### GeoConnections Annual Report 2009–2010

Mapping the Future Together Online

GeoConnections GéoConnexions

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Canadian Geospatial Data Infrastructure



Infrastructure canadienne de données géospatiales

### Canada

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### **Message from the Director**

It is my pleasure to present the 2009–2010 annual report for Natural Resources Canada's GeoConnections program. GeoConnections advances the use of geomatics in Canada by supporting developers and users of the Canadian Geospatial Data Infrastructure (CGDI), a system for organizing, using and sharing location-based or geospatial data.

During the second phase of GeoConnections, which began in 2005 and ended in the period covered by this annual report, the program focussed on making the CGDI an effective resource for decision makers in four priority user communities: public safety and security, public health, environment and sustainable development, and matters of importance to Aboriginal communities. The program has helped them increase their use of geospatial data and geomatics technologies to address the issues facing their communities.

GeoConnections has partnered with federal and provincial departments, the private sector, academia, and nongovernmental organizations to develop the technical standards and infrastructure needed for the CGDI. The program has assisted in the development of the CGDI and expanded its user base so that it has become an effective resource to assist decision makers to take on some of Canada's most pressing challenges. Furthermore, GeoConnections has supported Canadian geomatics companies as they have become international leaders in the geomatics industry.

The GeoConnections functional areas were busy in 2009–2010. The Policy Coordination and Communications team completed the analysis for sustaining the CGDI, organized a series of cross-country consultations and supported the first Canadian geomatics conference. The Standards and Architecture team provided leadership to a number of government-wide projects on technical standards, investigated emerging technologies, helped the Mapping Information Branch on several projects and launched a new version of the GeoConnections Discovery Portal. The User Capacity team worked with partners in the four user communities and improved internal information management practices to ensure project continuity despite a reduced staff. The Content team delivered workshops, published a framework data guide, monitored agreements for the maintenance of framework datasets and oversaw production of a needs assessment for integrated land management (ILM).

During 2009–2010, ILM, a comprehensive approach to managing ecosystems, remained a priority for the environment and sustainable development community. GeoConnections helped coordinate and support a national network of ILM practitioners and experts and co-funded four ILM pilot projects. Our public safety and security portfolio progressed towards the goal of an integrated national set of Multi-Agency Situational Awareness Systems (MASAS) by sponsoring a workshop and ratifying a common symbology for emergency management. GeoConnections helped to support and educate professionals in the public health community, developing components for the Geospatial Foundation for Public Health and co-funding projects to increase user readiness and capacity. The program continued its support of those interested in matters of importance to Aboriginal people by co-funding production of several user needs assessments, development of a traditional knowledge data model and compilation of an Aboriginal land and water planning atlas, as well as by providing a number of training and educational opportunities.



The second phase of GeoConnections has co-funded projects to develop capacity, assess user needs, create data standards, publish data, prepare web-based regional atlases and on-line decision support systems, and improve the technical infrastructure. These projects have enabled stakeholders to collaborate with the Canadian geomatics sector in developing solutions for decision makers. All projects co-funded in the second phase of GeoConnections, including the 27 begun in the 2009–2010 fiscal year, have now been completed

By the time this report is released, GeoConnections will be well into its third phase. The third phase will broaden partnerships with federal, provincial and territorial agencies and industry, engage communities in using the CGDI and improve on-line access to Canada's location-based information.

The second phase of GeoConnections helped position its user communities to take advantage of the growing trend in the use of geomatics. It assisted decision makers to discover the value of using location-based information to inform analysis of the issues facing their communities. The early adopters have blazed a trail that their peers and colleagues can follow, but work remains to ensure that the momentum continues.

The third phase of GeoConnections will continue the work begun in the second phase: developing and promoting policies and standards that support the use of geospatial information; providing leadership and coordination for geomatics in Canada; guiding development of the CGDI and promoting an environment in which the Canadian geomatics industry can thrive and maintain its contributions to the Canadian economy as a whole. GeoConnections has helped Canadians lead in the global use of geospatial information and its ongoing objective is to ensure that this lead is sustained.

Sylvain Latour, Director GeoConnections Division

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### Introduction

GeoConnections is a horizontal, national, multi-sectoral program managed by the Earth Sciences Sector of Natural Resources Canada (NRCan). GeoConnections supports the development of geomatics technology, including the Canadian Geospatial Data Infrastructure (CGDI), an infrastructure that enables decision makers to use location-based (geospatial) information to tackle some of Canada's social, environmental and economic challenges.<sup>1</sup>

Geomatics is the use of geospatial information to facilitate planning and business operations, and to improve decision making in areas where location-based data can play an important and helpful role. Any activity that has a geographical dependency or component can benefit from geomatics. The geomatics industry includes disciplines such as mapping, land surveying, aerial photography, remote sensing and geographic information systems. Employing about 23,000 specialists in over 2,100 businesses, the Canadian industry generates about \$2.8 billion dollars per year.<sup>2</sup>

GeoConnections is a partnership initiative among federal, provincial and territorial governments, non-governmental organizations (NGOs), and the private and academic sectors to develop the CGDI to make Canada's geospatial data, tools and services readily accessible on the Internet. The partnership approach has helped build provincial and local support and engage public and private stakeholders.

GeoConnections has been instrumental in helping to build the Canadian geomatics industry. By providing a focal point for the geomatics community of practice, partnering with industry and stakeholders in development projects, and supporting work on standards, GeoConnections has supported the development and growth of the Canadian geomatics sector. Nevertheless, there are on-going challenges to continuing the compilation of the national data layers and to raising awareness of the CGDI among potential users.

\$1.76: \$1.00 The ratio of cash and in-kind support for every dollar of GeoConnections funding (2010-2011)

### **Program Description**

GeoConnections used a matching investment approach to support projects that encouraged decision makers in four priority user communities to use the CGDI to meet the specific needs of their communities. The four user communities, which match key federal priorities, are Public Safety and Security, Public Health, Environment and Sustainable Development, and Matters of Interest to Aboriginal Communities.

GeoConnections works with the Open Geospatial Consortium (OGC), a non-profit international standards organization that includes over 400 companies, government agencies and universities, to develop publicly available interface specifications. As a sponsor, GeoConnections contributes to the development of specifications by OGC members and endorses OGC's specifications for the CGDI. GeoConnections also works with the Treasury Board Secretariat of Canada, the Canadian General Standards Board (CGSB) and the International Organization for Standardization (ISO) to develop

<sup>&</sup>lt;sup>1</sup> To find out more about GeoConnections, visit our website at www.geoconnections.org/en/aboutGeo.html.

<sup>&</sup>lt;sup>2</sup> From Shaping Canada's Landscape, report from the Geomatics Industry Association of Canada (August 2010).



standards for the Canadian and international geospatial industry.

