

INTRODUCTION

The Capital Regional District's (CRD), Integrated Watershed Management Program (IWMP), in cooperation with municipalities, First Nations and community groups, works to identify and reduce contamination in stormwater, creeks and the ocean. This is accomplished through monitoring, assessment, collaboration and education. The work is done to meet Liquid Waste Management Plan (LWMP) commitments, address public concerns, monitor watershed health and prioritize areas of concern for our municipal partners and others.

To accomplish this, CRD staff monitor stormwater and creeks to identify contamination and impacts from stormwater due to various land use practices through bacterial and chemical sampling. The program assesses approximately 300 stormwater discharges and creeks on the Saanich Peninsula and assigns priority ratings for mitigative action to be undertaken by the appropriate jurisdiction(s). Recently, the program added *E.coli* and enterococci as monitoring parameters, to align the program with provincial and federal programs and use the best indicators for health risk from recreational water contact.

In fall of 2015 until spring of 2016, program staff worked with the Island Health Authority to measure impacts from stormwater discharges on high-use public beaches during the rainy season. This work resulted in preliminary data on bacterial levels in the marine water adjacent to stormwater discharges previously assigned a high public health concern rating.

This report summarizes the results of work completed by the program in 2015. Water and sediment quality data, including details about how the discharges were rated for public health and environmental concern and sampling locations, are available on the CRD website (<https://www.crd.bc.ca/about/document-library/Documents/annual-reports/environmental-protection/integrated-watershed-management>).

Regulatory Background

The CRD created the service to meet commitments in the Saanich Peninsula Liquid Waste Management Plan (SPLWMP, CRD, 1996). The CRD commitments regarding stormwater quality and management are to:

1. *plan, promote and co-ordinate a program for management of stormwater quality and surface water resources in cooperation with the participating municipalities, communities and local governments to:*
 - a. *limit the impacts of stormwater runoff on the environment and public health and well being*
 - b. *protect freshwater and near-shore marine ecosystems and resources*
2. *promote education about water quality issues and to develop educational material*

Municipalities have authority over stormwater under the *Community Charter*. In the LWMP, the participating municipalities make the following commitments:

1. *to act on priorities within their jurisdiction to protect stormwater quality, the physical environment and aquatic habitat, and to reduce the levels of contaminants in stormwater discharges to accepted government standards in watercourses and near-shore marine areas*
2. *to use resources available to municipal governments to achieve these reductions*
3. *to amend bylaws, as necessary, to ensure that new development takes place in accordance with appropriate best management practices*

PUBLIC HEALTH

Public Health Concern Ratings

The program prioritizes stormwater discharges annually to meet LWMP commitments and to help guide jurisdictions in directing limited funds to where they will have the greatest benefit. The program evaluated 73 stormwater discharges for public health concerns in 2015 and **identified 8 high ratings for public health concern** (Table A). Fifteen were assigned a moderate public health concern rating.

During the year, staff collect a water sample for laboratory analysis of *E.coli* (fecal coliform bacteria were also sampled in 2015 as the program transitions to only *E.coli*) from each discharge in both the wet and dry seasons. Observations are made about the discharge flow, weather, animal presence, etc. Staff then assign a public health rating based on the level of bacterial contamination and the potential for public contact. To determine the public health concern rating, a fecal coliform rating and public shoreline use rating are calculated. The sum of these ratings determines the public health concern rating. Details on the CRD rating system (Drinnan, 1997a) can be found by contacting the CRD IWMP.

A selection of the roughly 300 discharges are assessed each year, including discharges assigned a high and moderate public health concern rating in the previous year, as well as a selection of the low-rated discharges to monitor for change. An attempt is made to sample each of the discharges every 5 years.

Ratings over Time

The number of high-rated discharges decreased to 8 in 2015 likely due to fluctuations in bacterial levels, but also due to additional monitoring efforts and actions by municipal staff (Table A).

Five of the current high-rated discharges have been of concern for a number of years. These sources are challenging to find, difficult or costly to repair, or the result of agricultural practices. In 2015, CRD staff found 2 sources in these discharges and will continue to make source identification a priority in 2016.

