic systems.*

This outcome was evaluated by tracking the length of time to resolution for septic repairs over the course of the project and assessing if there were any changes. The repairs in the KPI Watershed in 2010 (prior to initiating project field work) were compared with repairs in the KPI area in 2013. The mean time to resolution for a repair in 2010 was 288.4 days and the mean time to resolution for a repair in 2013 was 111.2 days (61.4% reduction). However, two of the 2010 repairs still have some unresolved issue and nine of the 2013 repairs still have some unresolved issue so the exact percent reduction cannot be calculated at this time. Even so, it appears that the outcome to have a 25% reduction in resolution time has been met.

*Project Outcome: have a 12% increase in the number of failing septic systems identified and corrected.*

To assess if this outcome was met, the number of failing septic systems identified and repaired in the KPI area was tracked from the start to the end of the project. There were 23 repairs in the KPI area in 2010 (two of which have not been fully resolved) and 22 repairs in the KPI area in 2013 (nine of which have not been fully resolved). Instead of accomplishing the goal of a 12% increase in the number of failing septic systems identified and corrected, there was instead a 4.3% decrease. This gives the initial impression that the use of a Septic Repair Facilitator (SRF) and the other tools funded through the grant were ineffective at improving the identification and resolution of failing septic systems. However, the picture is a bit more complex, since in 2010 the septic repair grant and loan program was operating at full steam and many of the failing systems were self referrals, where property owners wanted to utilize the available financial assistance to repair their systems. By 2013, nearly all of the grant and loan monies had been expended, the financial assistance funds were no longer being promoted, and property owners were no longer bringing their failing septic systems to our attention.

*Project Outcome: for 100% of identified failing septic systems, fecal coliform counts downstream of the failure will improve following system repair.*

Twenty five failing septic systems were identified over the course of the project. Twenty two of these systems have been repaired and the other three are in the repair process. Of the 22 repaired systems, there was no flow for 16 following completion of the repair so there was no longer a place to sample. For the other six repairs, fecal coliform counts downstream (generally small shoreline pipes or curtain drains) improved following system repair. Hence this outcome was met.

## **Septic System Workshop Surveys**

We completed four workshops in this project.

1. Shoreline Living workshop with Pierce County Surface Water Management, Pierce Conservation District, Washington State University Kitsap CE (9/22/12). This workshop was intended to provide information to residents about how they affect the shoreline in positive and negative ways. There were booths with displays and activities, with participants visiting stations at their own pace. Ten people pledged to become Shoreline Stewards, to take steps to protect the marine shorelines. Two people felt they already knew and practiced proper septic system maintenance, three people thought they could increase their efforts or needed more information to be effective. It was difficult to track the total number of participants because of the nature of the event, but staff estimates that 40 people attended this workshop.
2. Homeowner advisory group workshop (6/21/12). This workshop was a precursor to the formation of a citizen advisory group to provide guidance on Social Marketing. The information provided in this workshop was intended to make sure all participants would have the same basic information about septic system operation, maintenance and impact of failing systems upon the environment. There was no formal evaluation of this workshop, though all 11 participants continued to participate in the advisory group and remained engaged in meetings that met during the following six months.
3. Natural yard care workshop in Key Peninsula (8/7/13). This workshop was intended to provide information to home gardeners about practices they could adopt to both keep their gardens healthy and reduce the amount of fertilizers and pesticides. This workshop was offered in the mid-afternoon (2:30-4:30 PM) in hope that seniors and retired residents who are home gardeners would be interested and find the time convenient. The workshop attracted only three participants, and staff concluded that the time of day the event was held was the leading factor for the low attendance.
4. Septic workshop (9/13/13). This workshop featured an introduction and presentations by five septic system professionals. The presentation was advertised through flyers posted at public gathering places, an ad in the local paper, and through TPCHD Facebook and Twitter accounts. We received 9 evaluation forms from the 23 participants. We asked how they found out about the event, whether they found the workshop helpful, which presentations they found most useful and for suggestions to improve the workshop. Most people found out about the workshop from the ad in the Key Peninsula News, the local newspaper distributed to all residents of the Key Peninsula. Everyone that filled out an evaluation found the workshop helpful, and all respondents pointed to the “Dos and Don’ts About Septics” and “Septic Troubleshooting” workshops as most useful.

## **Sanitary Surveys**

*Project Outcome: 75% of property owners who received a sanitary survey can name one way that household actions can contribute to water pollution and 10% report changing a household action.*

To evaluate if this outcome was met, a questionnaire (a copy is included in the Appendix) was developed and mailed each quarter to the people visited in a sanitary survey the previous quarter. One hundred and nineteen questionnaires were mailed and 67 completed questionnaires were returned (56.3% return rate).

