STORMWATER QUALITY ANNUAL REPORT
DISTRICT OF SOOKE – 2010

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 2010 as part of the program.

The District of Sooke has a growing population of approximately 10,000 residents, and varied land uses (i.e., residential, commercial, agricultural and institutional). These land use activities and increasing development have the potential to impact stormwater quality.

Failing on-site sewage systems have resulted in sewage contamination in stormwater flows, watercourses and the marine environment in the District of Sooke. However, a wastewater collection system and secondary wastewater treatment plant was completed in the more developed area of the District of Sooke in 2006. SHWP monitors stormwater flows and the receiving environment for changes in environmental fecal coliform levels (an indicator of sewage contamination) as a result of sewage collection and treatment. In addition, stormwater monitoring data continues to be collected in areas using on-site sewage treatment including areas being considered for sewer expansion. It is anticipated that this data will assist the District of Sooke in making decisions about sewer expansion that will protect public health and the environment.

In 2010, as in previous years, the CRD SHWP assessed stormwater quality and impacts of stormwater contaminants on the receiving environment. This was accomplished through water and sediment quality monitoring. Data was used to identify contamination, identify whether contamination has the potential to cause adverse effects on human or environmental health, prioritize stormwater discharges of concern, conduct source investigations and provide direction for mitigative efforts by municipal staff. Data was collected and assessed through the following activities:

Stormwater discharge assessment: measurement of fecal coliform bacteria in 72 discharges and metals and polycyclic aromatic hydrocarbons in sediment within six stormwater discharges. Discharges were prioritized based on SHWP public health and environmental concern ratings to allow District of Sooke to ad dress discharges of most concern in a priority manner.

Watercourse surface water monitoring: measurement of water quality parameters in 14 watercourses during winter and eight during summer (remaining watercourses were dry). Measurements were compared to guidelines for aquatic life protection, SHWPs fecal coliform guideline and historical data to assess changes.

Marine surface water monitoring: measurement of fecal coliform in 28 marine stations (23 nearshore and 5 centreline). Results were compared to guidelines for recreational primary contact (e.g. swimming) and shellfish harvesting.

In addition, SHWP was involved a number of special projects to prevent or limit stormwater contamination. These are discussed further below.

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

RESULTS AND DISCUSSION

1) Fecal Coliform Levels –Stormwater Discharges, Watercourses and Marine Surface Water

Fecal coliform monitoring was completed in 72 stormwater discharges (including 14 watercourses) and 28 marine surface water stations.

Stormwater Discharges: Fecal coliform contamination (fecal coliform counts greater than 200 FC/100 mL) was observed in 31% (22 out of 72) of the stormwater discharges. Counts above this level suggest:

- sewage or animal waste (agricultural or companion animals) may be present
- primary contact (i.e. head immersion, ingestion) with these discharges has potential to cause adverse effects on human health

Data comparison to two thresholds used in the District of Sooke to indicate moderate and high levels of contamination (500 and 2,000 FC/100 mL) resulted in the following:

- 11 of the 72 discharges had at least one fecal coliform count greater than 500 FC/100 mL,
- seven of the 72 had at least one count greater than 2,000 FC/100 mL

Discharges that exceed these thresholds are shown in Figure A.

Compared to 2009, there were more discharges with exceedences of guidelines/thresholds in 2010. Most notably, the number of discharges with fecal coliform counts greater than 2,000 FC/100 mL rose from two in 2009 to seven in 2010. However, fecal coliform levels are somewhat variable each year and most of the discharges with elevated counts have had exceedences in the past.

Watercourses: Four of the 14 watercourses had fecal coliform counts above 200 FC/100 mL: (2042A [Alderbrook Stream], 2064 [Wright Road Creek], 2043-1B [Sooke River upstream] and 2103 [Kemp Lake Stream]. The highest count 1,400 FC/100 mL was in 2042A [Alderbrook Stream]. Sewage and agricultural and wild animal waste have been identified by SWHP staff as sources of the contamination.

Marine Environment: Similar to previous years, widespread contamination was not measured and average fecal coliform counts were low (i.e., geometric means were 2 FC/100 mL in winter and summer). Individual station and average concentrations were well below the SHWP guideline (200 FC/100 mL).

