

# Core Area Stormwater Quality Program

## 2020 Report

Capital Regional District | Parks & Environmental Services, Environmental Protection

### Including the jurisdictions of:

City of Colwood  
Township of Esquimalt  
City of Langford  
District of Oak Bay  
District of Saanich  
City of Victoria  
Town of View Royal  
Esquimalt First Nation  
Songhees First Nation  
Department of National Defence

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**CORE AREA STORMWATER QUALITY PROGRAM  
2020 REPORT**

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# CORE AREA STORMWATER QUALITY PROGRAM 2020 REPORT

## 1.0 INTRODUCTION

The Capital Regional District (CRD), Stormwater Quality Program works to identify and reduce contamination in stormwater, creeks and the ocean through monitoring, assessment, collaboration and education. In the core area, this work fulfills non-regulatory commitments in the Core Area Liquid Waste Management Plan (LWMP) and is done in partnership with participating municipalities and First Nations, with the goal of protecting human health and the environment. Program results are communicated to the participating municipalities and reports are available on the CRD website ([www.crd.bc.ca](http://www.crd.bc.ca)).

CRD staff identify contamination and impacts from stormwater through bacterial and chemical sampling. The program assesses stormwater discharges in the core area and assigns priority ratings for mitigative action for municipalities to consider. Where contamination is found, CRD staff conduct additional investigations and work with municipal staff to find and eliminate the source. In addition, staff also conduct sampling in seven major watercourses and the near-shore marine environment.

This report summarizes the results of work completed in 2020 (2021 data is considered in any conclusions when possible). Water and sediment quality data, including details about sampling locations and how discharges are rated for public health and environmental concern, are available in the *Core Area Stormwater Quality Program 2020 Supplemental Data* on the CRD website

## 2.0 RESULTS AND DISCUSSION

### 2.1 Stormwater Discharge Evaluations

The program evaluates water and/or sediment quality in approximately 550 core area stormwater discharges from the coastline between the Colwood-Metchosin border in the west and the Saanich-Central Saanich border in the east, including Esquimalt Lagoon, Esquimalt and Victoria harbours, the Gorge, Portage Inlet and the City of Langford coastline along Saanich Inlet (See Appendix A).

#### 2.1.1 Public Health Ratings

Each year, CRD staff sample a selection of stormwater discharges for analysis of bacterial levels. *E.coli* is measured as an indicator of fecal contamination and possible presence of pathogens. Staff assign a “public health concern rating” to each discharge based the extent of *E.coli* contamination in the discharge flow and potential for the public to contact the flow. While the CRD does not actually evaluate public health risk, this method is used to prioritize the discharges. This service allows appropriate jurisdictions to undertake remedial measures where they will have the most benefit. Appendix G describes the CRD public health concern rating system.

In 2020, staff sampled 180 stormwater discharges twice for *E.coli* concentrations (in winter and summer). These discharges included those previously rated as high- and moderate-priority, with a subset of low-priority discharges (to monitor for change).

Forty-nine percent of the discharges had one or more *E.coli* counts greater than 200 colony forming units (CFU)/100 mL, a level that indicates sources of sewage or animal waste with potential to cause adverse effects for public members engaging in primary recreational activities (e.g., swimming, diving). However, many of these discharges have low flows or are located where there is little risk of public contact. Considering the likelihood for contact, staff assigned the following public health concern ratings to allow prioritization:

- 91 low ratings
- 62 moderate ratings, and
- 27 high ratings (Table A, Figures B and C)

