

Update Report for Mason County PIC Program February 2, 2015

Prepared by:

Squaxin Island Tribe- Erica Marbet

Mason County Public Health- Stephanie Kenny

With contributions from Mason County Conservation District & WSU
Extension

For:

Mary Knackstedt

Washington State Department of Health

Executive Summary.....	2
Mason County Water Data	4
General.....	4
Tier I Ambient Sampling.....	5
Tier II Sampling- North Bay	7
North Bay Outreach and Education	15
Tier II- Oakland Bay Shoreline	16
Tier II Chapman Cove	29
McLane Cove.....	32
Squaxin Island Tribe Water Data	33
Mason County On-Site Septic Program	41
Washington State University Extension Activities	43
Mason Conservation District Activities	45
References	46
Appendix 1- Quality Control Data	46

Executive Summary

This is a summary of calendar year 2014 activities of the Mason County Pollution Inventory and Correction (PIC) program. Washington State Department of Health Shellfish Program marine water quality sampling stations have shown high levels of fecal coliform bacteria at certain sampling stations in the Oakland Bay and North Bay Growing Areas, and this has led to closures of portions of both bays. Mason County Public Health (MCPH) responded by doing intensive sampling in these areas, along with outreach to residents, on-site septic system management and stormwater management. Where animal waste from farms was present, the Mason Conservation District (MCD) worked with landowners to implement best management practices. As a result, thirteen farm waste management and fencing projects are slated for 2015. Washington State University Extension (WSU) completed outreach to local residents in the form of workshops, booths at fairs, and mailed water quality updates to residents. The Squaxin Island Tribe (SIT) continues monthly sampling at the mouths of eighteen creeks that drain into Puget Sound. Washington Department of Ecology (ECY) remains available for enforcement. All of these efforts will be described in detail below.

The County has held ongoing meetings to foster communication between all entities involved in this process. Together, these entities produced draft a protocol and flow chart for investigating the source of fecal coliform pollution (PIC Flowchart 2014, PIC Protocol 2014). The flow chart and protocol have not been incorporated into any formal agreement, but they serve a structure within which these entities can work together. They also serve as a way to analyze the strengths and weaknesses of pollution inventory and correction in Mason County.

With available resources, the Mason County and participating entities have established a basic program of septic system inventory, water quality monitoring, landowner outreach, and enforcement. The health of Mason County waters is dependent upon the continuation of this program. The program's strengths and efficiencies are in encouraging septic system maintenance, education, keeping a baseline of water quality data, and addressing the problems that stand out, i.e. septic system failures and properties with animals adjacent to waterbodies. It is important to the Squaxin Island Tribe and shellfish growers that the County focus additional resources on follow-up at sites where fecal coliform bacterial counts just barely exceed the freshwater standard (Table 1), show a seasonal pattern of high/low, or are hard to pin down spatially. This means much more interaction with landowners. The importance of follow-up on these "hard to pin down" sites comes from the fact that their receiving waters are extremely valuable fish and shellfish habitat of South Puget Sound.

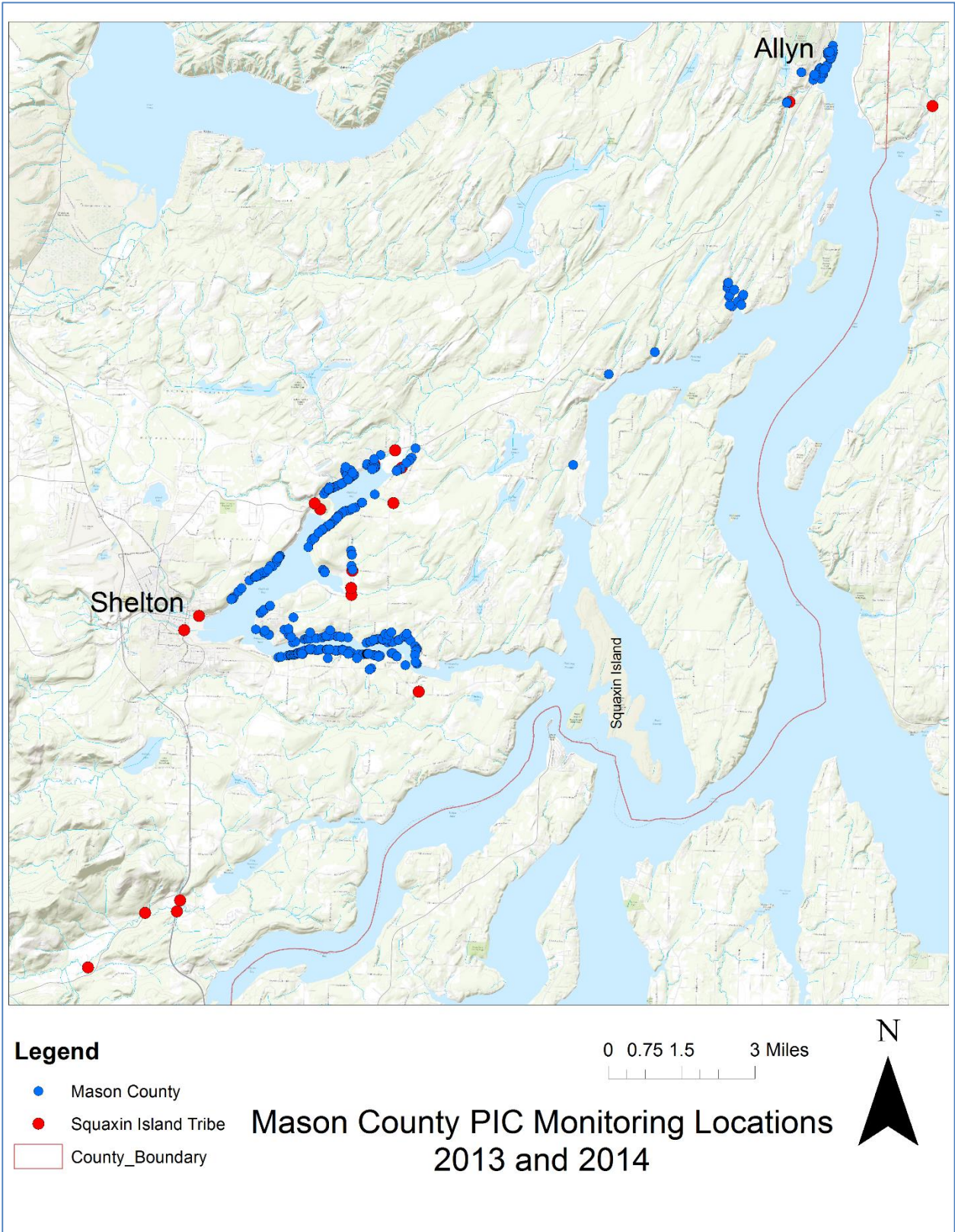


Figure 1. Monitoring Locations

Mason County Water Data

General

The water quality goal established in the QAPP is the state marine water quality standard. This standard is normally applied to the mouths of tributaries. The comparable fresh water standard is WAC 173-201a-200(2)(b). This standard should be applied to samples not influenced by marine waters. The standard applied to Oakland Bay shoreline sampling is a modification of Mason County Water Quality Standard Operating Procedures adopted in the Oakland Bay Marine Recovery Area QAPP (*2008). In 2014, 918 fecal coliform samples were collected.

Table 1. Water Quality Standards for Fecal Coliforms (FC) referenced in this grant

Marine Standard <i>Source- QAPP and WAC173-201a-210 (2)(b)</i>	Fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies /100 mL.
Fresh Water Standard <i>Source-WAC173-201a-200 (2)(b)</i>	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies/100 mL.
Oakland Bay Shoreline Standard <i>Source- Oakland Bay Marine Recovery Area QAPP(2008)</i>	Discharges with values greater than or equal to 200 FC/100mL will be considered high priority for FC confirmation sampling. Discharges with values greater than 100 FC/100mL will be considered medium priority.

The fresh water rather than marine water quality standard has been chosen as the standard to apply in reviewing the data. The areas in the grant where the marine sampling standard could be applied are some of the ambient sites, and some of the Chapman Cove sites. Roughly a quarter of the Mason County ambient sites are under marine influence at high tide, but since the samples are taken flowing off the land during a lower tidal stage, the fresh water standard seemed most applicable. The shoreline samples are also taken flowing off land. They are tested for salinity in cases such as beach seeps when it is not clear whether the water originates on land and diffuses down through layers of the beach to surface again lower on the beach, or whether the origin is marine water draining out of the top layer of gravel, mud or sand. For easy of reading the Mason County section of this document, samples that exceeded 100 FC/ 100 mL are show in red.

Tier I Ambient Sampling

Tier I sites are the long term ambient sites sampled by Mason County Public Health. The goal of long term ambient monitoring is to evaluate trends in water quality due to changes of use and development in the area. The sites selected as part of this grant were chosen because they were not part of the Squaxin ambient sampling, and because each is a significant drainage in a sensitive area or has/had some development in the area. Sampling started in March 2013 and will continue to the end of the grant. DER1 was segmented later in the year due to some elevated results. This will continue in 2015. PP003 had some slightly elevated results, but it is low enough that it may not be worth checking.



Figure 2. Tier 1 Ambient Sampling in Mason County

Table 2. Tier 1 Ambient Sampling in Mason County. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0.5-0.75	0	0.75-1	0.01-0.1	0	0.25-0.5	0	0.01-0.1	0	0	0	0	0.01-0.1	0	0	0	0.5-0.75	0	0.25-0.5	0	Geometric Mean
Site	1/29/2014	2/11/2014	2/26/2014	3/3/2014	3/31/2014	4/14/2014	4/23/2014	5/13/2014	5/27/2014	6/9/2014	6/10/2014	6/24/2014	7/9/2014	7/23/2014	8/6/2014	8/25/2014	9/9/2014	10/16/2014	11/13/2014	11/24/2014	12/2/2014	
19		28		13		4		3		18			56		89		77	40	15		33	22
DER1		27		85		3		20		83			240		120		1500	16	1	39	7	34
LYN1		28		39		10		9		51			36		45		11	7	5.5		24	18
NB-022		1		20		1		19		44						39		8	2			8
PBW1		12		23		16		3.5		5			3		11		10	10	1		2	6
NB-023		18		12		1		16		99				320	69	48		2	6			18
PP-001		8		43		28		4		4			39		29		36	6	9		4	13
PP-002		1				3		3			20				18		19					6
PP-003		60.5		41		100		110		52			100		43		52	130	13		8	49
RAU1		32		100		26		77											51		37	48
SH-001	33		5		14		9		27			36									15	16
TL-001		8		9		2		5		17			45		91		41	21	1		12	12
TL-002																				36		36
TL-003																				69		69

