

National Report of Canada
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INTRODUCTION

The Canadian tide and water level program plays an important role in support of commercial and recreational navigation, marine transportation, coastal zone management, as well as climate research. As part of the program, there are currently 92 tide and water level (TWL) gauges which provide real-time observed data (Figure 1). The number of gauge sites in each region which are part of the Permanent Water Level Network (PWLN) are as follows: Pacific Region: 13; Atlantic Region: 16; Central & Arctic Region: 40; Quebec Region: 23.

The responsibility of the Permanent Water Level Network on the Great Lakes and St. Lawrence River is a shared responsibility between the Canadian Hydrographic Service (CHS) of the federal Department of Fisheries and Oceans and the Water Surveys Branch of the federal Department of Environment. CHS also provides the predicted times and heights of high and low water for over 700 stations in Canada, including over 200 locations along the St. Lawrence shoreline. These predictions are available in print as part of the Canadian Tide and Current Tables, and are also available over the internet (<http://www.waterlevels.gc.ca>).

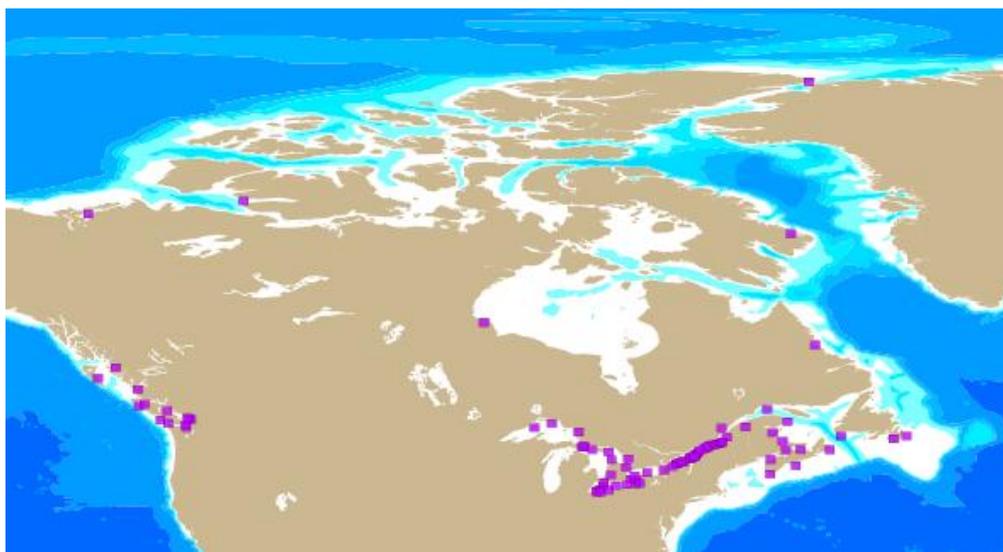


Figure 1. Permanent Operational Gauges

Currently five of the 92 stations have been designated as GLOSS stations.

| Table 1: Status of Active GLOSS Stations in Canada | | | |
|---|--|--|---|
| GLOSS ID | Location | Gauge Type | Status |
| 222 | Halifax, NS 44.67 N, 63.58 W | Float gauge with secondary bubbler and pressure sensor backup, GPS co-located | <ul style="list-style-type: none"> • Digital records span from Oct. 1895 to May 2007 • Data up to Dec 2005, has been sent to PSMSL |
| 224 | Nain, Labrador 56.55 N, 61.68 W | Float gauge with bubbler backup, GPS co-located | <ul style="list-style-type: none"> • Pressure sensor to be installed later in the year • Digital records span from Jan.1963 to Oct. 1988 and start again in April 2001 • Data up to 2005 have been sent to PSMSL |
| 155 | Prince Rupert, BC 54.32 N, 130.32 W | 2 separate float gauges with BEI optical encoders (in separate wells) | <ul style="list-style-type: none"> • Digital records span from Jan. 1906 to May 2007 • The complete dataset, up to Dec. 2005, has been transmitted to PSMSL |
| 223 | St. John's, NFLD 47.57 N, 52.72 W | Float gauge with secondary bubbler and pressure sensor backup, GPS co-located | <ul style="list-style-type: none"> • The period of record span from Aug. 1935 to Ma 2007 • The complete dataset, up to Dec. 2005, has been transmitted to PSMSL |
| 156 | Tofino, BC 49.15 N, 125.91 W | 2 separate float gauges (in separate wells) with bubbler and pressure sensors backup | <ul style="list-style-type: none"> • Part of Pacific Tsunami Warning System • GOES communication • The period of record spans from Oct. 1905 to May 2007 • The complete dataset, up to Dec. 2005, has been transmitted to PSMSL |

The 2006 data for the active GLOSS stations listed in Table 1 are available to PSMSL upon request.