Table A. Number of Discharges Rated High for Public Health Concern over Time

Jurisdiction	Number of Discharges Rated High										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Central Saanich	2	0	1	1	1	1	2	2	1	1	1
North Saanich	10	7	2	5	5	6	4	4	4	3	3
Sidney	3	4	6	5	5	4	5	4	5	6	3
Pauquachin First Nation	0	0	0	0	0	0	0	0	0	0	0
Tsartlip First Nation	0	0	0	0	0	0	0	1	1	0	0
Tsawout First Nation	0	1	1	0	1	0	0	1	0	0	0
Tseycum First Nation	1	0	1	1	1	1	1	1	1	1	1
Total	16	12	11	12	13	12	12	13	12	11	8

High-use Beach Marine Wet Season Sampling

Staff have been improving receiving environment monitoring to measure the impact of stormwater on the marine environment. In 2015, staff worked with the Island Health Authority to conduct a study of stormwater impacts on public beaches during the wet season. Samples were collected every 2 weeks from October 2015 to February 2016 on high-use beaches adjacent to stormwater discharges of high public health concern.

Marine bacterial levels indicate a number of high-use public beaches on the Saanich Peninsula have conditions that exceed Health Canada guidelines for recreational use during and after winter rainfall events (Table B). Further analysis identified bacteria from humans, dogs and ruminant animals in the marine water of all the beaches assessed.

Staff are working with the Island Health Authority to develop public education and notification strategies. In 2016, staff will complete additional sampling to determine the sources of contamination and observe how rainfall levels influence the data.

Table B. Saanich Peninsula High-use Beach Bacterial Results

Sampling Location		Enterococcus (CFU/100 mL)		Bacteria Source Tracking Results
		Geomean	Median	
Guidelines		35 (Recreation)	4 (Shellfish)	
Saanichton Bay	416-M	29	16	Not sampled - tide too high for safe access
Bazan Bay, Tulista Park	446-M	15	7	Not analyzed - bacteria count too low
	447-M	58	202	human, ruminant animal, dog
Robert's Bay	3005-M	42	20	human, ruminant animal, dog
	3006-M	63	40	ruminant animal, dog
Deep Cove	3078A-M	32	15	human, ruminant animal, dog
	3079-M	48	30	human, ruminant animal, pig, horse, dog
Coal Point	3087-M	96	41	human, ruminant animal, dog
Patricia Bay	3114-M	17	13	human, ruminant animal, dog
Coles Bay	3118-M	83	39	human, ruminant animal, dog
	3120-M	49	19	human, ruminant animal, dog
Brentwood Bay	3142-M	116	125	human, ruminant animal, dog

Notes:

Samples were collected in the marine environment in front of stormwater discharges. Sampling occurred every 2 weeks between October 14, 2015 to Feb 15, 2016 (10 samples). The guidelines include Health Canada's recreational guideline for primary contact (geomean of 35 CFU/100 mL) and the BC MOE shellfish harvesting guideline (median of 4 CFU/100 mL). Shading indicates the enterococci count is greater than the associated guideline. The shellfish harvesting guideline is based on a median of at least 5 samples collected in 30 days; the median reported here was based on 10 samples collected in 4 months.

Bacterial Source Investigations

In 2015, CRD and municipal staff continued to identify bacterial sources in stormwater discharges that have been high-rated for a number of years. Staff investigated the catchment areas of 3 high-rated discharges and Tetayut Creek during 15 sampling events.

Program staff narrowed down the source of fecal coliform contamination in 1 discharge in Sidney (450) and Sidney is working to refine the source location. A sample collected in Tetayut Creek at Jovi Road had fecal bacteria from humans and ruminant animals (e.g., deer and cattle) while an upstream sample at Cooperidge Park had no bacteria from a human source, but bacteria from ruminant animals, dogs and gulls were present. Finding the source is challenging in the remaining discharges due to multiple sources (humans and animals), fluctuating levels of bacteria and intermittent flow. Work will continue in 2016.

ENVIRONMENTAL CONCERN

Watercourses

The CRD continued to monitor water quality in Hagen, Reay, Tetayut, Tatlow, Tén Tén, Tod and Tseycum creeks in 2015 to provide information about creek and watershed health. Staff focused efforts on Tetayut Creek Watershed, including intensive water quality sampling and benthic invertebrate analysis.

CRD data shows that water quality in Saanich Peninsula creeks appears to have remained consistent over the past 5 years and was assessed as good in Tod Creek only. Tod Creek had no exceedances of guidelines with the exception of phosphorus, which is elevated in all CRD streams. The remaining streams have exceedances of fecal coliforms, turbidity, phosphorus or metals (only monitored in some streams). Elevated levels of these parameters are likely the result of higher levels of human settlement, spills or agricultural practices.

Water quality data in Tetayut Creek indicated that the levels of nutrients (nitrite and phosphorus), bacteria (fecal coliform and *E.coli*), and metals (aluminum, cadmium, chromium, copper, iron and zinc) are a concern in the creek, particularly upstream near Cooperidge Park.