Tier II Sampling- North Bay

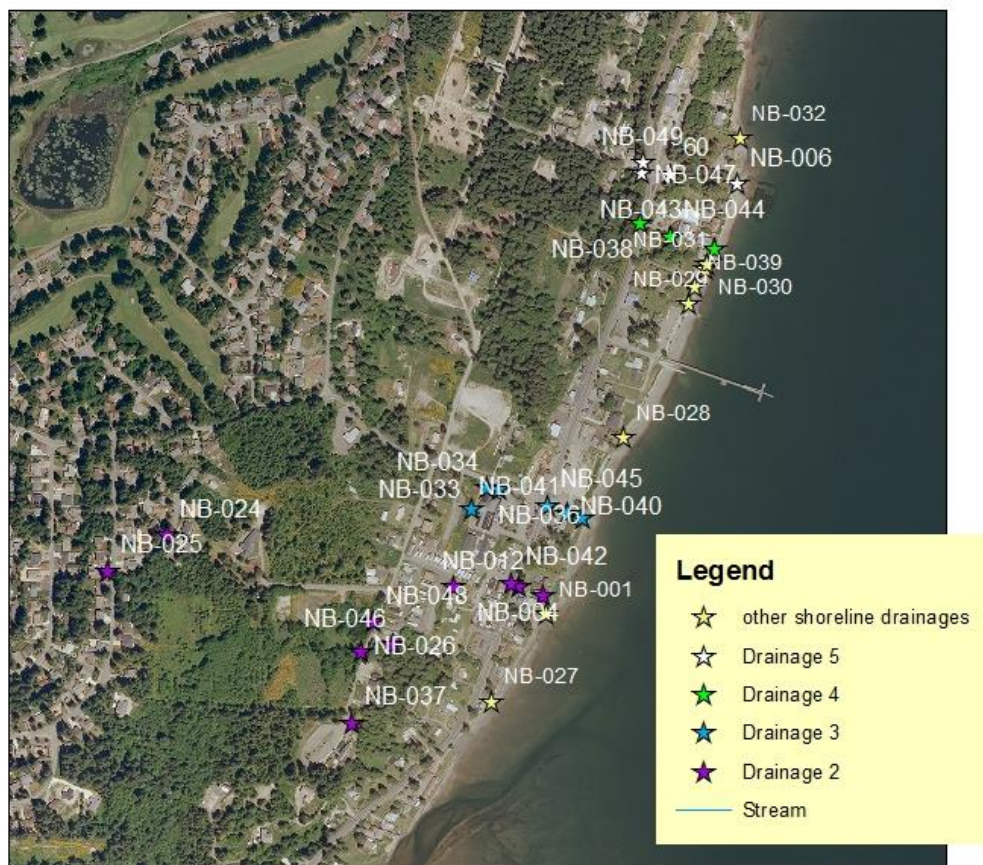


Figure 3. Downtown Allyn Drainages

The North Bay Growing Area was selected to be part of shorter term Tier II grant work because known water quality problems in the area have limited shellfish harvesting. Much of the upper North Bay Growing Area waterfront was sewered between 1998 and 2001 leading to some improvements in water quality. However, with the small town of Allyn right next to the shellfish harvesting area water quality is variable and potential contamination sources are many. Potential bacteriological sources include septic systems in the upland area, pet waste, and urban wildlife. Stormwater and impervious surfaces add to the problem; Impervious surfaces do not provide the level of treatment soil does and storm water drainages create easy route for bacteriological pollution to reach marine waters.

A full scale Tier II plan for the area was finalized in December 2013 and work really got under way in spring of 2014. The work consisted of a combination of sampling and education. The summary of sample results and follow up work, organized by drainage, is on pages 8 though 14. The education results are in the North Bay Outreach and Education section.

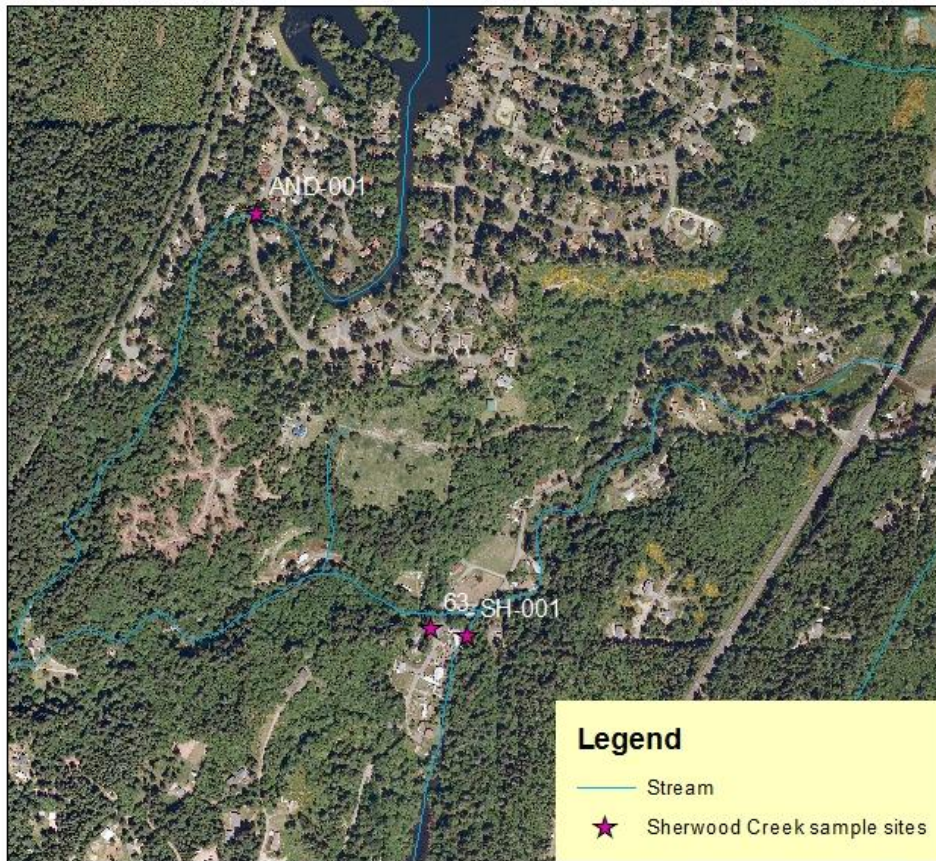


Figure 4. Anderson tributary to Sherwood Creek and North Bay

Table 3. Sherwood Creek drainage results. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0	0.01-0.1	0.25-0.5	0	0.01-0.1	0.01-0.1	0.25-0.5	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	4/23/2014	5/12/2014	5/27/2014	6/24/2014	11/24/2014	
AND-001					33				33
SH-001	33	5	14	9	27	36	15		15
63	88	2	6.5	29			27	21	24

Sherwood and Anderson Creek results had a geometric means below the water quality standard of 100 colonies/ 100 mL water. Due to the stations meeting water quality standards sampling will be discontinued.



Figure 5. Drainage 1 and 2, North Bay shoreline culvert NB-002.

Table 4. Drainage 2, North Bay shoreline culvert NB-002. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0	0.01-0.1	0.25-0.5	0.01-0.1	0.01-0.1	0.01-0.1	0.01-0.1	0	0	0.01-0.1	0.5-0.75	0	0.01-0.1	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	4/14/2014	5/12/2014	5/27/2014	6/9/2014	6/18/2014	6/24/2014	7/23/2014	10/16/2014	11/24/2014	12/2/2014	12/17/2014	
D1															
NB-001	21	5	1			27		3	10						7
NB-025															
NB-024															
NB-037										740		1			27
NB-048												3			3
NB-026					7	52		160	220			4			35
NB-046												3			3
NB-012					3	110		15	43			96			29
NB-042										800					800
D2															
NB-004				2	7	52	5	4	21	1900	530	120	47	118	37
NB-002	24	3	230			48		90	56	1200					65

Drainage 1 results had a geometric means below the water quality standard of 100 colonies/ 100 mL water at the mouth of the drainage. The only site with multiple higher single results, NB-026, was taken from an undeveloped area and therefore is likely to be wildlife sources. Due to these results, sampling will be discontinued. Work will be focused on drainage 2. Mason County Public Health is conducting a dye test the sewer lines, pump chambers and catch basins in drainage 2 to determine if any sewer infrastructure is leaking.

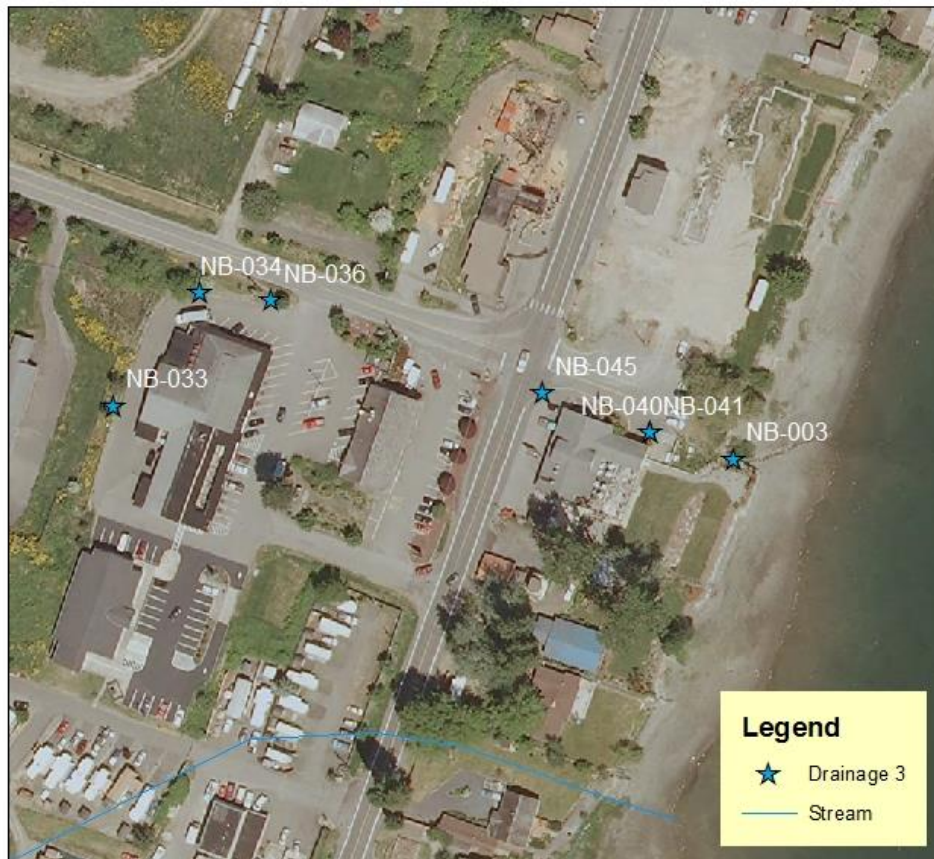


Figure 6. Drainage 3, North Bay shoreline culvert NB-003

Table 5. Drainage 3, North Bay shoreline culvert NB-003. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0	0.01-0.1	0	0.01-0.1	0.01-0.1	0.01-0.1	0.01-0.1	0.01-0.1	0.25-0.5	0	0.01-0.1	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	5/12/2014	5/27/2014	6/18/2014	6/24/2014	7/23/2014	10/16/2014	12/2/2014	12/17/2014		
NB-033				1									1
NB-034				1									1
NB-036					47	64							55
NB-045									560				560
NB-041								800					800
NB-040								800					800
NB-003	100	1	21		87	930	510	800	450	7	26.5		75

In Drainage 3 pollution shows up at the bottom of the drainage. During most of the year there is no flow from above Hwy 3 into the lower area. Sources of water for the lower area should be identified. A problem with dog walkers in the shopping plaza (upper drainage) was identified during the educational survey

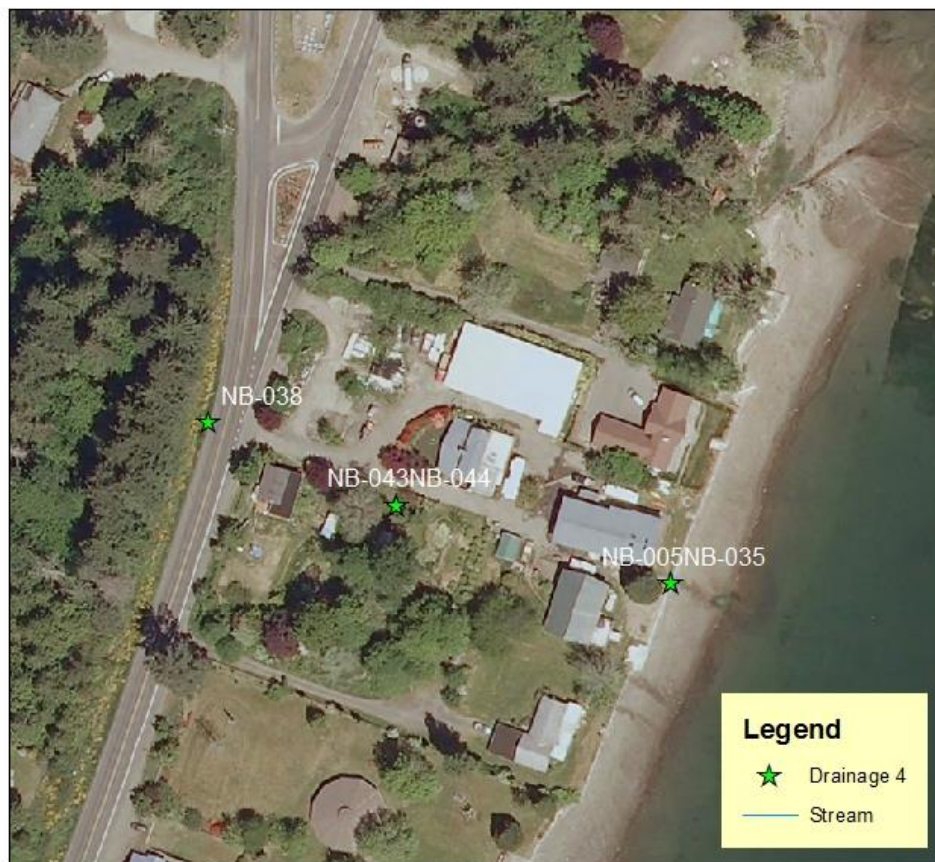


Figure 7. Drainage 4 North Bay grinder pump drainage from SR3 to NB005 (also 030 and 035?).

