



Atlantic Canada
Estuary Health
Assessment

LaHave Estuary

Overview

The Bluenose Coastal Action Foundation has completed an environmental health assessment of the LaHave Estuary in partnership with environmental groups from the Bay of Fundy, Gulf of St. Lawrence, and western Newfoundland, working together to address estuary health in Atlantic Canada.

Each group was assigned 20 randomly selected sampling sites in their estuary. A water sample from each site was analyzed for eutrophication indicators (**nutrients**): chlorophyll a, nitrogen, and phosphorous, as well as Secchi depth and dissolved oxygen. Fifteen of the sampling sites were chosen for coliform analysis (**bacteria**) and sampled five times, once in each season in dry conditions, once after a moderate rainfall, and once after a heavy rainfall. In the 5 most coastal sampling sites, a **sediment** sample was collected and analyzed for trace metals, mercury, polynuclear aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine (OC) pesticides, & total organic carbon (TOC).

Results

Bacteria: Fecal coliform counts ranged from <10 to 1800 coliforms/100 ml and was over the water quality standard at nine sites (60%). Six sites, located in the upper reaches of the estuary, are classified as highly impaired, exceeding limits multiple times. The highest counts were found during the summer, fall, and with high rainfall events.

Nutrients: Chlorophyll a was just above the 8 µg/L guideline at two sites (2C and 5C); 15 sites were ≤3 µg/L. There was a slight fresh water stratification during the spring sampling at site 10A; however, it did not impact the dissolved oxygen concentration (>10 mg/L). The only value of nitrate that was above the minimum detection limit (MDL; 0.050 mg/L) was at site 1A. This site was also above this assessment guideline of 0.045 mg/L for dissolved inorganic nitrogen.

Sediment: All five sites were below detection limits for PCBs. Sites 2C and 8A were below threshold effect levels (TEL) guidelines for the individual PAH parameters as well as below the NOAA PAH (sum) of 1.68 mg/kg. All other sites were below the detection limits for PAHs. All sites were above the TEL for Arsenic (7.24 mg/kg). Site 17B was also above the TEL for Lead (30.2 mg/kg) and site 2C was above the NOAA apparent effects threshold (AET) guideline for tin (3.4 mg/kg).

Discussion

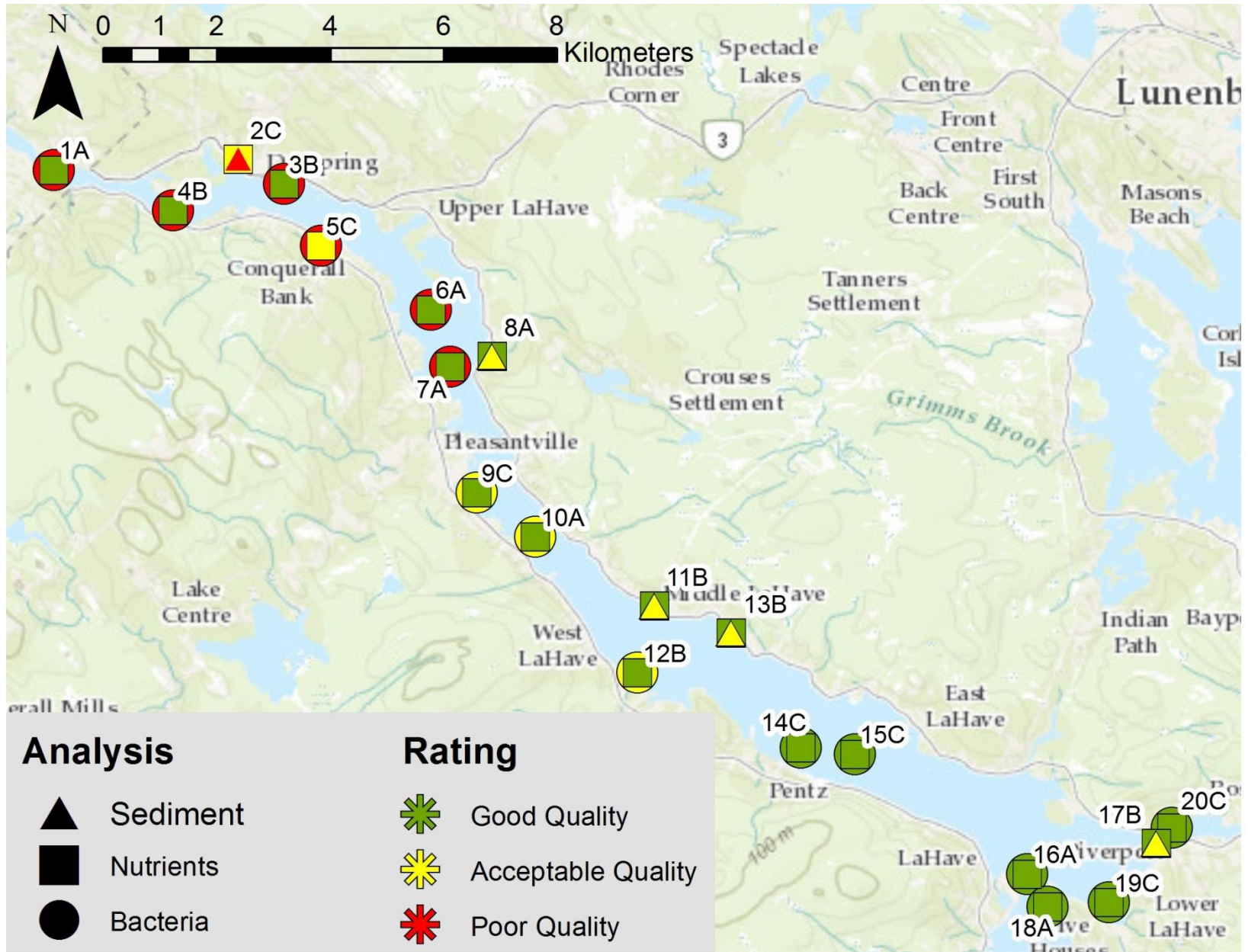
Fecal coliform contamination, particularly in the upper part of the estuary, is the main environmental issue in the LaHave estuary. This is caused by the approximately 600 straight pipes still being used in the estuary, as well as the 5 combined sewer overflow (CSO) pipes employed by the Town of Bridgewater. As seen below, the responsive action plan for the estuary will address this bacterial contamination.

