

# STORMWATER QUALITY ANNUAL REPORT DISTRICT OF SOOKE – 2008

## EXECUTIVE SUMMARY

### INTRODUCTION

The Capital Regional District (CRD) Stormwater, Harbours and Watersheds program (SHWP), in cooperation with the District of Sooke, works to limit impacts of contaminated stormwater runoff on the environment and to protect public health. This report provides the results of work completed in 2008 as part of the program.

The District of Sooke has a growing population of approximately 9,704 residents, and varied land uses (i.e., residential, commercial, agricultural and institutional). These land use activities and increasing property development and expansion of businesses and industry in the District of Sooke have the potential to impact stormwater quality.

In the past, failing on-site sewage systems have resulted in elevated fecal coliform levels (an indicator of sewage contamination) in stormwater flows, watercourses and the marine environment in the District of Sooke. However, in January 2006, a sewage collection system and secondary wastewater treatment plant was completed. Since then, the majority of residential properties and businesses have connected to the collection system. SHWP continues to monitor stormwater flows and the receiving environment for changes in environmental fecal coliform levels due to sewage collection and treatment.

This annual report covers five main activities carried out by the SHWP in 2008:

1. **Stormwater Discharge Surveys** – Stormwater discharges along the coastline of the District of Sooke are assessed for public health and environmental concern.
2. **Source Investigations** – Investigations were undertaken to identify sources of contamination in stormwater so mitigative measures and source control can be carried out.
3. **Marine Surface Water Monitoring** – Fecal coliform bacteria levels were measured in Sooke Inlet, Harbour and Basin and compared to shellfish harvesting and human health guidelines to assess contamination levels, potential sources and changes over time.
4. **Monitoring of Significant Watercourses** – Water quality monitoring was undertaken for 14 significant watercourses that flow onto the District of Sooke coastline and into the marine environment.
5. **Special Projects** – SHWP staff was involved in a number of special projects to improve stormwater quality in the region.

The findings of this annual report have been discussed with District of Sooke staff.

### RESULTS AND DISCUSSION

#### 1) Stormwater Discharge Surveys

In 2008, the survey area included stormwater discharges along the entire coastline of the District of Sooke, including areas acquired as part of the 2005 and 2006 jurisdictional expansions. Discharges were assessed for public health and environmental concern.

#### Public Health Concern

The SHWP evaluates stormwater discharges for public health concerns with a rating system. The public health concern rating (high, moderate or low) is based on the level of fecal coliform bacteria (indicator of sewage) in stormwater discharges, and the potential for public contact with stormwater flows (public use of the shoreline). Rating allows the District of Sooke to direct limited funds and undertake remedial measures where necessary.

Eighty stormwater discharges were evaluated in 2008. Each discharge was visited during wet weather (January through March) and dry weather (June through September) and examined for flow and fecal coliform levels. Discharges rated high or moderate for public health concern, and those that exceeded thresholds, are shown in Figure A. The following public health concern ratings were assigned:

- one discharge was rated high (2035 [Cooper Cove, near 5449 East Sooke Road])
- eight discharges were rated moderate (2001C, 2029, 2035A, 2039, 2041A, 2042A, 2059AB and 2065)
- 71 discharges were rated low

The high-rated discharge (2035; Cooper Cove) is not within the newly-sewered area. Investigations carried out by SHWP staff have indicated that the source of fecal coliforms is not of human origin. Horses observed upstream from the discharge are a probable source of high fecal coliform levels.

As a result of the 2008 findings, in 2009, fecal coliform sampling will be completed in all significant watercourses regardless of rating and the following 71 discharges:

- discharges assigned high and moderate public health concern ratings in 2008
- 30 of those assigned a low public health concern rating in 2008
- 33 remaining discharges between Cooper Cove and Whiffin Spit (completed every year)

### Threshold Comparisons

To further quantify discharges with elevated fecal coliform levels, fecal coliform counts are compared to two thresholds (500 and 2,000 FC/100 mL). In 2008, fecal coliform measurements in 15 of the 80 discharges were above the lower threshold (500 FC/100 mL) and five were above the higher threshold (2,000 FC/100 mL).

### Effects of Sewage Collection and Treatment

Discharge data suggests that fecal coliform levels have been reduced since the sewage treatment plant and conveyance system became active after January 2006. Comparison of the number of discharges within the sewer area (discharges 2047 to 2060) with a fecal coliform count that exceeded a threshold in 2005 (before sewage treatment) to those in 2008 is as follows:

- The number of discharges that exceeded 500 FC/100mL decreased from nine in 2005 to four in 2008.
- The number of discharges that exceeded 2000 FC/100mL decreased from eight in 2005 to one in 2008.