Table 6. Drainage 4: North Bay grinder pump drainage from SR3 to NB005 (also 030 and 035?). Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0	0.01-0.1	0.25-0.5	0.01-0.1	0.01-0.1	0.01-0.1	0.01-0.1	0	0	0.01-0.1	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	4/23/2014	5/27/2014	6/18/2014	6/24/2014	7/23/2014	8/25/2014	9/9/2014	12/17/2014	
NB-038								31				31
NB-043									10	4		6
NB-044									1	1		1
NB-005	450	1	160	330	29	10	4	47	16	100	7	29
NB-035				88	57	210	580	800	78		4	106

In Drainage 5 a grinder pump failure draining to NB-005 was corrected in May. The water quality appears to have been improved since then so sampling of all sites except NB-035 will be discontinued. NB035- is an isolated bulkhead drainage. Follow up is needed with the owner to discover what NB035 drains from.



Figure 8. Drainage 5 to NB-006 at shoreline via creek under WWTP station at SR3 and North Bay Rd.

Table 7. Drainage 5 to NB-006 at shoreline via creek under WWTP station at SR3 and North Bay Rd. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.5-0.75	0	0.01-0.1	0	0.25-0.5	0	0.01-0.1	0	0.01-0.1	0.01-0.1	0	0	0.25-0.5	0.25-0.5	0	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	4/14/2014	4/23/2014	5/13/2014	5/27/2014	6/9/2014	6/18/2014	7/23/2014	8/6/2014	8/25/2014	10/16/2014	11/24/2014	12/2/2014	
NB-049														63		63
NB-047															8	8
60				1		5	12	7		1100	120	72	37	14	8	21
NB-006	28	2	11		21				82					12		15

Drainage 7 results had a geometric means below the water quality standard of 100 colonies/ 100 mL water at the mouth. Due to the stations meeting water quality standards sampling will be discontinued.

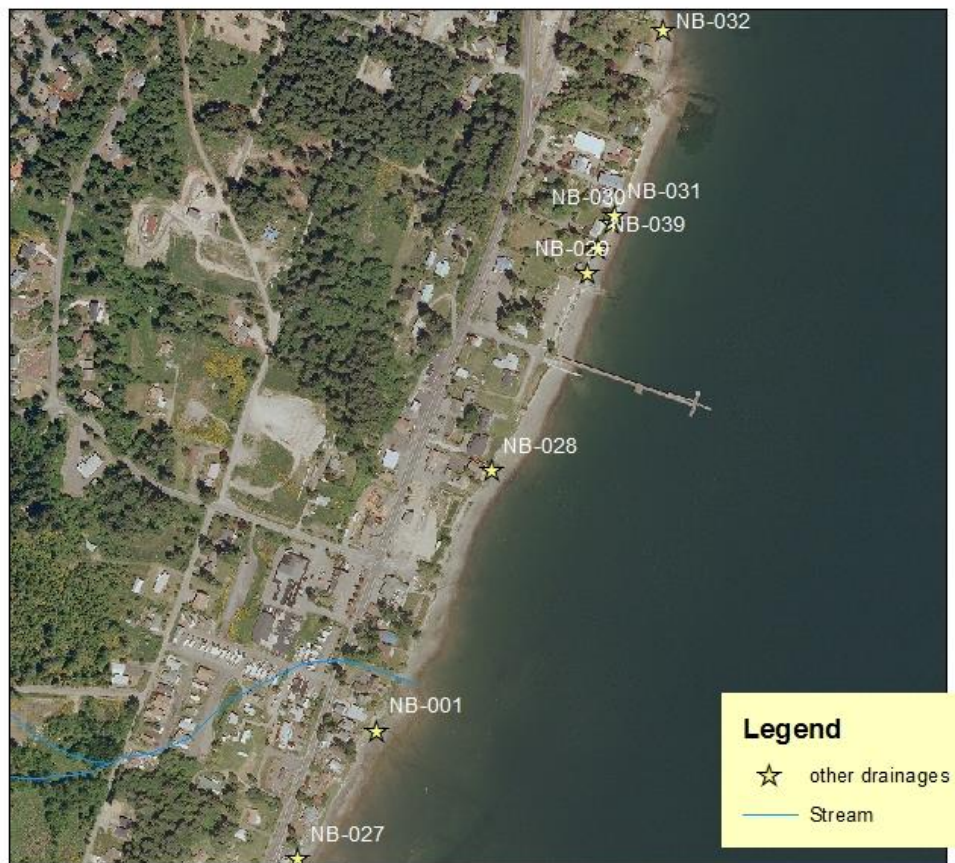


Figure 9. Other North Bay drainages.

See next page for tables for other North Bay drainages.

**Table 8. Other North Bay drainages.
Fecal coliform bacteria
(# of colonies per 100 ml).**

Precip. (inches)	0.5- 0.75	0	0.01- 0.1	0.25- 0.5	0.01- 0.1	0.01- 0.1	0.01- 0.1	0	0	0.01- 0.1	Geometric Mean
Site	1/29/2014	2/26/2014	3/31/2014	4/23/2014	5/27/2014	6/18/2014	6/24/2014	8/25/2014	9/9/2014	12/17/2014	
NB-001	20.5	5	1		27	3	10				7
NB-007	45	1	7	3		31.5					8
NB-027	6	27	4		11	3	1				5
NB-029	33	1	2	120			800			1	14
NB-032	1	1	1	1		11					2
NB-039								23	9		14

NB-001, NB-007, NB-027, NB-032 and NB-039 isolated shoreline drainage.

NB-029 drains from the port park. Quite a bit of dog walking occurs in the park, so dog waste is the likely source of fecal coliform. Dog waste stations are already installed in the park. Signage and other educational material has now been provided in an effort to make further improvements to water quality.

North Bay Outreach and Education

In the spring and summer of 2014 an Environmental Health Specialist canvassed the downtown Allyn area to educate each property owner or renter on water quality issues particular to their property. Education for business owners included information about garbage storage to discourage urban wildlife, whereas the education for residents included information about picking up pet waste and landscaping to retain and infiltrate stormwater on their properties. Proper care of septic systems was addressed when relevant to the property .

ISSUES AND RESPONSES

During the door-to-door education campaign, the larger community issues noted were dog waste and stormwater runoff.

Dog walkers (locals and tourists) use Allyn Waterfront Park, the parking lots and beach from NW Kayak to The Boathouse (formerly Lennard K's) and the mini park area of the Allyn shopping center. Two pet waste stations exist – one near the Allyn Waterfront Park park and one at the parking-lot-end of the dock; also one at Kayak Park on the south end of town. NW Kayaks would like a pet waste station but worry about the cost and responsibility. A pet waste station might also be useful at the Allyn Shopping center. Both the existing stations blend into the background. One suggestion was painting them to draw attention, or attach the laminated Scoop-the-Poop posters. Posters were provided for this purpose. Educational brochures were also provided for areas with kiosks. Some of the dog walking areas did have variable water quality, so additional stations and enhancement of existing stations may result in improved water quality.

Three properties expressed interest in a stormwater control project, St. Hughes church, Lutheran church and NW Kayaks. St. Hughes and Lutheran have been put in touch with the CD. NW Kayaks does not own the property it expressed an interest in.

A community workshop was held to provide additional education about garbage, pet waste, stormwater and septic issues.

Tier II- Oakland Bay Shoreline

Oakland Bay shoreline was not in the original scope of work for the grant, but it was added after Steering Committee discussions. This is a continuation of the Oakland Bay Clean Water District shoreline sampling supported under other grant funding that has concluded. The goal of this sampling plan is to survey one-third of the Oakland Bay Clean Water District shoreline every year and to sample all the culverts, bulkhead drains, natural drainages and rapidly flowing seeps in the survey area. Because the number of sample sites is so large, the goal for number of samples per site is small. The goal is to sample at least twice at each sample site: once in wet weather and once in dry weather. The northernmost section was sampled in 2014. Surveys of the sites with high results began at the beginning of 2014. The sites with high results are surveyed for water quality problems and issues addressed either through education or dye traces, if necessary. Additional work was done on shoreline investigations, but due to staffing changes the work needs to be reviewed before reportin



Figure 10. North Hwy 3 along Oakland Bay



Figure 11. South Hwy 3 along Oakland Bay

Table 9. Oakland Bay along Highway 3. See

Figure 10 and Figure 11. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0	0	0.5-0.75	0.01-0.1	0	0.01-0.1	0.1-0.25	0	0.25-0.5	0	0	0.01-0.1	0	0	0	0	0	0	0.1-0.25	0	0	0.25-0.5	0.75-1	0	Geometric Mean excluding rain event
Site	2/3/2014	3/12/2014	3/17/2014	3/18/2014	3/24/2014	4/1/2014	4/2/2014	4/21/2014	4/28/2014	5/20/2014	6/10/2014	6/17/2014	7/15/2014	7/16/2014	7/29/2014	8/5/2014	8/20/2014	8/27/2014	9/3/2014	9/4/2014	9/15/2014	10/21/2014	10/22/2014	12/3/2014	
OBC-002	1	7							14.5			200				185		86							26
OBC-003	1	1							2																1
OBC-008		6																							6
OBC-009	6			17							92	61							39						29
OBC-010	1			1																					1
OBC-011	1			2																					1
OBC-012				4			99		28														69		30
OBC-013									1																1
OBC-014							43		730					40									2000	84	101
OBC-015	2			7	150																	150			24
OBC-016	32.5			9							17	79		15		76	80.5					140			39
OBC-017	1	170																							13
OBC-019			1						3			20		3						27					5
OBC-020			2									130		110	200		80				160	12			51
OBC-021				32				34				75		11						14					26
OBC-042	16																						1000		16
OBC-043			1						2			10										2			3
OBC-044	3							210																140	45
OBC-045	1			5																			800	190	10
OBC-050							1																		1
OBC-051							1																		1
OBC-052							1																		1
OBC-053							1																		1
OBC-054							1																		1
OBC-055							1																		1
OBC-056							1																		1
OBC-057							4																		4
OBC-058						11																			11
OBC-059						2																			2
OBC-060						1																			1
OBC-061						1																			1
OBC-062							1																		1
OBC-063			3						11																6
OBC-064			2						1																1
OBC-068							6																		6
OBC-069							1																		1
OBC-071			4						47			2		4			6					8			6
OBC-081								12											990				560	140	118
OBC-082						1																			1



Figure 12. New Shoreline Survey

Table 10. New Shoreline Survey. Fecal coliform bacteria (# of colonies per 100 ml). OBY-035 is the only site needing investigation with results not influenced by flushing. OBY-102 and 103 were investigated this year. Both drainages are influenced only by wildlife. OBY-104 was difficult to sample due to tidal influence, and was also influenced only by wildlife . Other sites with results influenced by flushing: OBY 073 should be investigated in 2015 and confirmation sampling done at OBY-033, 39,80,81,82, 105.

