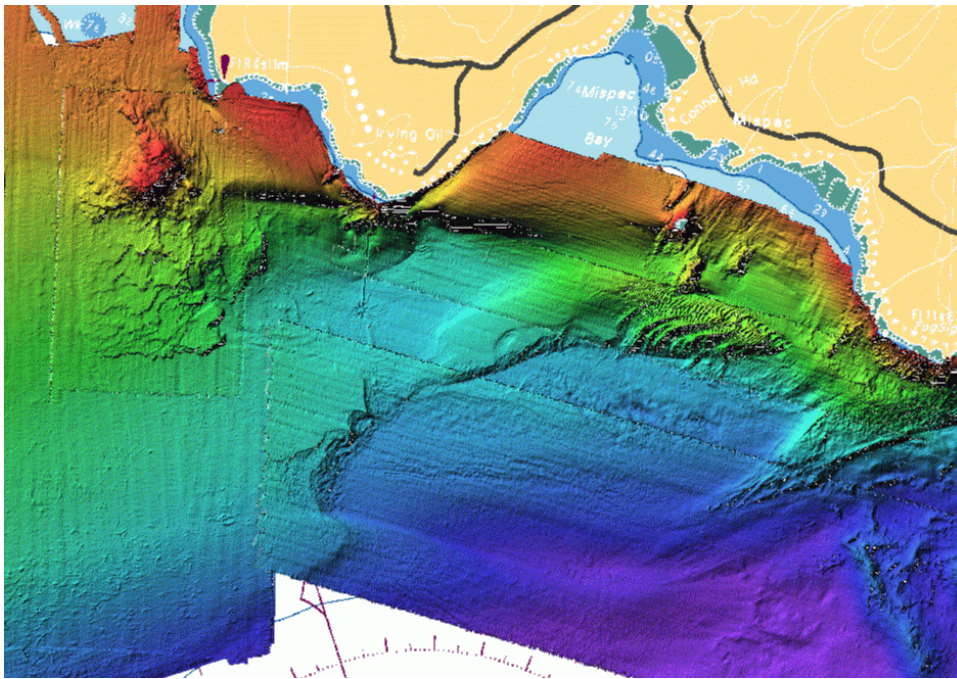


## Compendium of Monitoring Activities at Disposal at Sea Sites in 2001.



Disposal at Sea Program  
Marine Environment Branch  
Toxics Pollution Prevention Directorate  
Environmental Protection Service  
Environment Canada

December 2002

*Cover: Multibeam bathymetry of Black Point Disposal Site and surrounding area, November 2001, generated by Atlantic Geoscience Centre.*

## Summary

Each year, Environment Canada conducts representative monitoring at disposal at sea sites. This is one of the measures in place to protect Canada's marine environment under the *Canadian Environmental Protection Act, 1999* (CEPA) and meet our international commitments under the *London Convention 1972* and its *1996 Protocol* on preventing marine pollution by controlling the disposal of wastes at sea. This report provides a technical summary of monitoring activities conducted in the year 2001.

In the Atlantic Region, detailed geophysical measurements of the seafloor were taken at the Black Point and Amherst Cove disposal sites and their surrounding areas. As well, a benthic community study was carried out at Black Point and video and seafloor photographs were taken at Amherst Cove. These surveys found disposed material remained mostly within both sites, with some erosion observed at Black Point. Benthic community studies at both sites indicated the disposal activity had not changed sediment communities in the the surrounding areas of the sites.

In the Quebec Region, detailed bathymetry measurements were taken at five sites in the Magedalan Islands and benthic community studies were conducted at Depot D. Data analysis is continuing and results are expected to be available for the 2002 Monitoring Compendium.

In the Pacific and Yukon Region, sediment sampling was conducted at the Sand Heads and Watts Point disposal sites. Video surveys of the seafloor were carried out at Point Grey, Porlier Pass, and Watts Point disposal sites and their results are expected to be available for the 2002 Monitoring Compendium.

## Comments

Comments may be sent to:

|                                         |                              |
|-----------------------------------------|------------------------------|
| Paul Topping                            | Tel.: 819-953-0663           |
| Disposal at Sea Program                 | Fax: 819-953-0913            |
| Marine Environment Branch               | Email: paul.topping@ec.gc.ca |
| Toxics Pollution Prevention Directorate |                              |
| Environmental Protection Service        |                              |
| Environment Canada                      |                              |
| Ottawa, Ontario                         |                              |
| K1A 0H3                                 |                              |

## Table of Contents

|                                                                                                        |           |
|--------------------------------------------------------------------------------------------------------|-----------|
| <b>Summary</b>                                                                                         | <b>3</b>  |
| <b>Comments</b>                                                                                        | <b>3</b>  |
| <b>Table of Contents</b>                                                                               | <b>4</b>  |
| List of Figures                                                                                        | 5         |
| <b>Introduction</b>                                                                                    | <b>6</b>  |
| Conducting monitoring studies                                                                          | 6         |
| Intensity of monitoring                                                                                | 6         |
| Reporting                                                                                              | 6         |
| <b>Atlantic Region: Monitoring and Evaluation of Conditions at the Black Point Ocean Disposal Site</b> | <b>7</b>  |
| Facts about the site                                                                                   | 7         |
| Hypotheses tested at the site                                                                          | 7         |
| Parameters measured                                                                                    | 7         |
| Observations and results: physical surveys                                                             | 8         |
| Observations and results: benthic community surveys                                                    | 8         |
| Conclusions and follow up                                                                              | 10        |
| <b>Atlantic Region: Confederation Bridge Ocean Disposal Site</b>                                       | <b>11</b> |
| Facts about the site                                                                                   | 11        |
| Hypotheses tested at the site                                                                          | 11        |
| Parameters measured                                                                                    | 11        |
| Conclusions and follow up                                                                              | 13        |
| <b>Quebec Region: Bathymetry surveys at five sites</b>                                                 | <b>15</b> |
| Facts about the sites                                                                                  | 15        |
| Hypothesis tested                                                                                      | 15        |
| Parameters Measured                                                                                    | 15        |
| Observations and Results                                                                               | 15        |
| <b>Quebec Region: Review of site closure decision at Dépôt D</b>                                       | <b>16</b> |
| Facts about the site (see map in previous section)                                                     | 16        |
| Background                                                                                             | 16        |
| Benthic communities study at Depot D in 2001                                                           | 16        |
| Follow Up                                                                                              | 17        |
| <b>Pacific and Yukon Region: Sand Heads Disposal Site</b>                                              | <b>18</b> |
| Facts about the site                                                                                   | 18        |
| Background                                                                                             | 18        |
| Hypothesis tested                                                                                      | 18        |
| Parameters measured                                                                                    | 19        |
| Observations and results                                                                               | 19        |
| <b>Pacific and Yukon Region: Watts Point Disposal Site</b>                                             | <b>20</b> |