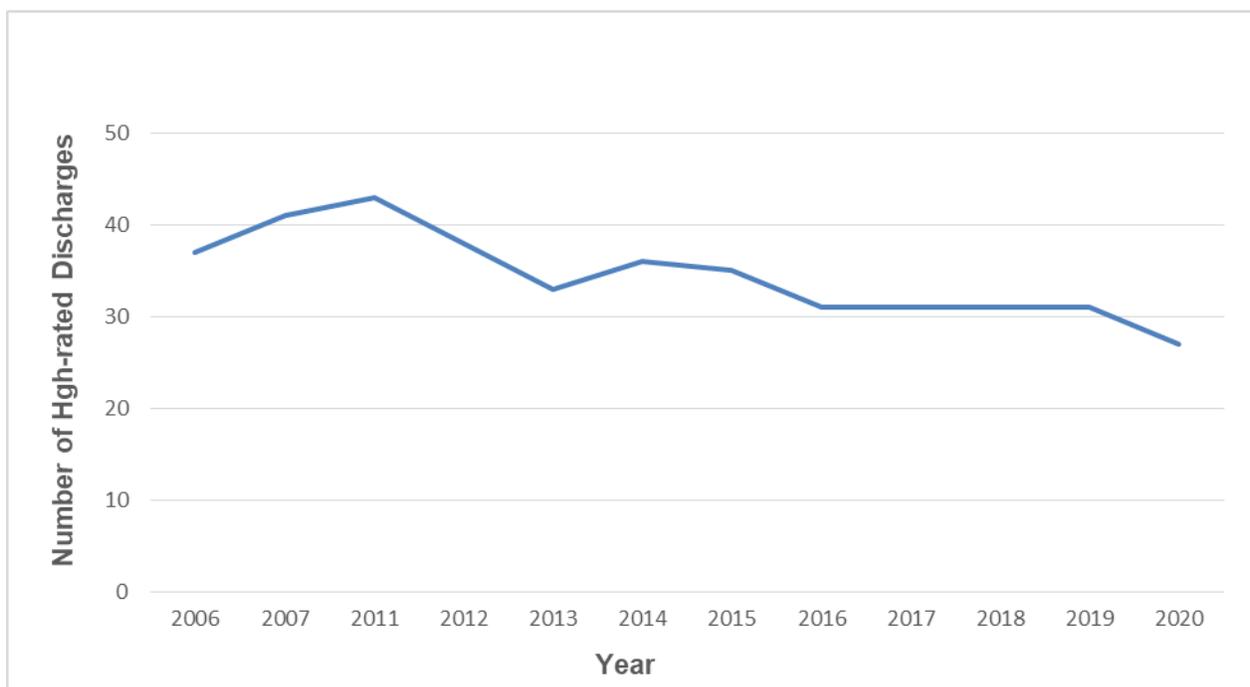
The number of high-rated discharges decreased in 2020 (Figure A and Table A). The decline in high-rated discharges since 2011, despite aging infrastructure and continuing development and renovations (which create the potential for stormwater-sewage cross-connections), highlight the ongoing efforts by the municipalities to replace, repair and reline old infrastructure, and work with residents and property owners to repair cross-connections. Notably, sewage forcemain upgrades along the shoreline, as part of the CRD sewage treatment project, may have resulted in lower bacterial counts in some storm drains.

While the total number of high-rated discharges has decreased, some of the individual discharges on the list have changed over time. In 2020, 11 of the previously high-rated discharges were assigned lower ratings, due to lower bacterial counts, while seven discharges were added to the list, due to newly-identified sources or fluctuation that resulted in higher counts.

Of the 27 high-rated discharges in the core area, 15 have remained high-rated for at least five years (see Appendix E). The causes of contamination in these discharges are often costly or difficult to repair or remediate, and some discharges have multiple sources of contamination in a single catchment, making it difficult to track.

Bacterial stormwater data, and the public health concern ratings for each discharge, can be found in appendices B and C, respectively.

**Figure A. Number of Discharges Assigned a High Public Health Concern Rating Over Time**



**Table A. Number of Discharges with a High Public Health Concern Rating from 2007 to 2020**

Year	2007	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Number of Discharges Assessed</b>	<b>(175)</b>	<b>(186)</b>	<b>(114)</b>	<b>(150)</b>	<b>(142)</b>	<b>(152)</b>	<b>(164)</b>	<b>(167)</b>	<b>(168)</b>	<b>(175)</b>	<b>(180)</b>
	<b>Number of Discharges Assigned a High Public Health Concern Rating</b>										
Colwood	0	1	0	0	1	0	0	0	1	0	0
View Royal	1	1	1	0	0	0	0	0	0	1	0
Esquimalt	8	7	7	8	7	5	6	6	7	5	4
Esquimalt private <sup>1</sup>	*	*	*	0	0	1	0	2	1	1	0
DND	0	0	0	0	0	0	0	0	0	0	0
Saanich	2	2	3	4	5	5	6	4	1	3	4
Saanich private <sup>1</sup>	*	*	0	0	0	0	0	0	0	0	0
Victoria	15	20	17	13	12	14	11	11	15	14	13
Victoria private <sup>1</sup>	5	3	1	1	2	2	2	2	1	1	1
Oak Bay	10	9	9	7	9	8	6	6	5	6	5
Langford	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>41</b>	<b>43</b>	<b>38</b>	<b>33</b>	<b>36</b>	<b>35</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>31</b>	<b>27</b>

**Notes:**

<sup>1</sup> Discharges that are not part of the municipal infrastructure are not under municipal jurisdiction and are separated out from the municipal totals.