Localized fecal coliform contamination occurred in some nearshore stations. Fecal coliform counts were above 14 FC/100 mL (the shellfish harvesting standard)[1] in two of 28 marine stations monitored in summer and one station in winter of 2010. Concentrations in the three stations ranged from 15 FC/100 mL (station 4) to 73 FC/100 mL (station 16).

For the first time, elevated counts were not measured in Sooke Harbour adjacent to the sewered area. Stations with elevated fecal coliform counts are located away from Sooke Harbour and do not correspond to any contaminated stormwater discharges. Birds or waste discharged from boats could be the source of contamination. Further sampling will be conducted to determine whether marine fecal levels in Sooke Harbour continue to be low.

2) Public Health Concern Ratings

Stormwater discharges are assigned a public health concern rating based on the fecal coliform contamination level (fecal coliform rating) and the potential for public to come in contact with this contamination (public shoreline use rating). Each shoreline segment is assigned a public shoreline use rating (low, moderate or high) based on public accessibility and activities that commonly take place (e.g. walking, kayaking, and swimming). Ratings provides guidance on mitigation priority when there are a number of contaminated discharges to address. In 2010, the 72 discharges assessed were assigned the following public health concern ratings:

- Four discharges were rated high (2042A, 2051, 2065, 2071)
- 17 discharges were rated moderate
- 51 discharges were rated low

[1] Environment Canada's recreational shellfish harvesting standard is based on median fecal coliform concentrations; single measurements were compared to this value.

Public shoreline use ratings (originally assigned in 2000) were reassessed in 2011 and applied to the 2010 fecal coliform data to determine the 2010 public health concern ratings. Updated pubic shoreline use ratings resulted in a change in public health concern ratings for ten discharges (six changed from low to moderate and four from moderate to high). The locations of high and moderate rated discharges are shown in Figure 2.

In 2010 a higher number of discharges of concern were identified compared to 2009 (none were rated high, five were rated moderate and 66 were rated low). The increase in discharges of concern is partly due to the updated public shoreline ratings, but is also due, in part, to increases in the level of fecal coliform counts (eight discharges, rated low in 2009, would have been rated moderate in 2010 using the previous shoreline ratings).

Although a number of stormwater discharges have fecal coliform contamination, the four high-rated discharges in 2010 should be addressed as a priority by the District of Sooke. These discharges have fecal coliform counts (1,400 to 33,000 FC/100 mL) well above human health guidelines for primary contact (200 FC/100 mL) and are along shorelines where there is a greater potential for public contact. Two of these are streams (2042A [Alderbrook Stream] and 2065 (unnamed stream south of Wright Road Creek)) and with the exception of 2051, these discharges are not within the sewered area.

The fecal coliform counts in the high-rated discharges have been elevated for a number of years. SHWP source investigation data suggests that the elevated fecal coliforms are likely due to human sources (failing septic fields) for two discharges (2051 and 2071) and from wild or agricultural animals for the other two (2042A and 2065). SHWP staff has contacted Vancouver Island Health Authority (VIHA) regarding 2071 and will continue to conduct source investigations in the other discharges to allow the District of Sooke to address the source of contamination effectively.

Discharges of concern are shown in Figure A.

3) Wastewater Collection and Treatment

Data suggests that fecal coliform contamination has been reduced since construction of the wastewater treatment plant and conveyance system. The number of discharges within the sewered area with fecal coliform counts above the District of Sooke thresholds (500 and 2,000 FC/100mL) has been reduced over time. In 2010, four of the discharges had fecal coliform counts above 500 FC/100 mL, compared to nine discharges in 2005. The number of discharges within the sewered area that exceeded 2,000 FC/100 mL in the same time period was reduced from eight to four. Remaining contamination appears to be related to properties that have not connected to the wastewater system.