The discharge within the sewer area (2048) with a fecal coliform count above 2,000 FC/100mL is located at the foot of Water Street. Fecal coliform counts in this discharge have been below these thresholds in recent years, therefore additional sampling will be carried out in 2009 to confirm the results and assess potential sources, if counts remain high.

Of note, human fecal bacteria are still present in Sooke Harbour adjacent to the sewer area. Presence of fecal coliforms in the nearshore environment is likely due to properties not connected to the sewage system at the time of sampling. Details on the marine sampling program are below.

### Environmental Concern

Stormwater discharges were evaluated for environmental concern and assigned a chemical contaminant rating. The rating is based on sediment concentrations of metals and hydrocarbons (two groups of polycyclic aromatic hydrocarbons [PAH]) in stormwater discharges compared to the CRD Marine Sediment Quality Guidelines (MSQG). Discharges with a confirmed high contaminant rating (high for two consecutive years) require mitigative action, beginning with an investigation to locate the source of contamination. Locations of discharges assigned high and moderate ratings for environmental concern in 2008 are shown on Figure A.

Contaminant ratings for six stormwater discharges evaluated in 2008 were as follows:

- high for one discharge (2056; foot of Maple Avenue)
- moderate for two discharges (2053; and 2057 both located at the foot of Murray Road)
- low for three discharges (2038, 2048 and 2065)

Discharge 2056 (foot of Maple Avenue) was rated high due to high mercury and zinc concentrations. In the past, ratings for this discharge have fluctuated between low (2002 and 2004) and moderate (1998, 1999 and 2003) based on collective chemical concentrations rather than a single contaminant. This discharge will be re-sampled in 2009 to confirm the rating.

The catchment of discharge 2053 (foot of Murray Road) has undergone several investigations by SHWP staff. Elevated concentrations of PAH (in 1998, 2000 and 2004) and zinc (in 2004) prompted upstream source investigations. One upstream station (2053-1) had elevated levels of zinc (in 2006), but PAH were below guidelines for three consecutive years. In addition to zinc, silver was elevated at 2053-1 (in 2004, 2006 and 2007), however silver contamination appears to be isolated to this station and therefore, does not appear to be entering the marine environment. The discharge (2053) has not received a high rating since 2004; in 2008 and 2007, it was rated moderate due to collective chemical concentrations rather than a specific contaminant. Some sources of stormwater contamination will likely be addressed through the proposed District of Sooke Stormwater Management Plan, presently under development. The District of Sooke addresses silver from photofinishers and medical, dental and veterinarian clinics through their sewer discharge bylaw. However, continued monitoring is required to assist with contaminant identification and reduction. SHWP staff will continue to work with District of Sooke staff to identify and remediate stormwater contamination. In 2009, SHWP staff will continue to sample sediments associated with stormwater discharges in Sooke to confirm contaminant levels and monitor for changes over time.

## **2) Source Investigations**

SHWP staff work towards identifying sources of fecal coliform contamination so they can be eliminated. Investigations are undertaken in discharges with elevated fecal coliform counts (>500 FC/100mL), seasonal data trends associated with failing onsite sewage systems or those where reports of odours or signs of contamination have been identified. Investigations include identification of land uses in the catchment area, upstream sampling, and bacterial source tracking. BST analysis provides genetic evidence as to whether the bacterial source is human or non-human.

A source investigation was undertaken for discharge 2035 in Cooper Cove in 2007. The fecal coliform source was not identified; however three BST analyses showed that the bacteria are not of human origin. This discharge was rated high for public health concern in 2008 and is not located within the sewer specified area.

In 2008, samples were collected from discharge 2042A and 2054 for BST analysis. Discharge 2042A had a low fecal coliform count (290 FC/100 mL) and no human fecal bacteria were present. The fecal coliform count for discharge 2054 was too low to complete BST analysis.

Investigations will be undertaken in 2009 to narrow down sources of high fecal coliform levels identified in 2008. Bacterial Source Tracking (BST) analysis will continue to be used to aid in identification of sources (human or non-human) responsible for fecal coliform contamination. This will allow investigative efforts to be focused in the appropriate direction.



0 250 500 1,000 1,500 Metres  
 Projection: UTM ZONE 10N NAD 83

- High Public Health Concern
  - Moderate Public Health Concern
  - ▲ High Environmental Concern
  - ▲ Moderate Environmental Concern
- Stormwater Flow Thresholds**
- 500 - 1999 FC/100 ml
  - ≥ 2000 FC/100 ml
- Other Symbols:**
- Municipal Boundaries
  - Major Roads
  - Minor Roads
  - Streams and Rivers
  - Major Parks
  - Sewer Specified Areas
  - District of Sooke

**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.

**Figure A**  
 District of Sooke 2008  
 Stormwater Discharges of Concern

### **3) Marine Surface Water Monitoring**

In 2008, the marine surface water sampling program continued in Sooke Inlet, Harbour and Basin to provide a measurement of nearshore and overall fecal coliform levels in relation to guidelines and to monitor changes over time. Shellfish beds in Sooke Basin and Harbour are presently closed to recreational shellfish harvesting, likely due, in part, to contaminated stormwater discharges.