The questionnaire was used to determine 1) whether 75% of property owners who received a site visit can name one way that household actions can contribute to water pollution; and 2) to see if 10% of those respondents can report changing a household action.

The first part of the outcome, “75% property owners who received a sanitary survey can name one household action that contributes to water pollution” was nearly met. Of the 67 surveys, this question was left blank by 20 respondents. It is hard to determine why the respondents left the question blank; whether they did not know the answer or whether they left portions of the survey blank for other reasons. Otherwise, 47 respondents answered the question and, of those, 45 respondents correctly named one household action that contributes to water pollution. Two respondents provided an incorrect response. When calculating the percentage of correct responses out of the total who answered the question (45 correctly responded out of the 47 total responses), this is 95%, exceeding the goal. When calculating the percentage of correct responses out of the total number of surveys (in other words including blank responses in the calculation), 67% of the respondents named a household action that contributes to water pollution. It is likely that the true percentage is between 67% and 95%.

Respondents provided great examples of appropriate knowledge around household behaviors that contribute to water pollution. Of all respondents’ statements, the topics fell into four major categories:

1. Use biodegradable products and avoid fertilizers, pesticides:  
A third of the respondents (n = 14) mentioned use of biodegradable products and avoidance of fertilizers and pesticides. Interestingly, six respondents specifically stated the terms “green” and “biodegradable” products, for example, “Use biodegradable products.”
2. Overall proper disposal of pollutants:  
A third of the respondents (n = 13) mentioned a more generalized, yet appropriate response, such as proper disposal of pollutants. An example response “Be aware that everything that touches the ground, pesticides, weed killers, oil, gas, etc. can end up in the sound. Also, one of the obvious, recycle...”

3. Maintain septic system:

A quarter of the respondents (n = 9) mentioned the importance of maintaining their septic system. An example response is, "Get septic system examined every 3 to 5 years."

4. Scoop pet waste:

A quarter of respondents (n = 7) mentioned the importance of scooping pet waste. An example response is, "Watch your pets and clean up after them. Not just on the beach, but in the uplands."

The second part of the outcome, "10% of respondents can report changing a household action" was met. However, a couple issues emerged with the responses to the questions "Have you changed how you do any household actions due to information received during the Health Department visit?" and, "If you answered 'yes', what are you doing differently? Please don't include things you were already doing before the Health Department visit". Forty respondents answered, "No", yet 45 were able to state an appropriate response to the question "State one thing people can do in their daily lives to protect the quality of Puget Sound Waters". Interestingly, this seems to suggest the majority of respondents are already an informed group. Of those who did respond "Yes" (n = 9) many were able to name a specific and detailed change, such as "We have changed to environmentally friendly dish and laundry soap..." It is unclear how many people interpreted the question appropriately, by stating what they were already doing before the health department visit.

A future survey could help avoid this possible confusion by asking, "Have you changed how you do any household actions due to information received during the Health Department visit?" in a different way. The survey could be set up in two columns. One column could be set up to ask what household action the respondent is currently doing; next to that, a column with fields, asking, "How did you learn about that household action." This might minimize misinterpretation of the question.

In addition to improving the aforementioned issue for the question, "Have you changed how you do any household actions due to information received during the Health Department visit?," there are further opportunities for improving future work. As an example, it may be helpful to improve communication from staff that conveys a specific "call to action" message. Research suggests people are more likely to follow through with a behavior when prompted with specific "call to action" messaging. As an example, a respondent who states, "Use biodegradable products" is more likely to enact this behavior than a respondent who states, "Be careful what goes into toilet and drains."

Of the respondents who answered the question, “State one thing people can do in their daily lives to protect the quality of Puget Sound Waters”, a third responded with a statement of a generalized awareness, rather than an action-oriented behavior change. Although this number could be improved, the good news is that three quarters of the respondents provided a specific, action-oriented statement.

Along with this recommendation, it may be worthwhile to target “call to action” messages in a way that is directly relevant to the respondents’ life situation. The question, “State one thing people can do in their daily lives to protect the quality of Puget Sound Waters,” may have elicited responses that addressed actions directly relating to the respondents’ life situation. As an example, people who do not have a septic system, but have a pet, may have been more likely to name scooping pet waste as a response to the question rather than maintaining their septic system. As such, it may be worthwhile to target “call to action” messages in a way that is directly relevant to the respondents’ life situation.

The sanitary survey visits elicited many positive responses from property owners, particularly regarding the information received from Health Department staff and their satisfaction with staff. Future opportunities might ask more detailed information regarding the staff contact. All but one of the respondents answered, “Yes” when asked, “Do you think you have enough information to keep your septic system running well?” Another favorable comment follows: “The material is helpful. Face to face contact, when it is polite and friendly, as these fellows were, is very good. Then I feel we are all concerned in keeping the Sound healthy.”

