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Country Reports**

**Canadian Geospatial Data Infrastructure  
2005 - 2009\***

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\* Prepared by GeoConnections, Natural Resources Canada

## 2009 Status Report to the United Nations-Summary

### Canadian Geospatial Data Infrastructure – 2005-2009

Over the past 9 years, the Government of Canada and its partners have invested in developing the Canadian Geospatial Data Infrastructure.

During Phase I of the program, GeoConnections and its stakeholders laid the foundation for the Canadian Geospatial Data Infrastructure (CGDI). Initial emphasis was on the development of a common vision, and on aligning the strategies of the geomatics communities, as well as implementing the core infrastructure and addressing key institutional and policy barriers to the sharing of data and interoperability of systems across organizations.

In phase II (2005-2011), a shift now takes place towards addressing users' needs, and promoting the use of the CGDI by policy- and decision-makers in four priority areas: public health, public safety and security, sustainable development & the environment, and matters of importance to aboriginal peoples. While challenging, the transition from addressing the needs of a client-base composed largely of geomatics and subject matter experts to a clientele of policy and decision-makers with little knowledge of geomatics technologies has contributed to a growing domestic awareness and understanding of the CGDI.

In fact, since our last report to the United Nation in August 2005, strategic investments in the CGDI have yielded some tremendous successes. For example:

- Ninety-three (93) new portals or systems resulting from 268 projects helped to build awareness amongst decision makers and other end users of the benefits of the CGDI.
- One hundred and twenty-one (121) funded projects made their data sets available through the CGDI.
- Forty-two (42) federal or interprovincial infrastructure projects were co-funded, resulting in the establishment of seven new regional atlases

These early results illustrates that users recognize the value of using the CGDI to regionally integrate information in addressing numerous inter-jurisdictional issues.

Extensive consultation and a comprehensive user needs assessment undertaken in 2005-2006 identified key policy issues for the four priority CGDI user groups, issues such as geospatial privacy, confidential business information, geospatial liability and security, the emergence of *mass-market* geomatics providers and licensing. Research and analysis projects have been undertaken to further our understanding of these policy barriers, and key deliverables will include policy papers and Best-Practices Guide that will facilitate the sharing of geospatial information.

**Canadian  
Geospatial  
Data  
Infrastructure**



**Infrastructure  
canadienne  
de données  
géospatiales**

**2009 Status Report to the United Nations  
Canadian Geospatial Data Infrastructure**

**Prepared by**



**GeoConnections  
Natural Resources Canada  
2009**

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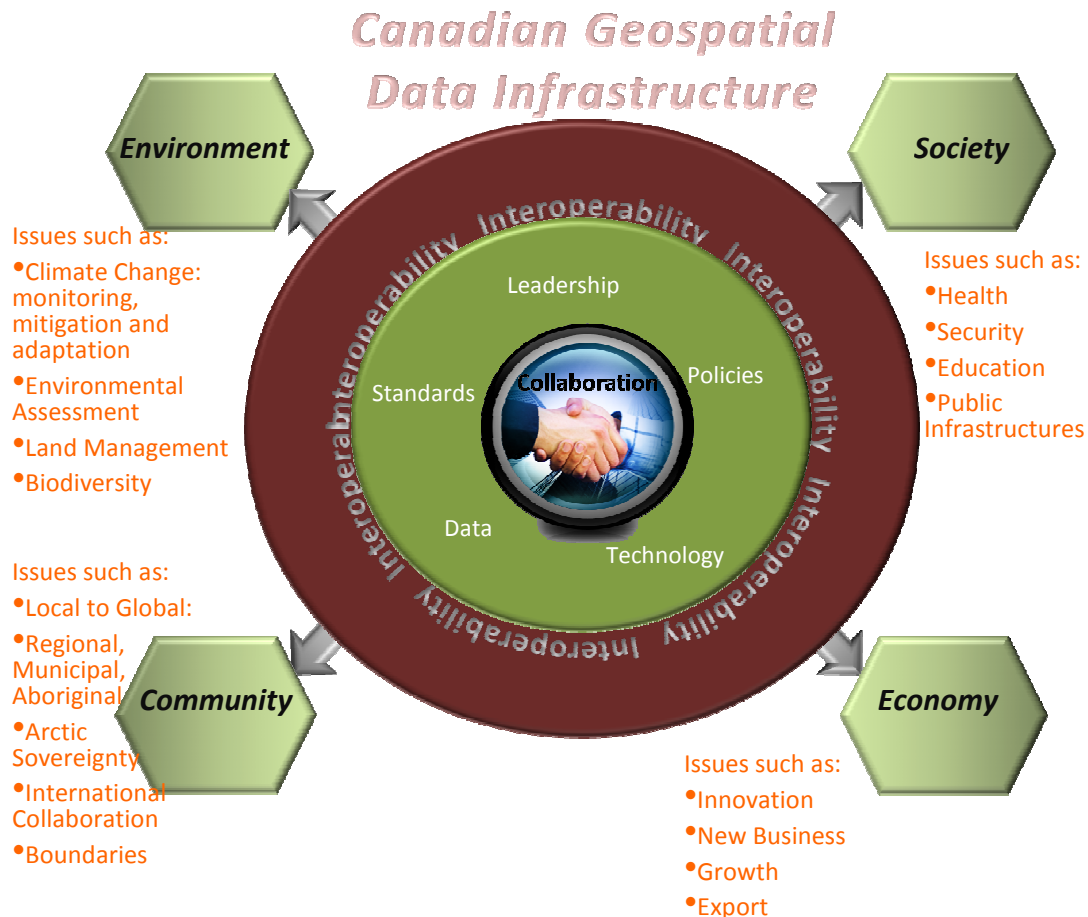
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# 1 Introduction

Over the past 9 years, the Government of Canada and its partners have invested in developing the Canadian Geospatial Data Infrastructure. The CGDI is now a public asset valued at over \$250M, which facilitates efficiency and effectiveness in government operations by enabling the sharing and use of geo-referenced information about Canada's lands, peoples and natural resources.

In Canada, the CGDI is a network for the effective, efficient discovery and access of Canadian geospatial information, which is achieved through *Interoperability, Collaboration, Leadership, Policies, Framework Data, Standards and Technologies*, in order to respond priorities related to the *Economy, Environment, Society and Community* at the local, national and international levels. This conception of the key pillars of the CGDI is illustrated as follows:



Internationally, the CGDI has been recognized as a leading edge approach to sharing data amongst public and private sectors in a distributed system. The CGDI is based on a cooperative approach with other agencies and levels of government. It is a reflection of

Canada's governance structure, where decision-making and the information needed to support it, is distributed across a confederated structure. Thus collaboration between partners is central to our model of the CGDI, with GeoConnections serving as the hub and central operating agency for the infrastructure. The CGDI model also reflects two other important philosophies:

- Private industry is best suited to develop the components in a model partnership with governments; and
- A single 'backbone', namely the CGDI, properly constructed, can support many applications.

