

2006 TAC Environment Achievement Award



**Presented at the 2007 Annual Conference of the
Transportation Association of Canada (TAC),
Saskatoon, Saskatchewan (October 15, 2007)**

Nomination: Nova Scotia Department of Transportation and Public Works (NSTPW)

Key Representative: Dr. Bob Pett

Initiative: Habitat Banking for HADD¹ and Wetland Compensation – New Partnership Opportunities and Significant Environmental, Economic and Community Benefits

Abstract:

The Nova Scotia Department of Transportation and Public Works (NSTPW) has worked with a variety of new partners to develop a ‘habitat banking’ initiative to address regulatory requirements for habitat compensation, simplify future environmental permitting needs, and maximize the environmental, economic and community benefits. This initiative has clear cost- and time-savings for us (proponents) in both the short and long-term. The larger bankable projects typically yield much higher ecological values than many smaller projects with lower risks for government regulators and the Public. Perhaps the greatest returns for this initiative are the new partnerships that arise and the extremely wide range of benefits that accrue from them.

In our approach, habitat banking involves the restoration and enhancement of historic-damaged salt marsh and coastal marine habitat by means of culvert replacement, dyke breaching, shoreline armouring/stabilization and channel dredging. We restore more habitat than is actually required by federal and provincial regulators for a given highway construction or maintenance project and we bank the extra ‘habitat credits’ for use in the future when our work is likely to cause further unavoidable damage to a stream, lake, wetland or coastline. The restored habitat is also well known to be extremely productive fish and wildlife habitat. To date, NSTPW in cooperation with several other partners has developed six habitat banks that will restore over 62 hectares of high value, coastal marine habitat along the Atlantic coast and in the Bay of Fundy and the Gulf of St. Lawrence. Two of the habitat banks are shared with the Small Craft Harbours Branch of Fisheries and Oceans Canada (DFO-SCH), and promise significant environmental returns, cost- and time-savings for the funding partners, new research, development and learning opportunities, and communities’ hopes for a bright future. NSTPW highly recommends consideration of this initiative to other transportation agencies and TAC members who need compensation options for damaged fish and wetland habitat.

¹ Harmful Alteration, Disruption or Destruction of Fish Habitat; defined in Section 35(1) of the *Fisheries Act*.

Details of the NSTPW Initiative:

Construction and maintenance activities carried out by NSTPW, like many other transportation agencies, occasionally results in unavoidable damage to streams, lakes, wetlands and coastlines. Federal and provincial government legislation and policies² require us (proponents) to compensate for damaged fish and wetland habitat by creating, enhancing or restoring habitat at another location, preferably at or near the site of damage. Until recently, the typical response to these regulatory requirements involved:

- (a) the identification of a candidate restoration site where one could restore an equivalent area of similar habitat (often not possible, or financially unattractive, in pristine or low impact, rural watersheds);
- (b) development of a restoration/compensation proposal;
- (c) submission and approval of various environmental permitting documents;
- (d) detailed design drawings and engineering specifications; and
- (e) selection and contracting of an implementation group, preferably, a local community or watershed group, to carry-out and monitor the project for at least five years after project completion.

For small projects in particular, with footprints on the order of tens to hundreds of square metres, this approach took considerable time and money, led to the occasional delay in construction, and generated (unnecessary) stress for busy NSTPW managers, government regulators, and construction contractors. An alternative approach was clearly needed for these ‘typical’ projects, and in cooperation with Fisheries and Oceans Canada (DFO), NSTPW developed a habitat banking model loosely based on concepts and approaches developed in the United States. In essence, NSTPW developed a large restoration project in order to create a bank of ‘habitat credits’ that could be used to compensate for future projects that require *Fisheries Act* Section 35(2) HADD authorizations. DFO has subsequently formalized many of the key considerations of a Memorandum of Understanding (MOU) with NSTPW in its new *Practitioners Guide to Habitat Compensation* (available on the DFO website: http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/policies-politique/operating-operation/compensation/index_e.asp).