|                                                                                                                           |           |
|---------------------------------------------------------------------------------------------------------------------------|-----------|
| Facts about the site .....                                                                                                | 20        |
| Background.....                                                                                                           | 20        |
| Hypothesis tested.....                                                                                                    | 20        |
| Parameters measured .....                                                                                                 | 20        |
| Observations and results.....                                                                                             | 21        |
| <b>Pacific and Yukon Region: Seafloor Video of Biota at Point Grey, Porlier Pass and Watts Point Disposal Sites .....</b> | <b>22</b> |
| Parameters measured .....                                                                                                 | 22        |
| Observations and results.....                                                                                             | 22        |
| <b>Annex 1. Offices for the Disposal at Sea Program .....</b>                                                             | <b>23</b> |

**List of Figures**

|                                                                                                                                                                                                                                        |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 1. Black Point Disposal Site and surrounding area.....                                                                                                                                                                          | 8  |
| Figure 2. Distribution of seabed animal communities determined in Environment Canada and EnviroSphere Consultants Ltd. studies, compared with sediment and turbidity distribution from studies by the Geological Survey of Canada..... | 9  |
| Figure 3. Amherst Cove, 1995, before disposal of dredge spoils from Confederation Bridge shown with the boundary of the disposal site. ....                                                                                            | 12 |
| Figure 4. Amherst Cove, 2001, after disposal of dredge spoils from Confederation Bridge shown with the boundary of the disposal site. ....                                                                                             | 13 |
| Figure 5. Sample of sandstone cobble recovered from Station 30 showing boring bivalves in the rock. ....                                                                                                                               | 13 |

## **Introduction**

Canada regulates disposal at sea through a permit system under the *Canadian Environmental Protection Act, 1999* (CEPA).

Each year, Environment Canada conducts representative monitoring at disposal at sea sites. This is one of the measures in place to protect Canada's marine environment under the *Canadian Environmental Protection Act, 1999* (CEPA) and meet our international commitments under the *London Convention 1972* and its *1996 Protocol* on preventing marine pollution by controlling the disposal of wastes at sea. This report provides a technical summary of monitoring activities conducted in the year 2001.

### **.1 Regulating Ocean Disposal in Canada Conducting monitoring studies**

Monitoring a disposal at sea site is conducted according to national guidelines. Activities carried out in a given year are based on available resources and can involve an assessment of the physical, chemical and biological features. The impact hypotheses generated during permit reviews are tested during disposal site monitoring.

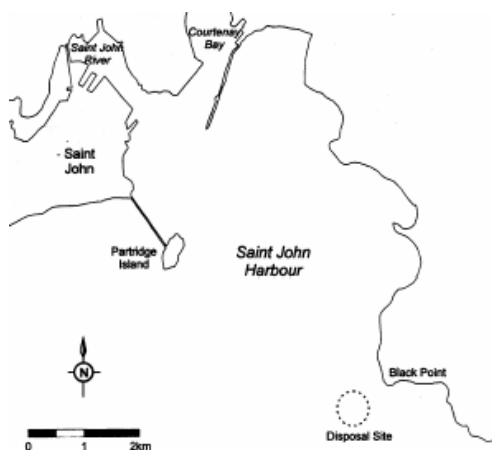
### **Intensity of monitoring**

Monitoring at every disposal site is not considered necessary, as current knowledge of impacts related to disposal of dredged material allows for good assessments to be drawn from representative disposal sites. The major sites (greater than 100,000 m<sup>3</sup> of dredged material per year) are monitored nonetheless on at least a five year cycle. The monitoring of other sites is determined by triggers set out in the national monitoring guidelines that are based on volume, proximity to sensitive areas, or level of concern. The number of sites monitored in a year and the parameters measured at each site depend the available resources through the collection of monitoring fees from permittees. The monitoring guidelines recommend that at least seven sites be monitored annually.

### **Reporting**

Canada's Disposal at Sea Program is administered through regional offices which are largely responsible for the permit review process, as well as for planning, conducting and reporting on monitoring studies undertaken in their administrative areas. This compendium, based on regional detailed reports, responds to Canada's national and international reporting obligations on disposal at sea site monitoring. Readers may request detailed information on any of the monitoring activities in this compendium from the appropriate regional office or through the national capital office (see Annex 1).

## Atlantic Region: Monitoring and Evaluation of Conditions at the Black Point Ocean Disposal Site



### Facts about the site

- Site** Black Point, in the Bay of Fundy, 45°12.00' N, 66°00.97' W, serving the Saint-John Port Authority, Saint John, New Brunswick.
- Depth** Ranges from 10 to 30 m.
- Material** Dredged material (silty sand).
- Quantity** About 18,000,000 m<sup>3</sup>, scow measure, was disposed of at the site; averaging 300,000 m<sup>3</sup> per year since the 1960's.
- Status** Continues to receive material annually.
- Concerns** Black Point is the largest disposal site on the East Coast. There are concerns among fishers and the public that accumulated dredged material has physically altered the marine habitat in the area, poses a threat to navigation and has introduced chemical contaminants.