Functionally, the CGDI:

- Provides easier access to historical and up-to-date authoritative geospatial framework data maintained by public agencies throughout Canada.
- Facilitates access to the leading thematic sources of Canadian geospatial information based on framework data.
- Increases awareness and understanding of the benefits of using geographic information in support of the environment, economy, society and local to global community for the benefit of all Canadians.
- Enables decision-making and policy development to address Canada's priority issues, such as health, security and safety, cultural, economic, and natural resources.
- Promotes the development and implementation of geospatial standards, specifications and innovative technologies.
- Nurtures partnerships and the sharing of geospatial information across all sectors, at all levels of government, and at internationally.
- Fosters the development and harmonization of policies in order to protect the interests of Canada's citizens and businesses.

Tremendous progress has been made since our last report to the 8th United Nations Regional Cartographic Conferences for the Americas in July 2005. Through renewed funding for the GeoConnections programs, the CGDI continues to evolve via national collaboration that is developing this online resource for Canadians. The CGDI brings order to the multitude of layers of geospatial information being collected across the country, helping Canadians find and access data sets directly from their source, rather than from a centralized warehouse. The CGDI is working to reduce duplication; to identify authoritative sources for geospatial data; and to improve the access, visualization, and use of data.

This document provides a synopsis of the activities and developments of the CGDI to achieve the vision of enabling access to the authoritative and comprehensive sources of Canadian geospatial information to support decision-making.

## 2 Background

### 2.1 GeoConnections Phase I (1999-2005)

GeoConnections was established as a national partnership initiative led by the Government of Canada to respond to challenges associated with advancing a culture and technology that supports the sharing and integration of geospatial data and services.

In its first five years, GeoConnections and its stakeholders laid the foundation for the Canadian Geospatial Data Infrastructure (CGDI). Initial emphasis was on the development of a common vision, and on aligning the strategies of the geomatics communities, as well as implementing the core infrastructure and addressing key institutional and policy barriers to the sharing of data and interoperability of systems across organizations. Key achievements included:

- Implementing the GeoConnections Discovery Portal, a national search engine that allows providers to catalogue their data sets and users to determine which data sets exist where;
- Establishing GeoGratis as a national repository where suppliers may place data for free distribution;
- Developing GeoBase, a national suite of framework layers coordinated by the Canadian Council on Geomatics and including place names, a national digital elevation model, a national layer of satellite imagery, a national road network, national geodetic (survey reference) points, and a national layer of administrative boundaries;
- Developing web-mapping standards in collaboration with the international Open Geospatial Consortium;
- Developing geomatics and metadata content standards through the Canadian General Standards Board and the International Standards Organization;
- Working with the private sector to develop standards-based technologies that access data directly at source;
- Achieving a ministerial-level Geomatics Accord involving federal, provincial and territorial government that lays out common principles for data sharing and collaboration; and
- Promulgating specific policies, guidelines, and best practices to promote the sharing of geospatial information.

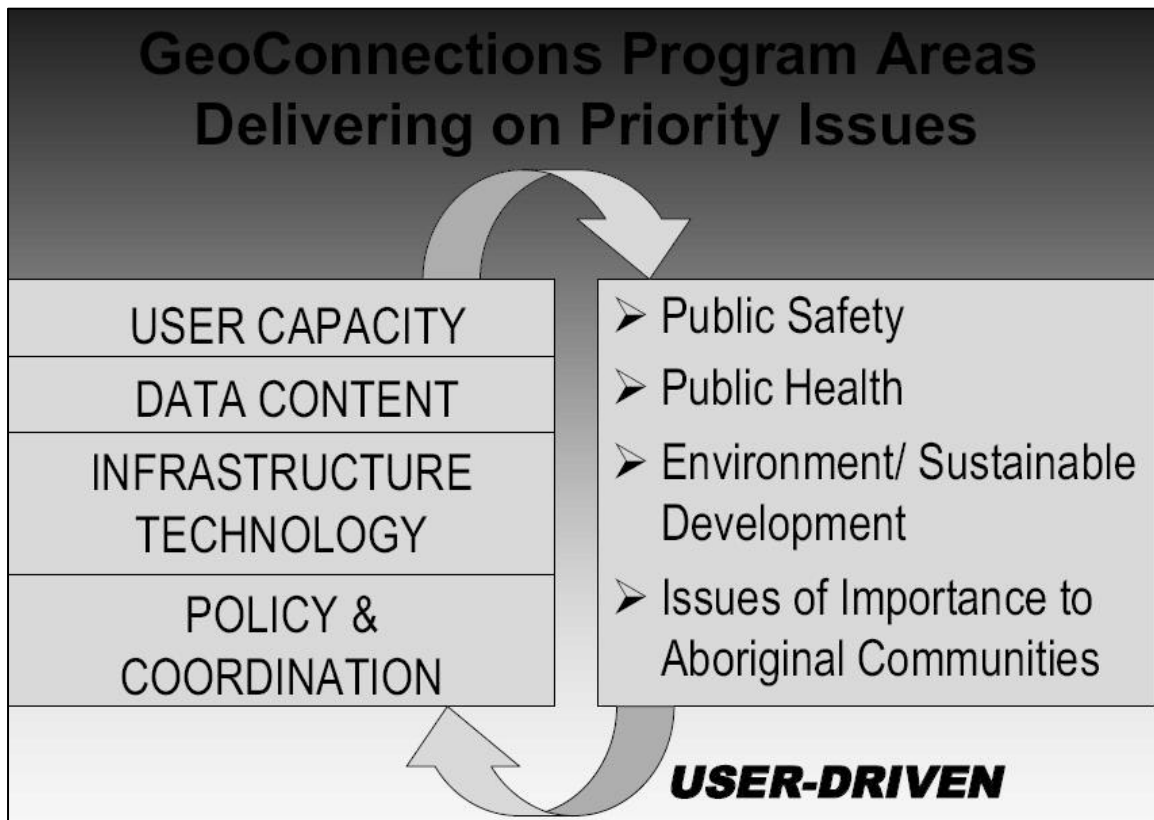
During its first five years, GeoConnections delivered on its original vision of “enabling timely access to, and effective application of, geospatial data, information holdings and services in support of policy, decision making and economic activity through a cooperative interconnected infrastructure of government, the private sector and academia”. A solid foundation was thus established for the next phase of GeoConnections.



## 2.2 GeoConnections Phase II (2005-2011)

In phase II (2005-2011), a shift took place towards addressing users' needs, and promoting the use of the CGDI by policy- and decision-makers in four priority areas: public health, public safety and security, sustainable development & the environment, and matters of importance to aboriginal peoples.