Other favorable comments regarding staff were mentioned in the open-ended section of the survey, “Do you have any other comments for us?” Of the respondents who left additional information, most stated they were thankful and appreciative, and mentioned staff were professional and helpful. This finding is a strong demonstration that staff made a connection with the property owners, and in fact, some respondents even called out particular names of staff. Some examples of comments are below:

- Your staff that visited were very professional.
- We are preparing to build a cabin and install a septic system. The random call from Len Adams gave us some early info on how to proceed and the status of our current well. It was greatly appreciated.
- Lindsay Tuttle has been very helpful in assisting to find the cause of the death (lead poisoning) of an American Bald Eagle at Minter Creek.
- Staff was very courteous and informative.

### **Septic System Incentives**

*Project Outcome: 100% of property owners who received O&M incentives will take the action for which the incentive was awarded.*

This outcome was met since the incentives program was designed to provide reimbursement following completion of the action- no money was provided prior to accomplishing the action.

### **O&M Inspections**

*Project Outcome: 20% of property owners in the KPI Watershed will inspect their septic tank as frequently as required by the new O&M regulation.*

This outcome was evaluated by analyzing the Health Department's Envision database to determine the percent of property owners in the KPI area who are current on O&M inspections as required by the new O&M regulation. This analysis found that 28% of the property owners in the KPI area who are in the O&M program are current on their inspections. Hence, this outcome has been met. The database was also evaluated to tally O&M inspections and septic tank pumpings in the KPI area over the course of the project and assess if there were any changes. The number of O&M inspections in the KPI area increased from 614 in 2010 to 989 in 2013 (an increase of 61.1%). The number of septic tank pumpings in the KPI area increased from 466 in 2010 to 620 in 2013 (an increase of 33.0%).

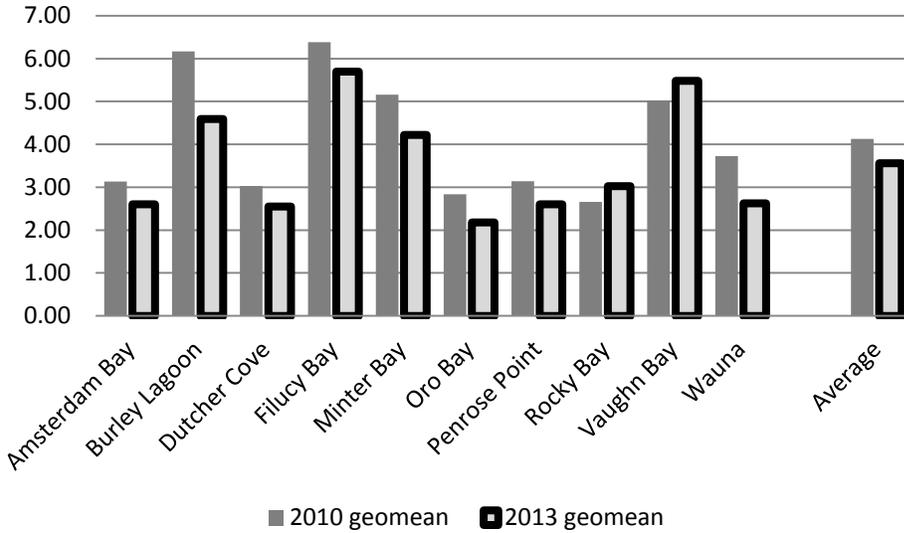
### **Water Quality Improvements**

*Project Outcome: Improved marine water quality in the shellfish waters monitored by DOH.*