### Hypotheses tested at the site

- Shifting disposal activities slightly west of the site will prevent further accumulation of sediment on the main mound and reduce future slumping of the materials to the south to avoid impacts to fishing grounds.
- Disposal activities did not cause significant impacts to the surrounding habitat.

### Parameters measured

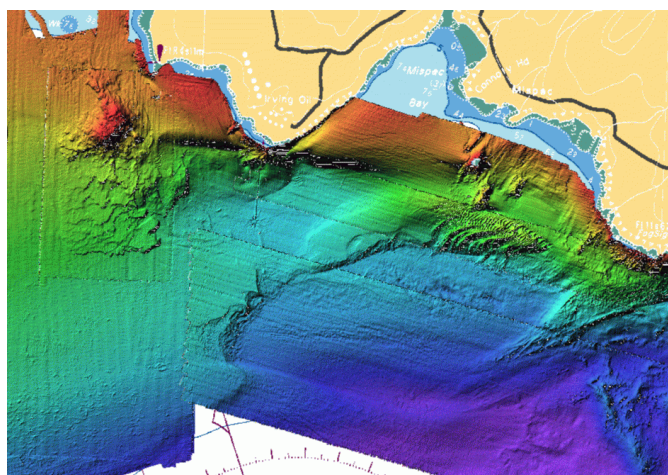
In 2001, Environment Canada and the Geological Survey of Canada continued a partnership from the previous year to assess conditions at Black Point Ocean Disposal site. Previous work in 2000 found the presence of a large mound of accumulated dredged sediment, but that contaminants did not pose a concern. Details were provided in the 2000 Monitoring Compendium. To address navigation concerns, in early 2001, the disposal operations were shifted 500 metres west to avoid further accumulation of the sediments. In November, after dredging operations were completed, supplemental hi-resolution bathymetric measurements of the sea floor were taken at the site and at areas offsite.

This work was to aid the assessment of offsite impacts, a key concern of the nearby fishing community, and to confirm that ongoing activities are not contributing to the main mound. As well, a benthic community survey was undertaken to compare biological conditions at the site and offsite.

### **Observations and results: physical surveys**

Multibeam bathymetry surveys were conducted in April and November 2001, after dredging operations where the material was placed west of the previous disposal pile. The rough topography, observed on top of the disposal pile during the April 2000 and 2001 surveys, was still evident. A new spoil pile, from the 2001 dredging season, was evident west of the main pile.

These data, when integrated into previous surveys of the area, showed a large erosional scarp on the seafloor, south east of the large slump associated with the Black Point disposal site (Figure 1). Local fishers had reported recent changes in the nature of the seafloor for this area. While some erosion was observed from the disposal site, the vast majority of the erosional material observed was found to be consistent with the natural erosion of the surrounding area.



*Figure 1. Black Point Disposal Site and surrounding area*

### **Observations and results: benthic community surveys**

Biological communities and sediments in outer Saint John Harbour, New Brunswick, were sampled in late-July 2001 to monitor the impacts of dredged material disposal at the Black Point Disposal Site.

Four main communities of benthic organisms, related to the type of bottom material, occur in outer Saint John Harbour in the vicinity of the disposal site. These include a group of animals living on the spoil; a common and dominant group of species occurring on silty to sandy bottom which occurs through most of the outer harbour outside the disposal site; a group on muddy shelly sand to the southeast of the disposal site; and a group on sandy to gravelly bottom in deeper water further seaward (Figure 2.)



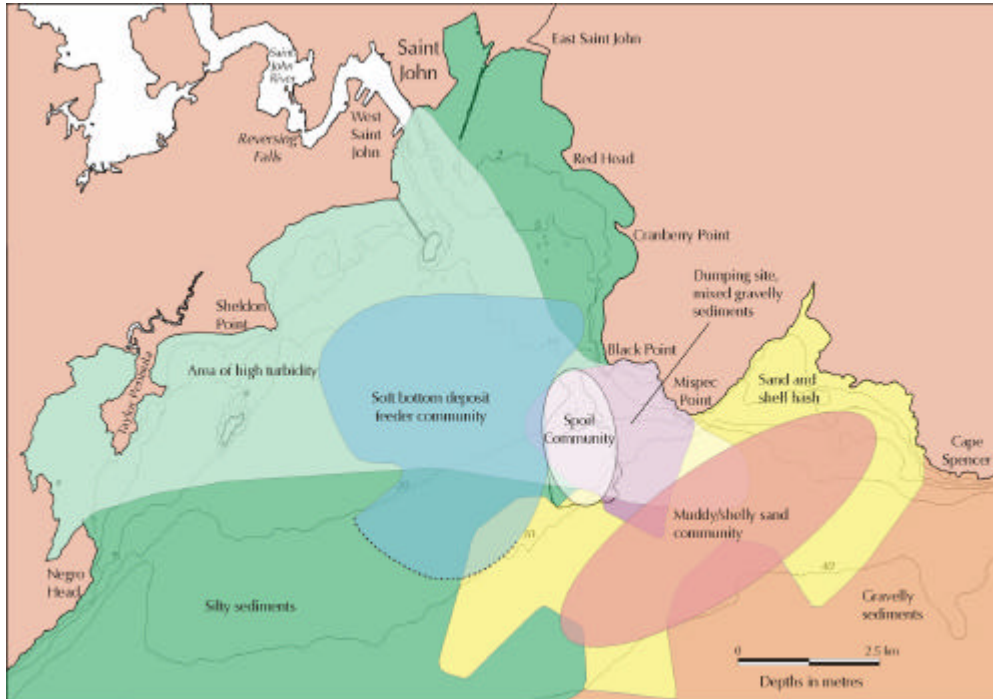


Figure 2. Distribution of seabed animal communities determined in Environment Canada and Envirosphere Consultants Ltd. studies, compared with sediment and turbidity distribution from studies by the Geological Survey of Canada.