- User Capacity collaborates with the priority user communities to help them apply geospatial information in support of decision making;
- **Content** collaborates with geospatial data suppliers to maintain and expand framework<sup>3</sup> and thematic data sets that are available through the CGDI;
- Standards and Architecture collaborates with national and international bodies to develop relevant standards, and with Canadian private-sector geomatics firms to ensure the technological stability and robustness of the CGDI;
- Policy Coordination and Communications is responsible for identifying and developing strategies to address issues related to geospatial data sharing and management, and for the development of best practices guides; and
- The Value Management Office oversees administrative and financial matters, including those related to the administration of contracts and agreements with stakeholders and partners.

### **Program History**

The first phase of GeoConnections ran from 1999 to 2004 and initiated development of the CGDI. The CGDI is the technology, policies, standards, access systems and protocols necessary to harmonize Canada's geospatial networks, tools and services and make them available on the Internet. The heart of the CGDI is framework data such as physical features, elevations, road systems, and other layers of mapping information.

The second phase of GeoConnections, from 2005 to 2010, has built the capacity of user communities to harness the CGDI in support of decision making in the four priority user communities. The second phase broadened partnerships with federal, provincial and territorial agencies, and industry to engage communities in using the CGDI to improve online access to Canada's geospatial information and apply it to decision making.

The objectives during the second phase of the program have been

- to develop the capacity of new users to apply geospatial information to decision-making priorities;
- to secure long-term access to the geospatial data needed by users;
- to operate and evolve infrastructure technologies and standards in support of user needs; and

<sup>3</sup> Framework data layers are national in scale and are the set of geospatial data that provides the reference framework for all other CGDIcompliant geospatial data. • to coordinate the management of federal, provincial and territorial, and municipal geomatics policies to avoid duplication and increase benefits.

### Relevance

According to an evaluation completed in 2010, GeoConnections stakeholders have expressed a continuing need for GeoConnections to set standards for data quality, accuracy, consistency and format.<sup>4</sup> GeoConnections' leadership role in developing standards and ensuring interoperable geospatial data across jurisdictions is a function that the private sector cannot provide. Mass-market providers of geospatial data have increased the demand by decision makers for location-based information, but cannot offer more than broad visual data and do not enable the analysis required to support policy making.

GeoConnections has provided decision makers with more complex geospatial data that extends beyond local boundaries. Stakeholders have used program funds to connect disjointed groups, cross existing boundaries and develop the ability to analyze geospatial data rather than simply view it. They have also used GeoConnections support to implement standards that enable them to integrate data systems used by different groups.

Stakeholders have frequently highlighted the inter-jurisdictional issue. The greatest success of GeoConnections in recent years has resulted from its support for workable inter-jurisdictional geospatial data systems that allow jurisdictions to share data easily. Decision makers have greater access to standardized data and report that they are making greater use of geospatial information.

### Governance

The Minister of Natural Resources has ultimate accountability for the GeoConnections program. GeoConnections is governed by a Management Board, managed by NRCan, and guided by Thematic Advisory Committees from the four priority areas. The **Management Board**, chaired by the Assistant Deputy Minister of the Earth Sciences Sector, provides leadership for GeoConnections. The Management Board draws members from all levels of government, the private and academic sectors, and stakeholder groups. This membership is intended to reflect the views of both content providers and users. The Management Board approves funding allocations and sets strategic direction.

- An **Operations Committee**, reporting to the Management Board, is responsible for operational management. The Operations Committee prioritizes users' needs based on input from the four functional program areas.
- Thematic Advisory Committees exist for each of the four priority areas and are composed of representatives of all groups represented on the Management Board. The key functions of the Thematic Advisory Committees are to identify communities' needs with respect to the CGDI and to refine the program's focus.
- **Implementation Teams**, consisting of staff from each of the four functional program areas, work with the Thematic Advisory Committees to develop funding criteria, announce funding opportunities, and select projects.
- The **GeoConnections Secretariat** consists of a Director, the Value Management Office and the Operations Committee. It provides program oversight, performance reporting, and measurement functions, and develops the contribution agreements, contracts, and letters of agreements.

<sup>4</sup> Evaluation Report, GeoConnections Program Phase II (2010), www.nrcan-rncan.gc.ca/evaluation/reprap/2010/e20100107-eng.php.

### **Priority User Communities**

This section summarizes GeoConnections activities in its four priority user communities in 2009–2010. External advisory committees, drawn from their four communities, identify priority issues and provide guidance on how GeoConnections can support each community. The four communities represent federal government priorities and mandates that it shares with provincial, territorial and municipal governments.

### **Public Safety and Security**

An advisory committee assists GeoConnections in meeting the needs of the public safety and security community and in ensuring that the Canadian Geospatial Data Infrastructure (CGDI) is an operational asset for the community. The community priorities that GeoConnections can help to address are critical infrastructure identification, situational awareness and assistance with the management of the consequences of public safety incidents. Public safety and security authorities require essential locationbased information about infrastructures that need to be protected. Emergency management agencies need location-based situational awareness to assist them in predicting, detecting, preparing for, and responding to public safety threats.

GeoConnections has led the development of the Multi-Agency Situational Awareness System (MASAS), starting with New Brunswick, British Columbia and the City of Vancouver. GeoConnections supported a project with GeoBC to provide geospatial critical infrastructure and Olympic venue data as part of security preparations for the 2010 Vancouver Olympic Winter Games.



GeoConnections sponsored a workshop on MASAS in May 2009 to convene emergency management stakeholders from federal, provincial, territorial, municipal, and private sector agencies. The workshop fostered dialogue on ways to ensure continued development and implementation of MASAS. Participants agreed to set up the "Canada Sandbox," hosted by the New Brunswick MASAS, as a pilot project to refine proven approaches and support rapid development and deployment of MASAS for jurisdictions in need of such systems. The workshop generated a number of other action items.

GeoConnections led a project to develop the Canadian Emergency Management Symbology—a common set of map symbols for public safety in Canada. GeoConnections partnered with the Canadian Association for Public Alerting and Notification (CAPAN) and other stakeholders from the public alerting community to add location references to the new Common Alerting Protocol-Canadian Profile (CAP-CP), The CAP-CP is a standard message format for alerting the public about emergencies.



GeoConnections funds in fiscal year 2009–2010 also supported the publication of a guide to improve emergency management information sharing through location-based solutions and an inventory of geospatial data standards for public safety and security. GeoConnections staff also published a number of brochures, case studies and articles on geomatics and public safety and security.

By the end of the fiscal year, it was clear that a new community of practice had been established consisting of emergency managers engaged in the use of geospatial information at a national scale. Initial investments by GeoConnections in provincial and regional projects to form a national "system of systems" based on the CGDI have served as a catalyst for the Canadian geomatics industry, especially those companies working in public safety and security. The CGDI is now further embedded as a base infrastructure through which public safety agencies can share information. Initial investments have spurred innovation and activities that are likely to continue.