Precip. (inches)	1-1.5	0.5-0.75	0.01-0.1	0.01-0.1	0	0	0	0.01-0.1	0	0	0	0	0	0	0	0	0	0.01-0.1	0.25-0.5	0.25-0.5	0.25-0.5	0.01-0.1	0	0	0	Geometric Mean		
site	2/12/2014	3/4/2014	3/19/2014	4/16/2014	5/12/2014	6/9/2014	6/10/2014	6/17/2014	6/23/2014	7/21/2014	7/22/2014	7/28/2014	8/4/2014	8/5/2014	8/19/2014	9/8/2014	9/16/2014	9/22/2014	10/1/2014	10/20/2014	10/21/2014	11/3/2014	11/5/2014	11/18/2014	11/19/2014	12/3/2014	Geometric Mean	
OBY-016										81													1				9	
OBY-021														1								1						1
OBY-025											53			16								13						22
OBY-026											1			1								1						1
OBY-027														1									32					6
OBY-028																							4					4
OBY-029																							2					2
OBY-031							185					6																33
OBY-032												53											31					41
OBY-033																			22		230							71
OBY-035										420									315		26							151
OBY-036										165																		165
OBY-038												13									2							5
OBY-039												4									250							32
OBY-040												4									5							4
OBY-070																							91					91
OBY-071												39											4					12
OBY-073							5	1500														1500						224
OBY-075							1															14						4
OBY-077																						33						33
OBY-079										2																		2
OBY-080										56												270						123
OBY-081										78											540							205
OBY-082										92											230							145
OBY-085												31										14						21
OBY-095										82											32							51
OBY-096											8												6	8				7
OBY-097											29													7				14
OBY-098											40													37				38
OBY-099											5													37				14
OBY-100												1																1
OBY-102													165				235		570	74								201
OBY-103														330					150	73								153
OBY-104													220	15														57
OBY-105																						230						230
OBY-106																96												96

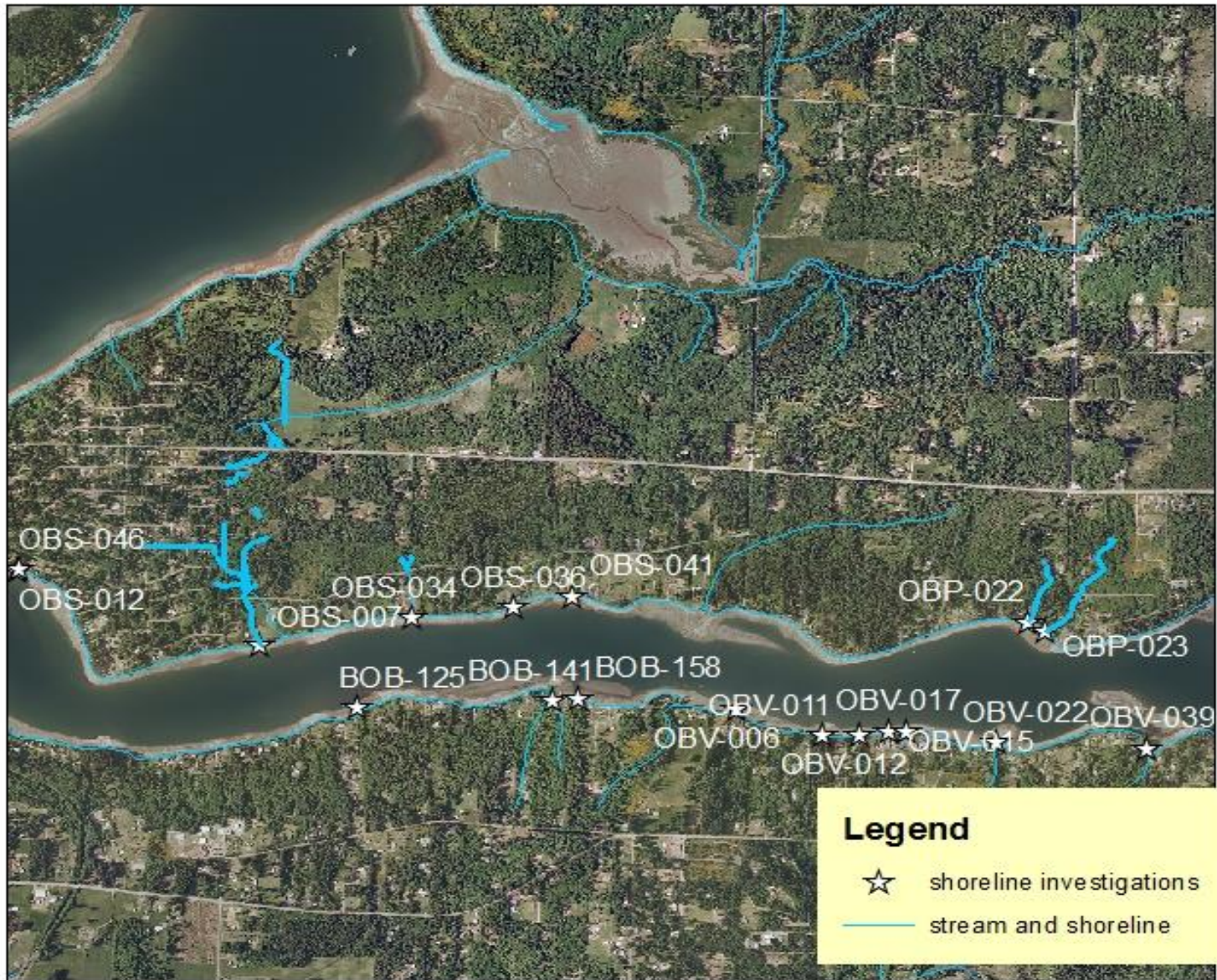


Figure 13. Shoreline Investigation-Overview, see next pages.

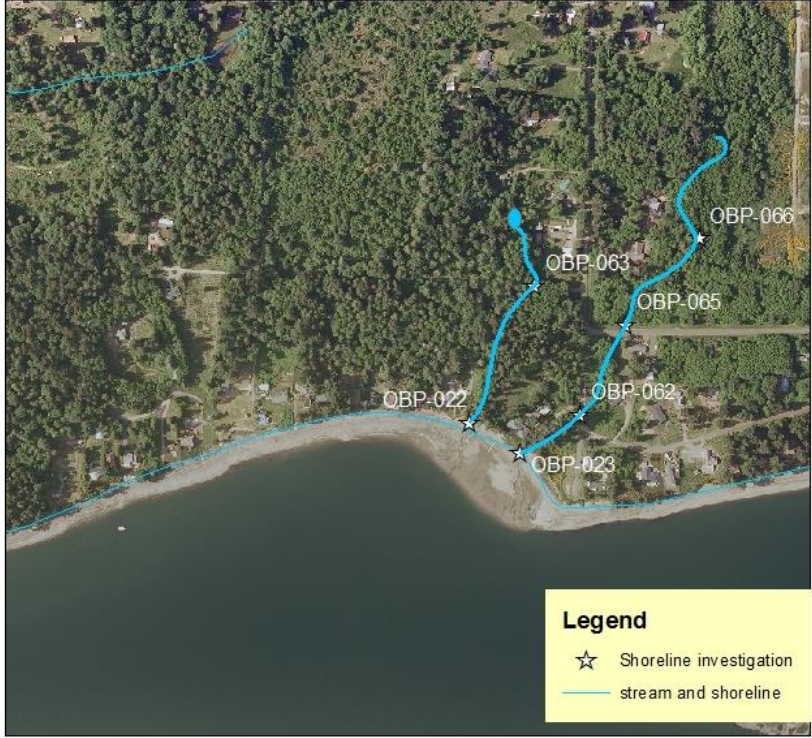


Figure 14. Shoreline Investigation-Focus.

Table 11. OBP-022 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.25-0.5	0	0	0	Geometric Mean
Site	4/23/2014	7/8/2014	8/6/2014	8/18/2014	
OBP-063		460	290	180	288
OBP-022	250	59	590	150	190

Results are high OBP-063, a site that is draining a undeveloped wooded area. Based on the results, wildlife is the likely source.

Table 12. OBP-023 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip (inches)	0.25-0.5	0	0	0	0	0	Geometric Mean
Site	4/23/2014	7/8/2014	8/6/2014	8/18/2014	11/18/2014	12/3/2014	
OBP-066					20		20
OBP-065					28	100	53
OBP-062		190	680	65	120	14	107
OBP-023	170	415	920	170		6	147

A Sanitary survey was completed at parcel 320245302020 (directly above OBP-062). A dye test has been started.

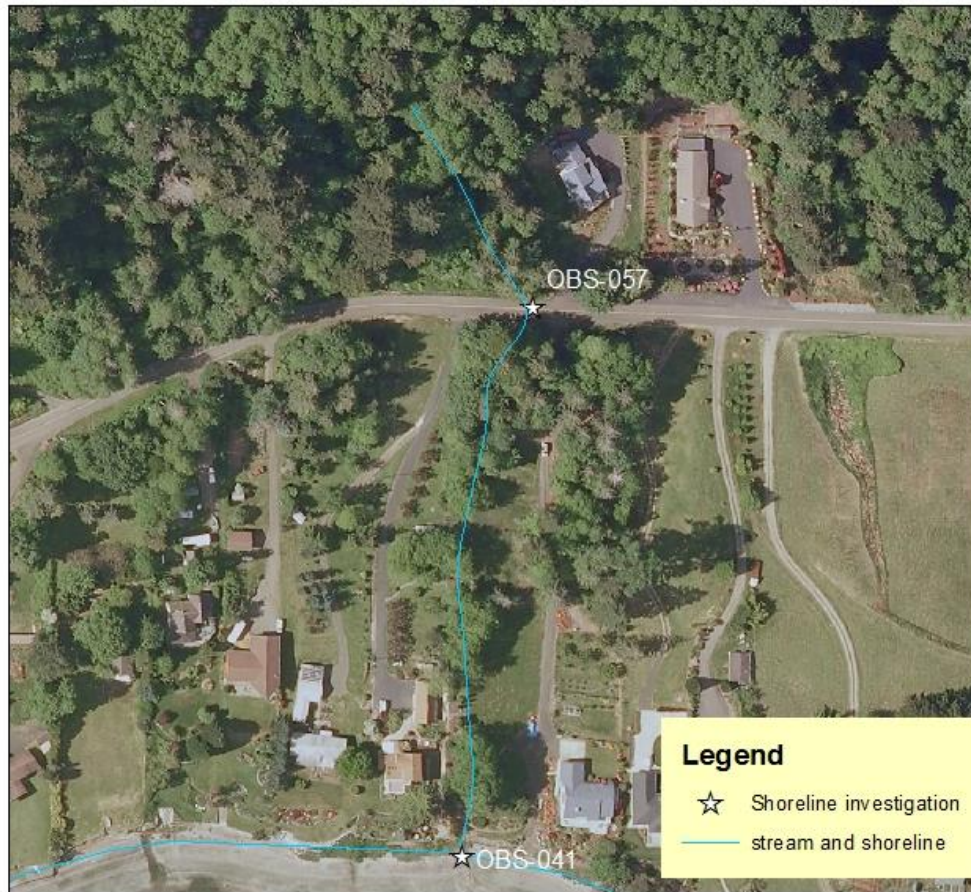


Figure 15. OBS-041 and upstream.

Table 13. OBS-041 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0.01-0.1	0	0	0	0	Geometric Mean
Site	4/16/2014	7/7/2014	8/5/2014	8/18/2014	11/17/2014	
OBS-057		21	12	21	110	28
OBS-041	275	190	450	430	28	195

The septic system at 320221400060 is a FAST that did not have the chlorinator running. The owner was educated about proper function of the system and an O & M provider got the chlorinator on-line so the system now works properly.



Figure 16. OBS-034 and upstream.

