Stormwater Quality
Southern Gulf Islands Electoral Area

Making a difference...together

Capital Regional District | 2013-2014 Annual Report

Horton Bay, Mayne Island. Credit: J. Pakvis

The Southern Gulf Islands Electoral Area (SGI EA) is located within the Capital Regional District (CRD) and is comprised of Galiano Island, Mayne Island, North and South Pender Islands and Saturna Island.

The Capital Regional District (CRD) Integrated Watershed Management program (IWMP) works to identify and minimize impacts of stormwater runoff on the environmental and public health in the Southern Gulf Islands Electoral Area (SGI EA). Program activities include monitoring water and sediment from storm drains, watercourses, potable water bodies and nearshore marine waters. When contamination is found, staff conduct investigations to find the sources.

The Capital Regional District's Role

The Southern Gulf Islands Stormwater Quality Management Extended Service Establishment Bylaw No. 1, 1996 allows the CRD to :

- reduce and eliminate pollution in stormwater runoff by investigating, monitoring and reporting on stormwater and sediment quality, and
- prioritize areas for investigation, carry out public education programs and coordinate stormwater quality management programs.

The authority to directly implement mitigative programs is the responsibility of the Island Health Authority, First Nations and other government agencies.

Other government agencies involved with stormwater quality issues include:

- Islands Trust
- Ministry of Transportation & Infrastructure (MOTI)
- Ministry of Environment (MOE)
- Ministry of Forests, Lands & Natural Resource Operations (FLNRO)
- Fisheries and Oceans Canada (DFO)

A sampling technician

Sample Collection

Water and sediment samples were collected from:

- stormwater entering the ocean from Galiano, Mayne, North Pender and Saturna islands
- stormwater entering potable water lakes
  - North Pender Island (Buck and Magic lakes), and
  - Saturna Island (Money Lake)
- selected watercourses:
  - North Pender (Bucaneer Creek),
  - Saturna Island (Lyall Creek),
  - Galiano Island (Georgeson and Putter creeks), and
  - Mayne Island (Deacon Creek and Hunt Brook)
- marine surface water in Bennett Bay

Sewage Treatment

Sewage treatment in the study areas consists mostly of septic tanks and fields or small sewage treatment plants (with in-ground disposal). Failure of these systems has potential to contaminate stormwater discharges, potable water and the marine environment.

Each year, IWMP staff collects fecal coliform data for stormwater discharges with high fecal coliform levels, high or moderate public health concern and low public health concern (if sampling hasn't occurred for 5 years).

Stormwater discharges with contamination are assigned a higher public health concern rating when there is potential for public contact. Credit: newsheimers.com

Stormwater Discharge Assessments

Public Health Concern

The Integrated Watershed Management program staff sampled 36 stormwater discharges in 2013 and 35 discharges in 2014 for fecal coliform bacteria. Staff assigned a public health concern rating to each discharge based on the fecal coliform level and potential for public contact. Rating allows remedial effort to be focused on discharges of most risk to public health.