At the disposal site, a range of organisms typical of the area had begun to live there in the four months since spoil was last disposed of on the site. Abundance, Shannon-Wiener Diversity index, and the number of species were lower on the disposal site than in adjacent areas. Organisms were typically a mix of those found on soft bottom environments in the adjacent areas, as well as on rocks and other firm substrate present in the spoil.

Two distinct areas of Saint John outer harbour and approaches were studied to determine the effects of the disposal site on benthic communities:

- an area of silt/clay in the outer harbour northwest, west and southwest of the disposal site; and
- an area in the southeast, southeast approaches to the disposal site on silty sand bottom.

These areas were chosen because local fishers were concerned that disposal activities at the Black Point site had significantly altered marine habitat.

The outer areas of Saint John harbour supported a benthic community apparently typical of silty bottoms, and found at similar depths and on similar types of sediment in other areas of the northeast coast of North America. The community was more reduced in abundance and number of species in the shallower parts of the outer harbour, and was most developed around and over a broad area to the west and southwest of the disposal site. Based on similar species composition and abundance found

in earlier studies at the site, the community appeared to be the same one which has occurred in the area for more than 40 years.

The second area surveyed was a broad area of muddy sand bottom southeast of the disposal site. A single main community was observed and found to be diverse and abundant. No differences in community measures or abundances of species were detected with distance from the disposal site in this area, although several species were present at one and not at the other of two control-impact stations.

Several locations were sampled from which the communities had been previously classified by multivariate analysis of benthic animals, sediment types, and turbidity characteristics, obtained from seafloor photographs. The main community found on soft bottom in this study corresponded to, and covered a similar area as, a zone classified as featureless soft bottom. The muddy sand bottom southeast of the disposal site corresponded to an area classified as sand bottom with shell debris. Some of the bottom types identified in bottom photographs as being present in certain areas (e.g. gravel) could not be found when the stations were revisited in the present study.

## **Conclusions and follow up**

### *Geophysical survey*

Preliminary interpretation of the multibeam bathymetry and geophysical data show that there were several activities and forces impacting the seafloor:

- the main spoil pile had slumped in previous years and flowed about 1.5 kilometres down the slope;
- material from the main pile was eroded during the winter storms;
- dredged material from relocated disposal activities during the summer and fall accumulated at a new pile west of the main pile;
- some dredged material remained relatively close to the main spoil pile;
- some dredged material was transported into deeper water along shallow troughs where it was deposited into bedforms; and
- a large erosional scarp was discovered southeast of the disposal site. The scarp appears to be the result of the erosion of fine grained sediments by the strong currents in the area. This erosion contributes sediment to sedimentary bedforms found at the base of the slump.

This data greatly improved the understanding of the factors influencing the nature of the seafloor. Additional data interpretation is being carried out, together with data generated from the current metre deployment, and will be discussed in the 2002 Monitoring Compendium.

### *Benthic community survey*

Apart from the disposal site, which has a reduced community, areas around the disposal site support a diverse community of deposit and filter feeders, similar in species richness, abundance, and species composition to natural communities in relatively unimpacted areas of the east coast of North America. It is likely that this community has coexisted with the disposal site since the late 1950s. Southeast of the disposal site, near areas of a groundfishery, communities were also diverse and abundant, and appeared to be unaffected by the disposal site.

## Atlantic Region: Confederation Bridge Ocean Disposal Site



### Facts about the site

**Site** Amherst Cove site: located in Amherst Cove on the Prince Edward Island side of the Northumberland Strait

- 1) 46°09.10' N, 63°46.00' W,
- 2) 46°08.90' N, 63°46.30' W,
- 3) 46°08.50' N, 63°45.80' W,
- 4) 46°08.70' N, 63°45.50' W.

**Material** Dredged material consisting mainly of sand and silty sand with gravel.

**Quantity** 473,000 m<sup>3</sup> of sediment from 59 bridge alignment locations and a jetty.

**Status** Received material during construction of the Confederation Bridge from 1994 to 1996.

**Concerns** Maintaining shellfish habitat.

### Hypotheses tested at the site

- Disposed material was deposited within the designated boundaries of the disposal site;
- Disposal activities created disposal areas that are stable in the local dynamic physical marine environment; and
- The mitigation measures adopted by the proponent have been able to support and/or attract shellfish.

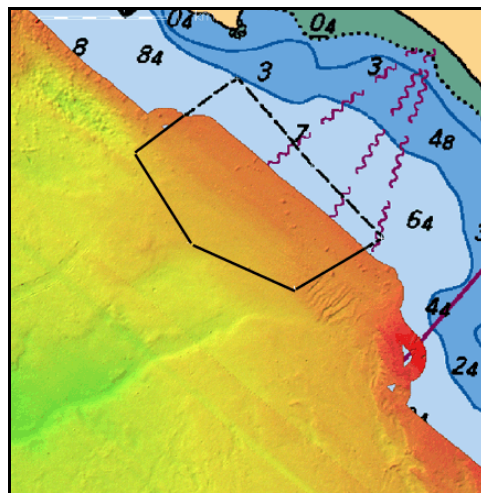
### Parameters measured

Multibeam and side scan sonar surveys were conducted to delineate the disposal site and assess the changes in the surficial geological features of the site. Bottom photography was used to assess the biological habitats of the site. Geophysical data, seafloor samples, and seafloor photographs and videos were collected from the CCGS Matthew in October 2001 south of Confederation Bridge in the Northumberland Strait between Prince Edward Island and New Brunswick.