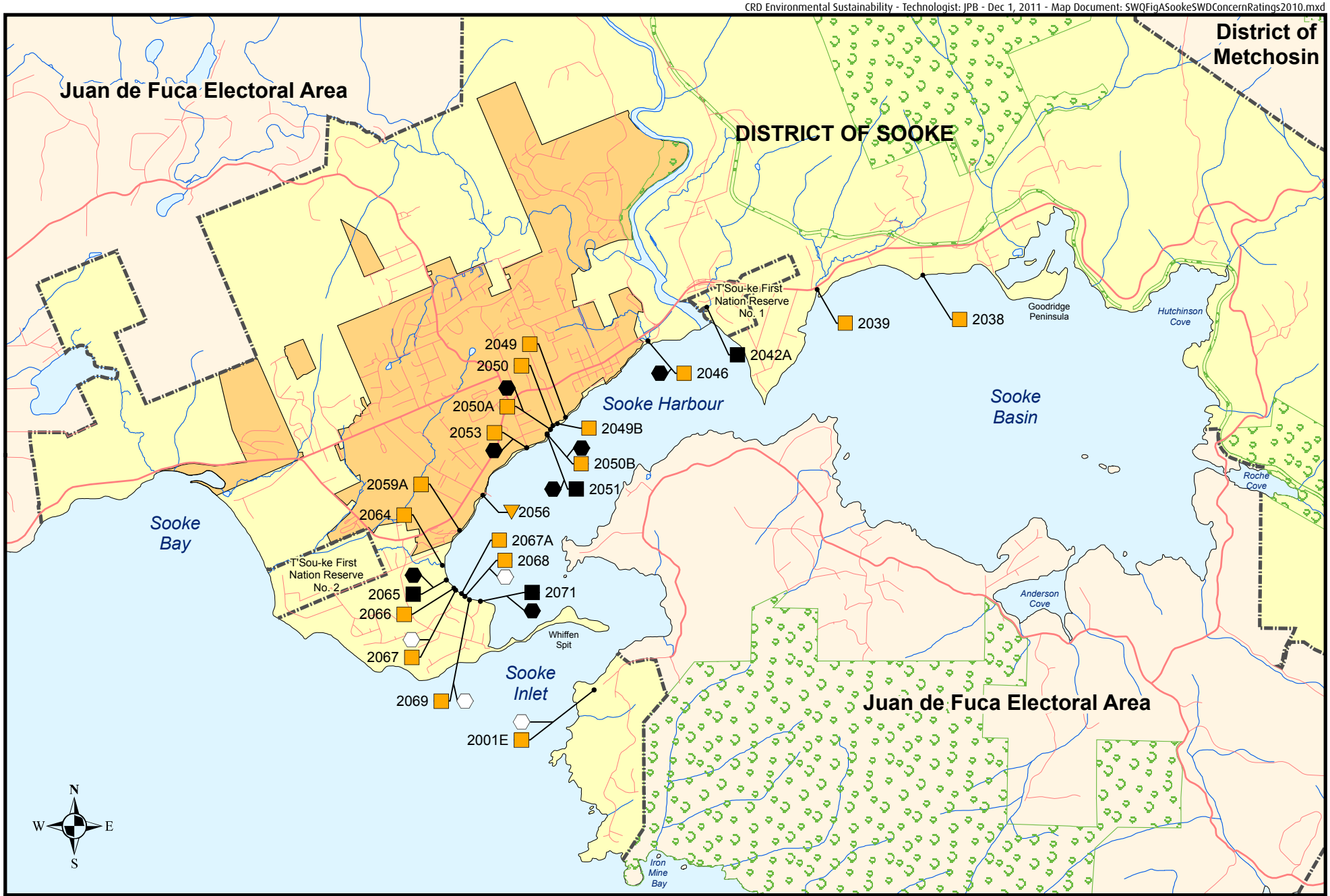
Also, for the first time, elevated fecal coliforms were not measured in Sooke Harbour adjacent to the sewered area. Further sampling will be conducted to determine whether marine fecal coliform levels in Sooke Harbour continue to be low.

Sewer Service Area Expansion

The District of Sooke is considering the Kaltasin and Whiffin Spit North catchment areas for expansion of the sewage service area. SHWP monitors six stormwater discharges in the Kaltasin area and five discharges in the North Whiffin Spit area.

In 2010 only the creeks in both areas had elevated fecal coliform counts. Four of the creeks in the two areas have a history of elevated fecal coliform counts. The creeks in the Kaltasin area (2039 and 2042A) were rated moderate and high (respectively) for public health concern in 2010. One creek in the Whiffin Spit Area (2065) was rated high for public health concern in 2010. The other (2064) was rated moderate.