Marine surface water samples were collected from the 28 monitoring stations (24 nearshore and four centreline stations) located in proximity to stormwater flows entering the ocean, shellfish beds or environmentally sensitive areas.

Widespread marine contamination was not found and average fecal coliform counts were low (i.e., geometric means for all three water bodies were 3 FC/100mL in winter and 9 FC/100mL in summer). Fecal coliform contamination was localized to nearshore waters near the more developed area in Sooke Harbour and was more prevalent in the summer.

Comparison of the fecal coliform counts from individual stations to the SHWP guideline (200 FC/100 mL) and Environment Canada's (EC) recreational shellfish harvesting standard (14 FC/100 mL) resulted in the following:

- none of the samples exceeded the SHWP guideline during winter or summer sampling
- samples from two stations (4 and 10) collected in the winter exceeded the shellfish harvesting standard
- samples from seven stations (2, 4, 20, 22, 23, 24, 25) collected in the summer exceeded the shellfish harvesting standard

Stormwater appears to be a source of fecal coliform contamination in the nearshore marine environment in Sooke Harbour. Five stations with elevated fecal coliform levels (20, 22, 23, 24 and 25) are located near the more developed area of Sooke Harbour and humans have been identified as a source of bacterial contamination at stations 20, 22 and 23. Three of these stations are adjacent to the recently sewered area; 22, 23, and 24. Contamination from human sources is likely due to failing onsite sewage disposal systems from properties outside the sewered area and those not yet connected to the sewer system at the time of sampling. Fecal coliform sources at Stations 24 and 25 have not been confirmed; however, due to the location, sources of elevated fecal coliforms are likely humans, birds or boat wastewater.

Nearshore marine sampling and source investigations will continue in 2009.

### **4) Monitoring of Major Watercourses**

In 2008, 14 watercourses that flow into the ocean from the District of Sooke were monitored to assess watercourse health and changes over time. Fecal coliform bacteria, temperature, pH, dissolved oxygen, specific conductance, turbidity, phosphorus and nitrate-nitrogen were measured once in each of the dry and wet seasons.

Water quality was measured at the point of discharge to the marine environment in watercourses that reside solely in the District of Sooke (Gillespie and Lannon creeks, Throup, Ella and Wright Road streams and Grouse and Nott brooks) and at the point of discharge and jurisdictional boundaries in watercourses that cross jurisdictional boundaries before discharge from the District of Sooke (Wildwood, Veitch and Ayum creeks, Alderbrook, Broom Hill and Kemp streams and Sooke River).

Watercourse discharges were all assigned a low public health concern rating in 2008 with the exception of four that were given a moderate rating: Grouse Brook (2001C), Gillespie Creek (2029), Saseenos/Lannon Creek (2039) and Alderbrook Stream (2042A).

Monitoring results suggest that water quality in these watercourses is generally good with a few exceptions. Exceedences of guidelines occurred for dissolved oxygen, fecal coliforms, temperature, specific conductance, phosphorus and turbidity however, most of the exceedences were marginal. Large exceedences of guidelines occurred in Alderbrook Stream and Broom Hill Stream. The parameters of most concern in these watercourses were fecal coliforms, phosphorus and turbidity.

Water quality does not appear to be changing in most watercourses, however higher than unusual turbidity was measured in the Alderbrook Stream, Broom Hill Stream and Throup Stream and phosphorus was elevated for the first time in Broom Hill Stream and Gillespie Creek. Continued water quality monitoring will be completed by SHWP staff to assess watercourse health and determine if the observed changes are indicative of established change or an isolated occurrence.

In response to elevated turbidity measurements in Alderbrook Stream and Broom Hill Stream, the District of Sooke agreed to follow-up with developers regarding silt and erosion control. Additionally, a Liquid Waste Management Plan being developed for the District of Sooke will provide guidance and tools to effectively manage stormwater in District of Sooke watersheds. It is anticipated that these positive efforts will improve or maintain healthy watercourses in the District of Sooke.

SHWP staff will continue to monitor water quality in Sooke watercourses to assess watercourse health and changes over time.

## **5) Special Projects**

During the past several years, the SHWP has undertaken a number of special projects related to reducing or eliminating contaminants in watercourses and improving stormwater quality in the region. This section discusses some of the projects that could be used by the District of Sooke to protect stormwater quality.