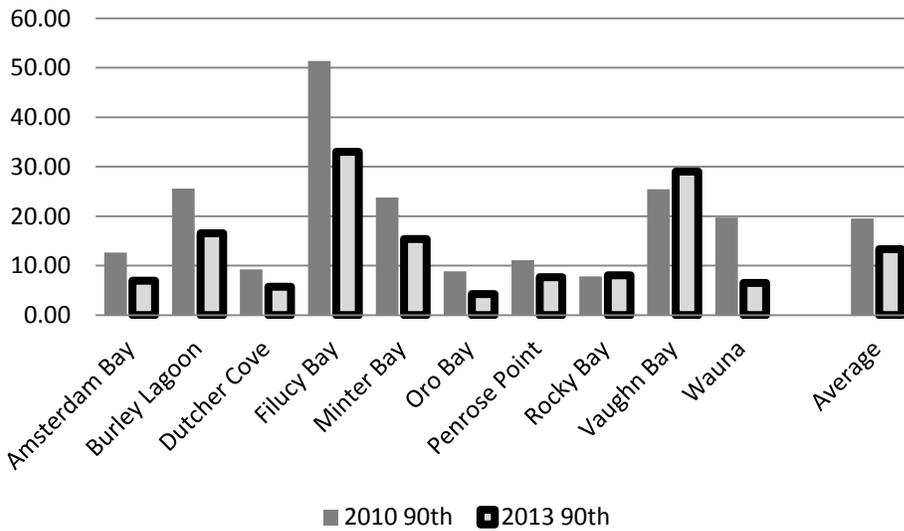
DOH water quality results were analyzed to determine the geometric mean value (GMV) and 90<sup>th</sup> percentile for each station, comparing data from July 2010 to data from December 2013. Overall, the GMVs and 90<sup>th</sup> percentiles declined from 2010 to 2013, indicating that water quality in the shellfish areas improved over the course of the project. The average GMV declined from 4.1 cfu/100 ml to 3.6 cfu/100 ml (13% reduction) and the average 90<sup>th</sup> percentile declined from 19.6 cfu/100 ml to 13.3 cfu/100ml (32% reduction). Of the eleven shellfish areas monitored by DOH, nine showed a decline in both the average GMVs and 90<sup>th</sup> percentiles. However two areas, Rocky Bay and Vaughn Bay, had a slight increase in average GMVs and 90<sup>th</sup> percentiles, indicating that water quality declined in these particular shellfish areas over the course of the project.

The results of the DOH water quality analysis are presented in the two figures and table below. The numbers in the bottom row of the table represent the fecal coliform arithmetic mean of the geomean and 90<sup>th</sup> percentile for all stations for each bay.

## Washington DOH marine samples Geomean cfu/100 ml



## Washington DOH marine samples, 90th percentile cfu/100 ml



2010 geomean	2013 geomean	Change geomean	2010 90th	2013 90th	Change 90th	
3.13	2.60	-17%	12.67	7.00	-45%	Amsterdam Bay
6.17	4.59	-26%	25.57	16.57	-35%	Burley Lagoon
3.03	2.55	-16%	9.25	5.75	-38%	Dutcher Cove
6.38	5.70	-11%	51.40	33.00	-36%	Filucy Bay
5.16	4.22	-18%	23.80	15.40	-35%	Minter Bay
2.84	2.18	-23%	8.88	4.25	-52%	Oro Bay
3.14	2.60	-17%	11.14	7.71	-31%	Penrose Point
2.66	3.02	14%	7.85	8.07	3%	Rocky Bay
5.03	5.48	9%	25.45	29.00	14%	Vaughn Bay
3.73	2.63	-30%	19.75	6.50	-67%	Wauna
4.13	3.56	-13%	19.58	13.33	-32%	Average

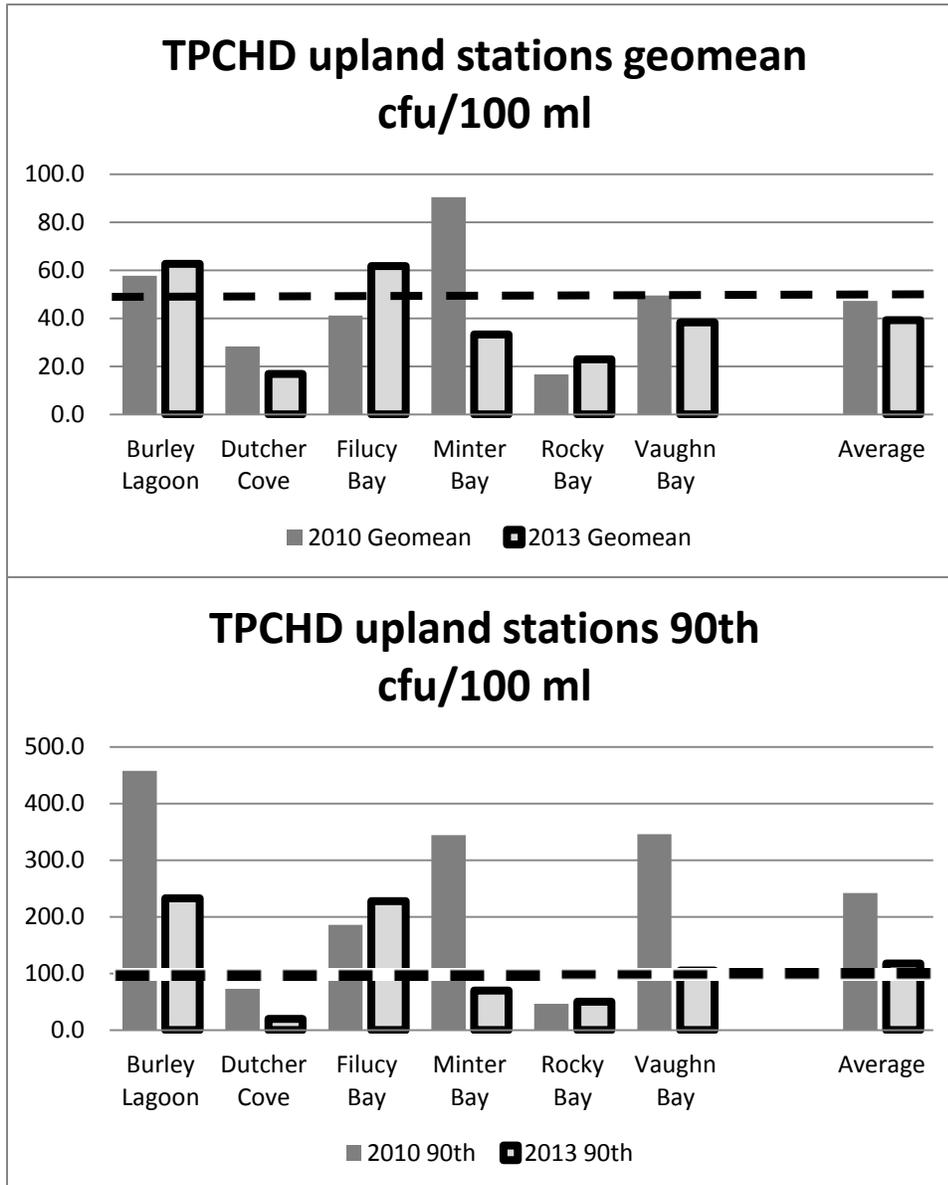
*Project Outcome: Improved water quality in tributaries to shellfish growing areas.*