\*Private discharges included in the municipal totals.

**Table B. Stormwater Discharges Assigned a High Public Health Concern Rating in 2019 and 2020**

Jurisdiction	Stormwater Discharges Rated High for Public Health Concern	
	2019	2020
City of Colwood	-	-
Township of Esquimalt	744B, 780, 781, 805, 806	744B, 781, 805, 806
Township of Esquimalt – private <sup>1</sup>	749A	-
City of Langford	-	-
District of Oak Bay	245, 249, 306, 310, 318, 320	245, 318, 320, 322, 323
District of Saanich	503, 558, 567	503, 506, 580, 581
City of Victoria	208/209, 214, 216, 222, 603, 607, 610, 611, 613, 614, 619, 641, 650, 777A	214, 216, 222, 229, 603, 607, 610, 611, 614, 619, 650, 758A, 777A
City of Victoria – private <sup>1</sup>	649	649
Town of View Royal	712	-
Esquimalt First Nation	-	-
Songhees First Nation	-	-
DND	-	-

**Notes:**

<sup>1</sup> Discharges that are not part of the municipal infrastructure are not under municipal jurisdiction.

## 2.1.2 Environmental Concern Ratings

CRD staff also prioritize stormwater discharges through measurements that indicate potential environmental impact. Ratings are based on concentrations of metals and organic contaminants [polycyclic aromatic hydrocarbons (PAH)] measured in sediment within the stormwater collection system (e.g., manholes, ditches and creeks) relative to sediment quality guidelines (for the protection of marine aquatic life). Discharges are sampled until the rating and contaminant(s) are confirmed (2 consecutive years). Once confirmed as a high-rated discharge, the discharge is targeted for corrective action starting with an investigation to locate the contaminant source(s). Appendix G contains detailed information about the CRD environmental concern rating system. Stormwater discharge sediment data and ratings can be found in Appendix E.

In 2020, CRD staff collected 19 stormwater sediment samples (10 at discharge points and nine at upstream locations). Based on the concentrations of metals and PAHs, this data resulted in environmental concern ratings for 9 discharges, as follows:

- 6 were assigned a low rating
- 2 were assigned a moderate rating, and
- 1 was assigned a high rating

The discharge assigned a high rating (discharge 692; Saanich) had elevated zinc and will be resampled in 2021.

Staff make recommendations for corrective action to find and eliminate sources of chemical contamination when a rating remains high for two consecutive years and the parameter(s) of concern are determined. Based on data up to 2020, CRD recommends 21 discharges for corrective action in the core area (shown in Table C). Locations of high-rated discharges in 2020, and those identified for corrective action, are shown on figures B and C.

The number of discharges recommended for action has fluctuated from 18 to 22 for the past seven years. Many discharges recommended for action have been a concern for more than five years. A number of the discharges with elevated metals are in large catchments with industrial land use, and along shorelines where historical practices or contaminated fill may have resulted in contamination (614, 620, 627, 629, 634, 636). Spills are more common in these areas as well.

Sources of contaminants in stormwater sediment can be complex to find and eliminate, as sediment is not always present when sampling, and contaminant levels fluctuate over time. Sources of contamination occur either as non-point sources (e.g., from roadways, parking lots) and transient point sources (e.g., spills). In some cases, sediment results reflect past practices that are no longer occurring. In 2019, staff started to collect water samples for contaminant analysis to supplement the sediment data. This will enable staff to detect more recent practices and evaluate the bioavailability of the measured contaminants.

Source control education has increased awareness of products used on commercial and private sites that have the potential to leach into surrounding waterways. As well, the use and maintenance of stormwater rehabilitation units (that capture the sediments before they reach the environment) has increased. The CRD and municipalities will continue to work together to identify and eliminate potential sources of contamination for these discharges.

### 2.1.2.1 Aqueous Metals in Storm Drains

In 2019, CRD staff started routinely measuring contaminants in water to provide more information about contaminant concentrations, sources, bioavailability and loadings to determine if a source is ongoing or dependent on precipitation. Data collected in 2019 and 2020 are provided in Appendix E.