In 2016, staff will work with municipal staff to locate sources of fecal coliform contamination. As part of the overall stormwater education initiative on the Peninsula, staff will also educate property owners about methods to reduce the amount of sediment and phosphorus leaving their properties and ultimately ending up in the creeks.

Stormwater Discharge and Stream Sediment Sampling

The program evaluates sediment from within stormwater discharges (pipes, ditches and streams) for potential environmental impact due to contaminant levels (metals and hydrocarbons). Contaminant levels are compared to sediment quality guidelines for protection of marine or freshwater aquatic life (where appropriate).

The program assigns contaminant ratings to the stormwater discharges from sediment samples taken at the point of discharge into the marine environment. The ratings are determined by comparing the concentration of each contaminant (8 metals and polycyclic aromatic hydrocarbons) with guidelines which are protective of marine life. For each discharge, the ratios of each sediment contaminant concentration compared to the guideline are then added to account for potential effects caused by combining the contaminants.

In 2015, the CRD assigned a high contaminant rating to 2 of the 8 discharges assessed. In Reay Creek (discharge 441), metals and polycyclic aromatic hydrocarbons measurements are at levels that may adversely affect aquatic life. The Reay Creek Technical Working Group was formed by the Town of Sidney in 2015 to address concerns about contamination in the creek. The CRD participates on the technical working group, which is exploring remediation options for part of the creek and Reay Pond.

Discharge 3138 carries flows from Tsartlip land and is a concern due to elevated zinc concentrations. Tsartlip replaced some aged corrugated pipes in 2014 and staff will resample this discharge in 2016.

Three other stormwater discharges have been of concern for a number of years based on sediment contamination. CRD staff have narrowed down the contaminant sources to within a few blocks for 2 of the discharges and Sidney has removed contaminated sediment from the catchments. Staff will resample in 2016 to determine whether the sources have been removed.

Quality Assurance

The 2015 data were acceptable for the purpose of the program. For bacterial analysis, the quality assurance program includes yearly establishment of a precision criterion based on a range of Saanich Peninsula stormwater sample triplicates. The program also includes blanks and replicate samples (field splits) for 10% of the discharge and marine surface water samples collected. None of the field splits exceeded the precision criterion during the wet season, while 1 pair of field splits exceeded the precision criterion in the dry season. The 2015 criterion was very low and data are acceptable if only 1 out of every 20 pairs of duplicates exceeds the criterion.

Quality assurance for sediment analysis included field duplicates, laboratory triplicates and Standard Reference Materials (SRM). Precision and accuracy of the laboratory analysis were estimated from the results of these replicate and SRM samples. A detailed discussion on the quality assurance program is provided in the supplementary data report found on the CRD website.

Saanich Peninsula Stormwater Source Control Service

The CRD established the Saanich Peninsula Stormwater Source Control Service in 2014 (Bylaw No. 3906). Staff refined the companion regulatory bylaw, started developing inspection protocols and performed trial inspections with several Peninsula businesses in 2014 and 2015, in order to evaluate the application of the regulations. Staff collected baseline data in 2 creeks that drain industrial areas, in order to assess change after the bylaw has been in place for a few years.

Sediment sampling continues to identify metal and hydrocarbon contamination from parking lots, roads, spills and business waste. It is anticipated that the sediment sampling program may be able to measure the success of the newly-created stormwater source control program. The CRD will be working with municipalities and stakeholders to finalize the regulatory bylaw for the stormwater source control program in 2016.

Education and Keyline Design Workshops

CRD data indicates that agricultural practices are one of the sources of contamination in stormwater and creeks on the Saanich Peninsula. The CRD sponsored and hosted 2 Keyline Design workshops in 2015 to address concerns about agricultural runoff into watercourses and the ocean. The project worked with local farmers to increase awareness and develop the skills to implement improved rainwater management on their properties. More workshops are planned for 2016 in response to positive feedback and requests.

Outlook for 2016

In 2016, CRD staff will focus resources and efforts on identifying and reducing existing contaminant sources. Staff will also continue to monitor water and sediment quality of stormwater discharges and the receiving environment for protection of public health and the environment. In cooperation with the Island Health Authority, the CRD will continue to develop public education and notification strategies on winter beach conditions. In addition, staff will conduct further sampling to determine the sources and fluctuations of bacterial contamination in marine water through various rainfall levels.

REFERENCES

CRD, 1996. Saanich Peninsula Liquid Waste Management Plan.

Drinnan, R.W., 1997a. Stormwater Discharge Rating System for the Capital Regional District. Prepared for the Capital Regional District, Engineering department.