This outcome was evaluated by analyzing the Health Department’s 2010 stream (upland) results to the 2013 upland results. Not all of the shellfish growing areas have a stream that discharges into the area and this evaluation analyzed only the six shellfish areas in the Marine Recovery Area with a stream tributary. It is important to note that many of the results were reported as less than the detection limit and the detection limit varied based upon the volume of water that was able to be processed via the membrane filter method. For this analysis, we used the maximum possible value (i.e. if the result was reported as <20 cfu/100ml, we used the value of 20 in our analysis). This has two implications: 1) the actual GMVs and 90<sup>th</sup> percentiles are in all likelihood lower than we’ve calculated, and 2: this dataset is not appropriate for statistical analysis.

The analysis showed an overall decline in GMVs (overall average reduction of 17%) and 90<sup>th</sup> percentiles (overall average reduction of 51%) but there was much variability from stream to stream. Three of the streams actually showed higher GMVs in 2013 than 2010 but these increases were offset by the much lower GMVs in the other three stream systems. The 90<sup>th</sup>

percentiles showed a similar pattern although only two of the streams had higher values in 2013 than 2010. The four stream systems with lower 90<sup>th</sup> percentiles had much lower values in 2013 than in 2010, which accounted for the very large overall reduction in the average 90<sup>th</sup> percentile.

These results are presented in the two figures and table below.



2010 Geomean	2013 Geomean	Change to geomean	2010 90th	2013 90th	Change to 90th	
57.8	62.7	9%	457.5	232.5	-49%	Burley Lagoon
28.3	16.8	-41%	73.0	20.0	-73%	Dutcher Cove
41.1	61.8	50%	185.8	227.9	23%	Filucy Bay
90.4	33.3	-63%	344.0	69.9	-80%	Minter Bay
16.7	22.9	37%	46.4	50.0	8%	Rocky Bay
49.5	38.3	-23%	346.0	105.5	-70%	Vaughn Bay
47.3	39.3	-17%	242.1	117.6	-51%	Average

Pierce County Surface Water Management (SWM) monitors water quality monthly in more than 40 Pierce County streams. Health Department staff compared SWM’s 2010 results with their 2013 results for the six streams in the shellfish areas to provide an additional perspective on water quality changes over the course of the project. The set of streams monitored by SWM was slightly different than the set monitored by the Health Department. SWM’s set included Schoolhouse Creek, which flows into Oro Bay on Anderson Island, but didn’t include the streams that flow into Filucy Bay.