Table 14. OBS-034 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0	0	0	0	Geometric Mean
Site	7/7/2014	8/5/2014	8/18/2014	11/17/2014	
OBS-056	120	91	110	10	59
OBS-034	33	1200	100	35	109

Sample results show distinctly higher fecal coliform counts below the septic system only once in four sampling events. Wildlife is the likely source of pollution.

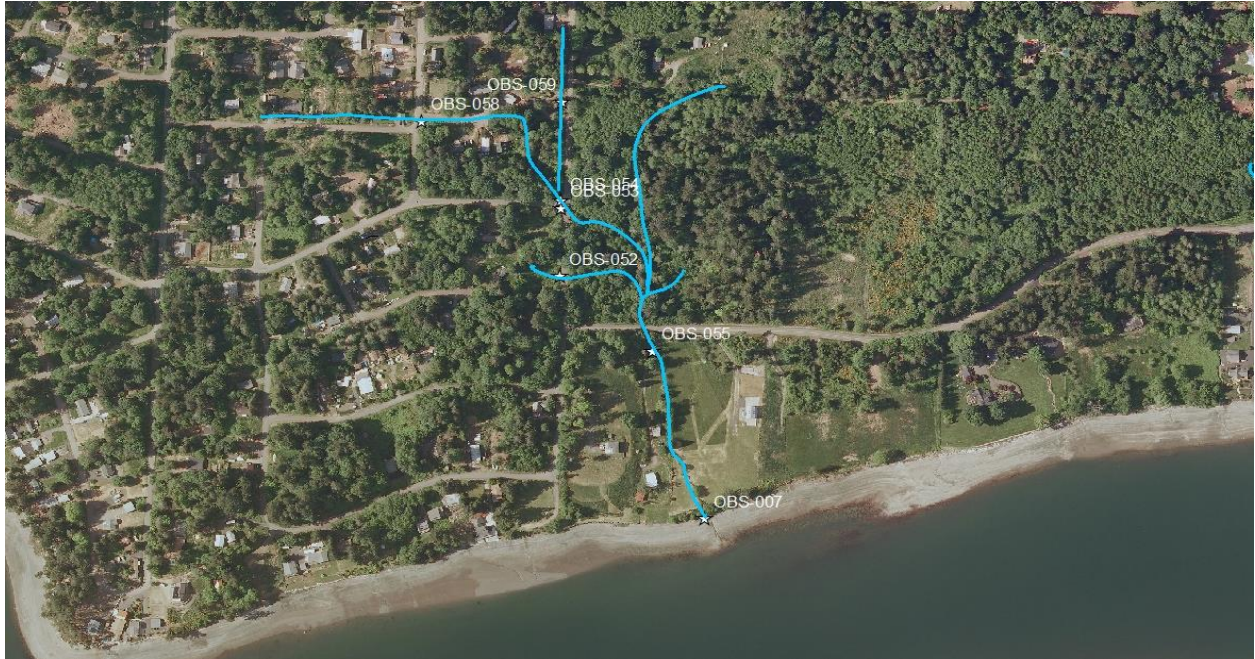


Figure 17. OBS-007 and upstream.

Table 15. OBS-007 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	0	0.25-0.5	0	0	0.01-0.1	0	0	Geometric Mean
Site	4/1/2014	5/5/2014	5/14/2014	5/28/2014	6/17/2014	11/17/2014	12/2/2014	
OBS-059							3	3
OBS-058							67	67
OBS-054		205	420	445	790	23	255	237
OBS-053		420	240			10	10	56
OBS-052		100						100
OBS-055			260	55	92	68	1	39
OBS-007	310		240	150	200	27	33	112

Pollution source appears to be above OBS-054. Work will focus on that area in 2015.

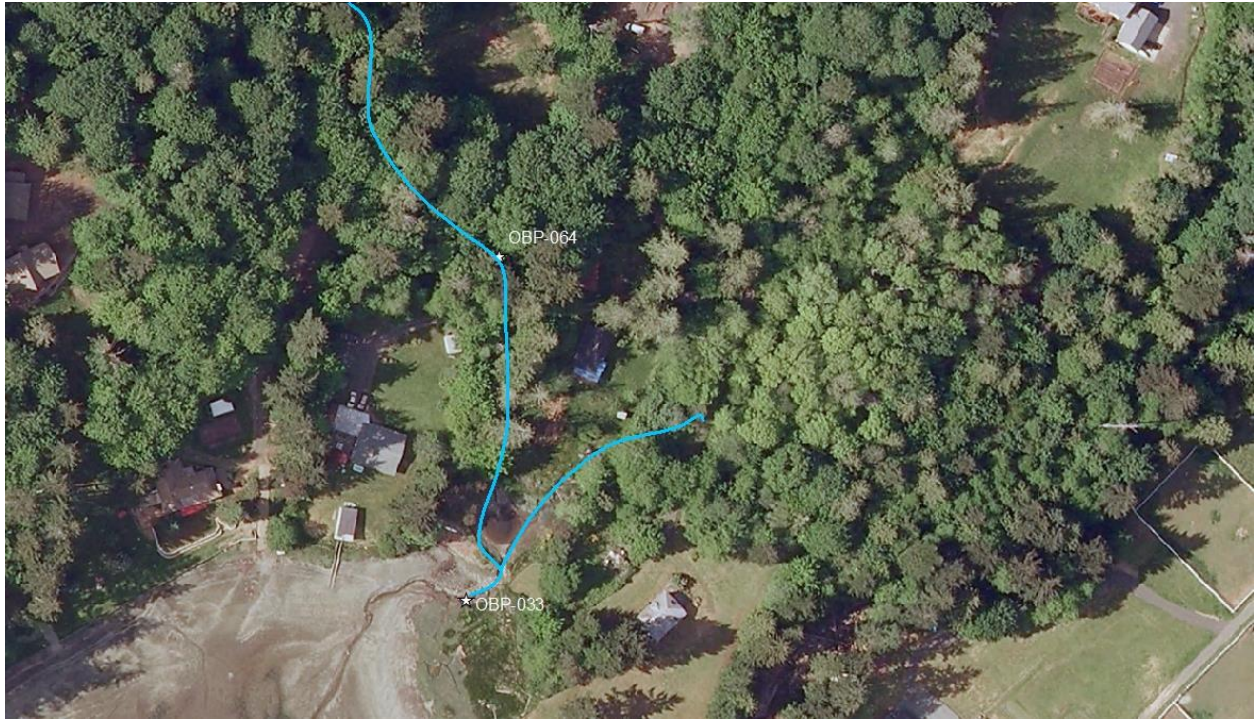


Figure 18. OBP-033 and upstream.

Table 16. OBP-033 and upstream. Fecal coliform bacteria (# of colonies per 100 ml).

Precip.(inches)	0.25-0.5	0	0	0	0	Geometric Mean
Site	4/23/2014	7/8/2014	8/6/2014	8/18/2014	11/19/2014	
OBP-064		5	6	17	79	14
OBP-033	290	350	450	49	23	139

Both residences are vacation houses, in summer of 2015 the drainages should be sampled separately and dye test if needed.

Tier II Chapman Cove

Chapman Cove was a separate task amended to the grant in 2012. Sampling started in October 2012 and will continue to the end of the grant in a modified form. As a result of the sampling from 2013, the Mason Conservation District is working with two of the farms in the area to create farm plans. This work is preliminary to some additional contacts to be made.



Figure 19. Uncle Johns Creek.

Table 17. Uncle Johns Creek. Fecal coliform bacteria (# of colonies per 100 ml).

Precip. (inches)	1-1.5	0.5-0.75	0.01-0.1	0.25-0.5	0	0	0	0	0	0	0.01-0.1	0.01-0.1	0	Geometric Mean
Site	2/12/2014	3/4/2014	4/16/2014	4/17/2014	5/12/2014	8/19/2014	8/20/2014	8/26/2014	9/8/2014	9/22/2014	9/30/2014	11/5/2014	12/1/2014	
UJC-017			17			31		83	110	120	85	84	13.5	52
UJC-023	21					36		84	37	280	39	65	15	47
UJC-024					11	64		49	28	43	140	40	28	40
UJC-025					120	60		48	10	390	52	35	15	50
UJC-026	200	430										83	28	119
UJC-033	100	120					65	52	17	73	33	72	24	52
UJC-035													18	18
UJC-038				280								55	27	75
UJC-039												51		51
UJC-040							110	130		12			1	20
UJC-041							44		230	260				138
UJC-042										85				85
UJC-043							79	190	160	300	185	73	16	107
UJC-055							63		33	37	64	63	6	35
UJC-056	130	320	10				61	65	48	36	47			58
UJC-058					43								8	19

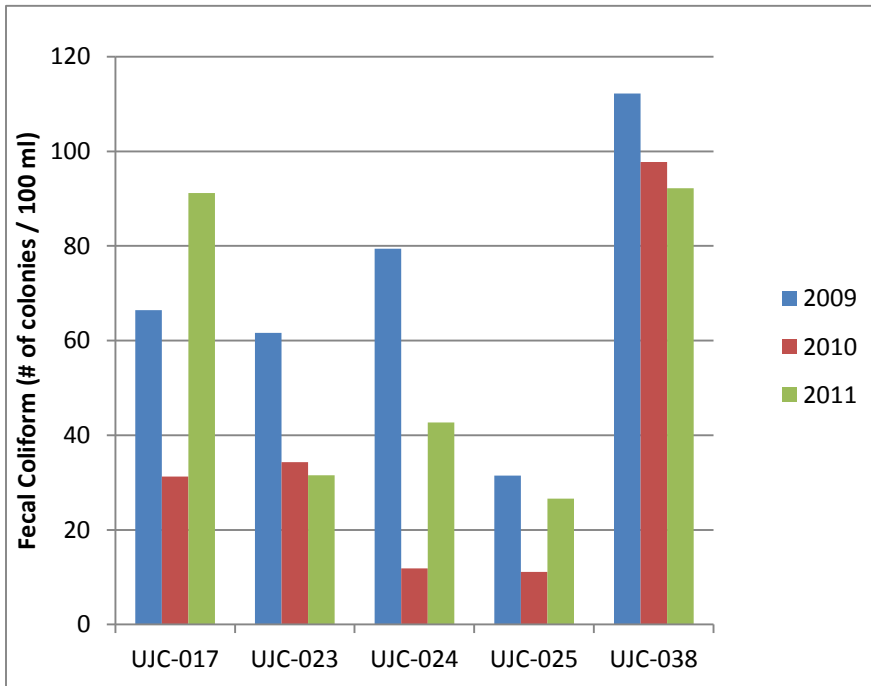


Figure 20. Uncle Johns Creek data year by year comparison with *multiple tube fermentation method*, 2009-2011, geometric mean of fecal coliform concentration.

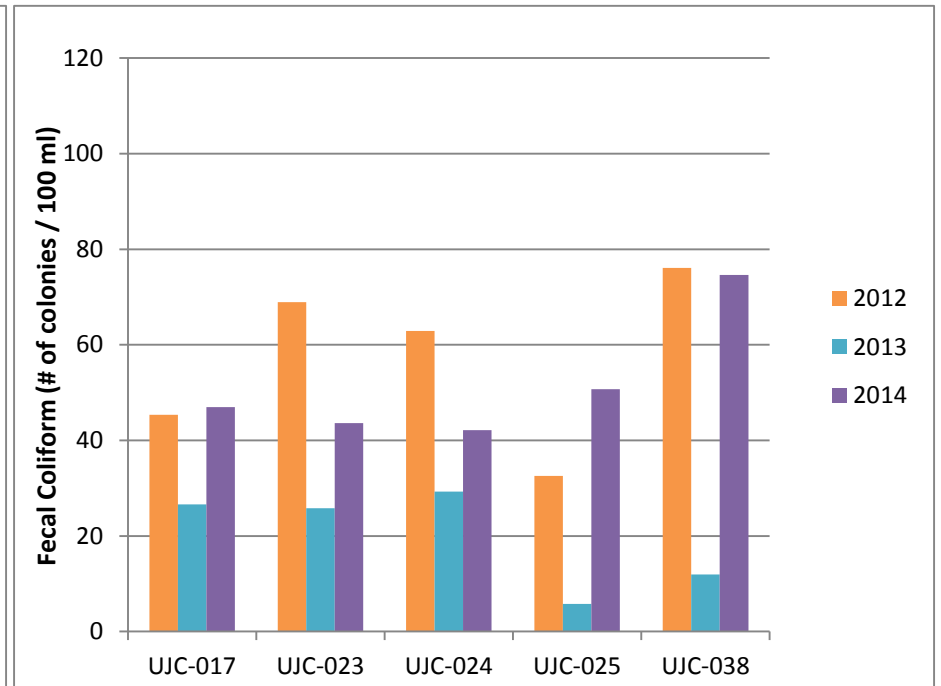


Figure 21. Uncle Johns Creek- *membrane filtration*, 2012-2014, geometric mean of fecal coliform concentration.