In 2020, CRD staff collected water samples for measurement of aqueous metals at 64 stormwater sampling sites throughout the core area (43 at the point of discharge and 21 upstream). Samples collected in eight of the discharges, located in Saanich and View Royal, did not have any exceedances of BC Ministry of

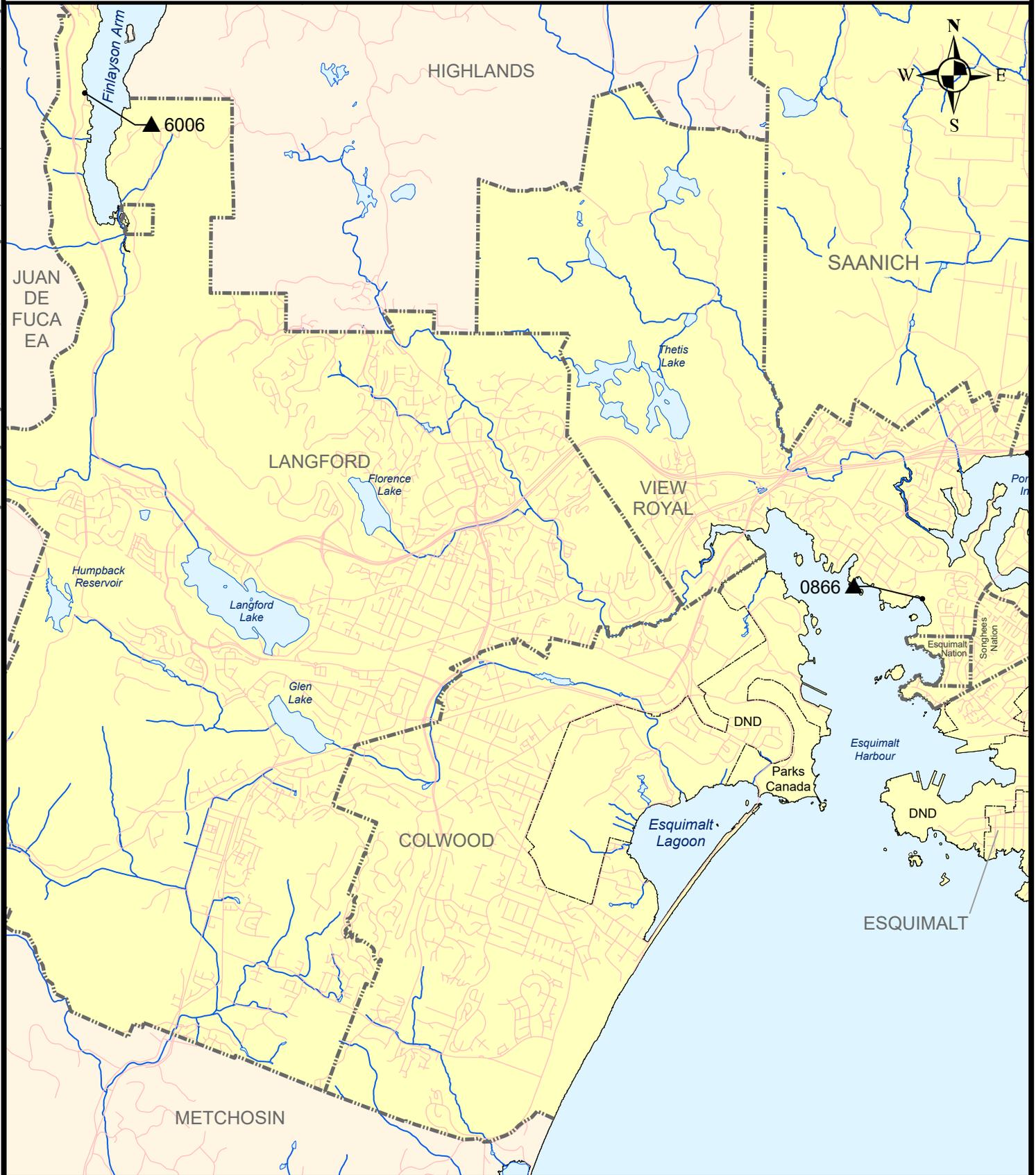
Environment and Climate Change Strategy (BC ENV) marine or freshwater aquatic life guidelines for the following metals (aluminum, arsenic, cadmium, copper, chromium, iron, lead, mercury, silver and zinc).

In the remaining 35 discharge locations, copper and/or zinc exceeded guidelines. There were also exceedances of arsenic, cadmium, chromium, iron and lead in some discharges in Victoria, Oak Bay, Esquimalt and Saanich. Data showed that exceedances of guidelines were most common in the winter.