These data were used to provide information on the character and distribution of seafloor sediments, and the geological and oceanographic processes which have affected the seafloor over the marine disposal site at Amherst Cove, Prince Edward Island.

Images generated from the multibeam bathymetry data collected during surveys in 1995 and 2001 are shown in Figures 3 and 4. The data in Figure 3 show several discrete isolated mounds on the seafloor of dredge spoils from historical disposal activities within the approved disposal site. An area of sandwaves can also be seen in the lower right portion of the image, just outside the disposal site.

The multibeam bathymetry data from the 2001 survey have been overlaid on the data and are shown in Figure 4. The mounds from the 1995 survey are still visible, along with a large assortment of new dredge spoils from the construction of the Confederation Bridge. The area of sandwaves seen in 1995 is still visible in the lower right portion of the image. The majority of the disposed material was placed within the bounds of the approved site.



*Figure 3. Amherst Cove, 1995, before disposal of dredge spoils from Confederation Bridge shown with the boundary of the disposal site.*

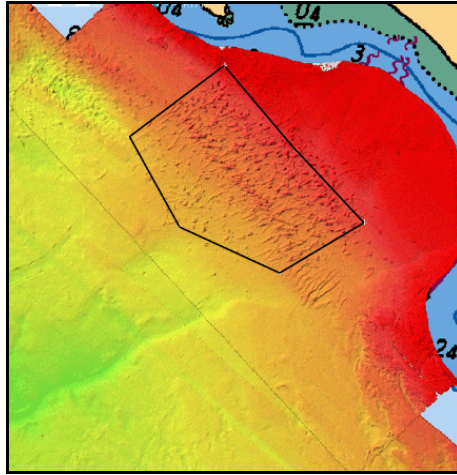


Figure 4. Amherst Cove, 2001, after disposal of dredge spoils from Confederation Bridge shown with the boundary of the disposal site.

The grab samples of the seafloor showed a wide variety of sediment ranging from fine sediments in the deeper water areas to gravel, cobbles and boulders. Large pieces of bedrock were observed in video transects through the disposal site. Some of the pieces showed holes that had been bored into the rock from a species of boring bivalve which were found at the site (Figure 5). In Atlantic Canada, these bivalves are found only in the Bay of Fundy and near Prince Edward Island where they inhabit the soft mudstone/sandstone rock present there.



Figure 5. Sample of sandstone cobble recovered from Station 30 showing boring bivalves in the rock.

### Conclusions and follow up

Survey results indicated that disposal was conducted within the boundary of the designated disposal site and seemed to create an area stable in the local dynamic physical marine environment. The fine materials detected from the disposal site may have come from other areas through local sediment transport after the construction of the bridge. Based on the video survey and bottom photographs, it seemed the mitigation measures adopted by the proponent had been able to support or attract shellfish.

More data interpretation will be carried out to refine the data set. Additional studies may be needed to assess the habitat enhancement objective.

## Quebec Region: Bathymetry surveys at five sites



### Facts about the sites

- Site** Five sites in the Magdalen Islands
1. Pointe-Basse: 47°22.10'N, 61°47.75' W
  2. Île d'Entrée: 47°17.19' N, 61°45.60'
  3. Grosse Île: 47°37.85'N, 61° 29.60' W
  4. Millerand Harbour: 47°11.80' N, 61°58.60' W
  5. Depot "D": 47°31.17' N, 61°36.29' W;
- Material** Dredged material.
- Quantity** Since the 1980's, the sites 1 to 4 received about 650,000 m<sup>3</sup> of sediment. Depot "D" received over 1.2 million m<sup>3</sup> over the same period.
- Status** Sites 1-4 received material from ongoing maintenance of small craft harbours. Depot "D" received material from ship terminal.
- Concerns** With sediment transport issues found at Depot D, communities near other disposal sites expressed concern that material was being transported off site and into nearby sensitive areas, including lobster habitat.

### Hypothesis tested

That disposed dredged material remained within predicted site boundaries for selected sites in the Magdalen Islands.

### Parameters Measured

Bathymetric surveys were conducted at five sites in the Magdalen Islands as indicated in the above map.

### Observations and Results

Preliminary data suggests no off-site sediment transport concerns, and a summary of the final results will be presented in the 2002 report on monitoring activities. Three dimensional bathymetry maps were compiled from multi-beam sonar data for the five sites of interest and are presented below. As interpretation is still underway, further details will be provided in the 2002 Monitoring Compendium.

Deleted:

## Quebec Region: Review of site closure decision at Dépôt D

### Facts about the site (see map in previous section)

**Site** Depot "D", Magdalen Islands. Region bounded by: 47°31.17' N, 61°36.29' W;  
47°31.37' N, 61°36.12' W; 47°31.22' N, 61°35.73' W; 47°31.02' N, 61°35.89' W.

**Depth** 12 m.

**Material** Dredged material.

**Quantity** Received quantities in 1980-1982 totalling 565,000 m<sup>3</sup>, in 1992 totalling 610,000 m<sup>3</sup>, and in 1997 totalling 192,487 m<sup>3</sup> from channel dredging operations.

**Status** Closed.

**Concerns** The material appeared to have migrated west of Depot D into an area of known lobster habitat.

### Background

Depot D was assessed in 1999. The results showed that the material appeared to have migrated to the west of Depot D into an area of known lobster habitat. The data indicated that the entire site was under constant erosion from 1982 to 1998 as part of a wider process occurring throughout the surrounding area. As the precise amount of material coming from Depot D, relative to that being deposited through natural processes was not known, the extent of disposal-related impact from Depot D on the lobster habitat was not known. Given this, the Depot D disposal site was officially closed until the permittee, Mines Seleine, could demonstrate that the sediments disposed of at the site were not being transported off-site and causing significant harmful effects nearby lobster habitat.