### **Public Health**

The main thrust of the program's work with the public health community has been to broaden awareness of the uses of geospatial information and to help the community to develop the capacity to use geospatial information systems. As members of the public health community recognize and adopt geospatial elements into their practices, their use and knowledge of the CGDI is growing. However, geospatial analysis is still new to the public health community, and there are a number of barriers that need to be addressed to facilitate the full acceptance of this type of analysis within the community.

The primary need is to educate health professionals about geospatial information and its uses. Using input from the public health advisory committee and other public health stakeholders, GeoConnections developed the Geospatial Foundation for Public Health by developing a user readiness guide, a data study and an analytical framework. GeoConnections has also investigated the Canada Health Infoway standards and system architecture, including potential links with the CGDI.

Of the 19 public health projects that GeoConnections funded and that were completed in 2009–2010, seven were directed at increasing user readiness by



developing strategic plans or by building user capacity. GeoConnections has also funded a project that developed a best practices guide for making geospatial public health data anonymous in public health applications.

### Environment and Sustainable Development

GeoConnections works with the environment and sustainable development community to take advantage of geospatial information and online mapping in making decisions. Geospatial tools and data make critical contributions to integrated approaches for land, watershed and oceans planning, as well as regulatory processes such as environmental assessments. GeoConnections helps develop the capacity for a holistic approach in the environment and sustainable development community to improve land-use planning, monitoring activities and regulatory processes.

Integrated landscape management (ILM) has emerged as a systematic way to manage trade-offs among complex environmental, economic and social issues and to identify solutions within broader development goals. ILM has been a priority for the second phase of GeoConnections and during fiscal year 2009–2010, GeoConnections supported ILM practitioners and experts through the Integrated Management and Geospatial Information Network for the Environment (IMAGINE) Canada ( www.imaginecanada. cyansolutions.com). GeoConnections coordinated IMAGINE Canada in conjunction with Environment Canada and provided financial support for the IMAGINE Canada Secretariat.

Four ILM pilot case studies with GeoConnections funding were completed during the fiscal year. These projects focused on how ILM could be used to find solutions to the conflicts between economics and the environment in the Bras D'Or Lakes of Nova Scotia, the Humber River Basin of Newfoundland and Labrador, the Eastern Ontario Model Forest and the Foothills Area of Alberta. Alberta's Foothills Research Institute also completed work on its regional online landscape decision support system, an integrated data warehouse that has become a model for similar projects. The Coastal and Ocean Information Network Atlantic (COINAtlantic) project to provide one-window access to a variety of distributed geospatial data was also completed.

The final report on the ILM network strategy, produced by the International Institute of Sustainable Development with GeoConnections funding, was published during the fiscal year. The Government of Canada's Policy Research Initiative (PRI) published a special issue of Horizons, its periodical, on Sustainable Places (March 2010, Vol. 10, No. 4). The issue featured ILM, referred extensively to GeoConnections and had contributions from GeoConnections staff. GeoConnections also supported the production of a best practices guide for sharing sensitive environmental geospatial data.

### Matters of Importance to Aboriginal People

GeoConnections activities and funded projects have raised the Aboriginal community's awareness of the benefits, challenges and sustainable methods for using geomatics and the CGDI in making decisions. More Aboriginal organizations are using location-based information to manage their lands and resources, which has helped them to make more informed decisions and capitalize on opportunities. GeoConnections assists them to address the gaps in human, financial and technical capacity that are barriers to their use of geospatial information in their operations.

With support from GeoConnections, the First Nations Technology Council of British Columbia is helping 203 BC First Nations and 39 tribal councils to meet their information management needs. In fiscal year 2009– 2010, the First Nations Technology Council led the implementation phase of the First Nations Information Support Services, guided by the strategic plan for a First Nations shared cultural, land and marine resource information service.

GeoConnections supported Confederation College in its development of a traditional knowledge data model to promote environmental stewardship using geospatial information. The program also funded user need assessments for a Nitassinan territory information system and a Lil'wat Nation regional atlas. The Nuuchah-nulth community land and water planning atlas, compiled partly with GeoConnections funds, was a significant achievement in that it is the first regional atlas specifically developed for seven Aboriginal communities



in British Columbia. GeoConnections supported the Cree Outfitting and Tourism Association in its expansion of the community of practice and web-based tools of the Cree GeoPortal, which facilitates land and resources management and tourism development throughout the 350,000 square kilometre Cree territory of Eeyou Istchee in the province of Quebec.

GeoConnections supported a number of training and education opportunities for Aboriginal communities. These included a good practices guide for building an Aboriginal mapping program, a geomatics training guide for Aboriginal communities, and the First Nations and Native Tribal Government Geographic Information System (GIS) Workshop in June 2009. All of these efforts have helped Aboriginal communities become aware of and build the capacity to use geomatics to strengthen their governance and decision making.

### **Functional Program Areas**

This section summarizes the activities of the four functional program areas of the GeoConnections program in 2009–2010. The administrative activities of the Value Management Office have not been described.

### Content

The Content team managed a number of framework data projects that were completed during fiscal years 2008–2009 and 2009–2010, and four GeoBase layers documents became national standards under the guidance of the team. The team published the GeoConnections Framework Data Guide, an online course designed to introduce users to framework data concepts, sources and uses. They also delivered six workshops and two web seminars, and monitored agreements for the maintenance of national framework datasets for the road network, geographical names, satellite imagery and digital elevation mapping.

After the announcement of the funding opportunity for publishing thematic data, the Content team dealt with a large volume of proposals and was able to select a limited number of high quality projects for funding. It contracted the production of a needs assessment for integrated land management (ILM) decision making that was developed in close consultation with four active ILM projects. The team also supported the production of a regional atlas for the five First Nations in the Clayquot Sound region of British Columbia.

To evaluate municipal data holdings and their uses across Canada, GeoConnections funded the GeoBase Municipal Boundaries Data Design Report, which contained a broad series of investigations. These assessments provided a valuable knowledge base for building a suitable, representative boundaries model. A variety of background materials and stakeholder involvement provided inputs to the assessment phase. The report provides a high-level review of data design aspects related to the second phase of GeoBase.

### 2,200 Approximate number of geomatics companies in Canada

### **Standards and Architecture**

During the past fiscal year, the Standards and Architecture team launched a new version of the GeoConnections Discovery Portal, redesigned with the intention of improving its usability. The team played a lead role in the evolution of the technical standards and community architectures that support the CGDI. It contributed to the design and information architecture of the Mapping Information Branch's One Portal project and provided advice and contributions to other Branch projects. The team also initiated investigations into technologies like cloud computing and the keyhole markup language (KML) file format used to display geographic data.

The Standards and Architecture team provided leadership to government-wide projects that evaluated various standards. It led the federal working group on the implementation of accessible web mapping as a component of the renewed Government of Canada web presence standards. It also led the federal working group on the implementation of the geospatial data standard intended to ensure that the CGDI remains interoperable with other spatial data infrastructures.