NSTPW has further expanded the habitat banking model with the Nova Scotia Department of Environment and Labour and NS Department of Natural Resources to enable the creation of a ‘Wetland Habitat Bank.’ Wetland habitat credits would be used to compensate for future projects that require a Wetland Alteration Approval under the NS *Environment Act*.

Of special note, the existence and future use of a habitat bank does not ensure approval of any future HADDs or wetland approvals, nor does it absolve NSTPW from working through DFO’s *Hierarchy of Preferred Compensation Options* (see Practitioners Guide) and NS’s mitigative sequence for wetland alteration, before considering the use of bank credits. Upon application for use of credits, we are obliged to justify why higher compensation options or additional mitigative measures (minimization) were not selected or proposed.

Over the past two years, NSTPW has developed six habitat banks that will restore and improve approximately 62 hectares of coastal marine habitat in a variety of ‘ecological units’ around the province (see Table 1 and accompanying photographs). Five of the banks involve restoration of

² *Fisheries Act*, the Federal Policy on Wetland Conservation, and Nova Scotia’s *Environment Act* and Wetland Designation Policy

salt marshes, one of the most threatened, if not endangered, types of wetlands in the Province. As much as 80% of salt marshes along the Bay of Fundy coast (or more than 50% of all salt marshes in NS) have been lost or significantly degraded over the past 400 years (see www.ecologyaction.ca/coastal_issues/coastal_proj_salt.shtm; www.bofep.org/Publications/Fundy%20issues/saltmarsh.htm). Finally, two of the banks, Cheverie Creek and St. Francis Harbour, are shared with the Small Craft Harbours Branch of DFO (DFO-SCH). The partners share the costs and the resultant credits, as well as the future cost- and time-savings associated with the environmental permitting of some of their new projects that require habitat compensation.

Table 1. Summary of NSTPW Habitat Banks.

Name of Habitat Bank and Restoration Techniques	Size of Habitat Bank (hectares)^{*1}	Ecological Unit and Habitat Type
Cheverie Creek Salt Marsh – culvert replacement to restore tidal flushing	25	Gulf of Maine-Bay of Fundy – salt marsh and tidal river
Walton River Salt Marsh – breaching a dyke that was originally designed for waterfowl habitat improvement	10	Gulf of Maine-Bay of Fundy – salt marsh
Smith Brook-Merigomish Salt Marsh – culvert replacement to restore tidal flushing	2	Gulf of St. Lawrence – salt marsh and tidal river
Lawrencetown Salt Marsh – culvert replacement to restore tidal flushing	1.5	Atlantic Ocean – salt marsh
St. Croix River Salt Marsh – breaching an agricultural dyke	~10	Gulf of Maine-Bay of Fundy – salt marsh
St. Francis Harbour Restoration – shore armouring and channel dredging to restore tidal flushing	13	Atlantic Ocean – intertidal and subtidal habitat

^{*1} Area requires verification by DFO specialists prior to use.

These projects are much more than ‘win-win projects’ for NSTPW/DFO-SCH and the environment. In each case, NSTPW has worked with a variety of other partners to identify the candidate site, or secure permission to modify, or otherwise benefit from the project. These new partnerships and the social, economic and community benefits are perhaps the greatest returns of this banking initiative. The remaining text is largely focused on the partnerships, and benefits arising from the Cheverie Creek Project, our most well-developed project to-date.

NSTPW first became aware of the Cheverie Project (and other salt marsh tidal barrier projects) following presentations by the Ecology Action Centre (EAC), an environmental non-governmental organization based in Halifax, NS. EAC staff had already initiated a *Salt Marsh and Tidal Rivers Restoration Project* involving restoration science workshops, audits of potential restoration candidates around the Bay of Fundy, baseline data collection at the most promising sites, public education, community outreach, school programs and a template for collaborative restoration planning (Bowron *et al.*, 1999; Cameron *et al.*, 2000; Bowron and Fitzpatrick, 2001; see also http://www.ecologyaction.ca/coastal_issues/coastal_proj_salt.shtm). We quickly saw the benefits of the restoration project and partnerships with EAC and its partners: the local community and school, several Canadian universities, the Gulf of Maine Council on the Marine Environment, and adjacent landowners including Ducks Unlimited Canada. The project would certainly be a win-win-win project for NSTPW, the environment, and the local community.