The highest concentrations occurred in a stormwater discharge (629) along the Victoria shoreline at Rock Bay. An upstream copper measurement at this location was more than 10,000 times greater than the marine water quality guideline. Exceedances for aluminum, cadmium, chromium, iron, lead and zinc were 10 to 100 times greater than guidelines. CRD staff are conducting source investigations in this area and working with the City of Victoria to reduce contaminants in the discharge.

Previous data collected in 2013 and 2018, showed that several storm drains along Victoria Harbour (between Bellville Street and Jutland Road) are discharging stormwater with a number of elevated metals. Storm drains 613 (which drains into James Bay) and 629 (which drains into Rock Bay) had the highest concentrations of metals. Staff measured elevated zinc and copper in three locations in the ocean adjacent to these discharges, indicating that the storm drains are likely impacting the marine environment.

**Figure B - Core Area 2020**  
 Stormwater Discharges Requiring Action for Public Health and Environmental Concerns  
 (Metchosin to Esquimalt Border)



Making a difference...together

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0 0.5 1

Projection: UTM ZONE 10N NAD 83

**Discharges Requiring Action**

- High Public Health Rating
- ▲ High Environmental Rating and/or Recommended for Action

- Municipal Boundaries
- DND Boundaries
- ~ Streams and Rivers
- Roads
- Stormwater Monitoring Area

**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 C - Core Area 2020**  
 Stormwater Discharges Requiring Action for Public Health and Environmental Concerns  
 (Esquimalt to Central Saanich Border)



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0 1 2

Projection: UTM ZONE 10N NAD 83

**Discharges Requiring Action**

- High Public Health Rating
- ▲ High Environmental Rating and/or Recommended for Action

--- Municipal Boundaries

... DND Boundaries

~ Streams and Rivers

— Roads

■ Stormwater Monitoring Area

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**Table C. Discharges Recommended for Action Due to Elevated Sediment Chemical Contaminant Concentrations**

Jurisdiction	Discharges Recommended for Corrective Action	Total
City of Colwood	-	0
Township of Esquimalt	737, 742, 749, 806	4
Township of Esquimalt – private <sup>1</sup>	-	0
City of Langford	6006	1
District of Oak Bay	250, 306, 307, 310	4
District of Saanich	505	1
District of Saanich – private <sup>1</sup>	-	-
City of Victoria	216, 603, 614, 620, 627, 629, 634, 636	8
City of Victoria – private <sup>1</sup>	649	1
Town of View Royal	866, 874	2
DND	-	0
<b>Total</b>		<b>21</b>

**Notes:**

<sup>1</sup> Discharges that drain from private property do not fall under municipal jurisdiction. The 2020 high-rated discharge (692) has only received one high rating and, therefore, is not on the action list.

## 2.2 Source Investigations

In 2020, staff conducted source investigations in the catchment areas of 16 stormwater discharges identified as having a high public health concern rating or high environmental concern rating.

### 2.2.1 Bacterial Investigations

Bacterial source tracking investigations in nine stormwater catchment areas was conducted and the results of these investigations is presented in Table D.

CRD staff identified one source of sewage entering the storm drain (in discharge 610), which drains to the Inner Harbour. Those findings have been passed on to City of Victoria and the property owner. One additional source in discharge 622 was identified, but the results have not been confirmed. City of Victoria also identified a source of sewage entering discharge 619 and have worked on infrastructure changes to reduce that input. Investigations, or continued monitoring, are ongoing in six of the discharges, due to presence of multiple sources, lower bacteria counts or lack of flows to sample in 2020.

**Table D. 2020 Summary of CRD Stormwater Bacterial Source Investigations in the Core Area**

Discharge #	Municipality	# of Samples	Investigation Status
320	Oak Bay	2	One source fixed; narrowed another source; lower counts
503	Saanich	1	Ongoing; multiple sources, mainly waterfowl
607	Victoria	1	Ongoing; multiple sources; continue investigation
610	Victoria	2	Source identified; passed on to City of Victoria
622	Victoria	2	Source narrowed; need flow for confirmation
623	Victoria	1	Ongoing; low flow
626	Victoria	1	Ongoing; multiple sources
629	Victoria	1	Ongoing; multiple sources
854	DND/Esquimalt	1	Ongoing

## 2.2.2 Chemical Contaminant Investigations

Staff conducted chemical contaminant source investigations in eight stormwater catchment areas. These investigations are summarized in Table E.