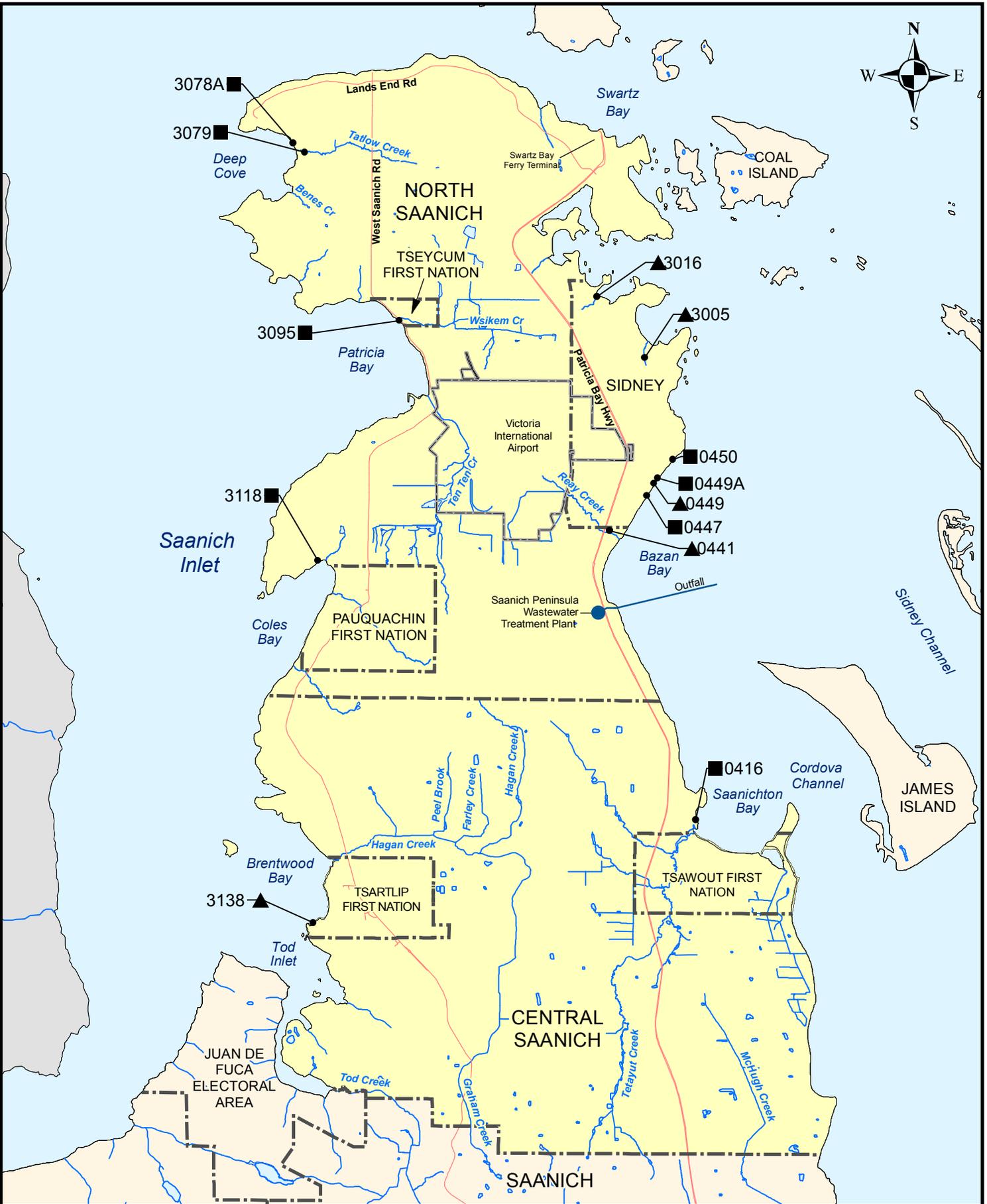


Figure A- Saanich Peninsula - Stormwater Discharges Rated High for Public Health or Environmental Concern

CRD
Making a difference...together

0 0.5 1 2 Kilometres

Projection: UTM ZONE 10N NAD 83

Important This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. **This map is not for navigation.** The CRD **will not be liable** for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

- High Public Health Concern Rating in 2015
- ▲ High Environmental Concern Rating in 2015 or previous years (and recommended for corrective action)
- Sewage Treatment and Outfall
- ~ Significant Ditches, Streams & Rivers
- - - Municipal and First Nations Boundary
- Major Roads
- Stormwater Monitoring Area