DFO-SCH came to the same conclusions and initially became a 50:50 funding partner with NSTPW. DFO-SCH has subsequently paid for 75% of the \$1.4 million project costs and receives 75% of the habitat credits.

The local school, the Dr. Arthur Hines Elementary School, became one of the biggest boosters of the project and the students certainly helped sway public opinion about the project. Led by some very committed teachers and the school principal, the Grade 5 and 6 classes designed and built a salt marsh within the school and developed a “Salt Marsh Video” to highlight what they were learning and their hopes for the future. The entire school certainly learned a lot from the project and many of these students will likely be advocates for future restoration projects and collaborative government-community planning.

The EAC in association with NSTPW, the school, and the local business community continued to hold public meetings about the project during the pre-construction period to broaden the social and economic project benefits. This also achieved the ultimate long-term goal – a catalyst project to show other community groups and government agencies that restoration can lead to a wide variety of social economic and community benefits. This goal was definitely achieved! Before construction even began, the project had already spurred the development of new teaching methods and sparked the imagination of many local community members. The local business community subsequently ‘picked up the ball’ and shortly after construction (early 2006), helped form the *Cheverie Crossway Salt Marsh Society*. The society is committed to developing a salt marsh interpretive centre to further spread the message about salt marshes and restoration, stimulate the local economy, and form another anchor point in the *Fundy Shore Ecotour*, a successful tourism initiative for this region and the Province of Nova Scotia (see <http://www.fundyshoreecotour.ns.ca>). The Society convinced the local regional government to purchase an adjacent property on which to build an interpretive centre and it teamed up with the School of Architecture of Dalhousie University to create a visual model of the centre and optimal site development plans. The designs and plans were created by architecture students based on community visioning exercises and engagement with another year’s Grade 5 and 6 classes at the Dr. Arthur Hines Elementary School (see accompanying photographs; Aldous and Graham, 2007 [in press]).

Our continuing focus and commitment to a science-based monitoring approach at Cheverie and our other bank projects, has strengthened relationships that NSTPW has been building with the research and development community in Nova Scotia and abroad. It also led to the creation of a new consulting firm that specializes in salt marsh restoration (CB Wetlands and Environmental Specialists). Scientific monitoring will occur for at least five years after completion of all of the habitat banks. Research funds and opportunities are going to several Canadian universities (Acadia, Dalhousie, McGill, Mount Allison, Saint Mary’s, St. Francis Xavier) and are likely to continue the stimulation of research discussions/activities into restoration science and optimal monitoring practices. NSTPW has posted the initial monitoring reports for its Cheverie and Walton projects on its website and will post updates and information on its other habitat banks as they become available (see <http://www.gov.ns.ca/tran/enviroservices/enviroSaltMarsh.asp>). We encourage other transportation agencies to do the same with their compensation projects.

Finally, development of the Cheverie project has stimulated a lot of discussion and action in the environmental NGO community to identify large projects that could be used as habitat banks, or at least, HADD compensation projects. NSTPW is very pleased to have NGOs from around the province approach us with both potential candidate sites and fish barrier inventory projects that

can identify candidate restoration sites for future compensation needs. This certainly helps us to simplify and shorten the HADD application and approval process. The St. Francis Harbour Bank is an excellent example and was put forward by the Mulgrave and Area Lakes Enhancement Association (MLEA), a small NGO based in rural eastern Nova Scotia. Historic degradation to both the harbour and the watershed created fish passage problems and low productivity. MLEA contacted NSTPW and DFO-SCH in late 2005-early 2006 to consider a proposal to restore tidal flushing to the harbour and thereby enhance diadromous³ fish survival and passage to and from the upper watershed. The project involved shoreline armouring/stabilization and channel dredging to revitalize more than 13 hectares of intertidal and subtidal habitat (see accompanying photographs). NSTPW, DFO-SCH and the Oceans and Habitat Branch of DFO approved the bank project as well as several HADDs around Nova Scotia. Construction began in the late fall of 2006 and was completed by the end of March 2007, a little more than one year after MLEA first proposed the project to NSTPW and DFO-SCH.