Investigations are ongoing in these catchments; however, a source was narrowed down for metals in discharge 629 and the City of Victoria has been notified. Staff were involved in spill responses in both discharges 627 and 629. Spill response resulted in a repair in discharge 627 and more careful practices in one business in 629, however, other sources remain.

**Table E. 2020 Summary of CRD Stormwater Contaminant Source Investigations in the Core Area**

Discharge #	Municipality	Sampling Events (#)	Contaminant of Concern	Investigation Status
216	Victoria	1	Lead	Confirmation of low lead concentrations. Continue monitoring
306	Oak Bay	1	HPAH and lead	Ongoing; appears to be historical contamination
505	Saanich	2	Mercury	Ongoing; partially narrowed down; confirming results
607	Victoria	1	None identified; looking at efficacy of SWRU	Ongoing; more data needed
627	Victoria	2	Copper and zinc	Ongoing; narrowing; need confirmation For another source, spill identified and repairs made
629	Victoria	3	Aluminum, arsenic, cadmium, copper, iron, lead, nickel, silver and zinc	Narrowed a source down to the 600 block of John St.; COV is investigating For another source, a business was engaged to ensure more careful practices following a spill
636	Victoria	1	Iron, cadmium, chromium, copper, iron, lead and zinc	Ongoing
742	Esquimalt	1	Mercury	Narrowed to a block, but continuing to narrow further; eliminated golf course

**Notes:**

PAH is polycyclic aromatic hydrocarbons; LPAH are the low molecular weight PAH and HPAHs the high molecular weight PAHs.

SWRU: stormwater retention unit

COV: City of Victoria

Many of the discharges with elevated metals are in large catchments with industrial land use and along shorelines where historical practices or contaminated fill may have resulted in contamination (614, 620, 627, 629, 634, 636). Spills are more common in these areas. These sources are challenging to narrow down and remediate.

Overall, CRD staff have narrowed down sources in 11 of the 21 stormwater catchments on the action list and continue to work with municipal staff on eliminating or lessening these sources (see previous reports for detail).

## 2.3 Major Watercourse Monitoring

In 2020, CRD staff continued to monitor Bee, Bowker, Cecelia, Colquitz, Colwood, Craigflower, Douglas, Hospital, Noble, Selleck and Tod creeks, Goldstream River and Mill Stream to provide information about watershed health to internal CRD, provincial and municipal staff, community groups and the public.

Each year, CRD staff collect water quality data twice at the discharge of each creek, providing a snapshot of creek health conditions in the wet and dry seasons. In addition, staff conduct more comprehensive watershed health assessments in two to three core area watercourses each year, with the goal to assess each watercourse in this manner every five years.

Craigflower Creek and Noble Creek watersheds were assessed more extensively, including measuring water quality five times in 30 days (5-in-30) in summer and fall at various locations in the watershed, and undertaking a health assessment of the benthic invertebrate animals living in the creeks. Additional water quality parameters, including metals, were measured. Sampling five times in 30 days allows for comparison to BC Water Quality Guidelines.

BC ENV, with assistance from CRD, have started developing draft Water Quality Objectives for CRD streams. However, the objectives are draft or the same as the BC Water Quality Guidelines (WQG), therefore, all CRD watercourse data is compared to the BC WQG. These data were also compared to data from the previous 5-in-30 assessment data.

### 2.3.1 Water Quality Data

CRD data indicate that the water quality parameters of most concern in core area creeks are bacteria, phosphorus, turbidity and metals. Some sites also experience low dissolved oxygen and elevated temperature in the summer. This is consistent with what is seen throughout the region and elsewhere wherever there is increased human presence. The BC ENV draft Vancouver Island phosphorus objective was exceeded in all CRD creeks, due to human and animal presence in these watersheds.

#### **CRAIGFLOWER CREEK WATERSHED**

Craigflower Creek Watershed lies within the municipalities of View Royal, Saanich, Langford and Highlands, and includes a number of lakes and parks (including Thetis Lake Regional Park, Prior and Pike lakes and part of Mount Work Regional Park).

Weekly data collected over the summer and fall in Craigflower Creek (10 weekly samples) indicated that urban development in the watershed continues to impact water quality. The parameters of concern (i.e., those above BC ENV approved water quality guidelines for protection of aquatic life) are aluminum, dissolved oxygen, phosphorus, temperature, suspended solids and turbidity.

While total iron was not measured above the guideline, dissolved iron was elevated at all sites, including the more pristine upstream site, indicating that it may be naturally elevated.