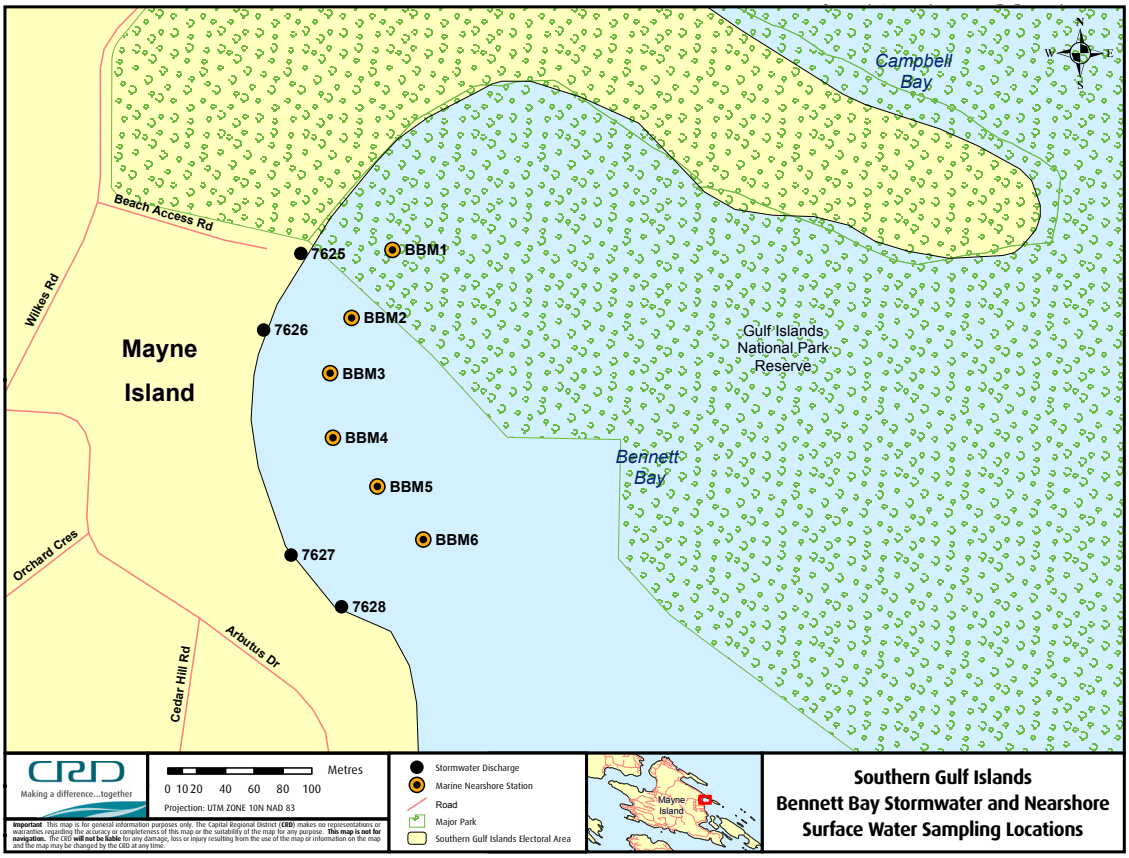
In both 2013 and 2014, IWMP assigned a high-public health concern rating to four discharges. Three of the four high-rated discharges are on Mayne Island (7626 [Bennett Bay], 7613 and 7614 [Miners Bay]). The other high-rated discharge is Georgeson Creek (7800) on Galiano Island. The two discharges in Miners Bay have been high-rated in the past and are discussed further below.

Fecal Coliform Source Investigations

IWMP staff investigates discharges with elevated fecal coliform counts to determine the source of contamination by conducting upstream sampling, dye-testing and bacterial source tracking (BST) to genetically determine whether the bacterial strain came from humans or animals.

Mayne: Discharges 7613 and 7614 (Miners Bay) have had elevated fecal coliforms since 2003. Bacteria of human origin have been measured in both discharges. IWMP staff identified a failing septic field servicing an upstream property. After repairs were made, fecal coliform levels were reduced but became elevated again in 2011. IWMP and Island Health staff continue to conduct source investigations. In discharge 7614, fecal coliform levels are intermittently elevated (the highest count was 940 FC/100 mL in 2014). Failing onsite sewage systems are suspected in both discharges and CRD staff continue to work with Island Health to find the sources.

Mayne: Discharge 7626 flows into Bennett Bay and is often dry in the summer. An elevated count (780 FC/100 mL) was measured in 2014 at the same time that fecal coliform contamination was measured the ocean at Bennett Bay. Further investigation showed intermittent contamination in the bay and although bacteria of human origin was not found in the marine water, elevated caffeine levels were present, indicating a human source. A failing onsite sewage system is suspected from a nearby property. Island Health is working with the owners to repair to the system.