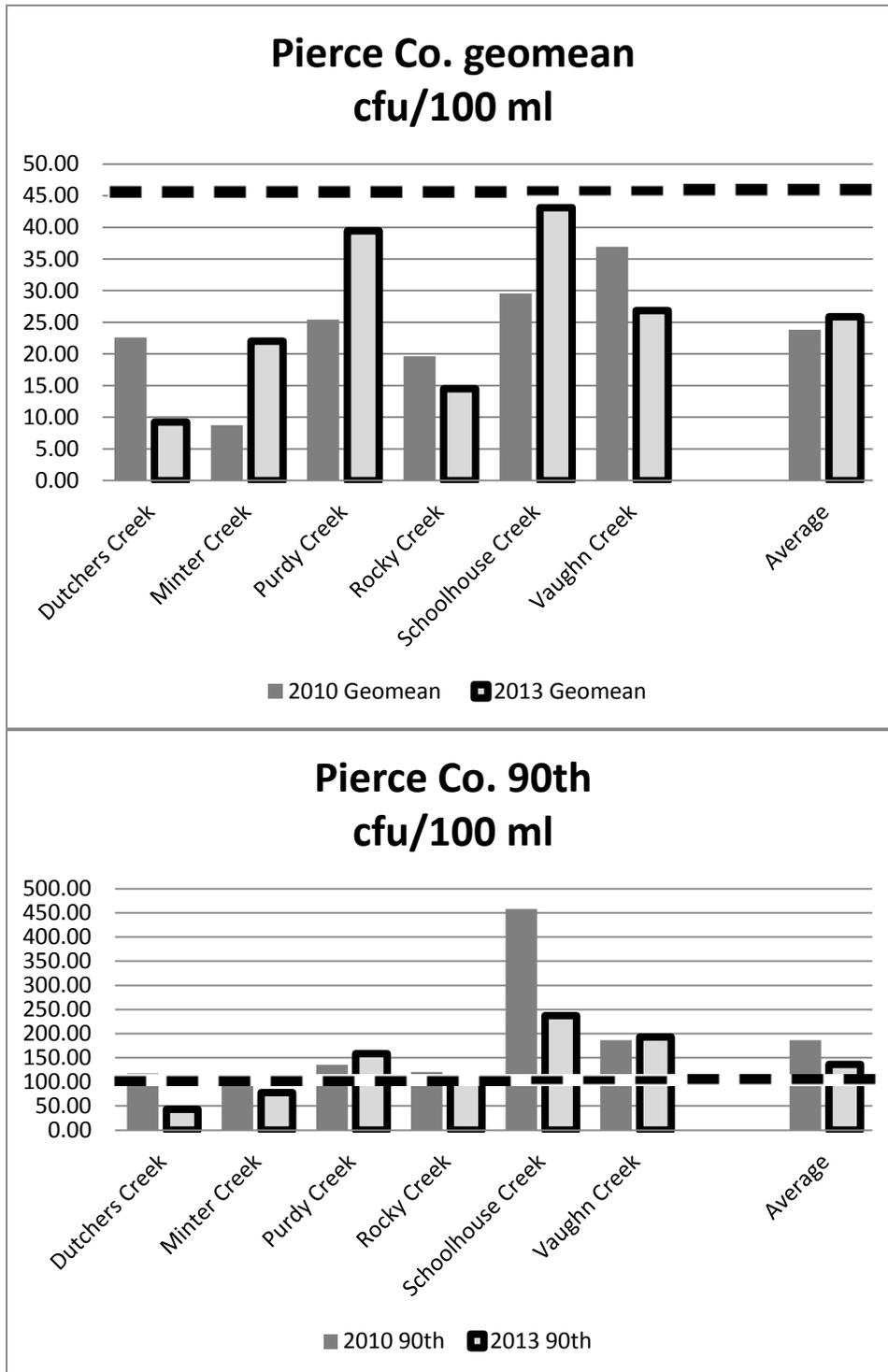
The analysis of SWM’s results showed a somewhat similar pattern to the Health Department’s results, with three streams having higher GMVs in 2013 than 2010 and three streams having lower GMVs in 2013 than 2010. Also, two streams had higher 90<sup>th</sup> percentiles in 2013 than 2010 and four streams had lower 90<sup>th</sup> percentiles in 2013 than 2010. However, SWM’s overall average GMV was higher for the 2013 results than the 2010 results (9% increase) whereas the Health Department results showed a decline in GMVs between 2013 and 2010 (17% decrease). Unlike the GMV results, the overall 90<sup>th</sup> percentile results were similar between SWM’s dataset (27% decline from 2010 to 2013) and the Health Department’s dataset (51% decline from 2010 to 2013).

It is not known why there is a fairly big difference in GMVs between SWM’s dataset and the Health Department’s dataset. There are likely a number of factors involved but four important differences are:

- the samples were collected on different days
- sampling was conducted under similar but different QAPPs
- the samples were analyzed by different laboratories

- Many results were below the detection limit and the detection limit varied from sample to sample (generally due to particulates that clogged the membrane filters).