### **User Capacity**

The User Capacity team worked throughout the fiscal year with partners who were providing or using geospatial content in the four priority user communities. Much of this work is described in the previous section in relation to the user communities. The team managed the national Multi-Agency Situational Awareness System (MASAS) initiative, under which Emergency Management BC and GeoBC developed the British Columbia Emergency Event Map Viewer (BCeMap) application. BCeMap won an Award of Excellence from the Environmental Systems Research Institute of Canada.

Priority Areas Advisors worked with Advisory Committees that were established for each of the communities in the spring of 2006. Through the work of the Advisory Committees, the program focussed its activities to address priority issue areas. The Advisory Committees finished their work and were dissolved as the second phase of GeoConnections was completed.

### Policy Coordination and Communications

The Policy Coordination and Communications team completed the research and analysis for sustaining the CGDI, including a study of its economic impact, which contributed to the successful renewal of the GeoConnections program. It also completed research on the national and international imperatives that drive the need for federal departments to share geospatial data.

The Canadian Council on Geomatics (CCOG) advised GeoConnections to conduct a series of cross-country consultations with the geomatics community. The Policy team organized the consultations and incorporated the results in a National Mapping Strategy that set the priorities for collaboration among all levels of government, industry, academia and NGOs.

The Policy team supported the first Canadian geomatics conference, the GeoConnections Management Board and the following secretariats:

- CCOG Secretariat, a federal/provincial/territorial committee that provides leadership to the Canadian geomatics community;
- GeoBase Secretariat, a sub-committee of CCOG that focuses on implementing national geographic framework data layers for complete country coverage;
- Inter-Agency Committee on Geomatics (IACG) Steering Committee Secretariat, an interdepartmental Government of Canada committee that develops the federal geomatics strategy; and
- IACG Working Group Secretariat, an interdepartmental director general-level working group.

The Policy Coordination and Communications team oversaw the completion of best-practice guides for making geospatial public health data anonymous for public health applications, for improving emergency management through geospatial solutions, for sharing sensitive geospatial data in the environment and sustainable development community, and for building and maintaining an Aboriginal mapping program. The team also oversaw research on issues of privacy around the sharing of geospatial data.

### **The Evaluation Framework**

In November 2007, GeoConnections finalized a comprehensive evaluation framework to accurately capture the program's performance in terms of outputs, outcomes and impacts. The 2007 evaluation framework has been used to assess the second phase of GeoConnections.

### Implementing the Performance Evaluation Framework

This 2009–2010 annual report includes output performance metrics from the GeoConnections Resultsbased Management Accountability Framework (RMAF) and performance indicators, which are intended to assess progress towards the immediate, intermediate and final outcomes of the Program Logic Model (see Annex 6, Program Logic Model). Three methodologies were applied to assess progress towards outcomes:

- Quantitative metrics derived from program and project activities: these measures address immediate outcomes 2, 4, 7, 8 and 10, and intermediate outcomes 17 and 18 from the GeoConnections Logic Model. They are summarized in Annex 3, Evaluation via Program and Project Analysis.
- Quantitative analysis of the results from a survey of current and potential GeoConnections stakeholders: the survey addresses immediate outcomes 3, 9 and 14, and intermediate outcomes 16 and 20 from the GeoConnections Logic Model. Highlights of the survey appear in Section 5, User Survey, while detailed findings are presented in Annex 4.

• Qualitative analysis of selected case studies: the case studies address immediate outcomes 5, 11, 13 and 14, and intermediate outcomes 15 and 19 from the GeoConnections Logic Model. The case studies are included in Section 6, Case Studies.

### 96 Number of new datasets integrated into the CGDI by projects in the second phase of GeoConnection

Final outcomes 21 to 24 are addressed using data collected through the above three methodologies. Outcomes 1, 6 and 12 are not tracked because the program's design assures success in these areas:

- Outcome 1, User requirements are well known before technology and data investments are made. This outcome was addressed during 2005–2007 by focus groups and a user needs assessment survey. The GeoConnections governance structure ensures ongoing consultation with stakeholders.
- Outcome 6, Users recognize framework data as an authoritative geomatics construct to enable priority applications. This outcome is addressed by requiring projects to meet this criterion before they receive funding.
- Outcome 12, Stakeholders recognize the value of and apply national and international technical standards for access and use of geospatial data through technical infrastructure. This outcome is supported by making adherence to CGDI standards a condition of funding.

The key performance indicators supporting the RMAF outputs are addressed by quantitative data summarized in Annex 2, RMAF Indicators.

### **Data Collection and Parsing**

GeoConnections used project tracking software to provide a substantial portion of the data collected for this report. The software has been programmed to produce discrete reports related to performance metrics. Case study information was also derived from interviews with project proponents.

The project start dates are used to identify which projects were initiated in the fiscal year (Annex 1). Projects reported against the RMAF indicators are reported in the fiscal year in which they end (Annex 2). All projects for the second phase of GeoConnections were completed by the end of fiscal year 2009–2010. Calculations of financial ratios in the performance metrics are based on the full budget of the project recorded, regardless of actual expenditures to date. Annex 3, Evaluation via Program and Project Analysis, reports on non-financial, quantitative outcomes from the GeoConnections program logic model, the results in 2009–2010 and cumulative progress. The financial data in Annex 5, 2009–2010 Financial Reports, record actual expenditures during the reporting period.

Updates and verification have resulted in some minor adjustments to prior year data. For the 2009–2010 annual report all performance metrics for all years of the second phase of GeoConnections were recalculated and the numbers reported here represent the most up-to-date figures available.

With the exception of Annex 5, wherever this report refers to "total GeoConnections spending" or "total GeoConnections program spending," these figures refer only to the money GeoConnections invests in partners through contracts, contribution agreements, Letters of Agreement and Memoranda of Understanding. These figures do not include any operational or salary spending. Neither do they include any funds spent on information technology, communications support or rental of office space.

The project tracking software financial information in this report is not comparable with financial information derived from Government of Canada (GOC) financial accounting systems for several reasons. The software does not record salaries and operating costs, which the GOC financial accounting systems do. The software does not distinguish spending in one fiscal year from spending in another. The software records total funds committed at the start of a project and total funds expended at the end, whereas GOC financial accounting systems record expenditures as they occur throughout the life of a project.

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### Number of projects funded by projects in the second phase of GeoConnection

### **External Evaluation**

During 2007–2008, NRCan's Strategic Evaluation Branch began an evaluation of GeoConnections as part of a wider examination of NRCan's work on infrastructures. The results of that evaluation were based on a review of over 90 documents and interviews with 30 stakeholders, and an analysis of project data from the project tracking software database. The evaluation was completed in fiscal year 2009–2010 and was presented to the NRCan Departmental Evaluation Committee, after which it was approved and published.<sup>5</sup>

In terms of its relevance and rationale, the assessment found that there is a continuing need for the GeoConnections program. GeoConnections responds to stakeholder needs and none of its activities can or should be transferred to stakeholders. Its leadership in

<sup>&</sup>lt;sup>5</sup> For the full evaluation report, see www.nrcan-rncan.gc.ca/evaluation/reprap/2010/e20100107-eng.php.



the use of geomatics, the development of framework data and the implementation of standards is essential. The role of the federal government in these areas is legitimate and expanding, particularly in light of the sensitivity of some of the framework data in areas such as health and security.