### Data Collection for Sooke Inlet, Harbour and Basin Water Quality Objective Development

In 2008, SHWP staff worked in partnership with Ministry of Environment (MOE) Environmental Protection Division (EPD), Environment Canada (EC) and Camosun College to collect data for development of marine water quality objectives (WQO) for Sooke Inlet, Harbour and Basin. The WQO is intended to provide protection for the shellfish resources of the marine areas as this water use was identified as the most sensitive. Thus, protecting the shellfish resources will protect all other water uses in the area. SHWP staff assisted in collection of fecal coliform and *Enterococci* data for objective development as bacteriological levels were identified as the parameter of greatest concern in Sooke Inlet, Harbour and Basin.

### Natural Areas Atlas

The web-based atlas of natural areas in the CRD continues to be enhanced. The atlas is a comprehensive informational tool of natural areas (e.g., significant watercourses) for anyone interested or involved in land use planning and stewardship, including District of Sooke staff. The atlas can be used to promote well-informed and responsible land use decisions in the District of Sooke. This will, in turn, have a positive effect on the protection and restoration of natural areas in the District of Sooke. The Natural Areas Atlas can be viewed at: <http://www.crd.bc.ca/maps/natural/atlas.htm>. For more information contact atlas staff at [atlas@crd.bc.ca](mailto:atlas@crd.bc.ca).

### Source Control

A CRD bylaw for the protection of storm drains and watercourses has been prepared by the SHWP. As of 2007, version 13B of the model stormwater bylaw and six sector-specific Codes of Practice (COP) have been made available to all member municipalities for optional adoption or to be built into existing municipal regulations. The COP set out municipal requirements under which various business sectors will be required to operate to prevent the pollution of stormwater. These codes include:

1. Automotive and Parking Lot Operations

2. Construction and Development Activities
3. Recreation Facilities
4. Streets and Roads
5. Recycling Operations
6. Outdoor Storage Yard Operations

SHWP staff will work with District of Sooke staff as required to assist with the implementation of the bylaw and the codes of practice. For more information send a message to [stormwater@crd.bc.ca](mailto:stormwater@crd.bc.ca).

#### Technical Assistance

The SHWP provides technical expertise and assistance to municipalities in the area of stormwater source control. Information on structural pollution prevention technologies, federal and provincial initiatives that involve stormwater quality, and changing environmental guidelines and regulations are some of the broad topics where the program provides advice to municipalities. The BWG provides a forum for the continued exchange of information relevant to stormwater source control. Guest speakers, such as governmental or business representatives, are arranged by the SHWP to address areas of concern or to provide information to the BWG.

#### Reducing Shellfish Closures

Currently shellfish beds in Sooke Inlet, Harbour and Basin are closed for recreational harvesting due to bacterial contamination. Stormwater flows are the major pathway of contaminants from land to the marine environment. SHWP works toward reducing pollution, through discharge and nearshore marine sampling and upstream investigations to identify the sources of this contamination. This work, combined with the construction of the District of Sooke community sewer system, may eventually lead to the opening of shellfish beds in these waterbodies.

### **RECOMMENDATIONS**

#### **Public Health Concerns**

The following recommendations are based on the results of the fecal coliform sampling:

1. that the Stormwater, Harbours and Watersheds program continues sampling stormwater discharges and creeks along the District of Sooke coastline to monitor for fecal coliform levels;
2. that the Stormwater, Harbours and Watersheds program continues working with the District of Sooke and Vancouver Island Health Authority staff to identify the sources of elevated fecal coliform concentrations in stormwater; and
3. that the Stormwater, Harbours and Watersheds program continues monitoring surface fecal coliform levels in Sooke Inlet, Harbour and Basin to track changes in these water bodies over time.

#### **Environmental Concerns**

The following recommendations are based on the results of the chemical contaminants survey:

1. that the Stormwater, Harbours and Watersheds program staff work with the District of Sooke to determine the sources of chemical contamination;
2. that sampling and analysis be discontinued at discharges where low contaminant levels have been confirmed;

3. that Stormwater, Harbours and Watersheds program staff evaluate the effectiveness of the current sediment sampling program and make changes as required to protect watercourses and the nearshore marine environment; and
4. that the Stormwater, Harbours and Watersheds program staff continue monitoring significant watercourses to assess water quality and to monitor for change over time.

#### **Stormwater Source Control**

1. that Stormwater, Harbours and Watersheds program staff continue to develop, as required, the regulatory framework of bylaws, codes of practice and best management practices for the protection of stormwater quality and
2. that the District of Sooke considers adopting the model storm sewer and watercourse protection bylaw, associated codes of practice and best management practices.

#### **General**

1. that the Stormwater Quality program continues working with community groups and others to promote the protection of stormwater quality.