GeoConnections' second phase received \$60M over five (now six) years for activities in four funded program areas: User Capacity, Data Content, Infrastructure and Technology, and Policy and Coordination.



In terms of private sector involvement in the development of the CGDI, Phase I GeoConnections represented a supply-push model, with Canada's geomatics industry being very engaged in the development of the infrastructure. Phase II introduced a demand-pull model – promoting use of the CGDI and the integration of geomatics into the four priority thematic areas, as well as furthering the goal of a sustainable national SDI, creates greater demand for private sector geomatics companies.

While challenging, the transition from addressing the needs of a client-base composed largely of geomatics and subject matter experts to a clientele of policy and decision-makers with little knowledge of geomatics technologies has contributed to a growing domestic awareness and understanding of the CGDI. In fact, for the first four and a half years of Phase II:

- Ninety-three (93) new portals or systems helped to build awareness amongst decision makers and other end users of the benefits of the CGDI.
- One hundred and twenty-one (121) funded projects made their data sets available through the CGDI. Of the 251 new data sets published with GeoConnections funding, only seven are not available through the CGDI.
- Forty-two (42) federal or interprovincial infrastructure projects were co-funded, resulting in the establishment of seven new regional atlases<sup>1</sup>, with an eighth currently in development. This activity illustrates that users recognize the value of using the CGDI to regionally integrate information in addressing numerous inter-jurisdictional issues.
- GeoConnections co-funds project, requiring a comparable investment from project proponents. To date, project proponents have invested at a ratio of 1.54:1, further illustrating that partners and collaborators see the value of investing in geo-enabling their organizations.

Details of the past four years of activities appear below.

### **3 Highlights of Accomplishments (2005-2006)**

Although GeoConnections II began April 1, 2005, Parliament did not formally allocate funding until June 2006. Therefore, 2005-2006 was a “ramp-up” year, which focused on building a solid foundation for the CGDI’s new operational framework. Staff focused on broad-based consultations to ensure the CGDI would be properly aligned with the needs of geomatics experts and, in particular, with the needs of decision-makers in the four new priority areas.

Highlights of GeoConnections’ program activities for 2005-2006 include:

- National focus groups with new end-users were held in seven cities across the country;
- National consultations with geomatics experts were co-hosted with the Geomatics Industry Association of Canada (GIAC)
- Workshops were held with new and existing stakeholders involved with public health, integrated land management, and national information systems
- A limited number of focused projects were launched to test the approach of the renewed program.

### **4 Highlights of Accomplishments (2006-2007)**

During 2006-2007, GeoConnections completed a comprehensive user needs assessment (UNA) that provided crucial guidance on program direction, published guides on user-

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1. GeoConnections defines a regional atlas as a body of integrated information, built by multiple stakeholders, directed by the needs of a fully engaged user community, covering a user-defined, continuous piece of geography that feeds public awareness processes and that communicates issues and solutions with rich, contextual information that is relevant to many users of diverse background.

centred design and how to conduct a user-needs assessment, and funded eight user readiness projects.

The Content team developed an action plan for enhanced content, based on the data needs identified by the UNA and other stakeholder consultations, signed agreements for the maintenance of three framework data layers, funded eight projects to publish data of specific interest to the four priority thematic communities, and initiated a national study on mapping critical infrastructure.

The Infrastructure team continued their work with the Open Geospatial Consortium (OGC) to develop standards that enable interoperability, such as for multi-lingual support, Digital Rights Management (DRM) and a draft North American Profile for metadata. A pilot Canadian Geospatial Data Infrastructure (CGDI) interoperability project that aimed to increase the speed and frequency with which data updates can be incorporated, was initiated. Two new standards were adopted this year.

The Policy team established a robust governance structure for the program, including recruiting a new Management Board, advising on the establishment of external advisory committees for all four thematic areas, and for the Infrastructure team. The Policy Working Group was reconstituted; work on a new best practices guide for licensing government geospatial data commenced, and research conducted to bring further refinements to GeoConnections performance evaluation framework.

More specifically, 62 projects were started during 2006-2007 and further details can be found in Appendix A.

## **5 Highlights of Accomplishments (2007-2008)**

GeoConnections activities during 2007-2008 focused on funding strategically important projects that help to integrate and support collaboration amongst partners and stakeholders. Some of the Program's accomplishments from the past year are highlighted below.

The Canadian Geospatial Data Infrastructure Interoperability Pilot (CGDI IP) tested the feasibility of using open standards-based technology to improve the management and dissemination of CGDI data. Funded through a cost-shared collaboration between GeoConnections, several provinces, and private geomatics industry partners, the CGDI IP project demonstrated near-operational implementation of two emerging standards. As a result of this project, municipal, provincial, territorial and federal authorities can now confidently use technology based on open geospatial standards to update their data and automatically make it available online in real time to those who need it anywhere across Canada.

At the heart of the CGDI is interoperability, the ability to share and compare information from diverse sources, which is enabled by adherence to national and international standards. As a result of GeoConnections work, nearly two dozen different federal departments and agencies now participate in sharing geospatial data through the CGDI.

The four priority user communities have enthusiastically embraced the CGDI. Indeed, as of last year, the Program had already met or exceeded many of its targets for publication of new thematic data sets that are of particular interest to these communities. All these new, specialized data sets present new challenges in terms of interoperability – a challenge that GeoConnections has been addressing over the past year with new initiatives to develop standards for specialized data.

Further details about the projects launched in 2007-2008 can be found in Appendix A.

## **6 Highlights of Accomplishments (2008-2009)**

As GeoConnections passed the mid-point of its second five-year (now six-year) mandate, it continued to work with developers to ensure that the Canadian Geospatial Data Infrastructure (CGDI) remains up to date and that users have the applications and services they need to get the most out of it. During the 2008–2009 fiscal year, GeoConnections worked with software developers who produced the components, interfaces, and services of the CGDI and integrate geospatial data from diverse sources.

One of the goals for the remainder of GeoConnections’ mandate is to ensure the sustainability of the expertise developed through GeoConnections projects and the sustainability of the CGDI itself. During the current reporting period, GeoConnections drafted a policy framework within which to pursue a strategy to ensure the sustainability of the CGDI.

The public safety and security community has become fully engaged with geomatics, effectively demonstrating that using geomatics for emergency preparedness is more cost-effective in managing risks to critical infrastructure than to rebuild after catastrophic events. Common protocols for information exchange among emergency measures organizations were tested through province-wide systems in Ontario and Saskatchewan.

GeoConnections also reported this year on the initial stages of a project to develop a National Infrastructure Data Model (NIDM) to support strategic situational awareness in the context of emergency management.