The program's greatest success has been in developing geospatial data systems that cross national, provincial and municipal boundaries. The assessment found that GeoConnections has been successful in encouraging decision makers to use more geospatial information and in addressing user needs. Nevertheless, overall awareness of GeoConnections and the CGDI could be improved, especially in terms of communicating the potential benefits of the CGDI to senior decision makers.

The assessment also found that stakeholders view GeoConnections as cost-effective and that Canadians are receiving value for their tax dollars spent on the program. GeoConnections exceeded its target of leveraging one dollar of additional investment for every dollar invested by the program. However, some stakeholders consider the administrative burden involved in the proposal submission and approval process to be excessive.

Some stakeholders expressed a need to see long-term federal commitment to the development and use of geospatial data. The fact that GeoConnections has a limited mandate suggested a lack of such commitment. GeoConnections will examine mechanisms to ensure that the local expertise currently under development can be sustained and transferred to a broader provincial or federal level.

Other recommendations were for improvements to the usability of the GeoConnections Discovery Portal and the development of a communications strategy to ensure that the CGDI brand is clearly understood by all stakeholders. These recommendations were acted upon in fiscal year 2009–2010.

### 128

New portals or systems started during the second phase of GeoConnection

### Alignment with NRCan Program Activity Architecture

In the NRCan Program Activity Architecture, GeoConnections falls under Canada's Geographic Foundation, Sub-activity 3.2.4.2, in the following hierarchy:

- Activity 3: Safety, Security and Governance
- Sub-activity 3.2: Natural Resource Landmass and Knowledge for Canadians
- Sub-activity 3.2.4: Basic Infrastructure is Provided to Support the Governing of Canada
- Sub-activity 3.2.4.2: Canada's Geographic Foundation

### **Risk Monitoring and Mitigation**

The evaluation by NRCan completed in fiscal year 2009–2010 found that interviewees were concerned that the local focus on priority areas might not have been the most effective mechanism to support the objectives of GeoConnections. The local approach was viewed by some as having created isolated pockets of geospatial decision making expertise at the expense of broader approaches that could reach a larger audience of potential users. The need for improved communication in terms of identifying and marketing a CGDI brand was also noted. Several stakeholders expressed concerns about the future of the program if the sun-setting funds are not sustained, particularly the core CGDI work on maintaining national data layers and standards.

The interoperability pilot project and the best practice guide on the dissemination of government geographic data were seen as mitigating the risks. The interoperability project developed a unified, standards-based mechanism to acquire data from all layers of government. It assessed opportunities for improving the management and dissemination of geospatial data. The best practices guide was cited by stakeholders as a key element in integrating local project findings and issues into a single, accessible document.

The evaluation identified major issues to be addressed for GeoConnections to succeed:

- Resolve the issue of funding local groups versus the need to establish a national approach and reduce redundancy;
- Increase awareness of geospatial data and capacity among senior decision makers and other users;
- Establish stronger and more explicit roles for provinces;



- Improve the user-friendliness of the GeoConnections portal; and
- Address the need for a long-term federal commitment to geospatial data versus the current sunset funding.

All of these issues were addressed in fiscal year 2009–2010.

### **Summary of User Survey**

GeoConnections invited 1,136 potential participants from four sectors (federal government; provincial, territorial and municipal governments, including Aboriginal governments; academia and non-governmental organizations [NGOs]; and private sector) and four user communities (public health; public safety and security; environment and sustainable development; and matters of importance to Aboriginal communities) to respond to an online survey about geomatics. This report is based on 187 participants who provided answers to the survey. The results from the present survey can be compared to the survey completed for the 2008–2009 annual report. For a more complete discussion of the survey results, see Annex 4.

The response rate for this year's survey was 16.5%, as compared to the 21% response rate last year. This reduction may represent the fatigue of GeoConnections stakeholders with being consulted about their experience with the program. Findings from the present survey indicate that geospatial data is being integrated into the business processes of responding organizations, and that GeoConnections and the CGDI are important factors in this trend.

A large majority of respondents know of GeoConnections and the CGDI (80%).<sup>6</sup> Over half of them gain access to the CGDI through a federal government portal (55%). Approximately half of respondents said they use the CGDI mainly to gain access to the GeoConnections Discovery Portal, GeoBase, GeoGratis and the Atlas of Canada (50%) and to geospatial data, maps and imagery (47%). Other important, although less commonly endorsed reasons were to find best practice guides and policy advice (28%), geomatics services (23%) and CGDI-endorsed standards and guidance documents (22%). "GeoConnections has provided a focussed entry point for industry engaged in geomatics and served as a facilitator to ensure the CGDI corporate network is a vibrant community." Survey respondent

The survey results show that the amount of time respondents spend searching for data is relatively low, while the amount of time using it is relatively high. While 47% of respondents said they spend less than five hours a week searching for data, 31% said that staff members spend over 35 hours a week using geospatial data. These contrasting numbers suggest that appropriate geospatial data has become relatively easy to find and organizations are spending more time using it than looking for it.

Respondents were asked how they received their geospatial data. Users report that they acquire their data mainly from federal (71%) and provincial/territorial (69%) government sources, although many generate data internally (68%). These figures are slightly lower than last year for government sources. The largest percentage of users requires provincial (24%) or regional (23%) scale data, while fewer respondents require national (16%), municipal (12%) or international (12%) data.<sup>7</sup> Many users reported that they were using more sophisticated tools and data sets, many of which employ the Web Map Service (WMS) and Web Feature Service (WFS) standards. Several noted that more high-resolution and 3-D imagery was becoming available.

<sup>&</sup>lt;sup>6</sup> The result establishes the success of GeoConnections in addressing Logic Model Immediate Outcome 3: Users are aware of and prepared to leverage the CGDI.

<sup>&</sup>lt;sup>7</sup> The results suggest that users may be integrating regional data with provincial data, which addresses Logic Model Immediate Outcome 9: Users are aware of the value of integrating regional information in provincial/territorial and national information systems.



The majority of respondents reported that their organizations use geospatial information more frequently now than they did five years ago (78%) and they expect this trend to continue (74%).<sup>8</sup> When asked if they share geospatial data, either internally or externally, most respondents reported that they did (70%). More than two-thirds of respondents (69%) said their organizations share geospatial information with other organizations more frequently than they did five years ago. Barriers to sharing were, in order of frequency, privacy and confidentiality, licensing and ownership, and trust and political issues.