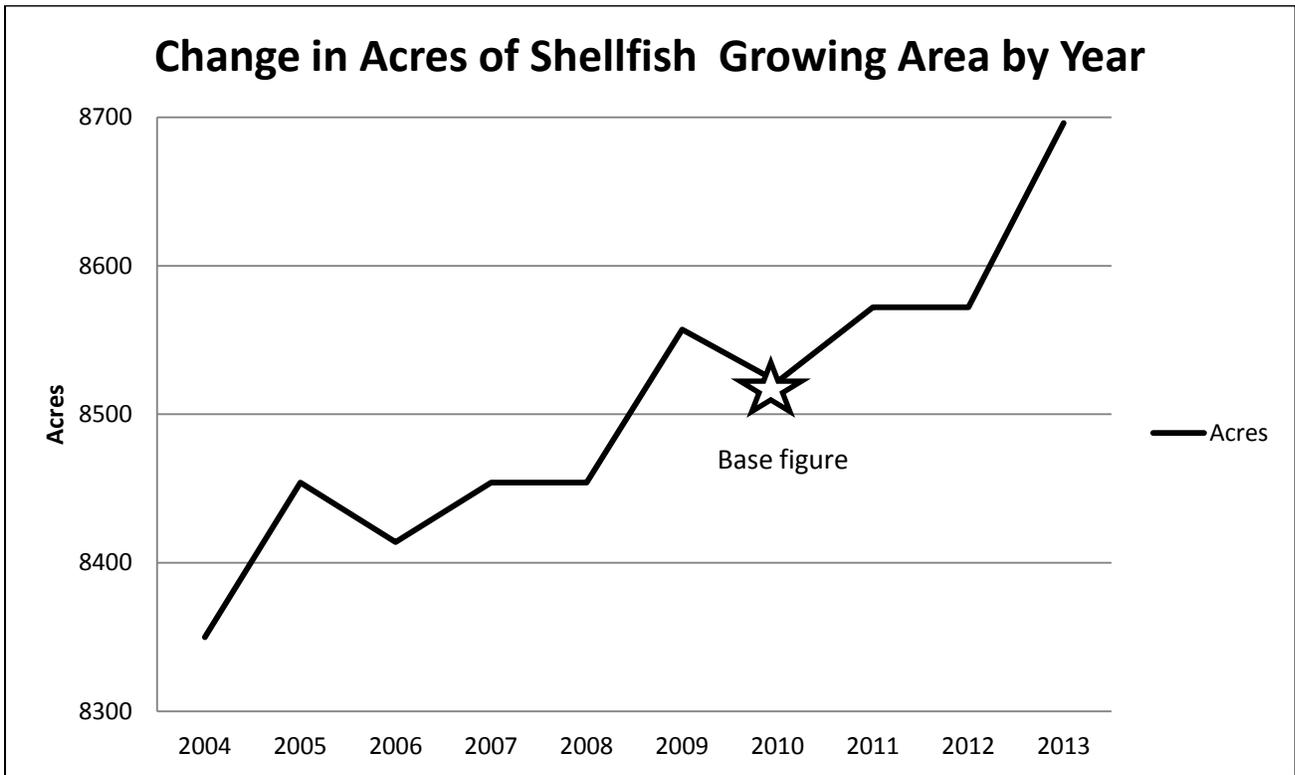
SWM's results are presented in the two figures and table below.



2010 Geomean	2013 Geomean	+/- %	2010 90th	2013 90th	+/- %	
22.61	9.25	-59%	117.50	43.50	-63%	Dutcher Creek
8.76	22.00	151%	98.50	77.80	-21%	Minter Creek
25.44	39.43	55%	135.50	158.60	17%	Purdy Creek
19.65	14.50	-26%	120.50	107.30	-11%	Rocky Creek
29.54	43.09	46%	458.00	237.00	-48%	Schoolhouse Creek
36.93	26.87	-27%	186.50	192.70	3%	Vaughn Creek
23.82	25.86	9%	186.08	136.15	-27%	Average

*Goal: Prevent future shellfish area downgrades and upgrade at least 5% of the shellfish growing area in Pierce County.*

To evaluate progress on accomplishing the project goal, staff compiled the figure and table below, using shellfish growing area acreage information provided by DOH. The figure tracks upgrades and downgrades that have occurred since the end of 2004. The start of the project is denoted by the noted star on graph. The goal of a 5% increase in acreage was not met but there was an increase of approximately 2%, with shellfish acreage increasing from 8,522 acres at the end of 2010 to 8,696 acres at the end of 2013. In addition, additional acreage in Burley Lagoon and Minter Bay is anticipated to be upgraded in 2014.