Marine Monitoring

Shellfish Closures

Stormwater discharges are the major pathway for contaminants from the land to the marine environment. Sources of stormwater pollution can originate from residential, commercial, industrial and agricultural land uses, resulting in closure of shellfish beds for recreational harvesting. The IWMP is working towards reducing these sources of contamination.

Bennett Bay, Mayne Island

Bennett Bay is a National Marine Park. Yearly monitoring was initiated in 2005 at the request of the SGI director to provide information about levels of contamination and potential impacts to the park. Fecal coliform levels are measured at six nearshore marine stations and four stormwater discharges entering the bay.


Bennett Bay.

IWMP staff samples Bennett Bay once in the winter and once in the summer each year. However, due to occasionally elevated fecal coliform counts, Bennett Bay was sampled four times in 2014. Fecal coliform counts ranged from <1 to 610 FC/100 mL and nine of the measurements were above safe levels for primary recreational use (e.g. swimming, diving).

Elevated fecal coliform counts appear to be from multiple sources, including humans. Bacterial source tracking results were positive for bacteria from ruminants (e.g. deer, cattle) and dogs, and caffeine was detected at three locations suggesting a human source. A failing onsite sewage system was suspected from a nearby property and Island Health was contacted. CRD staff will continue to investigate the source and monitor for changes.

Environmental Concern

Stormwater Sediment

IWMP staff collected sediment samples on SGI from eight locations in 2013 and seven in 2014. Sediment was analysed for eight metals (arsenic, cadmium, chromium, copper, lead, mercury, silver and zinc) and polycyclic aromatic hydrocarbons (PAHs). Staff compared concentrations to the IWMP marine sediment quality guidelines to assess potential impact on aquatic life and assign a contaminant rating.

Two stormwater discharges were sampled on each island, in both years. Twelve samples were collected at the point of discharge and three were collected upstream to investigate sources of previously identified contamination.

In both 2013 and 2014, staff assigned high contaminant ratings to three discharges due to elevated zinc levels. The three high-rated discharges (7004, 7411 and 7613) and a creek that was high-rated in 2012 (7800) are discussed further below:

North Pender: Discharge 7004 (Bucaneer Creek) received a high-rating due to elevated zinc levels. The sample is collected near the end of a metal pipe and it is possible that the pipe is the source. IWMP staff will conduct investigations to determine the source of zinc.

Saturna: Discharge 7411 is sampled in a ditch near the end of Sunset Blvd. CRD sampling data indicates that zinc has been elevated in this ditch since 2011. IWMP staff will conduct investigations to determine the source of zinc.

Mayne: Discharge 7613 (Miners Bay) received high ratings based on elevated zinc levels intermittently since 2008. IWMP staff conducted upstream investigations that suggest the source of zinc extends above 430 Village Bay. Copper is also elevated upstream and CRD staff will continue to conduct investigations to determine the sources.

Galiano: Discharge 7800 (Georgeson Creek) had elevated levels of lead in 2012. Subsequent samples collected in 2013 and 2014 displayed lower levels of lead below the aquatic life guidelines. Georgeson Creek has elevated fecal coliforms and IWMP staff will continue to monitor water and sediment in this creek.

Stormwater sediment is sampled from streams, ditches or manholes.

Watercourse Monitoring

IWMP staff samples Bucaneer Creek (North Pender), Lyall Creek (Saturna) and Putter Creek (Galiano) twice per year (dry and wet season) to assess impacts to fish and other aquatic life. In addition, staff more intensively sampled Georgeson Creek (Galiano Island) and Deacon Creek (Mayne Island) five times in 30 days, in fall 2014, to get more robust data on the health of these watercourses.

CRD staff compared water quality parameters (fecal coliforms, E.coli, temperature, pH, dissolved oxygen, conductance, turbidity, nitrate-nitrogen and phosphorus) to BC Ministry of Environment (MOE) guidelines for the protection of freshwater aquatic life. Staff also measured caffeine levels and conducted BST sampling to determine if sewage was present and measure any impact from humans.