Respondents were asked to identify the top three barriers to using geospatial information. The most frequently cited barrier to using data was cost. The expense of software, equipment and training were often noted as barriers. The most frequently cited options for overcoming barriers were technical, although a few respondents said they needed to be shown how geospatial data could help them.<sup>9</sup>

The main drivers for increased use were accessibility of data (49%), organizational capacity (49%) and changes

in business processes (36%). The answers to these two questions suggest that increased accessibility of data and increased organizational capacity have combined to increase the use of geomatics data by decision makers.

Canadian organizations are transforming their businesses to include the use of geospatial information.<sup>10</sup> While many factors are involved, the development of the CGDI is one of the main factors enabling this transformation to take place. Without the CGDI, the uptake by Canadian organizations of geospatial information would be more uneven and sporadic.

<sup>&</sup>lt;sup>8</sup> This result addresses Logic Model Intermediate Outcome 16: Priority user communities have increased their capacity to use the CGDI to meet their decision-making requirements.

<sup>&</sup>lt;sup>9</sup> The awareness of users to the barriers of using the CGDI, combined with the general increase in their use of it, address Logic Model Immediate Outcome 14: Stakeholders are aware of key decision/business areas where the CGDI can benefit them, key policy/cultural barriers to its uptake and potential approaches to overcoming these barriers.

<sup>&</sup>lt;sup>10</sup> Logic Model Immediate Outcome 20: As benefits outweigh costs, organizations transform businesses processes, including policies and culture, to adopt the CGDI.

### **Case Studies**

Case studies provide effective narrative evidence that GeoConnections achieved the outcomes described in its Program Logic Model. All projects that received GeoConnections funding were completed by the end of the 2009–2010 fiscal year, and their results establish the value of GeoConnections and the Canadian Geospatial Data Infrastructure (CGDI). Some of the projects described below were completed in fiscal year 2008–2009 and are included here because their benefits could only be measured after project completion. Although key elements in each of the case studies relate to the specific outcome that precedes it, many of these case studies are illustrative of more than one outcome.

Logic Model Immediate Outcome 5: Agencies cooperate for data production, reducing duplication.

### Creation of a National Watershed Data Layer

Geospatial framework data is provided to users free of charge through GeoBase, a federal, provincial and territorial government initiative that is overseen by the Canadian Council on Geomatics (CCOG). This initiative was undertaken to ensure access to a common, up-todate and maintained base of quality geospatial data for all of Canada. Through the GeoBase portal, users with an interest in geospatial information describing Canada's land mass have unrestricted access to quality geospatial information at no cost. The National Hydro Network (NHN) dataset is the framework data layer linking into a linear network of all lakes and rivers across Canada on the basis of their drainage areas. The CCOG network of collaborators built the NHN onto the existing GeoBase layers and aligned it with the GeoBase geometric framework. This project improved the existing base map data description of inland waters to enable modern spatial analysis in support of the management and sustainable use of water resources. The new layer contributes such attributes as water flow directions, place names and water-related features like falls, dams, and wharfs to enable network data analysis.

The project builds on the efforts of the provinces of British Columbia and Nova Scotia, working with NRCan and GeoConnections funding, to develop the NHN standard and start creating the data. The project began with NHN data for BC's drainage areas and some areas in the Yukon, Manitoba and Newfoundland and Labrador. Then, drainage areas, linear networks and flow data were developed for the entire country using data from the federal geospatial database. The project has also been a catalyst in the creation of original topographic data for areas where it did not exist in Northern Ontario and Nunavut. It updated several other areas to provide the right input for a meaningful NHN. More efforts were invested in bringing better provincial base data into the NHN to replace the federally-based version. The NHN is being connected to American hydrographic data to provide seamless hydro networking across the border.

In accordance with the GeoBase philosophy, the collaborators focussed efforts on building one data set that was collected once, closest to source. Such coordination reduced duplication and overall costs and closest-to-source collection also ensured accuracy. Less



effort is required to complete the database, which permits better maintenance, the provision of more layers and the availability of more resources to put the data to work. Beyond cost efficiencies, the approach of sharing the tasks of constructing and maintaining a common base further integrates the user community, both horizontally across the federal government and vertically among levels of government.

The project quickly delivered concrete NHN data products to the user community and set the stage for the provision of a sustainable NHN solution for the country. Developers of the data took it through the necessary steps from a database that is compliant with the NHN standard through to NHN data products that could be handed over to the user community through GeoBase. Through the provision of NHN data, spatial data analysis capabilities become available to decision makers to inform the management, protection and sustainable use of water resources.

There has been broad demand for the NHN and it has already been used in a number of recent projects. Agriculture and Agri-Food Canada researchers used the NHN and Canadian Digital Elevation Data (CDED) to assess the risk of water contamination through runoff from agricultural land. Researchers from Fisheries and Oceans Canada, with collaboration from the natural resources ministries of Quebec and Ontario, are using NHN data to help find out why the American eel is declining and identify ways to reverse the trend. They have developed a geographic decision support system for evaluating the river habitats of the eel. The Newfoundland and Labrador Department of Environment and Conservation has used the Network Linear Flow layer of the NHN data to classify provincial streams for a national program to collect, assess and distribute information on the biological condition of aquatic ecosystems. Hydro Québec is using Network Linear Flow to develop a system to help plan and manage construction of future hydroelectric plants.

The Canadian geospatial data user community has been identifying hydrographic data as one of the priority framework data sets that needs to be put in place. Through this project, that data is now available through GeoBase in a useable form that can be maintained, updated and expanded as needed (www.geobase.ca/ geobase/en/data/nhn/index.html). Decision makers are now able to manage and plan water resource use in greater detail and with more accuracy. **Logic Model Immediate Outcome 11:** Stakeholders are able to achieve operational efficiencies resulting from use of existing and evolving technical infrastructure services.

### Public Access to Air Quality Data Will Improve the Lives of Canadians and the Environment

A recent project led by the City of Hamilton and co-funded by GeoConnections is providing national access to air pollution data that will help public health professionals, land use planners, environmental researchers and other end users to determine the health and socio-economic impacts of air pollution on local populations.

According to the Ontario Medical Association, air pollution is a contributing factor in almost 9,500 premature deaths per year in Ontario and is estimated to cost close to \$8 billion a year from hospital admissions, emergency room visits and absenteeism. These impacts can be extrapolated to provinces and territories across Canada.

The City of Hamilton and the Greater Toronto Area (GTA) have been collecting air pollution data for many years to better understand the impacts of smog and other pollutants on their citizens, the environment and the economy. Hamilton is the ideal test case for air quality data collection, as it has an iron and steel industry, and heavy manufacturing, is a transportation corridor for ships, airplanes, railways, cars and trucks, and has many extended urban areas. Air pollution data have been collected from a number of fixed air monitoring sites since 1997, providing one of the best collections of air quality data in Canada.