CRD Environmental Sustainability - Technologist: JPB - Dec 1, 2011 - Map Document: SWQFigASookeSWDConcernRatings2010.mxd



Making a difference...together

Metres

0 250 500 1,000 1,500

Projection: UTM ZONE 10N NAD 83

High Environmental Concern
Moderate Environmental Concern
High Public Health Concern
Moderate Public Health Concern

Stormwater Flow Thresholds
500 - 1999 FC/100 ml
≥ 2000 FC/100 ml

Municipal Boundaries
Major Roads
Minor Roads

Streams and Rivers
Major Parks
Sewer Specified Areas
District of Sooke

Figure A

District of Sooke

2010 Stormwater Discharges of Concern

Agricultural or companion animal bacteria have been identified in each of these creeks. Human bacteria were measured in 2064; however, a more recent sample had lower bacteria counts and could not be analyzed for bacterial source.

The CRD has assessed habitat sensitivity, stormwater flow rates and marine flushing rates of the areas. Habitat around both areas is highly sensitive and includes shellfish beds and eelgrass, however there is less flushing around Billings Spit.

Despite its larger size, the Kaltasin area has little fecal coliform data as only six discharges have been identified and three of them rarely flow. In November 2010, SWHP staff re-surveyed the Billing Spit shoreline of the Kaltasin area for any new stormwater discharges. Because the area is vulnerable to high groundwater and failing septic systems, samples were collected from discharges, shoreline perimeter drains and the nearshore marine environment for fecal coliform analysis. With the exception of Alderbrook Stream, all discharges and perimeter drains were dry and could be sampled. Concurrently, marine surface water samples were all above the shellfish harvesting guidelines and three were above the SHWP primary contact guideline (200 FC/ 100 mL). Details of this survey are provided in Appendix G

It is anticipated that data collection in these two areas, will assist the District of Sooke in making decisions about sewer expansion that will protect public health and the environment.

5) Fecal Coliform Source Investigations

Fecal coliform bacteria are indicators of sewage, but also fecal contamination from all warm-blooded animals. SHWP source investigations have shown that agricultural or companion animal waste is present in a number of stormwater discharges with elevated fecal coliform counts (2042A, 2065, 2066, 2039, 2035, 2064). This may be the result of waste that is improperly disposed of, but could also be from use of animal manure as fertilizer.

Human bacteria have also been identified in a few Sooke discharges (2064, 2071 and 2051) likely due to failing onsite sewage treatment systems. SWHP is conducting further investigations in these discharges; however VIHA has been contacted regarding 2051. Although little human bacteria have been measured in stormwater discharges, it has been measured in Sooke Harbour in the past. In 2011, nearshore marine samples will be analyzed to determine if human bacteria is still present.

6) Environmental Health Monitoring

Environmental health is evaluated by assessment of contaminants in sediments from stormwater discharges and by assessment of water quality parameters in the significant watercourses that discharge onto the Sooke coastline.

Environmental Health Concern Ratings

No discharge sediments sampled in 2010 had concentrations of chemical contaminants (eight metals and two groups of hydrocarbons) above the CRD's Marine Sediment Quality Guidelines. Based on elevated levels of contaminants found in previous years, sampling was conducted upstream in two of the discharges (2053 and 2054). Silver contamination in discharge 2053 appears to be isolated to an area between Lincroft Road and West Coast Road, suggesting silver is not entering the receiving environment; however, marine sediment has not been assessed.

Watercourse Monitoring Results

Development near watercourses and inputs of sewage from on-site treatment system and agricultural waste pose the most risk to watercourses in the District of Sooke.

Water quality was measured in 14 Sooke watercourses in winter and summer (where flows allowed) in 2010. Based on the results, water quality was good in many of the watercourses monitored. No exceedences of guidelines occurred in Broom Hill Stream, Ella Stream, Gillespie Creek, Grouse Brook, Nott Brook, Sassenos Creek, Throupe stream and Wildwook Creek.

The watercourse that displayed the poorest water quality in 2010 and previous years was Alderbrook Stream due to turbidity and fecal coliform levels. Exceedences of guidelines occurred in five other streams, Ayum Creek, Wright Road Stream, Sooke River, Kemp Lake Stream and Veitch Creek.

Fecal coliform and phosphorous guidelines were exceeded most frequently and to the largest extent. Measurements outside the guidelines indicate the potential for adverse effects on fish populations and other aquatic life. The sources of fecal coliforms and phosphorus are likely due to land clearing, development around streams and failing onsite sewage treatment systems. Turbidity which has been a parameter of concern in previous years is also related to land clearing and development around streams.