Results indicate that water quality is fair in SGI streams monitored by the IWMP. These streams are often dry in summer, so data is indicative of wet conditions. Turbidity and phosphorus are most often outside guidelines and levels were particularly elevated in Georgeson Creek. Elevated turbidity and phosphorus levels may impact drinking water quality and aquatic life. Sources include onsite sewage disposal, poor agricultural practices and land clearing and development. IWMP staff will continue to monitor and investigate sources.

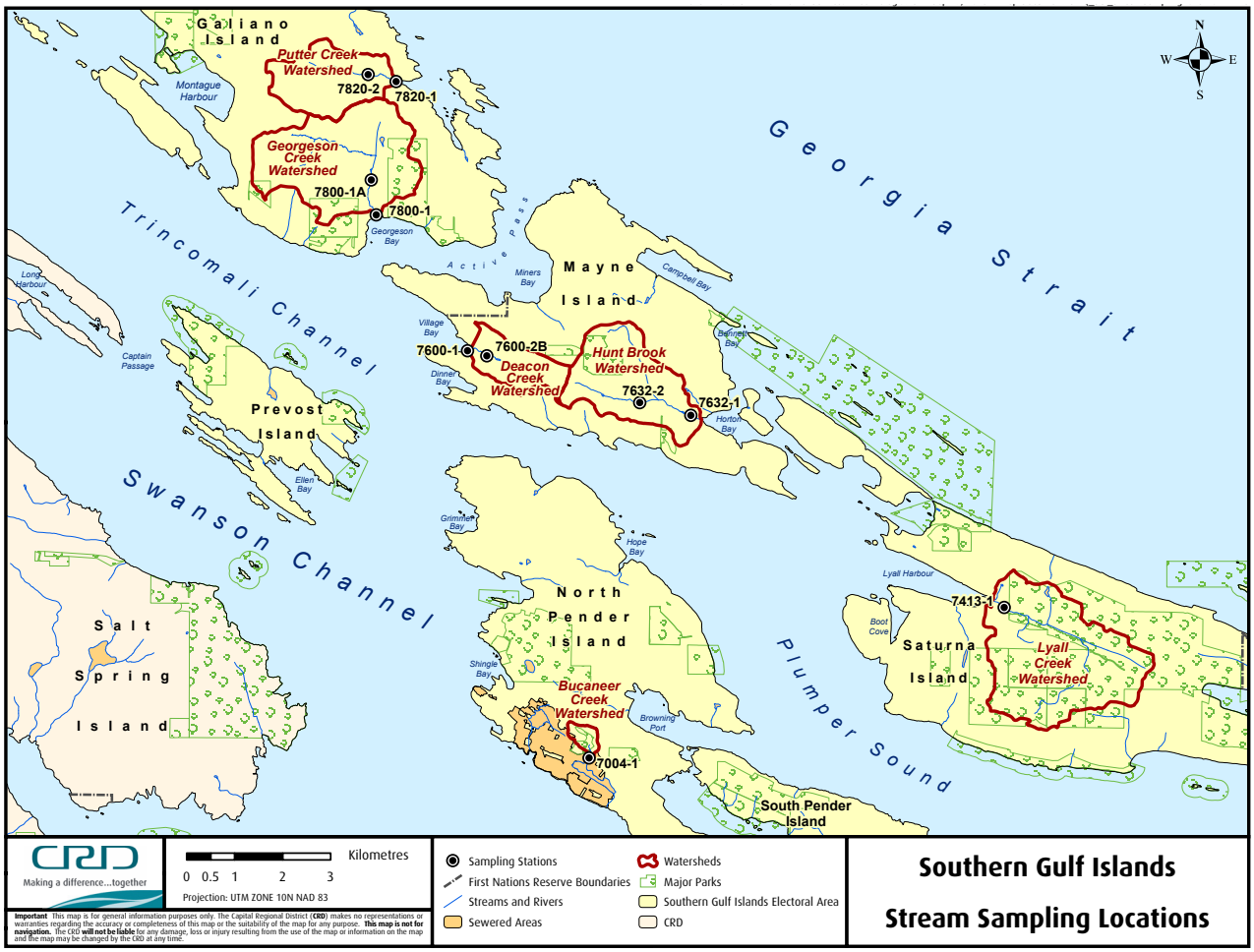
Results of the intensive water quality sampling in Georgeson and Deacon creeks in 2014 are as follows:

Georgeson Creek

- Phosphorus and turbidity are above BC guidelines for protection of aquatic life and are two to four times higher upstream of Bluff Road West than at the discharge.
- Fecal coliform and *E.coli* bacteria levels are above recreational guidelines for activities such as swimming and boating in the creek near Active Pass Drive.
- Presence of caffeine and bacteria stains from humans indicates that sewage is present in the creek. The source is likely a failing onsite wastewater treatment system upstream of Active Pass Drive.

Deacon Creek

- Phosphorus was above the Vancouver Island Objective for protection of aquatic life, but levels upstream and downstream were similar to each other and other CRD streams.
- Turbidity was slightly above the BC guideline (30-d average), but no single measurements exceeded the maximum guideline and levels were similar upstream and downstream.



2013 and 2014 At A Glance

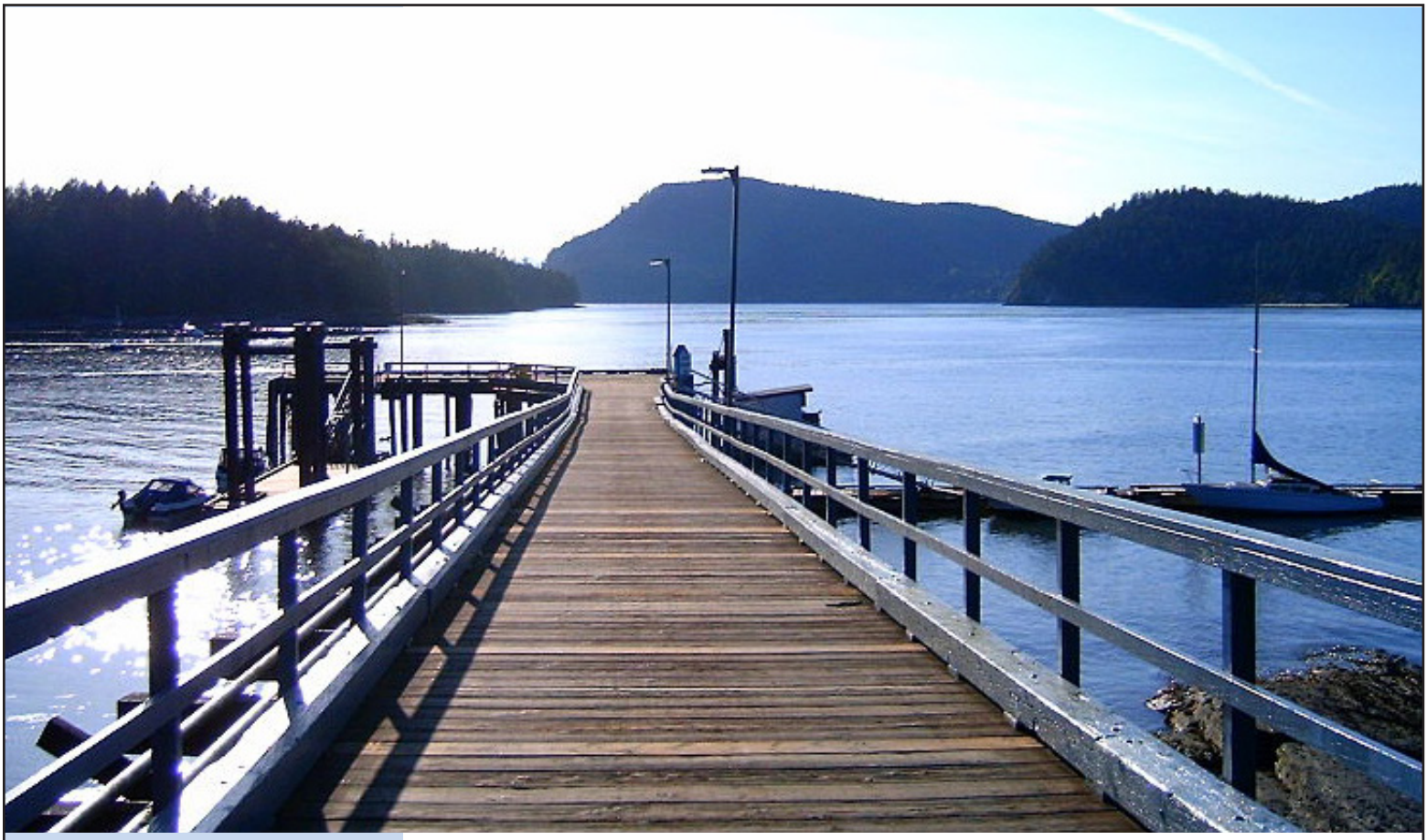
The CRD IWMP has identified some contamination of stormwater in the Southern Gulf Islands EA likely due to human activities on land (e.g. onsite sewage disposal, agricultural practices and development). This contamination has potential to impact public health and the environment.