The station at Little Cornwallis Island (GLOSS ID 153) has not been in operation since September 1994, and it is extremely unlikely this station will ever be re-activated. Canada recommends this station be removed from the GLOSS list and replaced by the PWLN station located at Alert on Ellesmere Island. Station details for Alert are provided in Table 2.

In response to increased demand for sea level and climatic information from the northern polar environment, Canada has five other tide stations in the high latitudes. A list of these stations is presented in Table 2.

| Station Name | Geo Location | Gauge Type | Status |
|---------------------------------------|--|---|--|
| Alert | Ellesmere Island, Eastern Canadian Arctic 82.49 N, 62.32 W | Bubbler system, GPS co-located | <ul style="list-style-type: none"> • Gauge re-established Dec. 2002 • Previous period of record, 1961-1979 • Sampling at 3 minute intervals • Daily provision of data to ISDM |
| Holman | Victoria Island, Western Canadian Arctic 70.74 N, 117.76 W | Bubbler system, GPS co-located | <ul style="list-style-type: none"> • Gauge established Dec. 2002 • Sampling at 3 minute intervals • Daily provision of data to ISDM |
| Qikiqtarjuaq (Broughton Island) | Baffin Island, Eastern Canadian Arctic 67.52 N, 64.07 W | Bubbler system, GPS co-located | <ul style="list-style-type: none"> • Gauge re-established July 2004 • Sampling at 3 minute intervals • Daily provision of data to ISDM |
| Churchill | Hudson Bay, Central Canada 58.77 N, 94.18 W | 2 separate float gauges with pressure sensor backup, GPS co-located | <ul style="list-style-type: none"> • Gauge established Jan 1940 • Float and counterweight with encoder and a pressure sensor for backup • Sampling at 3 minute intervals • Daily provision of data to ISDM |
| Tuktoyaktuk | Western Canadian Arctic 69.44 N, 132.99 W | Bubbler system, GPS co-located | <ul style="list-style-type: none"> • Gauge re-established Aug 2003 • Previous period of record 1961-1982 • Sampling at 3 minute intervals • Daily provision of data to ISDM |

GAUGE TECHNOLOGY

The majority of the gauges in the Canadian Permanent Water Level Network use Sutron float/counterweight systems with secondary pressure sensor back-up. Most gauges located in the Arctic use bubbler type gauges, with the exception of Nain which uses both types. Gauges located in the St. Lawrence Seaway system are equipped with additional sensors to measure atmospheric pressure and water temperature for water level validation, and for a few of them, water salinity.

Communications with most gauges are through modem. The St. Lawrence system uses a network of RF transmitters/receivers to transmit data to a central server. As part of the Pacific Tsunami Warning System, four stations (Tofino, Port Alberni, Winter Harbour, and Henslung Cove) are equipped with GOES satellite communication. This data is accessible by the West Coast / Alaska Tsunami Warning Center (WC/ATWC), as well as from the public data collection platform (DCP) data servers at Wallops Island (NESDIS).

The majority of the data collected from the national networks has been more recently provided to the Integrated Science Data Management branch (ISDM) on a regular daily basis (Monday to Friday). Some regions also provide their data on a monthly basis.

GPS TECHNOLOGY

As highlighted in Table 2, the majority of the Arctic tide stations are co-located with continuously recording GPS sensors to allow interpretation of any tectonic motion. GPS sensors are also co-located with 4 water level stations in the Great Lakes basin. This is to measure isostatic rebound and water level changes in response. The GPS data are collected and managed by the federal department of Natural Resources (NRCan).

GPS technology, integrated with real-time reference shore station observations, has been used for the past few years to measure in-situ tidal heights while conducting operational sounding and dredging operations in the St. Lawrence estuary.

DATA AVAILABILITY

Almost all data collected by the Canadian permanent network has more recently been transmitted to ISDM on a daily basis along with the monthly submissions. Data are quality controlled, archived and available for free public access. Exchanges with other government departments and international agencies occur on a daily basis. Monthly submissions of hourly and 15-minute tidal data are sent to the UHSLC. Monthly mean data are submitted to PSMSL on an annual basis.

Archived data and products can be accessed through a request system in which clients fill out an online form and then receive the data after the request has been actioned by a data technician. More recently, the observed water level data, including daily means, and monthly means, has been available for download from the ISDM website, along with the station information and inventory. Benchmark information is also available to the public from the ISDM website. The data available from the website is currently updated once a day and is free of charge.

National tidal predictions and information:

<http://www.waterlevels.gc.ca>

Online data inventory and download of digital archive:

http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Databases/TWL/TWL_inventory_e.htm

Public Benchmark access:

http://www.meds-sdmm.dfo-mpo.gc.ca/meds/prog_nat/benchmark/public/default_e.asp

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