Comparison of the 2015 and 2020 data did not indicate changes in the parameters of concern. However, compared to the 2015 data, there were temperature changes in two locations downstream of Prior Lake in 2020. Elevated summer temperatures (and higher than usual flows) were recorded weekly in McKenzie Creek, while 2015 measurements were below the draft objective of 17°C. Mean ( $\pm$  standard deviation) temperatures were higher in 2020 compared to 2015 in McKenzie Creek ( $17.9 \pm 0.6^\circ\text{C}$  and  $13.8 \pm 1.1^\circ\text{C}$ ) and Craigflower Creek upstream of Highland Road ( $15.1 \pm 0.9^\circ\text{C}$  and  $12 \pm 1.2^\circ\text{C}$ ). It is likely that the increased temperatures were due to reports of weekly (or more frequent) removal of a beaver dam in Prior Lake in summer. This was also evident in observations of higher than usual flows downstream and in-stream rocks often wetted higher than the water level.

## **NOBLE CREEK WATERSHED**

Noble Creek discharges from the northeastern Saanich coastline, while the upper reaches of its watershed are located in Central Saanich.

Water quality data indicates that upstream agricultural practices continue to be a source of poor water quality. The parameters of concern in 2020, as well as 2017 (i.e., those above BC ENV approved water quality guidelines for protection of aquatic life), continue to be dissolved oxygen, iron, nitrate, nitrite, phosphorus, suspended solids, turbidity, temperature and *E.coli*.

A high dissolved aluminum value was also measured in one summer sample downstream, but the result was inconsistent with the other summer samples and the dissolved value was higher than the total. Additionally, upstream dredging in the creek on September 8 resulted in turbidity and suspended solids measurements which were more elevated than usual.

Water quality is important in these creeks, but hydrological changes and physical alteration are also a concern. Therefore, benthic invertebrate community data and hydrological data are also collected. Hydrological data is collected in FlowWorks. For access to this data contact [stormwater@crd.bc.ca](mailto:stormwater@crd.bc.ca).

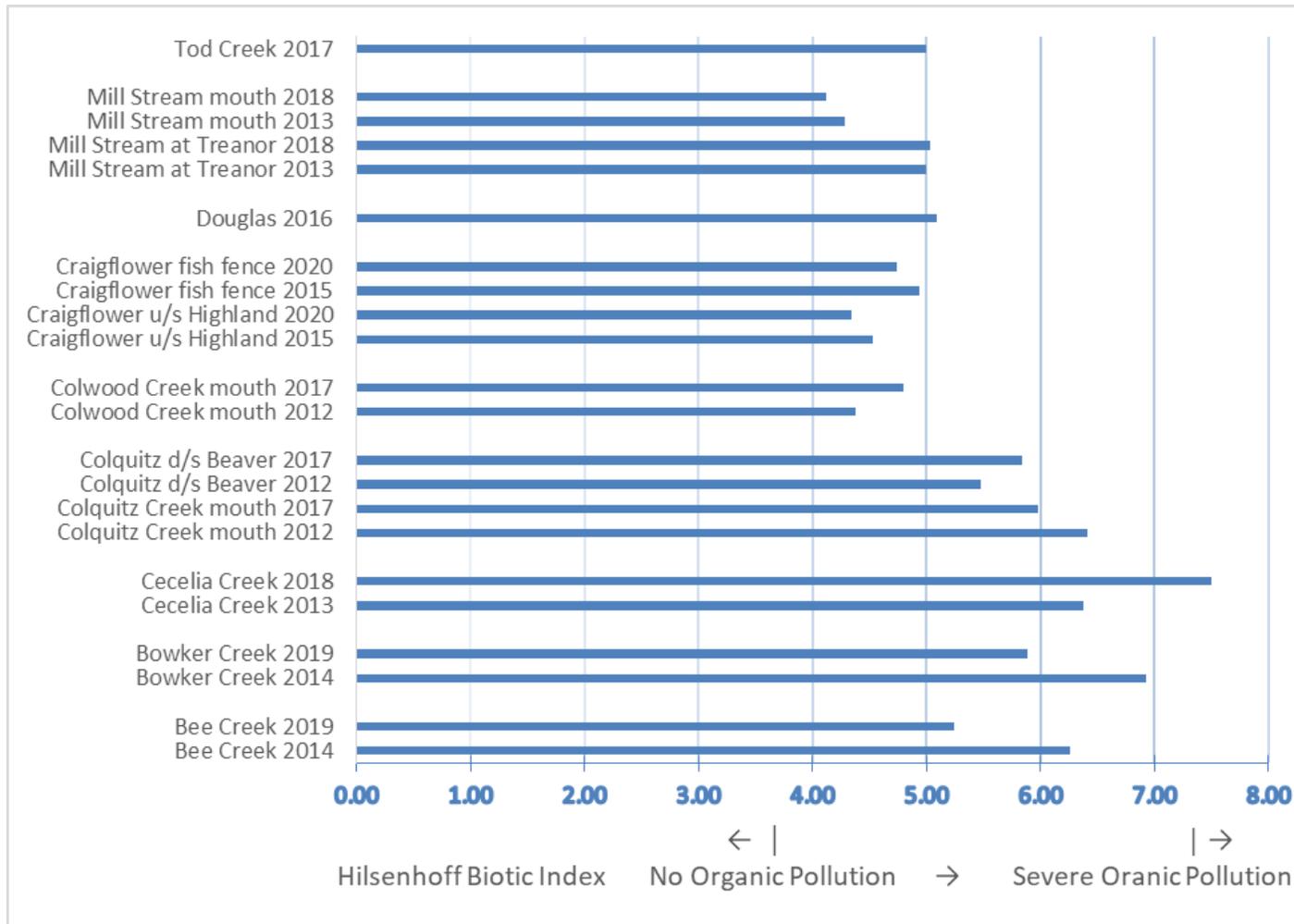
### **2.3.2 Benthic Invertebrate Community Data**