Mobile monitoring surveys have been conducted in the GTA and Hamilton since 2005 to gain a more comprehensive picture of the region's air quality; in particular, air and health impacts owing to traffic emissions and atmospheric inversions. Data have been collected on selected industries, on limited parts of the street and road network, and at restaurant and coffee shop drive-throughs. Recorded pollutant data included levels of sulphur dioxide, inhalable particulates, volatile organic compounds and carbon monoxide. The resulting data have proven valuable on a local level and have been used by traffic pollution modellers and community groups, among others.

Recognizing that the results could be relevant to city exposures provincially, nationally and internationally, Clean Air Hamilton, a multi-stakeholder group dedicated to improving air quality in Hamilton, collaborated with the Centre for Spatial Analysis at McMaster University on a project funded by GeoConnections to validate, analyze and publish detailed city air pollution data, including maps. The data encompasses two databases, one focussing mainly on industry and the other on traffic.

The Centre for Spatial Analysis performed advanced GIS analysis, generated the visual displays, and made the data available in accordance with CGDI-endorsed standards. The data archive is available at the Centre's Website and comprises air pollution sampling data from 2005–2009, covering the GTA and Hamilton.

The Hamilton Air Monitoring Network (HAMN) also provides real-time data to the public with the most current air quality results from HAMN's database. Several reports are available to summarize hourly, daily and monthly data. Statistical reports are provided to carry out data analysis. An interactive network map enables users to view detailed information about each monitoring station. Opening the online view of the stations provides current measurements of pollutants. The map also displays information about wind speed and direction, and traffic conditions. The data is published on the Clean Air Hamilton website, where the network map is also available (www.hamnair.ca/ hamilton-air-quality-real-time-reporting.aspx).



Attracting local, Canada-wide and international attention, the project highlights the importance of geo-referenced data for better air quality modelling. Project partners anticipate that the data could be used by healthcare professionals to optimize public health services and provide better advice to patients; by land-use planners to approve residential housing, traffic and industry; and by the provincial and federal governments, community groups and ordinary citizens to effect necessary change.

### Logic Model Immediate Outcome 13:

Stakeholders are aware of time, effort and cost savings relative to business transformation using the CGDI approach.

### MEGAPHONE Project Relates Health and Environment

Recent advances in geospatial technologies, when combined with powerful online analysis tools, are helping researchers and decision makers understand how environmental factors are related to the health of local residential populations. The developers of an existing tool for the analysis of epidemiological data through a geographical information system (GIS) have recently improved data availability and made it easier to use the system. GeoConnections supported these improvements through a partnership with a group of Quebec health research organizations.

The Montreal Epidemiological and Geographical Analysis of Population Health Outcomes and Neighbourhood Effects (MEGAPHONE) improves the quality and speed of research and decision making about issues related to the influence of physical, social and built environments on the health of residents in the Montreal region (megaphone.crchum.qc.ca/ geonetwork/srv/en/main.home).

MEGAPHONE enables researchers to integrate geospatial information in a spatial data infrastructure and use specialized tools and advanced spatial analysis methods to develop cause-and-effect scenarios relating population health and geographical location. The online MEGAPHONE catalogue allows researchers to quickly identify geospatial data relevant to their study and then link the data to social epidemiology concepts. The results help decision makers address health outcomes linked to specific environmental factors.

Originally initiated in 2004 at the Centre de Recherche du Centre Hospitalier de l'Université de Montreal, developers completed work on the latest improvements to MEGAPHONE in March of 2010. In the process, they had input from the Léa-Roback Centre, the Direction de santé publique du Quebec and the Ministère de la santé et des services sociaux du Quebec.

Basing their work on CGDI standards, these groups worked together to establish data standards, prepare and structure data and implement a web portal. The web portal makes MEGAPHONE available from any computer via the Internet. The portal simplifies access to a powerful and extensive spectrum of spatial databases so that data suppliers can update them and researchers and decision makers can use them.

The MEGAPHONE publicly accessible website includes links to a broad variety of projects that relate aspects of public health to location. The public health issues include obesity, healthful aging, transmission of HIV, smoking, mental health, cardiometabolic diseases, adverse birth outcomes and mortality. A map viewer further allows layers of data on education, income and so on to be visualized as spatial information overlaid on maps.

There are many potential applications of the MEGAPHONE technology to relate location-based information to the health of populations to assist decision makers. For example, a city official may be reviewing an application for a fast-food restaurant that would be located near a school. As part of his review, he could access the MEGAPHONE databases and create a map showing the highest incidence of childhood obesity. By overlaying a second data set showing the locations of fast food restaurants and a third set showing the locations of schools, he could gain evidence that the proximity of fast-food restaurants to schools contributes to childhood obesity. He could then weight the economic benefits to the city of allowing the restaurant to be built against student well-being and potential future health costs. The Centre de Recherche du Centre Hospitalier de l'Université de Montreal is actively creating a diverse cooperative of geospatial researchers and institutions, both national and international, to share and link geospatial health and environmental data. This cooperative would be based on the standardized, CGDIcompliant relational MEGAPHONE infrastructure. Data providers would manage decentralized databases to share centralized, shared metadata that is compliant with international regulations.

GeoConnections supported the MEGAPHONE project's implementation of a web portal to provide access to data structured using CDGI-endorsed standards. Now that MEGAPHONE is online and accessible to the world, it provides an infrastructure for the cooperation of geospatial data providers and researchers working in the field of epidemiological and geographical analysis. MEGAPHONE shows how geospatial data can help decision makers mould positive environments for healthier populations.

Logic Model Immediate Outcome 14: Stakeholders are aware of key decision/business areas where CGDI can benefit them, key policy/ cultural barriers to its uptake and potential approaches to overcoming those barriers

### An Online Geographic Decision Support System for the Alberta Foothills

Integrated Land Management (ILM) is a strategic planned approach to managing and reducing the human footprint on public land. The management of large tracts of public land can be greatly enhanced through the collaborative aspects of geospatial data collection and sharing. A successful project in Alberta has helped raise the profile of ILM.

GIS specialists at the Foothills Research Institute (FRI), in collaboration with a variety of public and private sector partners, are developing a comprehensive set of open-source data and maps that will greatly enhance the information base for land-use decisions for the Alberta Foothills. Part of the FRI vision is to provide sciencebased tools and knowledge that is understandable to natural resource managers, policy makers and the public.

The FRI geographic decision support system is an online, CGDI-compliant land-management atlas for the Foothills region. The project represents the only western Canadian project contributing to the national ILM initiative, a priority area under the Environment and Sustainable Development theme of GeoConnections.

The FRI ILM system provides access to a base of partner datasets, such as roads and management units, along with landscape access and disturbance data, and information from project partners within FRI's region. This system is the first step in helping to manage multiple-source landscape disturbance and access information such as roads and trails that relate to ecological values such as maintaining wildlife habitat.

This pilot system is part of the Canadian ILM network and is based on a user needs assessment that produced the requirements on which the system is based. One of the requirements was to promote the "beyond boundary" exchange of data and information between project partners and organizations within the FRI region. FRI aims to develop a system that will promote the collaboration of regional partners in landscape-level resource development plans.