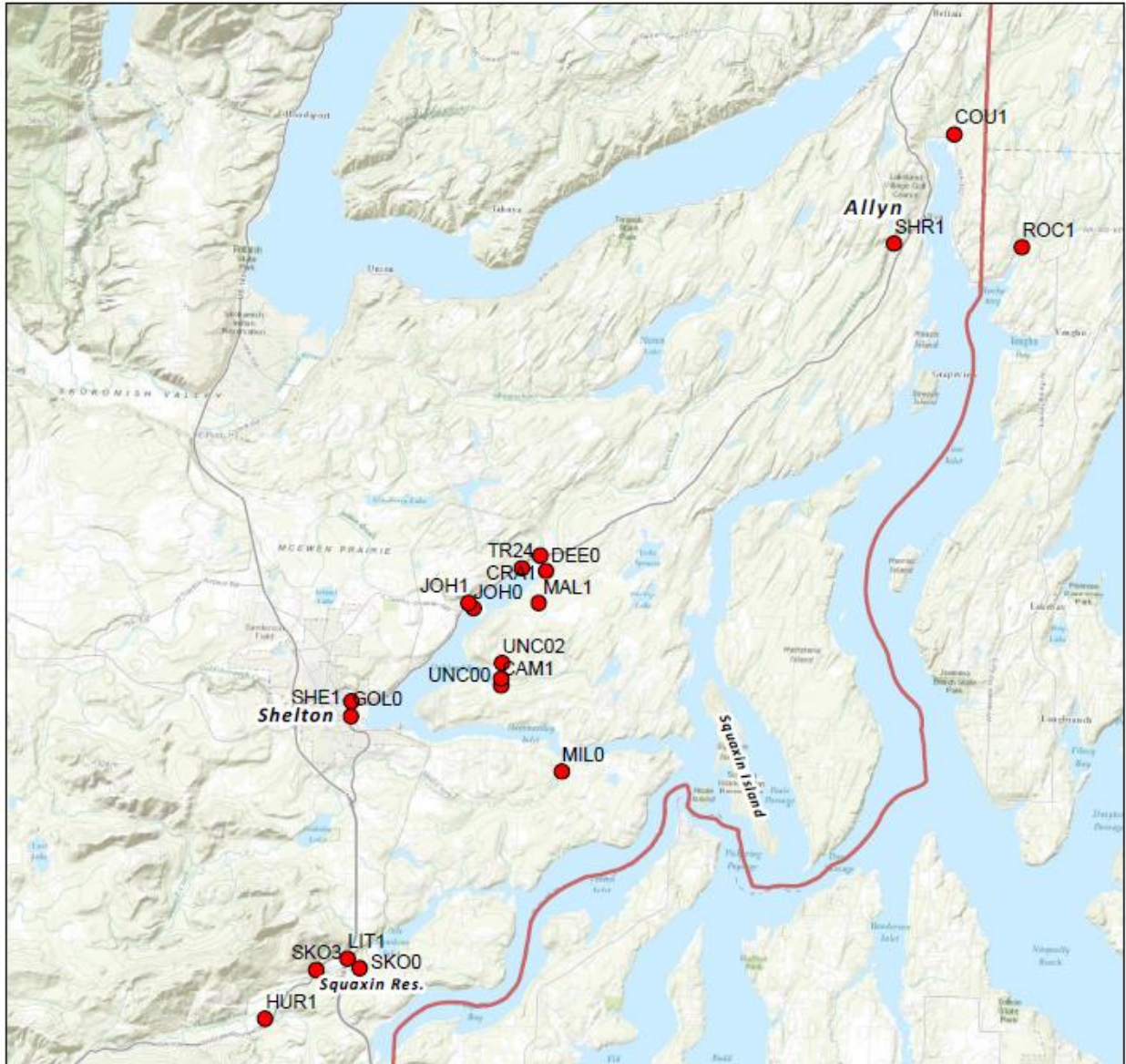
Results appear middle of the range for 2014.

McLane Cove

Sampling work was concluded at the end of 2013. This year, in addition to the septic rebate offered and the educational work, two farms were encouraged to make contact with the Mason CD for farm waste management advice and assistance.

Squaxin Island Tribe Water Data

The Squaxin Island Tribe quality assurance project plan uses the marine water quality standard for freshwater samples at the mouths of streams (Table 1, Figure 22, Konovksy 2009). Note that no sites meet the marine water quality standard, but all meet the state freshwater standard for geometric mean (Table 18). Six sites do not meet the freshwater standard for 90th percentile 2004-2012. Three did not meet the 90th percentile standard in 2013-2014 (ROC1, SHE1, and TR24). Some, though they meet the freshwater standard, show an up and down pattern over the years. Skookum Creek and its tributaries show a pattern of high bacterial counts in late summer, which causes the rolling 90th percentile to be higher than the standard (Figure 24, Figure 24). Several tributaries to Oakland Bay show that pattern (Figure 25, Figure 26). Also, Shelton Creek has showed regular high counts throughout the season, but it dropped to 160 colonies/ 100 ml last year (Table 18). Shelton Creek is urbanized. Sources of bacterial pollution in the watershed include sewage basins, human waste from homeless camps, pet waste, and garbage. We are in contact with the City of Shelton to address these sources. Sites that merit further investigation in the coming year include four in the Skookum watershed: Hurley Creek (HUR1), Little Creek (LIT1), and Skookum Creek (SKO0 and SKO3). Also, in Oakland Bay: Malaney Creek (MAL1) and Site TR24 (unnamed tributary), merit further investigation. Uncle Johns Creek (UNC00 and UNC02) still have high bacterial counts. Much parcel investigation has been done Mason County Public Health in the past year to identify sources of bacteria, but nothing stands out as a major source in Uncle Johns.



Squaxin Island Tribe Monitoring Locations 2013-2014

Legend

- Squaxin Island Tribe
- ▭ County Boundary

0 1.25 2.5 5 Miles



Figure 22. Squaxin Island Tribe ambient sampling at the mouth of eighteen creeks. See inset details on the next page.

**Detail for Figure 22
on previous page**

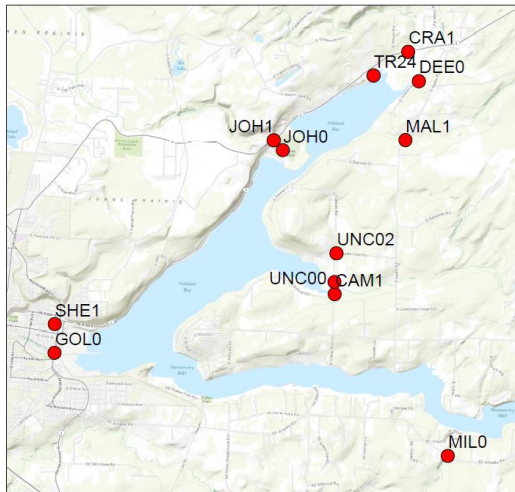
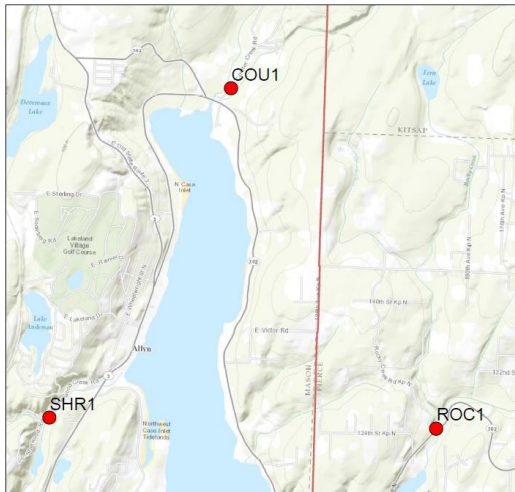
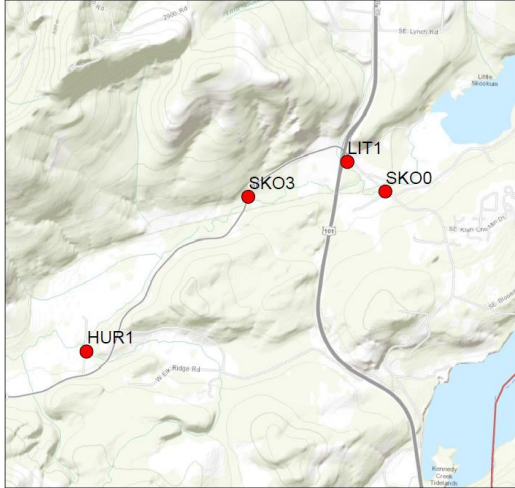


Table 18. Squaxin Island Tribe ambient water quality monitoring at the mouths of eighteen creeks. Some sites have no data for 2004-2012, because sampling only started at the beginning of this grant (late 2012). Sites in bold have recent high bacterial counts. Fecal coliform bacteria (# of colonies per 100 ml).

		2004-2012	2013	2014	2004-2012	2013	2014
	Site	Geometric Mean			90th Percentile		
Campbell 1	CAM1	22	15	31	142	54	107
Coulter 1	COU1		11	17		55	52
Cranberry 0/1	CRA0/1	38	12	10	157	85	52
Deer 1	DEE0	22	21	20	113	102	93
Goldsborough 0	GOL0	27	29	26	120	100	88
Hurley 1	HUR1	46	12	20	279	72	155
Johns 0/1	JOH 0/1	14	9	15	59	31	44
Little 1	LIT1	32	10	22	185	94	125
Malaney 1	MAL1	28	17	21	172	131	128
Mill 0	MIL0	17	12	32	70	25	152
Rock 1	ROC1		21	18		214	58
Shelton 1	SHE1	71	63	53	449	340	140
Sherwood 1	SHR1		16	18		59	39
Skookum 0	SKO0	45	26	41	275	56	156
Skookum 3	SKO3	45	28	36	231	108	89
TR24	TR24	69	25	28	1012	261	372
Uncle Johns 0	UNC00	55	21	42	324	72	181
Uncle Johns 2	UNC02		17	36		65	125