Cost Implications:

The development of habitat banks is anticipated to create lower costs for NSTPW over the long run compared to the design and implementation of many smaller projects. The construction and monitoring costs of our banking projects are on the order of \$5 per m² as compared to \$20 to \$50 per m² for smaller projects. In addition to the economies of scale, the larger, bankable projects also yield much higher ecological value per unit area compared to smaller projects. Size does matter when one is trying to compensate for lost or damaged habitat and its associated species and ecological services. Moreover, at least part of the compensation is done upfront and perhaps well ahead of known future projects in the area or involving a specific habitat type. This lowers the degree of risk for the regulators and ultimately to our clients – the Public. As noted earlier, these bank projects will definitely yield cost- and time-savings for future compensation needs by virtue of a simpler permitting process. This initiative is certainly transferable to other transportation agencies and we highly recommend its consideration when compensation is required for projects in pristine or relatively low impact watersheds that do not have restoration options or there are no economically-feasible small projects.

References:

- Aldous, D., and J. Graham. 2007. Watching the Tide Role In: Cheverie Creek Restoration. Proceedings of the Workshop: Six Years in the Mud – Restoring Maritime Salt Marshes: Lessons Learned and Moving Forward. January 31 to February 2, 2007, Bedford Institute of Oceanography, Dartmouth, NS. In press. http://www.ecologyaction.ca/files/images/file/SixYears_summary.pdf
- Bowron, T.M., and A. Fitzpatrick. 2001. Assessment of Tidal Restrictions Along Hants County's Highway 215: Opportunities and Recommendations for Salt Marsh Restoration. Marine Issues Committee Special Publication Number 9, Ecology Action Centre. Halifax, NS. September 2001.

³ fish that migrate between fresh and salt water at some stage of their life cycle. Those species that spawn in freshwater and later move to seawater as juveniles or adults are referred to as anadromous species (e.g., salmon). The American eel (*Anguilla rostrata*) is a catadromous species; they spawn in the ocean and migrate into freshwater as 'elvers' where they spend most of their life in streams, rivers and lakes.

Bowron, T.M., J. Graham and M. Butler. 1999. Community and Social Considerations in Salt Marsh Restoration Work in Nova Scotia. Marine Issues Committee Special Publication Number 5, Ecology Action Centre. Halifax, NS. October 1999.

Cameron, C., T.M. Bowron, J. Hall, M. Butler, and J. Graham (Eds.). 2000. Getting Dirty: The Why and How of Salt Marsh Restoration. Marine Issues Committee Special Publication Number 8, Ecology Action Centre. Halifax, NS. December 2000.

2006 TAC Environmental Achievement Award Nomination – Support Photos

- Nova Scotia Department of Transportation and Public Works (NSTPW)
- Title: Habitat Banking for HADD and Wetland Compensation – New Partnership Opportunities and Significant Environmental, Economic and Community Benefits
- Contact: Dr. Bob Pett (902-424-4082; pettrj@gov.ns.ca)