Year	Changes in Acreage	Cumulative Acres
2005	Added 99 acres in Burley Lagoon	8,454 acres
2006	Lost 40 acres in Minter Bay	8,414 acres
2007	Added back the 40 acres in Minter Bay	8,454 acres
2008	No changes	8,454 acres
2009	Added 103 acres in Vaughn Bay	8,557 acres
2010	Lost 35 acres in Burley Lagoon	8,522 acres
2011	Added 50 acres in Vaughn Bay	8,572 acres
2012	No changes	8,572 acres
2013	Added 87 acres in Henderson Bay, 27 acres in Mayo Cove, and 10 acres in Von Geldern Cove	8,696 acres

# Appendix

## Septic Repair Questionnaire and Sanitary Survey Questionnaire



## Septic Repair Questionnaire

Dear Resident:

We are asking people who had their septic system repaired in the last year about their experiences with Health Department staff, to find out how we can improve our services.

Please take a few minutes to fill out this survey and return it in the enclosed self-addressed envelope. Your replies are important to us.

If you have any questions, please contact me at (253) 798-2845 or [rhanowell@tpchd.org](mailto:rhanowell@tpchd.org).

Thank you for your time!

Ray Hanowell  
Environmental Health Specialist

1. Did you have a septic system repair done in the last 12 months?
  - Yes
  - No → You do not need to complete the rest of the survey.
  - I don't know → You do not need to complete the rest of the survey.

Please return it in the envelope provided.

2. Which of the statements below describe the property on which the repair was done?  
Please check all that apply:
  - Commercial property
  - Residential owner-occupied property
  - Residential renter-occupied property
  - Mobile Home Park
3. How was your septic failure identified?
  - Through a complaint
  - Through a routine inspection
  - Through a sanitary survey
  - I initiated the repair myself
  - Not sure
  - Other (please specify): \_\_\_\_\_
4. Thinking about the entire process, how satisfied were you with the repair of your septic system?
  - Very satisfied
  - Somewhat satisfied
  - Somewhat dissatisfied
  - Very dissatisfied

5. How did the time needed to complete the repair compare with your expectations?
  - The process took much less time than I expected
  - The process took somewhat less time than I expected
  - The process took about as much time as I expected
  - The process took somewhat more time than I expected
  - The process took much more time than I expected
  
6. How did the cost of the repair compare with your expectations?
  - The cost was much less than I expected
  - The cost was somewhat less than I expected
  - The cost was about as much as I expected
  - The cost was somewhat more than I expected
  - The cost was much more than I expected
  
7. Did you receive any financial assistance from Pierce County to help with your repair (only eligible if in unincorporated Pierce County and repair benefits surface water quality)?
  - Yes, I received a full grant
  - Yes, I received a partial grant and a low-interest loan
  - Yes, I received a low-interest loan
  - Not sure
  - No
  
8. How would you rate how well you were informed about the repair process by Health Department staff? For example, why the work was needed and how it would affect you and your family.
  - Excellent
  - Good
  - Fair
  - Not very good
  - Poor

In the next set of items, please indicate your level of agreement with the following statements:

9. Health department staff were courteous and helpful.
  - Strongly agree
  - Somewhat agree
  - Somewhat disagree
  - Strongly disagree
  
10. I knew who to contact if I had questions or concerns.
  - Strongly agree
  - Somewhat agree
  - Somewhat disagree
  - Strongly disagree
  
11. Answers to my questions were complete and accurate.
  - Strongly agree
  - Somewhat agree
  - Somewhat disagree
  - Strongly disagree
  
12. I understood why the repair was needed.
  - Strongly agree
  - Somewhat agree
  - Somewhat disagree
  - Strongly disagree

13. The benefit of the repair was worth the cost.

Strongly agree     Somewhat agree     Somewhat disagree     Strongly disagree

14. How can we improve the septic repair process?

15. Is there anything more you'd like to tell us about your septic repair experience?

Thank you for completing this survey! Please return it in the enclosed envelope.



## Sanitary Survey Questionnaire

Dear Resident:

Several months ago, Tacoma-Pierce County Health Department staff visited your property. If you were home, we talked to you about maintaining your septic system and other household actions and how they might affect water pollution.

Please take a few minutes to complete this survey and return it in the enclosed self-addressed envelope. Your replies are important to us.

If you have any questions, please contact me at (253) 798-2845, or [rhanowell@tpchd.org](mailto:rhanowell@tpchd.org).

Thank you for your time!

Ray Hanowell  
Environmental Health Specialist

1. Did you speak with Health Department staff or read materials they left for you?  
 Yes  
 No → Please skip to question 6.
  
2. Did the visit help you identify any household actions you could do differently?  
 Yes  
 No
  
3. Have you changed how you do any household actions due to information received during the Health Department visit?  
 Yes  
 No
  
4. If you answered “yes”, what are you doing differently? Please don’t include things you were already doing before the Health Department visit.