Unlike other communities, the use of geomatics technology in the public health community is nascent. But public health officials and professionals are enthusiastic about what could be accomplished. GeoConnections saw the advantage of the novelty of geomatics for the public health community and helped define priorities and decide on common actions.

In the environment and sustainable development domain, where the ecosystem–based approach is conducive to the use of geomatics, GeoConnections’ focus shifted to large, integrated projects rather than the smaller projects that had been supported in earlier years.

Capacity levels and data priorities for the use of geomatics are variable within the Aboriginal community, so GeoConnections funded a project to document the geospatial data needs and resources for Aboriginal land-use planning. The program sponsors regional conferences to build practitioner networks, and has issued contracts to write good practices guides on the use of geomatics and on mapping traditional knowledge.

At the end of the fiscal year, the Government of Canada extended the current second phase of the GeoConnections program by one year. The program is now expected to end March 2011. The extension allows GeoConnections and its collaborators to continue contributing to the development, use and sustainability of the CGDI. Following the extension announcement, an announcement of funding opportunity was launched for another round of projects to publish geospatial data online through the CGDI.

The preliminary results of an independent third-part evaluation of GeoConnections concluded that there is a continuing need for GeoConnections, and that the program is successful and cost effective.

## **7 The CGDI - A Federal Perspective**

### **7.1 The Inter Agency Committee on Geomatics**

The continued implementation of the CGDI at the federal government level is facilitated by the Inter Agency Committee on Geomatics (IACG), an inter-departmental federal co-ordinating body for the effective and efficient utilization of geomatics within the Canadian government. The objectives of IACG are to develop and implement a federal government geomatics strategy complementary with provincial and territorial approaches that promote the maintenance and widespread use of a data infrastructure having common standards and up-to-date data that are collected once and used by many agencies. The IACG operates by:

- Establishing cooperation and recognising the lead roles for the collection, maintenance, analysis, integration and sharing of geospatial data and information to eliminate overlap and duplication by;
- Ensuring best efforts to reduce or eliminate federal inter-agency charges for access and use of common geospatial data;
- Encouraging and furthering the interoperability of geospatial and other information systems developed by agencies and their partners;
- Promoting the use of common geomatics standards that comply with international standards; facilitating easy access to and use of geographical information by all Canadians though, for example, the use of common data licenses; and
- Providing a consultative forum for the federal geomatics community.

### **7.2 Example of Federal Collaboration Project: CARTS**

Capitalizing on the CGDI, the Canadian Council on Ecological Areas (CCEA) has developed the Conservation Areas Reporting and Tracking System (CARTS). The system enables users to go to one place to find information on the state of Canada's designated protected areas. CARTS operates on the principle that information sharing works best

when a data custodian maintains only one version of their data and makes this version available online to users.

Sharing data requires the use of CGDI-endorsed common data standards. These standards allow a user to draw on upon not only protected area data but integrate, say, forest-cover or ecosystem data from source agencies, and produce a map that depicts a more revealing and useful integrated view than what any one layer offers alone.

By capitalizing on a distributed network and the CGDI's common data standards, CARTS users can call up information from provincial data servers and meld it into a national overview of Canada's protected areas. By adopting standard definitions of 16 protected area characteristics CARTS lets users compare Canada's protected areas with one another and with other areas around the world. Researchers, analysts, and policy makers can use the system to query data and create reports, graphs, tables, and maps—gaining better insight into some of our most fragile ecosystems.

In fact, CARTS excels as a tool for international reporting. Environment Canada's Canadian Wildlife Service uses CARTS to respond to the United Nations Convention on Biological Diversity, and the Canadian Parks Agency uses the system to report to the World Commission on Protected Areas. CARTS allows these Canadian authorities to produce national reports more accurately and faster than ever before.

Without CARTS, generating a broad view of protected areas is tedious and time consuming. One would have to scour many data sources: provincial government departments, federal departments, non-governmental agencies—some with databases, others without—some with current data, others without.

CARTS was developed with support from GeoConnections, and other partners contributed in-kind resources. These partners included protected area experts from Canada's ten provinces and three territories and from three federal agencies: Parks Canada Agency, Canadian Wildlife Service—Environment Canada, and Fisheries and Oceans Canada. Other partners included the World Wildlife Fund (Canada), The Canadian Parks Council, and the National Forest Information System Steering Committee and Project Management Office.

### 7.3 Sample Links to Federal Systems

Use of the CGDI is expanding within the Canadian federal government. Here are some examples of federal systems that have implemented the CGDI

- Atlas of Canada -- <http://atlas.nrcan.gc.ca/site/index.html>
- Canadian GeoBase -- <http://www.geobase.ca/>
- GeoGratis -- <http://geogratis.cgdi.gc.ca/>
- Discovery Portal -- <http://geodiscover.cgdi.ca/gdp/index.jsp?language=en>
- National Land and Water Information Service -- <http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1226330737632&lang=eng>
- National Forest Information System -- <http://www.nfis.org/>

- Canadian Council on Ecological Areas - Conservation Areas Reporting and Tracking System (CARTS) -- [http://www.ccea.org/en\\_carts.html](http://www.ccea.org/en_carts.html)
- Canadian Geosciences Knowledge Network -- [http://cgkn.net/cur/index\\_e.html](http://cgkn.net/cur/index_e.html)
- Indian and Northern Affairs Canada (INAC) GeoPortal -- [http://geoportal-geoportal.ainc-inac.gc.ca/main\\_e.html](http://geoportal-geoportal.ainc-inac.gc.ca/main_e.html)
- National Topographic Database -- <http://geogratis.cgdi.gc.ca/geogratis/en/product/search.do?id=8147>
- Canada Wind Energy Atlas -- <http://www.windatlas.ca/en/index.php>
- Geoscience Data Repository -- [http://gdr.nrcan.gc.ca/index\\_e.php](http://gdr.nrcan.gc.ca/index_e.php)
- COIN Atlantic -- <http://coinatlantic.ca/>
- Canadian Biodiversity Information Facility (CBIF) -- [http://www.cbif.gc.ca/home\\_e.php](http://www.cbif.gc.ca/home_e.php)
- Historical Atlas of Canada -- <http://www.historicalatlas.ca/website/hacolp/>

## 8 The CGDI - Federal, Provincial and Territorial partnerships

### 8.1 Canadian Council on Geomatics

The Canadian Council on Geomatics (CCOG), created in 1972, is the major federal-provincial-territorial consultative body for geographic information management. Its aims are to provide a forum for exchanging information on programs, to consider common operational issues, to discuss proposed legislation relevant to geomatics, and to develop and promote national geomatics standards. All ten provinces and the three territories are members of CCOG as well as the Federal Government represented by Natural Resources Canada. The Council is responsible for the Canadian Geomatics Accord and GeoBase.