Bay of Fundy



Route 215

- Planning since 2001
- International attention

Cheverie Creek Salt Marsh

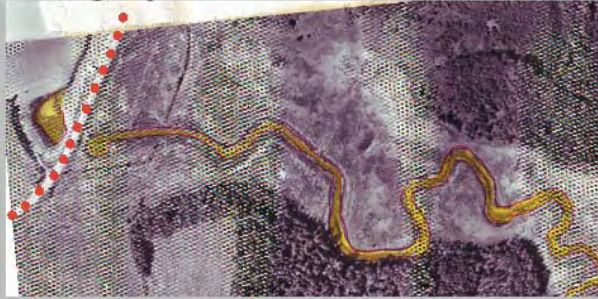
- old culvert limited tidal flooding to 5 ha.
- 30 ha flooded after new CV installed.
- 25 ha habitat bank; 75:25 partnership with DFO-SCH.

cheverie salt marsh interpretive centre

design ideas:

architecture student designs (excerpts from Aldous and Graham, 2007)

building as path:



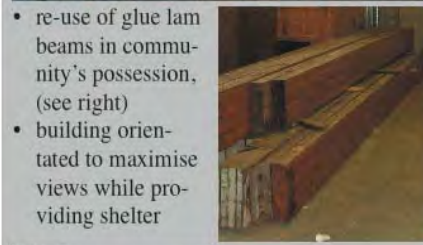
- building follows a path inspired by the movement of the tide through the marsh. the occupant is led through a series of spaces including information centre, amphitheatre and wash-rooms,

building as deck:



- building as an extension of the ground plane into the side of the hill
- serves as a viewing deck and provides shelter underneath
- provides views over the marsh and across the bay

building as view finder:



- re-use of glue lam beams in community's possession, (see right)
- building orientated to maximise views while providing shelter



