

The Canadian Positioning, Navigation and Timing Board Update



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Jennifer Wharram
Director – Canadian PNT Office
Jennifer.Wharram@canada.ca

The Canadian Positioning, Navigation and Timing Board

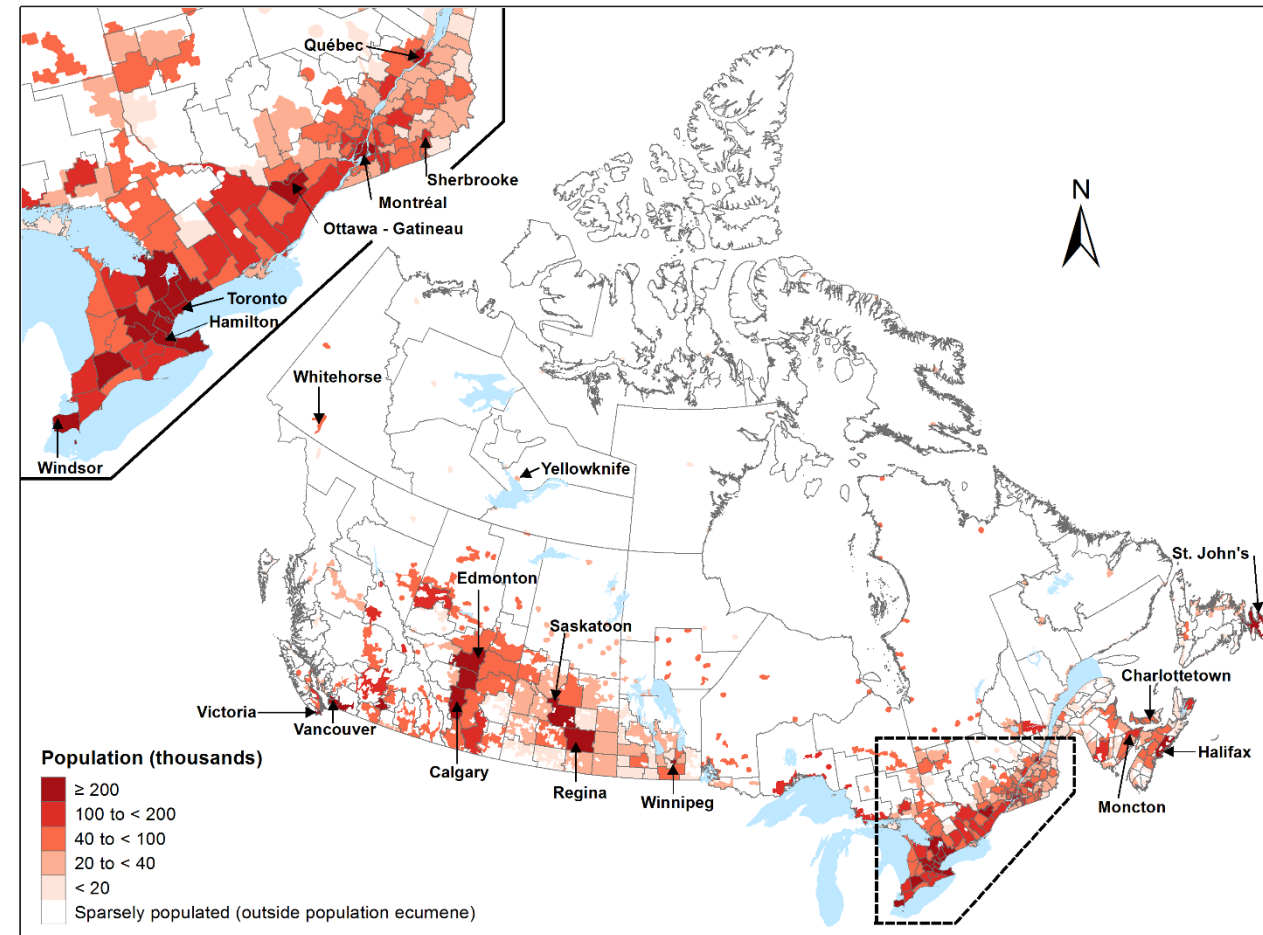
- No single department or agency in Canada has the overall mandate for Global Navigation Satellite Systems (GNSS) or Positioning, Navigation and Timing (PNT).
- Established in 2011, the Canadian PNT Board serves as a central point of contact for the coordination of civilian and federal PNT issues.
- The PNT Board also acts as a centralized point of contact for the exchange of information with foreign governments and organizations on civilian PNT matters.

Visit us at: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10805.html>

Canadian Context

- PNT applications have become prevalent, deeply embedded and integral to both the economy and safety of Canadians.
 - Canada has identified 10 Critical Infrastructure Sectors
- Our population is geographically dispersed, yet concentrated along the Canada - United-States border.
 - More than 100,000 Canadian reside in the North.
- Canada has over 3.5 million square miles of land and 3 coastlines.