### 8.2 A Renewed Geomatics Accord

The Canadian Geomatics Accord (CGA) is a Ministerial document that outlines principles, and roles and responsibilities for federal, provincial and territorial collaboration in the collection, management and distribution of geographic information. In Canada, geomatics activities are a shared jurisdiction between federal, provincial and territorial governments.

The original accord was originally signed in 2001, and expired at the end of 2006. Benefits of the new Geomatics Accord will include increased effectiveness through, for example, common data based on national standards, reduced overlap in data production for road networks and elevation, and greater use of geomatics data by public and private sector experts in Canada. The new Accord reiterates the principles that:

- ❖ Data should be collected only once, closest to the source and in the most efficient way possible.
- ❖ Data should be integrated both horizontally and vertically across jurisdictions, to reduce duplication of effort and to promote the concept of “collect data once, use many times.”

Provincial, Territorial and the Federal Government Ministers, representing the geomatics community within their jurisdiction, have signed the new Canadian Geomatics Accord.

### 8.3 GeoBase Data Layers - Status Update

GeoBase is a federal, provincial and territorial government initiative that is overseen by CCOG. It is undertaken to ensure the provision of, and access to, a common, up-to-date and maintained base of quality geospatial data for all of Canada. It is one of the major geospatial data portals for the country and users with an interest in the field of geomatics have access to quality geospatial information at no cost and with unrestricted use.

GeoBase has continued to evolve both in terms of the data offerings on the GeoBase Portal and in terms of building the partnerships needed to make GeoBase a success. Since 2005, second versions of the National Road Network, the National Hydro Network, Land Cover, and Aboriginal Lands, data layers have been added to GeoBase. In addition, the GeoBase satellite orthoimagery is being updated with medium resolution SPOT 4 and SPOT 5 data collected between 2005 and 2010. Work is underway on two more data layers: municipal boundaries and a critical infrastructure, which will contain Canada's railway and power transmission networks. Additional critical infrastructure is under consideration.

Building the partnerships between the provinces, territories and federal government departments to produce and maintain the data sets continues. In addition, GeoBase is exploring the ways and means of harnessing user or citizen input in order to update data sets. Web 2.0 technologies and the collaborative Web 2.0 way of working have made this a real possibility and may well allow for more accurate and current data on the GeoBase portal.

GeoBase data is well used. As of June 2009 the GeoBase community of registered users is composed of approximately 35,000 users that create value-added products that are subsequently distributed to a wider audience. Statistics on data downloads are gathered bi-annually and show a consistent upwards trend since the launch of GeoBase in November of 2003. In the past few years concerted effort has been put into communicating the existence of GeoBase and this appears to be yielding results.

See Appendix B for additional information about data layer newly added to GeoBase.

### 8.4 Example of a provincial project using the CGDI

#### 8.4.1 Resource-Management Tool Fires up BC Forest Service

Each year, British Columbia sees 3,500 wildfires on average. When these fires threaten communities, endangered species habitats, or valuable timberlands, halting their spread becomes vital. This dangerous task falls to the Protection Branch of the BC Forest Service, an organization that now has the ability to use the CGDI to help battle—and conquer—the province's wildfires.



With support from GeoConnections and in partnership with Vancouver's Selkirk Systems, the Protection Branch developed a prototype technology known as Resource Management for Emergency Response System (RMERS). The Protection Branch used the dispatch application to manage fire-reporting calls, air-tanker requests, and other administrative details, but the application was limited to the Branch's internal data sets.

To give itself and its front-line crews an advantage when battling fires, the Protection Branch upgraded the system to interoperate with CGDI-compliant data layers. RMERS was subsequently born, and now the Protection Branch can get a far better picture of a fire—and how to combat it. When a fire is reported now, the Protection Branch can call up a CGDI-based digital elevation model of the area and then overlay another CGDI data layer that depicts species at risk. Another layer might reveal the proximity of a neighbouring town. Combining these various views equips fire-management teams with a potent fire-fighting ally: information. Fire management teams can use this information to assign and coordinate firefighters, equipment, and other resources more efficiently, both on the ground and in the air.

RMERS relies on Web Mapping Service (WMS), a CGDI-endorsed Open Geospatial Consortium specification that standardizes the way web maps are requested and generated. For instance, users employ WMS to determine which data layers to include in their maps and to specify a map's size. Thanks to the CGDI's data-interoperability standards and services such as WMS, users now have a world of geospatial information at their fingertips—all available through the Internet.

## 8.5 Sample Links to Provincial / Local Portals Using the CGDI

Use of the CGDI continues to expand with many provinces. Here is a partial listing of provincial portal that are now using the CGDI.

- GeoNova -- <http://www.gov.ns.ca/geonova/home/default.asp>
- Land Information Ontario -- <http://www.mnr.gov.on.ca/en/Business/LIO/index.html>
- Grand River Information Network -- <http://www.grandriver.ca/index/document.cfm?Sec=63&Sub1=0&sub2=0>
- Manitoba Land Initiative -- <https://mli2.gov.mb.ca/>
- GeoBC -- <http://www.geobc.gov.bc.ca/>
- Yukon Spatial Data Clearing House -- <http://www.geomaticsyukon.ca/data.html>
- Government of Northwest Territories - Spatial Data Warehouse -- <http://maps.gnwtgeomatics.nt.ca/portal/index.jsp>
- Ontario Road Network -- <http://www.geographynetwork.ca/website/orn/viewer.htm>
- Geology Ontario -- <http://www.geologyontario.mndm.gov.on.ca/>
- Nova Scotia Forestry Division -- <http://www.gov.ns.ca/natr/forestry/GIS/downloads.htm>
- Great Lakes Information Network -- <http://gis.glin.net/>

## 9 Standards and Technical Infrastructure

### 9.1 The CGDI Interoperability Pilot project

The main objective of the CGDI Interoperability Pilot (IP) project was to test the feasibility of using open standards-based technology to improve the management and dissemination of CGDI data. In particular, this project demonstrated that technology from multiple vendors based on the Open Geospatial Consortium's (OGC) Web Feature Service (WFS) standard could interoperate to provide access to the most current and authoritative data; thereby maintaining currency, avoiding versioning and minimizing duplication of the data.

Cooperation with the OGC was key to the success of this project. Public sector participants came from Natural Resources Canada, Statistics Canada, Environment Canada, Elections Canada and government organizations in Newfoundland and Labrador, Nova Scotia, Quebec, Saskatchewan, Alberta and British Columbia.

Access to current, standardized and national geospatial data is critical for doing many tasks and making many decisions. For example, emergency measures personnel responding to an industrial accident involving a toxic plume need access to the up-to-date data to develop evacuation plans for the affected areas. But those who use data in different offices and at various levels of government have found it difficult to share information and update their databases. This problem is significant because data can change frequently.