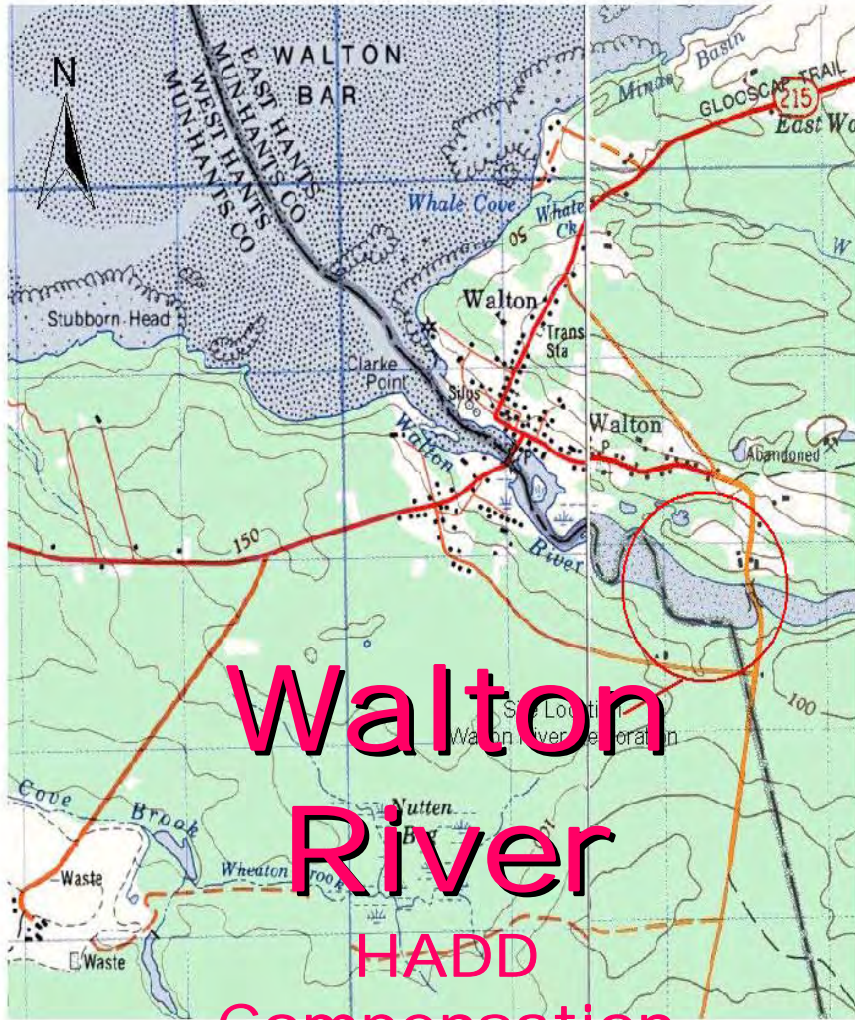
drawing by Rebekah Weatherbee



drawing by Alexa Smith



Conceptual Model



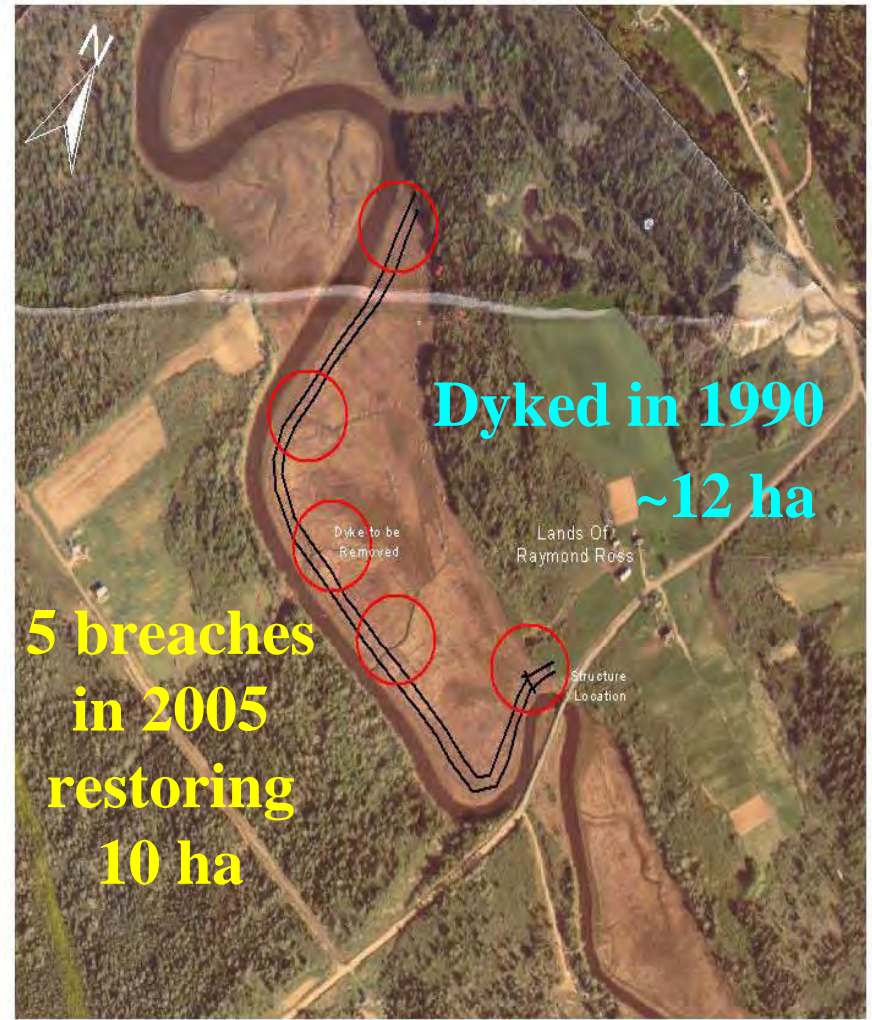
Walton River

HADD Compensation Project

Construction Notes:

1. Approximate dyke footprint is 45 feet wide.
2. Dyke to be removed in five sections. At both ends and at location of three vents.
3. Dyke material to be placed back in original borrow pits and leveled to existing marsh level or lower.
4. Concrete water control structure, corrugated steel pipe, steel cut-off wall and tide gate to be truck from site.
5. All exposed surfaces to be covered with mulch.