Map 1.1
Population distribution as of July 1, 2019, by census division, Canada



Source: Statistics Canada, Centre for Demography.



Activity Highlights

Recent Initiatives

Maritime Navigation

Lead: Canadian Coast Guard (CCG)

The future of the CCG Differential Global Positioning System (DGPS)

- Due to its age and the discontinuance of the US National DGPS, the CCG conducted an options analysis for the future of the CCG DGPS service.
- This work included an evaluation of WAAS as a potential alternative solution.
- Further details will be available at ION GNSS+ 2020, session A6 Marine Applications.

For more information, see: Johnson, Gregory, Dhungana, Gaurav, Delisle, Jean, "An Evaluation of WAAS 2020+ to Meet Maritime Navigation Requirements in Canadian Waters," Proceedings of the 32nd International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2019), Miami, Florida, September 2019, pp. 855-875

Technical analysis and engineering study of resilient non-GNSS PNT alternatives for maritime navigation

- Canadian mariners recognize the need for an alternative, non-GNSS maritime navigation solution.
- The study will consider PNT requirements both south and north of 60 degrees North.
- The final report will include recommendations on implementation strategies and directions on new technology advancements.
- CCG is working collaboratively with Germany on the development of Ranging Mode (R-Mode).

For more information, see: Huot, Caroline, Châteauvert, André, Delisle, Jean, "Study for a Resilient Position, Navigation and Timing (PNT) Backup Solution in Canada," Proceedings of the 31st International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2018), Miami, Florida, September 2018, pp. 1806-1816

Threats and Risks

Lead: Innovation, Science and Economic Development Canada (ISED)

Jammer Risk Management

- Although prohibited by Canadian law, the use of and sale (online) of jammers continues to proliferate, creating cases of interference in GNSS bands.
- Federal departments and NAV CANADA have partnered to develop a multi-agency Jammer Risk Management Framework with recommendations regarding technical and policy capabilities.

Canadian Risk Assessment and Risk Mitigation Assessment

- There is a need to understand where to focus efforts and what partnerships can be leveraged to improve PNT resiliency for current and future GNSS-based critical PNT uses in Canada.
- This project seeks to identify the current and future Canadian PNT risks and assess potential mitigation measures for those risks.
- The results are intended to support informed decision making and identify potential synergies for risk mitigation measures.

Connected and Automated Vehicles (CAV)

Lead: Transport Canada (TC)

- There is a need to better understand and characterize how PNT can enable higher levels of automation across various modes of transportation.
- An independent report prepared for TC and Natural Resources Canada looked at examples of regulatory frameworks, key sensors being used, test facilities and GNSS augmentation infrastructure requirements.
- In June 2019, a workshop with key PNT and CAV stakeholders was held to discuss:
 - PNT infrastructure requirements needed to enable CAV deployments,
 - Codes or standards gaps that need to be addressed,
 - The readiness of Canada’s PNT ecosystem to support higher levels of CAV deployments,
 - PNT interoperability requirements – domestically, continentally and globally.

For more information, see:

<https://tcdocs.ingeniumcanada.org/sites/default/files/2019-10/Report-Sunil%20Bisnath-PNT-Workshop-for-CAVS.PDF>