Although local, provincial, or territorial officials can transfer map-feature changes over the Internet, previous technology constraints meant that these officials had to transfer *whole* data sets for *every* change—an unwieldy task. Consequently, often databases were updated only once a year, making much of their information old and therefore of little value for decision making. The pilot project's new distributed architecture, however, permits continual updates.

Culminating in a live, real-time demonstration of the CGDI in action, the project focused on three types of national framework data: geographical names, the national road network, and municipal administrative boundaries.

The CGDI IP project ran from January 2007 to December 2007 and culminated with a live, real-time demonstration of the CGDI in action, in response to the Use Case scenarios. The demonstration was well received by the participants and a web cast on November 30, 2007 was attended by more than 500 people. This project also created international interest particularly in the United States and Australia.

#### 9.1.1 Government of Canada Standard on Geospatial Data

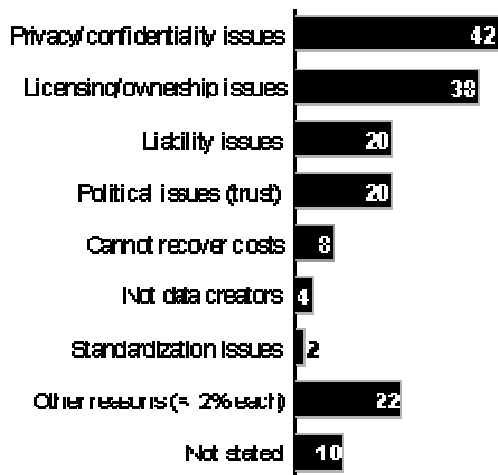
The adoption of standards is key to the successful interoperability of the CGDI. Amongst the many federal government departments that supply, hold or use geospatial data, several different approaches were being used, presenting a challenge to interoperability.

Working closely with Treasury Board of Canada Secretariat (TBS) - the central federal agency that sets policy for Government of Canada departments - GeoConnections was able to promote the development and implementation of standards for the CGDI. TBS has now established the Standard on Geospatial Data for the Government of Canada. The Standard on Geospatial Data supports two other whole-of-government policies – the Policy on Information Management and the Policy on the Management of Information Technology of the Government of Canada. The Standard on Geospatial Data facilitates interoperability across institutions and increase their ability to identify, understand, use, and share geospatial data. It also allows institutions to maximize the reuse of existing mapping and related products, thus reducing duplication of effort and saving money for Canadian taxpayers.

The standard came into effect on June 1, 2009. Departments will have until May 31, 2014 to fully implement the standard.

## 10 The CGDI - tackling policy issues

Key policy issues for the four priority CGDI user groups were initially identified through extensive consultation and a comprehensive user needs assessment undertaken in 2005-2006. The results of this analysis indicated the following issues presented barriers to the sharing of geospatial information:



This and other input from key stakeholder groups, such as the IACG and CCOG helped to frame the policy priorities for 2005-2011. The following were identified as top priority issues:

- Privacy
- Confidential business information
- Liability
- Security
- Mass Market Geomatics (MMG)

Several other policy issues were also identified as being important:

- Cost – user pay versus taxpayer pay; cost recovery is problematic in that it limits data use. Increasingly data is made freely available to users, and this is substantially the model adopted by the Government of Canada, as evidenced by decision in 2007 to make freely available data in the National Topographic Data Base, which was formerly only available for a fee.
- Metadata – should the requirement to publish metadata be compulsory or legislated? Compelling publication of metadata is somewhat contrary to the cooperative model on which the CGDI was built.
- CGDI Sustainability Roadmap – Following extensive consultations with stakeholders during 2008-2009, a series of issue papers was developed relating to sustaining the key elements of the CGDI. A summary of these issue papers will soon be released to senior managers and leaders for their review, approval and implementation.
- Tomorrow’s Canadian Geomatics Professional – In 2006, a survey was commissioned to assess the size and economic importance of Canada’s geomatics industry. In 2007, an updated analysis of the status of human resources within the geomatics industry was commissioned.

These top-priority policy issues are being tackled via research, the establishment of working group and the production of best-practices guides.

### 10.1 Privacy

A privacy working group, comprising representatives from federal, provincial and territorial governments, as well as academia and the private sector, was established to oversee research on this topic. Among other accomplishments to date:

- A partnership with academia established mechanisms for assessing the risk to privacy in collecting geo-referenced public health data, and for anonymizing such data;
- A best practices guide for the protection of privacy relating to geo-referenced public health data is in development; and
- Public opinion research is underway to assess the public’s expectations of privacy with regards to location information and aerial imaging. The study will also explore Canadian’s willingness to trade-off their privacy for services or benefits gained; and
- An international comparative analysis of geospatial privacy issues and best practices is currently underway.

### 10.2 Confidential business information

The issue of confidential business information arises in three of the four priority user groups. The environment and sustainable development community has concerns about public disclosure of sensitive information, such as the location of habitat critical to endangered species. Similarly, Aboriginal communities are reluctant to share information about culturally sensitive locations with those outside their community. Within the public safety / security community, mapping the location of critical infrastructure initially met with resistance from private sector utility companies who hold many of the assets

considered critical infrastructure; companies saw this information as a competitive advantage and were unwilling to share data that might be viewed by their competitors.

As a result, work is now underway to address these concerns:

- A best practices guide for sharing sensitive geospatial data, with a focus on supporting programs, services, businesses and/or applications related to land management and sustainable development of the environment is now in development;
- GeoConnections is funding the translation into both Inuktitut and French of *Living Proof*, a follow-up to EcoTrust's *Chief Kerry's Moose: A Guidebook to Land Use and Occupancy Mapping, Research Design and Data Collection*. *Living Proof*, will be representative of 'true best practices' with respect to indigenous land use and occupancy mapping in Canada and Australia. The textbook will address a clear and pressing need for a freely accessible resource for First Nations and worldwide indigenous peoples that introduce the highest quality techniques of data production and sound methodology design for use and occupancy maps.
- A guide to improved emergency management through location-based solutions was developed.

### 10.3 Liability

As members of the public increasingly rely on geospatial data, for example, via the use of on-board navigation devices, the accuracy, currency and reliability of that data may be called into question. There are numerous examples of individuals coming to grief as a result of over-reliance of questionable navigational data. Courts have tended not to support the use of disclaimers by data providers as a defence against suits brought by data users. However, the CGDI as such is not a data provider. Rather it offers a mechanism for sharing data.

The liability issue is also related to data quality and to data licensing, both issues which are being addressed by other mechanisms.