IWMP staff assigned high public health concern ratings to four discharges and subsequent testing has identified the presence of sewage in these discharges likely from onsite sewage disposal. Staff will continue to conduct investigations in these discharges to narrow down the source or work with Island Health to ensure onsite sewage systems are repaired.

Elevated bacterial and caffeine levels were measured in Bennett Bay suggesting that contamination originating from one of the high-rated discharges is impacting the marine environment. IWMP staff and Island Health are working together to find sources of contamination and ensure they are repaired. Staff will continue monitoring and further investigations will be undertaken if elevated bacterial counts continue to be measured.

One stormwater flow assigned a high public health was 7800 (Georgeson Creek) on Galiano Island. This stream and three others also exhibited levels of phosphorus and turbidity that have the potential to impact fish and other aquatic life. Sources of phosphorus and turbidity include onsite sewage disposal, poor agricultural practices and land clearing and development.

Zinc was above sediment guidelines for protection of aquatic life in three stormwater discharges (including one that also has elevated fecal coliforms, discharge 7613, Miners Bay). Sources may include corrugated metal pipes and road runoff. Georgeson Creek (discharge 7800) had elevated levels of lead in 2012; however subsequent samples have shown lower levels. Staff will confirm contaminant levels and continue source investigations in these catchment areas in 2015 and 2016.



Did you know...
The Integrated Watershed Management Program conducts similar programs in eleven municipalities and two other electoral areas.

Previous reports, supporting documents and data can be obtained on our website or by contacting:

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Outlook for 2015 - 2016

IWMP staff, in cooperation with the SGI EA director, will continue to monitor water and sediment quality of stormwater discharges, watercourses and the nearshore marine environment. Together, IWMP staff, the SGI EA director, Island Health staff and the community will work towards identifying, reducing and eliminating sources of contamination.

Public Education

The IWMP provides education materials for reducing stormwater contaminants and managing rainwater. We promote Best Management Practices (for preventing pollution), reporting of spills to Emergency Management BC (1.800.663.3456) and conduct rainwater management workshops.

In 2014, staff sponsored and hosted a Keyline Design workshop and pilot study to address concerns about agricultural runoff into watercourses and the ocean. The facilitator worked with local farmers to develop skills to implement improved rainwater management. More workshops are planned for 2015. For additional information, check out our website.

www.crd.bc.ca/watersheds