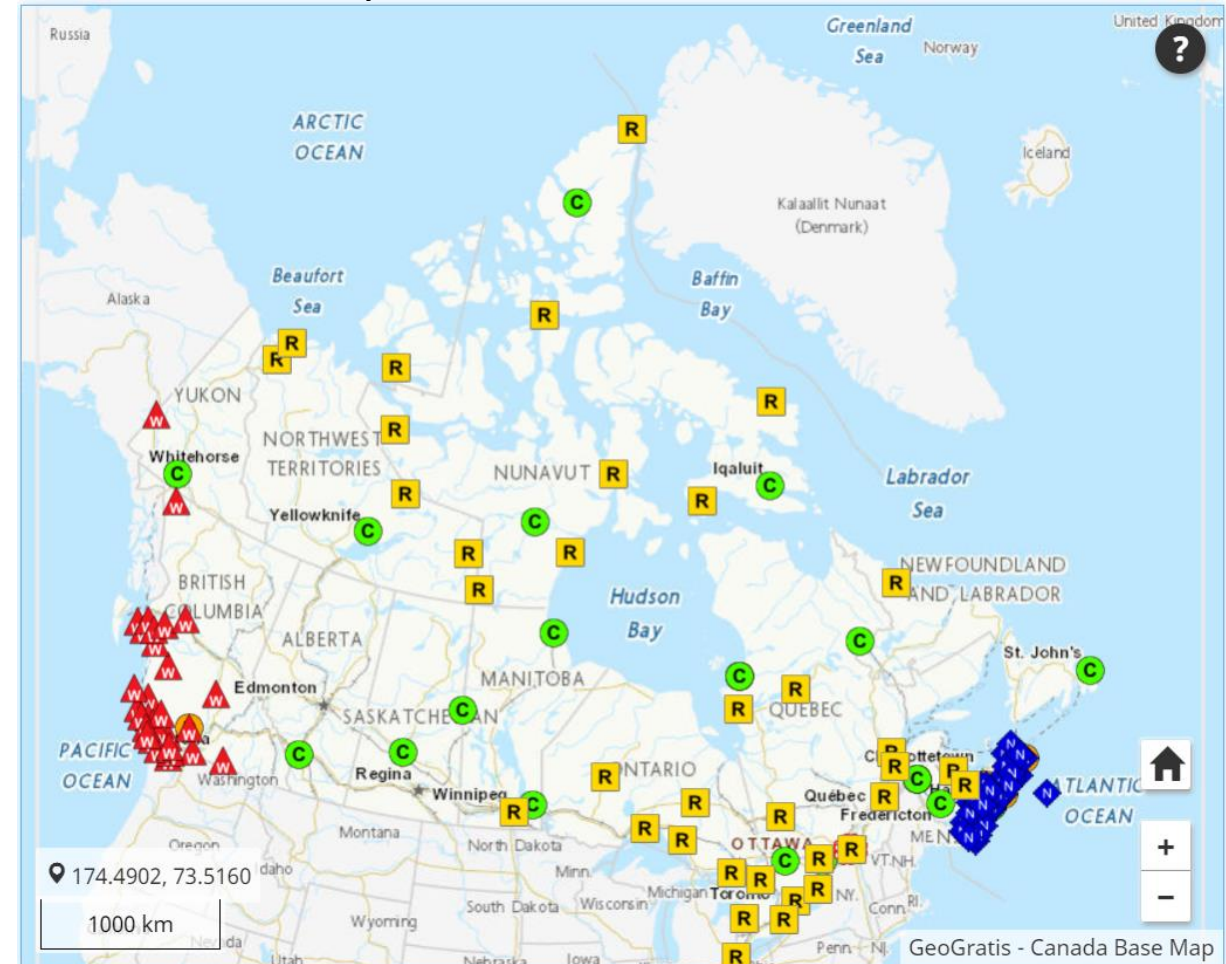
- Next, TC will launch a project to analyze Canada’s PNT infrastructure and its readiness to enable automation followed by a workshop to share and discuss findings and recommendations.

Geodetic Standards & Services

Lead: Natural Resources Canada (NRCan)

- Modernization is ongoing to meet today's economic and scientific requirements.
- The Canadian Geodetic Survey is working closely with the United States National Geodetic Survey in modernizing reference frames to ensure they will also be suitable for Canada.
- NRCan's PPP services are used extensively by users all over the world. Significant improvements are being introduced, with more to come.
- Support for international scientific priorities and UN Global Geospatial Information Management efforts are ongoing.

Canadian Active Control System



Source: <https://webapp.geod.nrcan.gc.ca>

International Activities

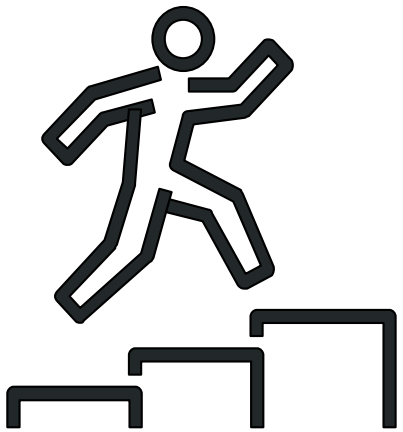
- Bi-lateral and multi-lateral dialogues have taken place to exchange information on areas of mutual interest and focus on cross-government issues.
- Two meetings were held:
 - United States: Civil GNSS meeting held in Ottawa in March 2020
 - European Commission: Civil GNSS meeting held in Ottawa in October 2019

Opportunities

- An independent study contracted by Natural Resources Canada showed that advanced precision GNSS services would have many economic and societal benefits including:
 - Reducing operating costs associated with mining exploration and extraction, increasing bitumen recovery and improving health and safety;
 - Reducing operating costs related to on-site planning and insect disease management in the forestry sector;
 - Facilitating efficient deployment of agricultural inputs, reducing costs associated with operating farming machinery and generating yield gains in the agriculture sector;
 - Enabling new technologies and applications that can generate numerous scientific benefits (e.g. for climate change research, space weather forecasting) or societal benefits (e.g. improved health and safety outcomes, reducing environmental impacts, improving coverage in underserved areas).

Conclusion

- The Canadian PNT Board will continue to foster a coordinated approach and a platform to share information.
- We are reviewing internal and external drivers impacting PNT use in Canada.
- We will need to be strategic in managing the PNT dependencies, investments and risks.



Thank You

For more information, please contact the Canadian PNT Office

✉ ic.pntoffice-bureaudupns.ic@canada.ca



For more information on the Canadian PNT Board, please visit our website:

<https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10805.html>