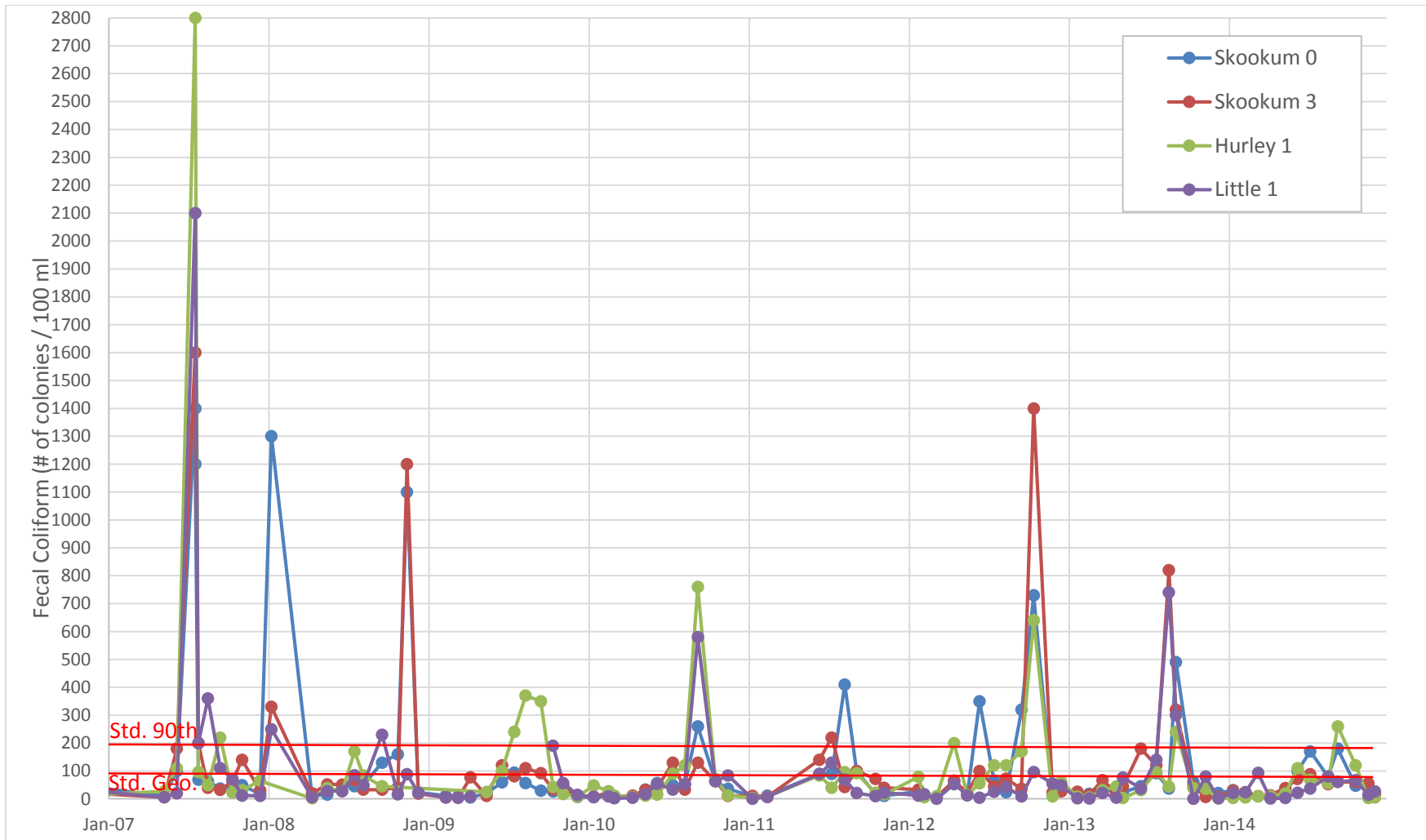


Figure 23. Time series of fecal coliform bacteria concentration, 2007-2014, for four creeks in the Skookum watershed, sampled by the Squaxin Island Tribe. Red lines mark the state freshwater standard for geometric mean and 90th percentile.

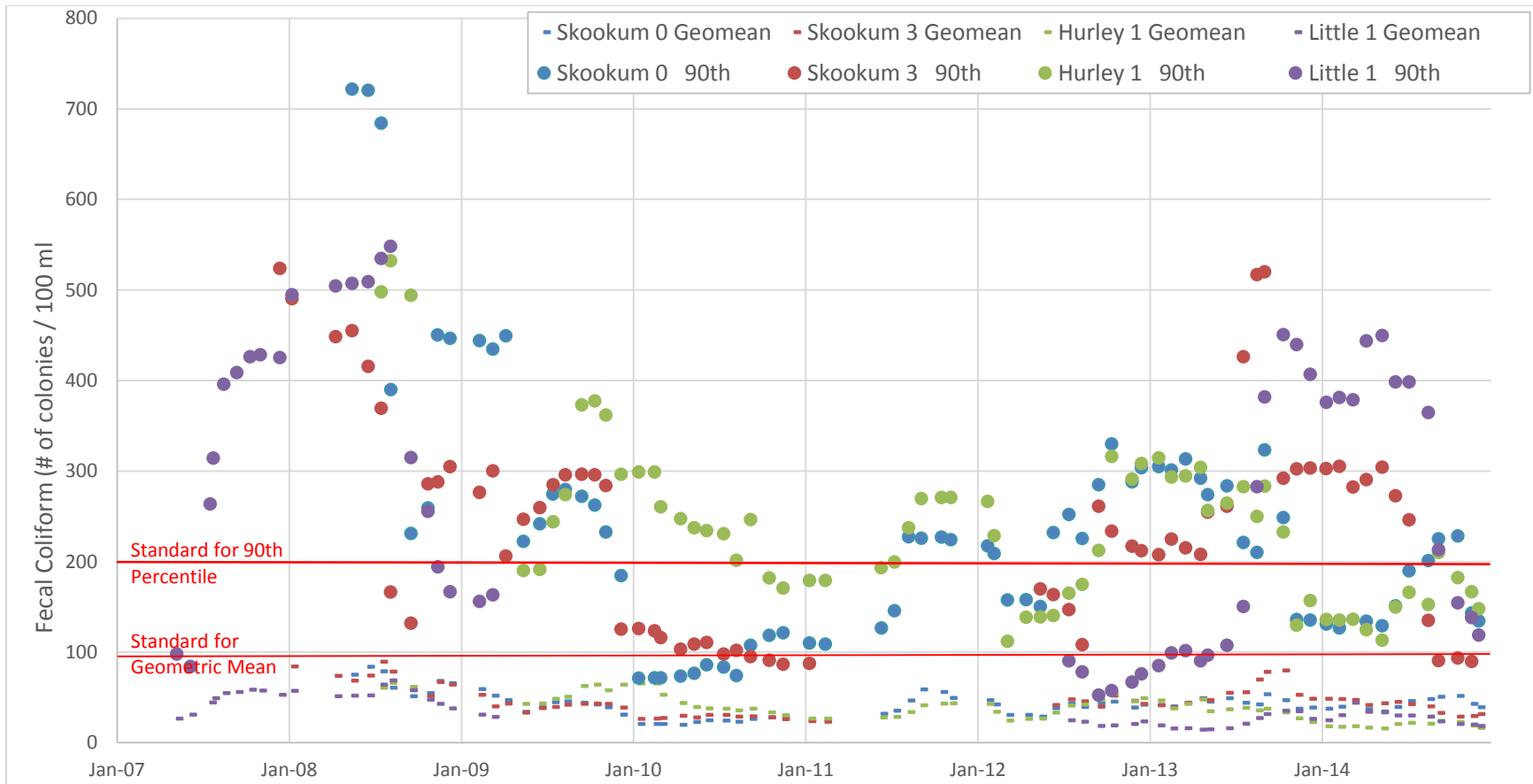


Figure 24. Rolling geometric mean and 90th percentile of fecal coliform concentration, 2007-2014, for four creeks in the Skookum watershed, sampled by the Squaxin Island Tribe. Red lines mark the state freshwater standard for geometric mean and 90th percentile.

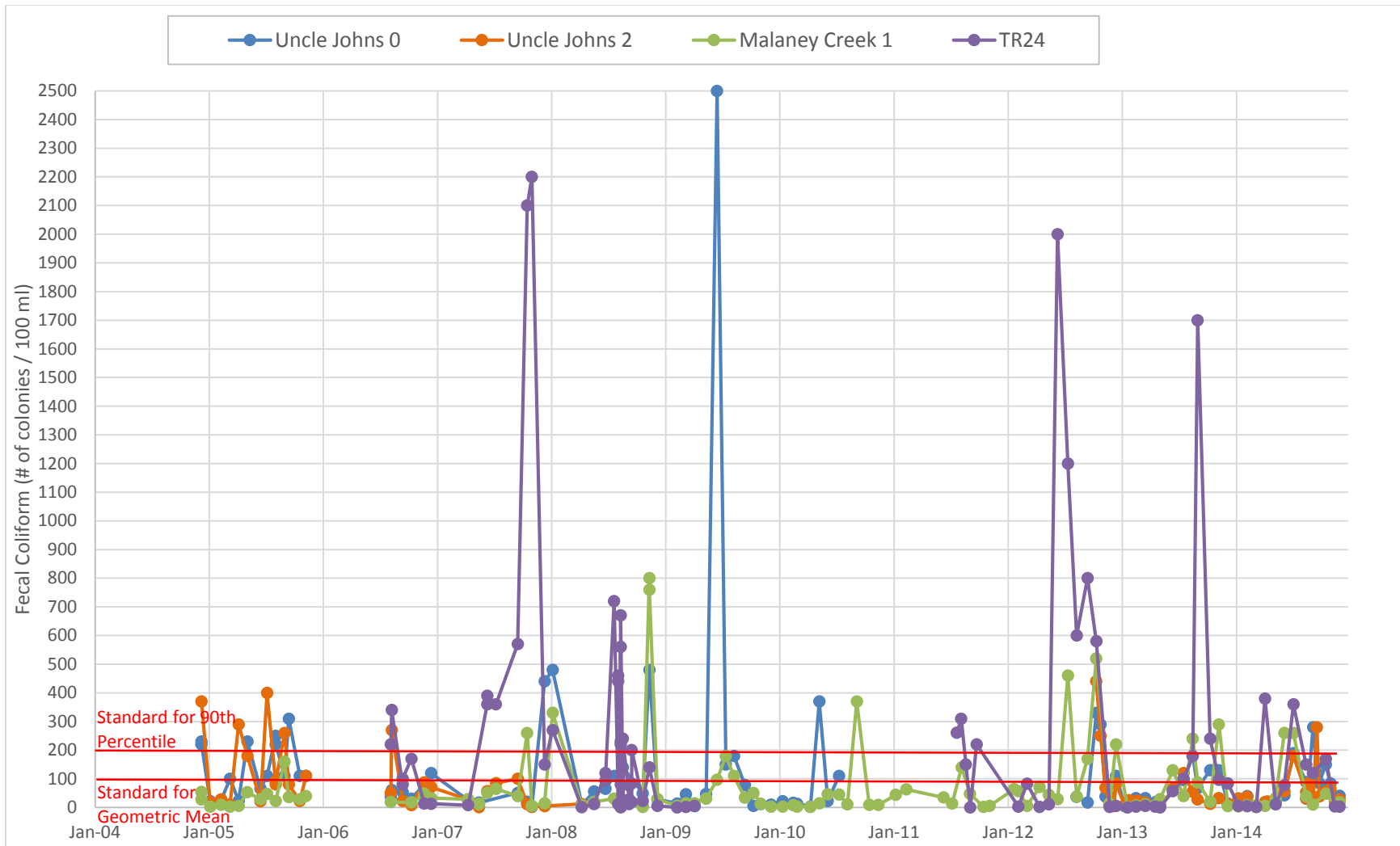


Figure 25. Time series of fecal coliform bacteria concentration, 2005-2014, for four creeks in the Oakland Bay watershed, sampled by the Squaxin Island Tribe. Red lines mark the state freshwater standard for geometric mean and 90th percentile