During the summer of 2000, Mines Seleine assessed these impacts. Study results gave information on the uptake of suspended matter in the water column, bottom sediment transport, measurement of wave currents related to wind velocity and direction etc. These parameters were assessed with optical back scatter probes and current meters at both the disposal site and the nearby environment in order to evaluate the contribution of the disposal site to the sediment transport dynamic on a lobster habitat. Environment Canada, Fisheries and Oceans Canada, INRS-Océanologie, Laval University and Mines Seleine collaborated on this project.

### Benthic communities study at Depot D in 2001

During 2001, sediments were sampled at Depot D disposal site for a benthic community study which sought to address the following questions.

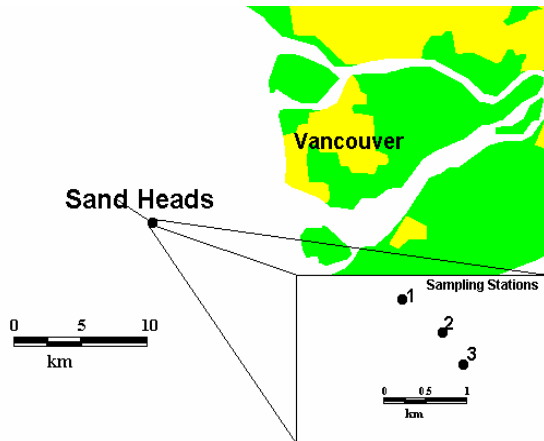
1. How does the benthic community evolve at the disposal site after disposal activities and how much time does it take to completely recover?
2. Did the benthic community change in each mound and in the reference site since 1997 and if so how?
3. Are the communities living in the different mounds of the disposal site still showing signs of impacts?
4. What is the composition of the benthic community at the site where dredged material will be disposed of?



**Follow Up**

At this time, analysis is still underway and summary results of both the 2000 and 2001 studies will be presented in the 2002 Monitoring Report.

## Pacific and Yukon Region: Sand Heads Disposal Site



### Facts about the site

- Site** Sand Heads Disposal Site, British Columbia, located at 49°06.00'N, 123° 19.5'W. The site boundaries were delineated to allow position fixing on the navigation aids at the mouth of the main arm of the Fraser River Delta. It is used almost exclusively by the Fraser River Port Authority for disposal of sand and silt from maintenance dredging in the navigation channels of the main arm of the Fraser River.
- Depth** 70 m.
- Material** Dredged material.
- Quantity** Since 1974, approximately 11,500,000 cubic metres of material have been taken to the disposal site.
- Status** Remains a designated site for disposal at sea receiving material annually.
- Concerns** Need to verify that assumptions of permit decisions were correct, namely that contaminants would be below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

### Background

The Sand Heads disposal site has been in active use since 1974. The site is located in a highly dynamic zone subject to significant freshwater flow, tidal action and the marine weather conditions of the Strait of Georgia. The foreslope of the Fraser Delta is also subject to frequent sloughing into the Georgia Basin.

### Hypothesis tested

That concentrations of trace contaminants in sediments at the disposal site will be below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

### Parameters measured

In April 2001, surface sediment samples were collected with a Smith-McIntyre grab sampler at 16 stations at the Sand Head disposal site and the surrounding area. The samples were analysed for trace metal concentrations, organics (not completed), TOC and particle size distribution.

### Observations and results

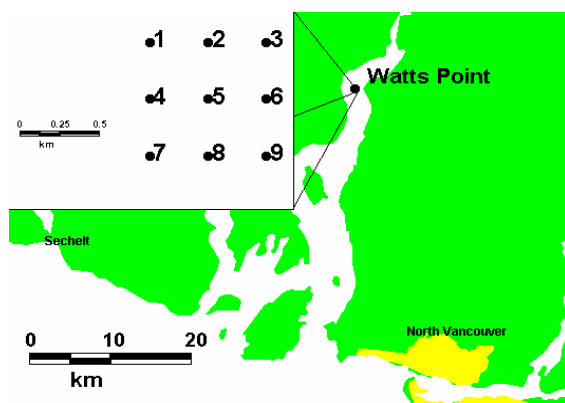
Preliminary results indicate that the levels of contaminants in the sediments at the disposal site were below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

**Table 1. Results of Trace metals and grain size analysis from samples taken from Sand Heads Disposal Site in April 2001**