Responsive action plan

Action	Type	Outcome	Lead	Partners	Cost	Timing
* Replace 600 straight pipes with approved systems	Restoration	Reduction of fecal coliform levels	* Municipality of the District of Lunenburg	* Infrastructure Canada Build Canada Fund	* High	* Long
Complete separation of Town of Bridgewater's storm and sewer systems		Stop discharge of untreated sewage	Town of Bridgewater	* Government of Nova Scotia		
Continued monitoring of fecal bacteria levels in the estuary	Monitoring	The public will remain informed about the health hazards of water recreation	Bluenose Coastal Action Foundation	Municipality of the District of Lunenburg	Medium	Short Med Long
		Any changes in fecal coliform levels will be identified		Town of Bridgewater		
Public education initiatives	Stewardship	Public will stay informed about illegal straight pipes, bacteria contamination, & health hazards.	Bluenose Coastal Action Foundation	Municipality of the District of Lunenburg	Low	Short Med Long
				Town of Bridgewater		
				Nova Scotia Department of Environment		

* Project is not confirmed; conditional on approval by Municipality of the District of Lunenburg's council to apply for Build Canada Fund and on the Federal decision to award this funding.

Results map



LaHave River Estuary

Site	Fecal Coliforms/100ml (Spring)	Fecal Coliforms/100ml (Summer)	Fecal Coliforms/100ml (Fall)	Fecal Coliforms/100ml (12.5mm rain)	Fecal Coliforms/100ml (25mm rain)	Fecal Coliforms/100ml (mean)	Secchi Depth (m)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat)	Nitrate + Nitrite (mg/L)	Chlorophyll α (µg/L)	Polychlorinated Biphenyls (PCBs) (µg/kg)	Polynuclear Aromatic Hydrocarbons (PAHs) (µg/kg)	Arsenic (mg/kg)	Lead (mg/kg)	Tin (mg/kg)
1A	180	530	410	730	480	466	1.65			0.057	2.01					
2C							1.58			<0.050	8.19	<MDL	<TEL	15		4.1
3B	160	570	480	880	180	454	2.8			<0.050	6.56					
4B	210	610	490	1800	200	662	2			<0.050	3.18					
5C	220	280	880	370	480	446	2.04			<0.050	8.73					
6A	190	610	670	230	300	400	2.51			<0.050	3.51					
7A	230	480	850	160	220	388	2.66			<0.050	6.74					
8A							2.55			<0.050	5.96	<MDL	<TEL	20		
9C	310	50	430	190	300	256	3.33			<0.050	2.44					
10A	320	150	750	80	270	314	4.23			<0.050	2.46					
11B							4.11			<0.050	2.1	<MDL	<MDL	9.6		
12B	380	90	430	20	160	216	2			<0.050	1.77					
13B							3.38			<0.050	1.7	<MDL	<MDL	15		
14C	180	10	320	<10	160	168	4			<0.050	1.67					
15C	210	30	160	<10	210	153	5.7			<0.050	1.43					
16A	70	10	130	<10	100	78	5.9			<0.050	1.33					
17B							3.7			<0.050	1.21	<MDL	<MDL	13	41	
18A	110	<10	130	<10	190	143	5.03			<0.050	1.07					
19C	50	<10	100	<10	150	100	4.69			<0.050	1.35					
20C	10	20	10	<10	110	38	4			<0.050	1.42					