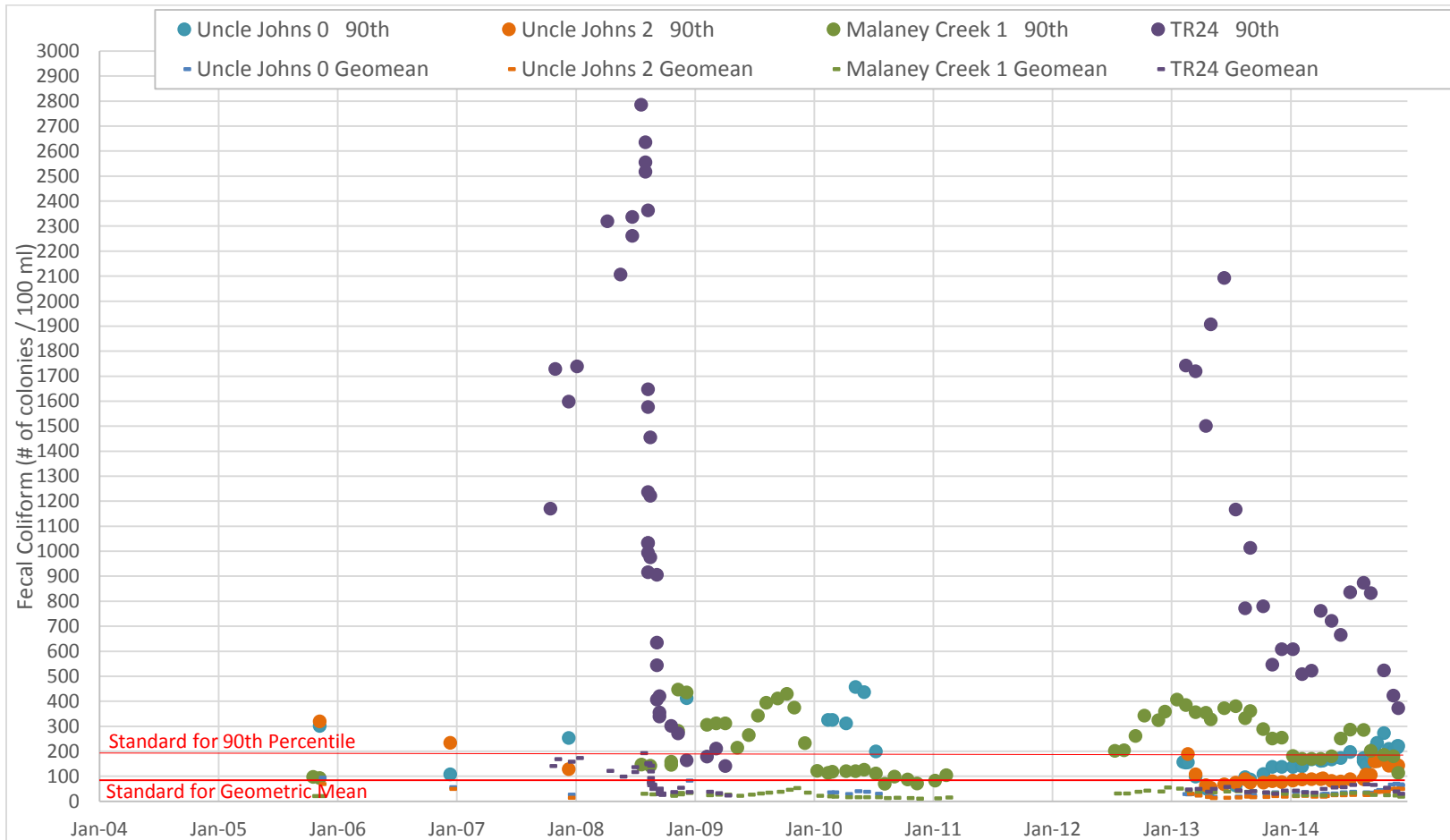


Figure 26. Rolling geometric mean and 90th percentile of fecal coliform concentration, 2007-2014, for four creeks in the Oakland Bay watershed, sampled by the Squaxin Island Tribe. Red lines mark the state freshwater standard for geometric mean and 90th percentile.

Mason County On-Site Septic Program

Mason County Onsite Septic Update 2014

Overall Activity

There are currently 25,910 septic systems in the county, and they now have records for 21,663 systems (94%). They do not have records for 4,245 systems, but they know the systems exist due to the presence of a household structure on the property (or the owner has paid for some maintenance). The county has a grant lined up to do record drawings for the remaining systems.

- The county gave out 270 septic system permits this year. Of those permits, 88 were repairs, and the rest were for new systems.
- Of the 270 permits, 21 of those were in Oakland Bay, and one of those was a shoreline system.
- Of those 270 permits, 46 of those were in Hood Canal, and 21 of Hood Canal permits were shoreline.
- All septic system records are available online.
- The county has changed their permitting, so that if they have a repair, they can show if it's from either maintenance activity, a complaint by a neighbor, or self-reporting.
- County homeowners had a total of 3,468,605 gallons of septic waste pumped in 2014. That is a 12.2% increase from the year before.

Education and Outreach

Seven septic system workshops were done with Washington State University Extension in 2014. The county also had a booth at Oysterfest and gave a presentation to the Pioneer Kiwanis. They participated in "May on Oakland Bay", where they handed out maintenance brochures, lists of septic system service providers, and operation and maintenance manuals. People could request their septic system records right there on the spot. The county sent out 17,133 maintenance reminders on every door direct mailing. In September, they sent out 1,516 reminders to people with proprietary systems.

Mclane Cove Rebates- The county offered maintenance rebates in the Mclane Cove area. They had only six homeowners respond, so they extended the rebate offer to the rest of the Puget Sound drainage inside Mason County. Pumpers got the word out to residents, and the county health department also sent a notice to Oakland Bay residents who have never had service. They have also used the rebates as an incentive tool when they were doing sanitary surveys that resulted in necessary maintenance.

Complaints and Failures

The county followed up on 79 sewage complaints for 2014. Forty-one of those complaints were within this grant area. If a complaint or any other inspection results in necessary repairs to the system, and the

owner does not comply, the county will post the site for non-occupancy. This happened twice this year: once in the Phillips Lake area, and once near Walker Park.

There was one instance of norovirus detection in shellfish from Mason County this year. The WA Dept. of Health investigated and found a failing septic system on the south shore of Hammersley Inlet. They let the Mason County know, and the county did a site visit. The county informed the landowner that they needed to cap and pump their system until it could be repaired or replaced. The owner complied, and a new septic system design is in the process.

Upcoming Plans

Mason County Public Health plans to do a septic system operations and maintenance blitz in the first two weeks of June 2015. They will contact managers of message boards such as fire stations, the drive-in theater, and local banks. They will also ask the City of Shelton to put some banners up, and they will also craft ads for the newspaper and radio. The message will be a request that homeowners do septic system maintenance. After that, they will be ready to field inquiries and to use the remainder of their rebate funding as incentive for repairs and maintenance.

Washington State University Extension Activities



Mason County

WASHINGTON STATE UNIVERSITY
EXTENSION

Mason NEP PIC Program Outreach 2014

Washington State University Mason County Extension conducted a variety of outreach activities throughout 2014 to highlight water quality issues and the ongoing efforts made to address them. A summary of these outreach activities is listed below.

- Taylor Shellfish Seed Sales, Taylor Shellfish Farms
 - May 31, June 28, August 23
 - Direct outreach to shoreline property owners on water quality issues, best management practices, and the Shore Stewards program.
- May on Oakland Bay, Flying Dog Farm, May 18
 - Approximately 200 people attended this family friendly event coordinated by WSU and the Mason ECO Net. The event featured educational exhibits and activities, a bird walk, environmental conservation walk and talk, farm tour, live music, shellfish cooking demonstration, and scavenger hunt for children. The WSU booth had information on water quality issues, best management practices, and the Shore Stewards program.
- Septic Sense Workshops
 - June 26, August 28, September 18, October 16
 - In Shelton, Hoodspport, and Grapeview
 - Workshops were held in partnership with Mason County Public Health. Provided information to residents with onsite septic systems on the best management practices to maintain them, use them properly, understand how they function, and know when they need to be repaired.
- Mason Area Fair, Mason Fair Grounds, July 25-27
 - Direct outreach to shoreline property owners on water quality issues, best management practices, and the Shore Stewards program.
- Tahuya Day, Tahuya WA, July 5
 - Direct outreach to shoreline property owners on water quality issues, best management practices, and the Shore Stewards program.
- OysterFest, Mason Fair Grounds, October 3-5
 - Direct outreach to shoreline property owners on October 4-5 on water quality issues, best management practices, and the Shore Stewards program.
 - Kids Day at OysterFest education programs for local 4th grade classes on October 3.

- Water quality report cards and updates
 - Three areas were targeted for water quality updates that were produced and made available to local residents. The reports highlight water quality sampling results, areas of concern, and best management practices on topics including pet and livestock waste, septic system maintenance, and stormwater management for use on local properties.
 - Oakland Bay, June
 - McLane Cove, July
 - North Bay, December

- Shore Stewards Program
 - The Shore Stewards program currently has 603 member households in Mason County. Shore Stewards are provided information on best management practices for shoreline properties and receive a regular newsletter with highlights, updates, educational opportunities, and offers of technical assistance. In 2014, the newsletters featured information on harvesting shellfish, using rain barrels for garden irrigation, landscaping septic system drainfields and mounds, noxious weed identification and control, natural outdoor cleaning methods, composting, and water conservation in the home.

Mason Conservation District Activities

Mason Conservation District continues to actively work within the framework of the Mason County PIC program for mitigating water quality and fish habitat concerns in Mason County. Through the PIC Advisory Committee, district efforts have been primarily focused within the Oakland Bay Watershed. Mason Conservation District staff working on these efforts include; Small Farm Specialists, Natural Resource Planners, Engineering Staff, Environmental Specialists, and the District Manager. Activities include: technical assistance with individual parcel owners, farmland inventory development, priority ranking criteria, farm plan preparation, and implementation of identified best management practices.

In 2014, MCD staff worked with 10 landowners whose operations directly impact the Oakland Bay Watershed (including Chapman Cove). A total of 58 BMP's have been identified and are either being planned or implemented. Funding for these BMP's has been secured, or is being solicited, from the PIC program, the WSCC Shellfish program, FSA CREP program, RCO Riparian Enhancement program, and NRCS. To Date, three high priority BMP's have been implemented and MCD plans to complete an additional 13 BMP's by June 30, 2015. These BMP's will specifically address agricultural water quality impacts and enhancement of riparian habitat/buffers along riparian and agricultural drainage systems.

MCD has continued efforts in collaborating with area agricultural producers that have been identified either through marine water quality assessment (DOH) or through the development of the farm inventory ranking criteria for drainage system focus. The farm inventory ranks drainages within the county based on livestock access and proximity to surface water, windshield surveys of livestock populations, and current site conditions/infrastructure, etc. A ranking criteria has been developed to inform of "Very High" to "Low" prioritization of drainage systems to help guide a multi-scale approach to outreach and mitigation efforts in the county.

In addition to the landowners identified in the Oakland Bay Watershed, MCD has also identified additional high priority landowners in the greater Oakland Bay area. Additional PIC funding will likely be needed in areas outside of the immediate Oakland Bay Watershed. MCD is providing technical assistance to a number of new landowners who will need financial assistance to implement needed BMP's for water quality and riparian buffer enhancement on agricultural lands in Little Skookum Inlet, Pickering Passage, North Bay, Annas Bay and Lynch Cove.

References

Kenny, Stephanie. March 2012. 2011 annual report on the activities of Mason County Public Health and Human Services in Oakland Bay

Konovsky, John. August 2009. Squaxin Island Tribe shellfish early warning system quality assurance project plan.

Oakland Bay MRA QApp 2008. Mason County Oakland Bay Onsite Septic System Marine Recovery Area Project, Quality Assurance Project Plan, Written by Mason County Public Health.

PIC Flowchart, 2014- Guidance for Water Quality Compliance in Mason County, Written by Stephanie Kenny (Mason County Public Health) and Erica Marbet (Squaxin Island Tribe) in discussion with Erik Hagan (WA Dept. of Ecology) and Derek Rocket (WA Dept. of Ecology).

PIC Protocol, 2014- Guidance for Farm Management Referrals, based on discussions between Erik Hagan (Mason Conservation District), Stephanie Kenny (Mason County Public Health), Derek Rocket (WA Dept. of Ecology), and Erica Marbet (Squaxin Island Tribe).

Oakland Bay MRA QApp 2008. Mason County Oakland Bay Onsite Septic System Marine Recovery Area Project, Quality Assurance Project Plan, Written by Mason County Public Health.

Appendix 1- Quality Control Data

1. Sample Events		77						
2. No. of Samples		773	not including blanks & dups					
3. No. of Samples per Area								
4. No. of Blanks		77	equals 1 per sampling event (77 sampling events)					
5. No. of Dups		79	equals 10% of samples, not including blanks & dups (773 x 0.10 = 77.3)					

Percent difference between field duplicates ranged between zero and 150% and averaged 35%.