Benthic macroinvertebrates live in or on the bottom of streams and are indicators of stream health. Their community composition reflects the overall condition of the aquatic environment and depends on nearby water and sediment quality, as well as hydrology.

The Hilsenhoff Biotic Index (HBI) indicates the amount of organic and nutrient pollution in a stream, based on species distribution and their tolerance to such pollution. A comparison of the CRD streams HBIs are shown in Figure D. Mill Stream (at the mouth) was deemed “Very Good”, with slight organic pollution probable. Colwood, Colquitz (downstream of Beaver Lake), Craigflower, Douglas, Mill Stream (at Treanor Road) and Tod creeks were deemed “Good”, with some organic pollution likely; Colquitz, and Bee creeks were deemed “Fair”, with fairly substantial pollution likely; and Bowker and Cecelia creeks were deemed “Fairly Poor”, with substantial pollution likely.

**Table F. Hilsenhoff Biotic Index Scores and their Predicted Water Quality and Organic Pollution Levels**

<b>HBI</b>	<b>Water Quality</b>	<b>Organic Pollution</b>
0-3.75	Excellent	No apparent organic pollution
3.76-4.25	Very Good	Slight organic pollution possible
4.26-5.00	Good	Some organic pollution probable
5.01-5.75	Fair	Fairly substantial pollution likely
5.76-6.60	Fairly Poor	Substantial pollution likely
6.51-7.25	Poor	Significant organic pollution
7.26-10	Very Poor	Severe organic pollution



**Note:** The Hilsenhoff Biotic Index is a measure of benthic invertebrate communities that indicates higher organic pollution with increasing score.

**Figure D. CRD Core Streams Benthic Macroinvertebrate Data Overtime Represented by Hilsenhoff Biotic Indices**

A slight degradation of the HBI in Colwood Creek in 2012 compared to 2017 (from 4.38 to 4.80), and Cecelia Creek and Mill Stream in 2013 compared to 2018 (from 6.38 to 7.49 in Cecelia and 4.28 to 5.03 in Mill Stream) suggests that pollution may be increasing in these creeks and further study is warranted. However lower HBIs in 2019 for Bee and Bowker creeks (from 6.25 to 5.24 and 6.93 to 5.88, respectively) indicated that organic pollution may be decreasing in these creeks. Changes in the HBI in Craigflower Creek between 2015 and 2020 were small and may indicate a slight improvement.

While the HBI can indicate changes in organic pollution, other environmental factors can influence the invertebrates in the stream at the time of sampling and the HBI, including large rainfalls that wash invertebrates downstream or environmental spills.

### **3.0 2021 PROGRAM**

The program will continue to work with municipal partners, First Nations and the community to achieve LWMP goals to identify stormwater discharges of public health and environmental concern, and investigate the sources of contamination. CRD staff will continue to work with our partners to identify and reduce bacteria and contaminant concentrations in stormwater discharges, creeks and the marine receiving environment. Following a five-year cycle to look at all the major core area watersheds, focused water quality and benthic invertebrate sampling will be undertaken in Douglas Creek and Goldstream River in 2021.