| Station | Mercury<br>mg/kg | Cadmium<br>mg/kg | Copper<br>mg/kg | Lead<br>mg/kg | Zinc<br>mg/kg | TOC<br>% | Gravel<br>% | Sand<br>% | Silt<br>% | Clay<br>% |
|---------|------------------|------------------|-----------------|---------------|---------------|----------|-------------|-----------|-----------|-----------|
| 1       | 0.046            | n.d.             | 25.7            | n.d.          | 65            | 0.64     | 0.1         | 46.0      | 41.5      | 12.5      |
| 2       | 0.038            | 0.15             | 16.5            | n.d.          | 48            | 0.62     | 0.2         | 78.6      | 14.9      | 6.3       |
| 3       | 0.042            | 0.16             | 14.5            | n.d.          | 43            | 0.12     | 0.6         | 95.0      | 2.6       | 1.8       |
| 4       | 0.033            | 0.17             | 18.3            | n.d.          | 51            | 0.76     | 0.1         | 75.0      | 17.4      | 7.6       |
| 5       | 0.034            | 0.17             | 17.5            | n.d.          | 52            | n.d.     | 0.1         | 72.9      | 19.9      | 7.1       |
| 6       | 0.028            | 0.23             | 14.3            | n.d.          | 46            | 0.45     | 0.5         | 94.4      | 2.7       | 2.3       |
| 7       | 0.039            | 0.25             | 18.9            | n.d.          | 52            | n.d.     | 0.3         | 74.8      | 18.7      | 6.2       |
| 8       | 0.049            | 0.42             | 24.8            | n.d.          | 67            | 0.59     | 0.0         | 57.3      | 31.3      | 11.4      |
| 9       | 0.035            | 0.17             | 14.2            | n.d.          | 45            | 0.28     | 0.0         | 89.2      | 7.4       | 3.4       |
| 10      | 0.036            | 0.58             | 19.2            | n.d.          | 51            | 0.18     | 0.0         | 90.0      | 7.2       | 2.8       |
| 11      | 0.055            | 0.26             | 23.4            | n.d.          | 64            | 0.48     | 0.0         | 43.8      | 43.4      | 12.8      |
| 12      | 0.040            | 0.30             | 23.0            | n.d.          | 61            | 0.45     | 0.0         | 64.0      | 29.0      | 7.0       |
| 13      | 0.029            | 0.19             | 16.4            | n.d.          | 49            | 0.25     | 0.0         | 79.5      | 14.4      | 6.1       |
| 14      | 0.065            | 0.25             | 26.9            | n.d.          | 67            | 0.37     | 0.0         | 45.2      | 41.3      | 13.6      |
| 15      | 0.059            | 0.30             | 28.1            | n.d.          | 74            | 0.75     | 0.4         | 22.9      | 56.5      | 20.2      |
| 16      | 0.073            | 0.21             | 27.6            | n.d.          | 71            | 0.54     | 0.0         | 28.7      | 53.4      | 17.9      |

*All results expressed in mg/kg dry weight*

## Pacific and Yukon Region: Watts Point Disposal Site



### Facts about the site

- Site** Watts Point Disposal Site, British Columbia,
- Depth** 230 m.
- Material** Dredged material.
- Quantity** Since 1976, approximately 475,000 cubic metres of material have been taken to the disposal site.
- Status** Remains a designated site for disposal at sea.
- Concerns** Need to verify that assumptions of permit decisions were correct, namely that contaminants would be below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

### Background

Sediment chemistry data are available from surveys conducted in October 1987 and 1989. While cadmium, zinc and copper were found in low levels in surface sediments, they were present in higher concentrations in deeper layers, with cadmium exceeding the regulated limit. The observed pattern may in part be attributed to historical discharges from a mining operation in Howe Sound. The site was monitored again in June 1993 for surface sediment chemistry and all the tested contaminants (Hg, Cd, Pb, Cu, Zn, PAH and TOC) were found to be well within regulated limits and screening levels. Watts Point disposal site was monitored in April 1996. Surface sediment samples were collected at each of nine stations within the disposal site. Samples were analysed for trace metals, TPAH, TOC and particle size. All chemical parameters are within regulated limits.

### Hypothesis tested

That concentrations of trace contaminants in sediments at the disposal site will be below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

### Parameters measured

In April 2001, surface sediment samples were collected with a Smith-McIntyre grab sampler at nine stations on the disposal site. The samples were analysed for trace metal concentrations and particle size distribution. Composite samples were submitted for TOC and organic analysis.

### Observations and results

Preliminary results indicate that the levels of contaminants in the sediments at the disposal site were below the Lower Action Levels of the *Disposal at Sea Regulations* and other screening levels used.

**Table 2. Results of trace metals and grain size analysis from samples taken from Watts Point Disposal Site in April 2001**

| Station number | Mercury mg/kg | Cadmium mg/kg | Copper mg/kg | Lead mg/kg | Zinc mg/kg | Gravel % | Sand % | Silt % | Clay % |
|----------------|---------------|---------------|--------------|------------|------------|----------|--------|--------|--------|
| 1              | 0.034         | 0.09          | 79.8         | 10         | 89         | 0.0      | 1.1    | 60.7   | 38.2   |
| 2              | 0.046         | 0.10          | 74.4         | -8         | 85         | 0.1      | 4.8    | 62.4   | 32.7   |
| 3              | 0.039         | 0.34          | 83.7         | -8         | 93         | 0.3      | 6.3    | 63.0   | 30.4   |
| 4              | 0.029         | 0.10          | 66.6         | -8         | 76         | 0.0      | 2.4    | 65.0   | 32.6   |
| 5              | 0.043         | 0.10          | 79.2         | -8         | 90         | 2.6      | 10.5   | 53.2   | 33.7   |
| 6              | 0.033         | 0.10          | 81.9         | -8         | 88         | 0.8      | 5.0    | 58.8   | 35.4   |
| 7              | 0.033         | 0.09          | 66.0         | -8         | 78         | 0.2      | 3.2    | 62.7   | 33.9   |
| 8              | 0.041         | 0.10          | 87.1         | 10         | 95         | 0.9      | 7.2    | 54.8   | 37.1   |
| 9              | 0.057         | 0.39          | 174.0        | 21         | 180        | 24.5     | 15.3   | 36.0   | 24.1   |

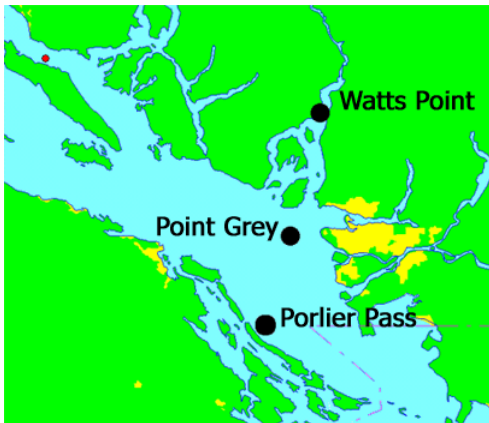
*All results expressed in mg/kg dry weight. Negative numbers denote detection limit.*