Water Quality Trends

Water quality in most of the watercourses does not appear to be degrading or improving over time; however, higher than usual values were measured in Sooke River**.** Fecal coliform concentrations have consistently been above the SHWP guideline since 2008 at one station indicating degradation of the water quality. Phosphorous also exceeded the CCME guideline at two stations in Sooke River in 2010 for the first time since 2005.

SHWP staff will continue to monitor water quality to determine if the observed measurements are indicative of established changes in water quality.

All watercourse sampling locations are shown on Figure 6. Data (2009 and historical) are provided in Appendix E.

Future Sampling and Evaluation Efforts

In 2010, if possible, SHWP staff will conduct the following activities:

1) Stormwater Discharge Sampling

Sampling for analysis of fecal coliform counts and evaluation of public health concern for the following:

- stormwater discharges rated moderate and high in 2010
- significant watercourses
- discharges with a change in public health concern ratings from the previous year to confirm ratings
- discharges between Cooper Cove and Whiffin Spit (2035 to 2075) as requested by Sooke Council

2) Sediment sampling and assessment will be completed for the following:

- discharge 2057 to confirm the 2010 low rating,
- discharge 2053 to continue upstream investigations,
- discharge 2054 to confirm a 2007 high rating--sediment was not available in previous years, and 2054-1 to confirm moderate rating as part of upstream investigations, and
- discharges not visited for 5 years (2043 and 2064).

3) Watercourse Monitoring

SHWP staff will continue to monitor water quality in winter and summer for the 14 significant watercourses to assess watercourse health and determine if the observed measurements are indicative of established changes in water quality. SHWP staff will continue to monitor water quality to determine if the observed measurements are indicative of changes in water quality.

Continued sampling is required to properly assess water quality in these watercourses. The program will continue to be updated as changes in land use occur and other relevant information becomes available.

4) Marine Surface Water Monitoring

SHWP staff will continue to monitor fecal coliform levels at all 28 marine sampling stations in winter and summer for comparison to shellfish harvesting and human health recreational guidelines. In addition, four new stations have been added around Billings Spit to monitor areas where elevated fecal coliforms were identified in 2010.

5) Source Investigations

Source investigations will be conducted on a selection of discharges rated high and moderate for public health concern in 2010.

Special Projects

The CRD 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 main projects undertaken that could be used by the District of Sooke to protect stormwater quality within the jurisdiction.

BILLINGS SPIT INVESTIGATION AND MARINE SAMPLING

To provide information on potential areas for sewer service expansion part of the Kaltasin and the Flats Catchment Area shoreline was re-surveyed and stormwater discharges and the nearshore marine environment was sampled for fecal coliform levels. The survey included the Billing Spit shoreline from Alderbrook Stream to Kaltasin Road at Sooke Road. This shoreline area was inventoried to find new stormwater discharges and perimeter drains in 2010. Attempts were made to sample all the perimeter drains and stormwater discharges if flows existed. Marine water samples were also collected close to the shoreline twice during November 2010 to assess whether sewage was entering the marine environment.

The marine fecal coliform concentrations found along the Billing Spit shoreline in November 2010 were above the shellfish harvesting guideline and three were above the recommended recreational swimming guideline. The high shoreline fecal coliform concentrations were unexpected, considering there were no flows from any of the perimeter drains or stormwater discharges except for the Sooke River, Alderbrook and Lannon Creek. Elevated fecal coliform counts may indicate contamination from failing septic systems leaking into groundwater flows; however, groundwater sampling would be required to confirm this.

PUBLIC EDUCATION

The CRD SHWP includes public education as an important component for reducing contaminants flowing into storm drains. Part of this public education includes promoting the use of Best Management Practices (BMP) by the community. BMP are voluntary strategies for preventing stormwater pollution.

Public education also involves educating community groups on stormwater quality and quantity issues and strategies to reduce or prevent pollution. In 2008, work began on developing an education and outreach strategy that incorporates stormwater quality and quantity issues, as well as restorations and protection of watersheds.

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.

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 measure contamination and track changes in these water bodies over time.

4. that the Stormwater, Harbours and Watersheds program reassess the public shoreline use ratings in the District of Sooke.

Environmental Concerns

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

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, best management practices for the protection of stormwater quality and

General

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