### 10.4 Security

Security of geospatial data is of understandable concern to many users as this issue is closely related to concerns about privacy of personal information, and confidentiality of sensitive information. Developing policies to address geospatial data security is particularly challenging in the context of a widely distributed network, such as the CGDI, which is built on collaborative efforts, rather than being supported by a legislative or regulatory framework. Consequently, geospatial data security in the CGDI is principally being addressed by technological approaches that ensure authentication of users, and establish protocols for different levels of authorized user access.

### 10.5 Mass Market Geomatics (MMG)

A recently completed research project explores the impact of Mass Market Geomatics on the government provision of geographic information. Mass Market Geomatics is defined as the preparation and publication of geospatial data and services by private sector organizations such as Google Earth, Microsoft Bing Maps, MapQuest, etc. The report

explored how services comparable to the CGDI in other countries were addressing this challenge; what role if any MMGs would play in servicing remote communities, archiving data, and acknowledging data providers; how the geomatics market in North America is evolving; and how the technological questions of system standardization and interoperability be resolved in an environment where the momentum of market forces overtakes standards development.

The report concluded that governments will continue to play an important role in developing and publishing geo-data, particularly for expert users and for users in remote communities; that archiving historical geo-data would also remain an important role for government; that the advent of MMGs has important policy and operational implications for data maintenance (including updating and the use of crowd sourcing), data pricing, licensing, and access to data – including issues related to security of both the state and individual. Far from competing with MMGs, the report recommends that governments seek to establish mutually beneficial partnerships with MMGs that capitalize on the strength of both parties – the impressive visualizations and intuitive user interfaces of the MMGs, and the ability of governments to provide reliable and usable data based on open-source standards that promote interoperability.

## 10.6 Licensing

During its first phase GeoConnections developed a best practices guide for the licensing of government data. However, the Internet platform on which the CGDI operates is changing rapidly and the 2005-2007 User Needs Assessment identified data licensing and ownership issues as an important barrier to sharing geospatial information. Consequently, an updated version of the best practices licensing guide was developed and published in 2008.

### 10.6.1 Best Practices Guide Simplifies Creating Data Licensing Agreements

A new version of *The Dissemination of Government Geographic Data in Canada: Guide to Best Practices* was released in 2008. This version reflects recent technology changes that help people access and use data via the Internet. The updated guide also introduces templates that help governments share data with one another. This guide is making it much simpler for suppliers and users of geographic data to enter into agreements with one another.

Before the guide's arrival, suppliers and users both had little option but to create data licensing agreements from the ground up each time they wanted to distribute or exchange data. Over time, some organizations amassed a bewildering number of license agreements, which complicated managing and tracking these documents and increased administration costs.

As well, organizations new to the data licensing world had to be educated about their options, a time-consuming task that further increased data-licensing costs for both data users and data suppliers. Moreover, data suppliers' concerns about liability made them wary about licensing their data for others to use.

Collectively, these constraints hampered data sharing and impeded the growth of geographic information systems (GIS) in Canada.

## 11 The Future of the CGDI

As a result of broad-ranging consultations with stakeholders, and input from the independent third-party evaluation, the future of the CGDI is now coming into focus. The CGDI is a national public asset greater than the sum of its parts and is of greater value than the investment to date. The CGDI will be preserved as a public asset.

The functionality that the program delivers (partnerships, information sharing, interoperability and other qualitative enhancements) has lent a sense of purpose and cohesion to the interaction among program stakeholders. Potential improvements in international competitiveness, productivity, economic efficiency, etc., that can position the Canadian geospatial industry to exert its leadership in a growing global marketplace, are beginning to emerge from the investment. Furthermore, national and international imperatives, including policy priorities and reporting requirements of the government can be served effectively by using the CGDI. The networks that have been established under the GeoConnections banner are effective in responding to national issues, including critical infrastructure protection, situational awareness, public health priorities, the preservation of environmental assets, and the ongoing pursuit of sustainable development.

GeoConnections is already responding to recommendations from the independent third-party evaluation. For example, the evaluation recommended that:

- GeoConnections management should examine mechanisms to ensure that the local expertise that is currently being developed can be sustained and transferred to a broader federal and/or provincial level. In response, GeoConnections has launched three provincial multi-agency initiatives that will help to link individual projects with local expertise so as to better sustain it. An additional five regional projects focus on linking expertise relating to integrated land management. An initiative is underway to build a GeoSpatial Foundation for Public Health so as to better sustain the budding expertise in this community of practice. Within the Aboriginal community, a First Nations Shared Information Service is in development, along with Aboriginal Awareness activities.
- GeoConnections management should examine mechanisms to improve the usability of the CGDI. In response, GeoConnections has contracted a private company to update the GeoConnections Discovery Portal, which serves as electronic yellow pages for the data holdings of the CGDI; and another initiative is underway to improve the usability of the GeoBase Portal and accessibility to the GeoBase Data.
- GeoConnections' management should develop a communication strategy to ensure that the "CGDI Brand" is clearly understood by all stakeholders. In response, GeoConnections is adjusting its communication and outreach.
- Natural Resources Canada senior management should consider developing a sustainability strategy to identify and maintain components of the geospatial infrastructure currently being developed. GeoConnections anticipated this

recommendation and has already developed a framework for sustaining the CGDI, along with a substantial body of research to support sustainability, some of which is ongoing.



## **12 Appendix A - Yearly project highlights**

### **12.1 - 2006-2007**

#### **12.1.1 Federal and Inter-provincial Infrastructure projects**

Substantial progress was made towards the establishment of a National Information Systems (NISs) for two priority thematic areas. GeoConnections Public Safety and Security Advisory Committee (PSSAC) recommended situational awareness as the focus of a public safety NIS. GeoConnections Environment and Sustainable Development Advisory Committee (ESDAC) recommended focus on environmental assessment (EA), specifically regional EA, as the focus for a NIS

#### **12.1.2 Single agency infrastructure applications**

A total of 18 user capacity projects were funded during 2006-2007, with the following breakdown by thematic area: 5 projects each in environment / sustainable development, public safety / security and Aboriginal communities; and 3 projects in public health.

#### **12.1.3 Pre-CGDI user-readiness geomatics projects**

In addition to the extensive user needs assessment and stakeholder consultations undertaken by the program itself, GeoConnections also developed and published a guide on understanding users' needs and user-centred design, and funded 17 capacity-building and user-needs assessment projects undertaken by stakeholder groups – 6 projects in Aboriginal communities; 4 public health projects; 2 public safety / security projects; and 5 projects relating to environment and sustainable development.

#### **12.1.4 New framework datasets**

Analysis of user needs undertaken identified which new framework data layers were of top priority for users. Development of a National Hydrographic Network (NHN), one of the top framework priorities identified by stakeholders was started. Work also started for NRNV2, an enhanced road network layer that would include street names and address ranges, another identified priority. Additionally, a UNA and business case study aimed at establishing the desirability and feasibility of a national parcel data system was launched.