**Table 3. Results of analysis for Total Organic Carbon (TOC) and total Polynuclear Aromatic Hydrocarbons (total PAH) from samples taken from Watts Point Disposal Site in April 2001**

| Station numbers | Sample Type | Core Depth | Sample   | TOC mg/kg  | Total PAH mg/kg |
|-----------------|-------------|------------|----------|------------|-----------------|
| 1, 2 & 3        | Composite   | 0-5        | 1 (dup)  | 0.53       |                 |
| 1, 2 & 3        | Composite   | 0-5        | 53       | 0.53       | 0.28            |
|                 |             |            | Mean av. | 0.53 ± 0.0 |                 |
| 4, 5 & 6        | Composite   | 0-5        | 57       | 0.65       | 0.21            |
| 7, 8 & 9        | Composite   | 0-5        | 1 (dup)  | 0.52       |                 |
| 7, 8 & 9        | Composite   | 0-5        | 61       | 0.49       | 0.25            |
|                 |             |            | Mean av. | 0.51 ± 0.0 |                 |

*All results expressed in mg/kg dry weight*

## Pacific and Yukon Region: Seafloor Video of Biota at Point Grey, Porlier Pass and Watts Point Disposal Sites



### Parameters measured

In October 2001, the Department of Fisheries and Oceans ROV, ROPOS, was used to record benthic conditions at the Point Grey, Porlier Pass and Watts Point disposal sites. In addition to the routine video and computer captured images which are recorded and georeferenced for assessment and comparative purposes for future surveys, a new logging system for ROV's was added to the Disposal at Sea Monitoring Program in the Pacific and Yukon Region.

### Observations and results

The system was tested against the computer frame-grab capture system we have used for the past few years and will be evaluated and assessed with respect to the Monitoring Program in the next few months. Video records are being processed for each disposal site and will be edited for presentation purposes and for future survey comparisons.

## **Annex 1. Offices for the Disposal at Sea Program**

The Disposal at Sea Program Offices are located in the following Environment Canada offices.

### **Atlantic Region-Maritimes**

Disposal at Sea Program  
Environmental Protection Branch  
Environment Canada  
45 Alderney Drive, 4<sup>th</sup> Floor  
Dartmouth, Nova Scotia  
B2Y 2N6

### **Quebec Region**

Disposal at Sea Program  
Environmental Protection Branch  
Environment Canada  
105 McGill Street, 4<sup>th</sup> Floor  
Montreal, Quebec  
H2Y 2E7

### **Pacific and Yukon Region**

Disposal at Sea Program  
Environmental Protection Branch  
Environment Canada  
224 W. Esplanade Avenue  
North Vancouver, British-Columbia  
V7M 3H7

### **Atlantic Region-Newfoundland and Labrador**

Disposal at Sea Program  
Environmental Protection Branch  
Environment Canada  
6 Bruce Street, Mount Pearl  
Newfoundland and Labrador  
A1N 4T3

### **Prairie and Northern Region**

Disposal at Sea Program  
Environmental Protection Branch  
Environment Canada  
5204 - 50<sup>th</sup> Avenue, Suite 301  
Yellowknife, Northwest Territories  
X1A 1E2

### **National Capital Region**

Disposal at Sea Program  
Environmental Protection Service  
Environment Canada  
351 St. Joseph Boulevard, 12<sup>th</sup> Floor  
Hull, Quebec  
K1A 0H3

Further details and contacts for program staff may be found on-line at the Program's web site  
[http://www.ec.gc.ca/marine/seadisposal/main/index\\_e.htm](http://www.ec.gc.ca/marine/seadisposal/main/index_e.htm)

## Annex 2. Monitoring Expenditures

In March 1999, pursuant to Treasury Board policy on cost recovery, Environment Canada introduced a monitoring fee of \$470 per 1000m<sup>3</sup> of dredged or excavated material. This fee is known as a “right or privilege” fee and is meant to provide Canadians with a fair return for use of public resources. Proceeds from this fee are used to cover the cost of disposal site monitoring, thus allowing environmentally sound management and allowing users continued access to their disposal sites.

Part of Environment Canada’s commitment to the regulated community was to provide an annual summary of revenues and expenditures related to disposal site monitoring. The figures below represent the second year of cost recovery.

At the start of the 2001-2002 year, the Disposal at Sea Program still expected lower revenues and carried out a reduced monitoring program in 2001 to avoid a deficit. In 2001-2002, revenue reached the cost recovery target described in the impact analysis on the fee regulation. From that revenue, \$712,000 went to direct program costs, and the remainder was held until year-end to accommodate refunds, with the intention of carrying it forward to guard against future shortfalls.

---

### Monitoring Expenditures 2001-2002

---

|                                                      |                           |
|------------------------------------------------------|---------------------------|
| Atlantic Region                                      | \$309,000                 |
| Quebec Region                                        | \$108,000                 |
| Pacific and Yukon Region                             | \$229,000                 |
| Prairie and Northern Region                          | \$46,000                  |
| Headquarters                                         | \$20,000                  |
| Environment Canada indirect expenditures             | \$208,000                 |
| <b>Sub total expenditures for Environment Canada</b> | <b>\$920,000</b>          |
| In-kind support from other federal departments       | \$396,000                 |
| <b>Total expenditures for federal government</b>     | <b><u>\$1,316,000</u></b> |

---

### Resources Recovered 2001-2002

---

|                 |             |
|-----------------|-------------|
| Monitoring Fees | \$1,018,000 |
|-----------------|-------------|

---

### Net Expenditures 2001-2002

---

|                                             |                  |
|---------------------------------------------|------------------|
| <b>Net federal government expenditure</b>   | <b>\$298,000</b> |
| <b>Net Environment Canada carry forward</b> | <b>\$98,000</b>  |