Project Information	
Province	Nova Scotia
County	Hants
Size	29 acres
Drawn By	RNF
Drawing No.	6599/1
Topo Map	11 E / 4
Zone	20
UTM	422500 5007800
Air Photo	1978
Date	May 6, 2005



Dyked in 1990
~12 ha

5 breaches
in 2005
restoring
10 ha



General Plan
Walton River Restoration



Pre-Restoration

Pond scum

July 2005



Walton River Salt Marsh

First flooding – September 2005



**New cordgrass
(*Spartina*) colonization**

August 2006



Smith Brook, Merigomish Harbour



Old culvert in a 50 m-long causeway



2.2 ha salt marsh restored



- Small wooden box CV (2 m²) scheduled for replacement during a paving of Route 245.

- Instead of one new culvert, we put in three, total 10 m² opening.

3 new culverts, Sept. 2006

Lawrencetown

HADD Compensation Project

Route 207

Abandoned RR-
Trans Canada Trail

*Marsh isolated
in 1912*



Atlantic Ocean

S.W. CORNER 02324 134

11D/11 1: 10 000





Wetland and HADD Habitat Bank at St. Croix (~10 ha)

St. Croix
River

Dyke removal
in 2007

Thumb
Hill
Creek

101



© 2006 Europa Technologies

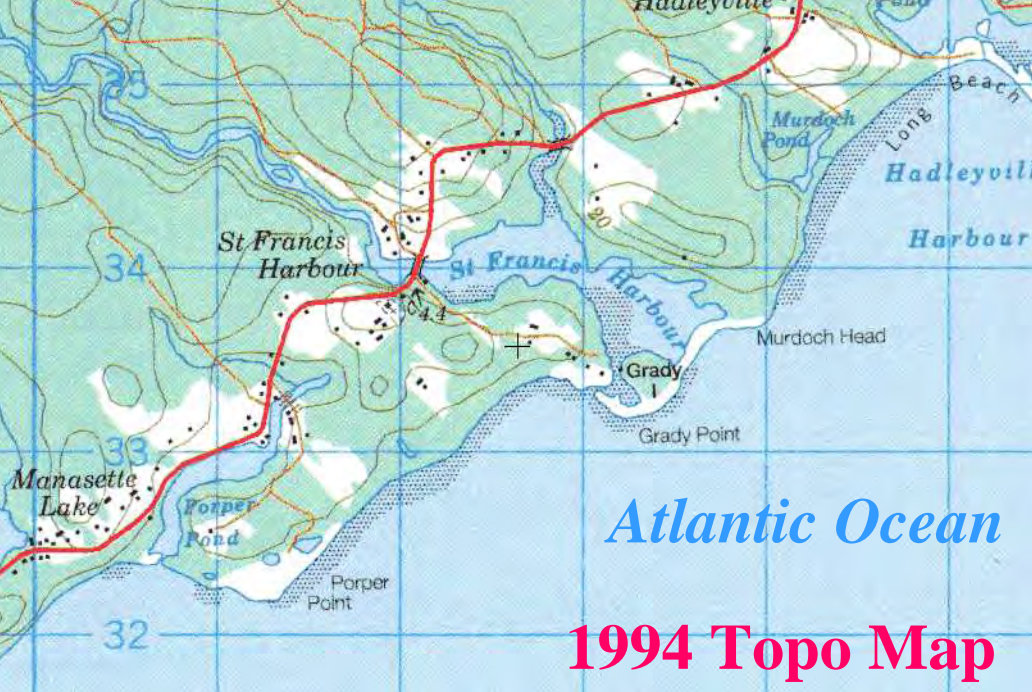
Image © 2006 DigitalGlobe
© 2006 Navteq

© 2005 Google

Pointer 44°58'16.15" N 64°01'52.49" W elev 34 ft

Streaming 100%

Eye alt 4685 ft



St. Francis Harbour HADD Compensation Project

New channel development

Bank armouring/stabilization (300 m)

13 ha restored; shared bank with DFO-SCH

March 2007