#### **12.1.5 Best practice policy guides**

Work was commenced on the update and expansion of a new best practices guide on licensing government geospatial data.

### **12.2 - 2007-2008**

#### **12.2.1 Federal and Inter-provincial Infrastructure projects**

Further progress was made towards the establishment of National Information Systems (NISs) for the thematic areas of public safety and environment and sustainable development. Public safety advisors identified the need for a Multi-Agency Situational Awareness System hosted by Public Safety Canada. A GeoConnections implementation

team was established and a contractor engaged to develop the system architecture. Public health advisors devoted more resources to foundational and capacity building rather than invest in a national information system. Environment / SD advisors identified the need for a system to facilitate regional environmental assessments (REA). GeoConnections and Canadian Environmental Assessment Agency co-hosted a workshop with stakeholders to introduce and refine the business case for an NIS for REA. The business case was subsequently finalized and an expert panel of advisors formed.

### 12.2.2 Single agency infrastructure applications

A total of 24 user capacity projects were funded during 2007-2008, with the following breakdown by thematic area: 5 projects in environment / sustainable development stream, 9 funded projects for public safety / security; 4 projects in Aboriginal communities, and 5 more projects in public health, plus an additional project of common interest.

### 12.2.3 Pre-CGDI user-readiness geomatics projects

GeoConnections funded 16 capacity-building and user-needs assessment projects undertaken by stakeholder groups – 6 projects in Aboriginal communities; 1 public health projects; 1 public safety / security projects; and 5 projects relating to environment and sustainable development, in addition to another 3 projects of common interest

### 12.2.4 New framework datasets

As a result of the previous year's work, it was decided to further the analysis of developing a National Parcel data layer. GeoConnections fostered a UNA and a business case study aimed at establishing the desirability and feasibility of a national parcel data system. Work on the National Hydrographic Network (NHN) continues – a multi-year agreement (\$1.2M) was signed with GeoBase to establish Canada's first national data framework data layer relating to surface water (lakes, rivers, streams). Work on an enhanced road network layer (NRNv2) also continues with the signing of two agreements with Statistics Canada: one enabling financial transfers to provinces / territories; the other enabling Statistics Canada to maintain this data layer. Furthermore, a UNA was undertaken to establish users needs with respect to the establishment of a land cover framework data layer. Work on best practices guide on licensing government geospatial data continued and the development of a best practices guide for the protection of privacy in geomatics for public health has been initiated.

### 12.2.5 Best practice policy guides

Work on best practices guide on licensing government geospatial data continued and the development of a best practices guide for the protection of privacy in geomatics for public health has been initiated.

## **13 Appendix B - New GeoBase data layers**

### **13.1 National Hydro Network (NHN)**

After several years of community effort, National Hydro Network (NHN) data became available to GeoBase users in March of 2008. By May 2009 data for 1113 drainage areas was available, accounting for more than 95% of the Canadian landmass. By the end of summer / early fall 2009 national coverage will be achieved.

A key GeoBase principle is to provide closest-to-source data. To do so, agreements between Natural Resources Canada and provinces and territories for more detailed, precise, and up to date provincial and territorial data are made. Currently NHN agreements with British Columbia, the Yukon, Manitoba, Ontario, Quebec and Nova Scotia have been signed. Negotiations with New Brunswick are underway. Data from these jurisdictions have or will replace federal data in 2009/2010.

### **13.2 Canadian Digital Elevation Data (CDED)**

Following the signing of an agreement between Natural Resources Canada and the Ministry of Natural Resources and Wildlife of Quebec, 379 new CDED datasets for those areas south of the 49th parallel were produced using Quebec's 1:20,000 scale topographic data base. These datasets are now available on GeoBase. Additional data will be delivered over the next three years.

### **13.3 Satellite Ortho-imagery**

Work continues on the collection and processing of SPOT 4 and SPOT 5 satellite imagery – acquired between 2005 and 2010 - to create updated medium resolution orthoimagery for all of Canada. As of March 31, 2009 - processing of 3061 of the approximately 5000 orthoimages was complete. Current production of the orthoimages is at 125 orthoimages per month.

### **13.4 National Road Network (NRN)**

Natural Resources Canada and Statistics Canada continue to develop delivery and maintenance schedules for the National Road Network with provincial and territorial partners. NRN 1.0 provides road attributes and geometry. NRN 1.0 agreements are in place for all of the provinces and territories excepting Quebec and New Brunswick.

In the fall of 2007, the second edition of the NRN was launched. NRN 2.0 includes place names, street names, and address ranges between intersections. (See: <http://www.geobase.ca/doc/factsheets/NRN-FactSheet-20080331.pdf> for more information.) To date, Nova Scotia, British Columbia, Alberta, the Yukon, Ontario and Prince Edward Island have finalized NRN 2.0 agreements. In the works are agreements with Quebec, New Brunswick, Newfoundland and Labrador, and Manitoba.

Spring and summer 2009 will see updated road network data files from Nunavut, Alberta, British Columbia, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, the Northwest Territories and the Yukon. Updated files from Saskatchewan will be available in the fall.

### **13.5 Land Cover**

At the fall 2008 Canadian Council on Geomatics (CCOG) meeting, the Land Cover data model and standards - designed to meet user needs as determined in the spring 2008 user needs assessment study - were accepted as national standards. June 2009 saw the first release of Land cover data - a vectorization of classified Landsat orthoimagery for the forested, agricultural and northern regions of Canada.

The forest cover classification was produced through a Canadian Forest Service (CFS) initiative, in collaboration with the Canadian Space Agency (CSA) and in partnership with provincial and territorial governments.

The agricultural coverage classification was assembled by the National Land and Water Information System (NLWIS) of Agriculture and Agri-Food Canada (AAFC). The northern land cover classification was completed by the Canada Centre for Remote Sensing (CCRS).

### **13.6 New Data layers - Coming Soon**

#### ***Aboriginal Lands***

June 2009 will also see the release of Aboriginal Lands data on GeoBase. This data will be distributed in 13 data sets organized by province or territory. A national data set for all of Canada will also be available. This data is the result of collaboration from Natural Resources Canada's Surveyor General Branch, Centre for Topographic Information – Sherbrooke and GeoConnections.

#### ***Municipal Boundaries***

Currently the data model and standards for the Municipal Boundary data layer are being built. These data specifications will be submitted to the CCOG for acceptance at the fall 2009 meeting.

#### ***Critical Infrastructure***

A set of data layers, organized under the theme of 'critical infrastructure', are currently under CCOG consideration. At its annual meeting in October 2008 in Regina, Saskatchewan, the CCOG agreed that work should proceed on developing railway and power transmission line data layers. The GeoBase Steering Committee was tasked with further exploring the possibilities of adding strategic buildings, telecommunications towers and pipelines.