With funding support from GeoConnections, the Foothills Model Forest Regional Online Sustainable Land Management Atlas is based on an open source platform. The platform provides an adaptable framework, the ability to meet FRI and partner business needs, for collaboration with a community of open source developers and the opportunity to divert money otherwise required for maintenance towards capacity building and faster development time. FRI has established key data sharing agreements, and users and partners can share and access information through a beta version of the atlas website. According to Debbie Mucha, FRI's GIS Program Manager, "GeoConnections funding has been essential to the creation of the system and also in completing the user needs assessment." The program "offered lots of expertise, as well as a variety of tools that a project like this can draw upon." FRI found the GeoConnection's data sharing guide an especially "valuable reference."

Members of the public interested in learning about geophysical features of the Foothills region will be able to gain access to certain layers of the online land management atlas. They will be able to view regional trails, watersheds, roads and the general area of the Foothills land base. The FRI frequently offers public education on geospatial technologies. For example, during a "GIS day" at the local library interested citizens could drop by to see how the FRI uses GIS to track grizzly bear use of the landscape, to map points of historical importance and to map all streams and tributaries in a specific watershed.

The FRI online geographic decision support system benefits partner organizations and stakeholders by providing for the efficient discovery of, access to and use of landscape access information. Through the Foothills Landscape Management Forum site within the system, this information can contribute to collaboration and joint planning to reduce the industrial footprint on the landscape. For example, if an oil company needs to build a road to access resources, it can contact the forestry company that harvests the trees in the area. The two companies can work together to decide who will build the road and who will cover which costs. Instead of building two access roads, the collaboration of the two companies through ILM enables them to use one road, which reduces their combined footprint on the land and also can reduce costs.

The online atlas provides FRI staff and stakeholders with a consistent and comprehensive baseline of regional partner information, which will have a positive impact on land use planning in the Foothills region. According to Ms. Mucha, the online land management atlas has "generated a lot of interest within FRI from



Map from FRI Online Atlas Showing Data Table of Contents

other programs." The FRI ILM system can be used as a stepping stone by other provincial or local communities to leverage CGDI expertise and standards for their own ILM systems that help protect and enhance the economic value of public lands.

### Logic Model Intermediate Outcome 15:

Due to the success and relevance of operational CGDI systems, champions in key priority areas transfer knowledge of the CGDI in their community to encourage take-up.

### **BCeMap Provides Province-wide Common Operating Picture to Emergency Responders**

Emergency responders urgently require the right information about the right location at the right time to achieve successful and coordinated responses to natural emergencies, threats, hazards or large event security issues. Innovative developments in GIS are improving the ability of emergency management

agencies to prepare for, respond to and recover from accidents, natural disasters, or terrorist or criminal acts by providing real-time situational awareness tools.

The British Columbia Emergency Event Map Viewer, or BCeMap, is a pilot application that allows multiple agencies to create, update and share geographic information and provide a unified and real-time view of emergency events across the province. With this tool, emergency planning and response agencies save time previously spent manually reviewing their separate data during a crisis and then coordinating with each other via telephone and dispatch services. With BCeMap, they all see the same situational awareness data at the same time.

For example, in the summer of 2010 the pilot system was put to good use managing wildfires across the province. "It has huge value," said Kristopher Hayne, project lead. "When we didn't have BCeMap, we had to spend hours and hours doing data gathering and then analysis. Now, as long as we have the information spatially, we can do it in a matter of minutes instead of 8 or 9 hours. It's a decision-support tool that a non-GIS trained person can access."

A user can draw a perimeter on a map, then access layers showing schools, public buildings, population and economic values, and use this information to determine risk and plan appropriate action. "BCeMap can enable

us to see all data relevant to a particular event in a single, comprehensive view," said Becky Denlinger, Fire and Emergency Management Commissioner and head of Emergency Management British Columbia (EMBC). "It provides real-time situational awareness, based on the integration of dynamic information feeds and mapping data that can help our agencies coordinate efforts and effectively monitor and act upon emergency events."

Part of a larger emergency management information service implemented by EMBC, BCeMap was partly funded by GeoConnections. "Support and funding from GeoConnections was very important," said Mr. Haynes. "This project would not have gone through without it." With input from a broad range of municipal, provincial and federal partners, it is an excellent example of how GIS can support partnerships among government agencies in the interest of citizen safety and security. In April 2010, Environmental Systems Research Institute (ESRI) Canada presented an Award of Excellence in GIS to the creators of BCeMap at the ESRI regional user conference, applauding EMBC and GeoBC for leveraging ESRI's GIS to create the application.

BCeMap integrates data from multiple security and safety agencies using the CGDI framework. Hosted on GeoBC's spatial data infrastructure, BCeMap accesses more than 80 datasets stored in the BC Geographic Warehouse. Part of the 2010 data atlas, these datasets were collected from municipal, provincial, federal and private sector organizations to support public safety and emergency management during the 2010 Winter Olympics in Vancouver. It is linked with realtime information systems such as Drive BC's road status, Environment Canada's weather alerts, NRCan's earthquake information and emergency incident information from BC emergency operations centres. EMBC and GeoBC continue to add databases to enhance BCeMap.

BCeMap successfully supports the production and dissemination of province-wide incident maps in realtime, enables local emergency management agencies to receive and share geospatial incident information and



offers a common mapping environment that integrates geospatial data about infrastructure with information on threats and hazards. BCeMap has demonstrated its ability to access and disseminate geospatial information to the national Multi-Agency Situational Awareness System (MASAS) and to the Canadian Association for Public Alerting Notification (CAP-CP). "We are proud of the progress we have made in developing this pilot application and expect it to significantly enhance emergency and public safety operations to benefit our citizens," said Ms Denlinger.

### **Logic Model Intermediate Outcome 19:** Stakeholders evolve their business processes by sharing, jointly developing and using common services, tools and standards of the CGDI as part of their operations.

### Nuu-chah-nulth Creates Atlas to Support a Conservation Economy

Aboriginal land and water management, especially in remote areas of Canada, can benefit immensely from geospatial technologies that can facilitate land and resource management and community planning by First Nations decision makers. A new web-based mapping tool is showing residents of Clayoquot Sound in British Columbia how climate change may affect them, which areas were logged in the past 40 years and how wildlife populations have changed.

Working with the Nuu-chah-nulth Tribal Council's Central Region Board and the Ahousaht, Hesquiaht, Tla-o-quiaht, Toquaht and Ucluelet First Nations, Ecotrust Canada, a non-profit organization committed to conservation and community economic development, built the Living Atlas (livingatlas.org). This land and water planning atlas tracks economic indicators for First Nations communities in the Clayoquot Sound region on the western coast of Vancouver Island. The Living Atlas helps these communities develop sustainable local economies while celebrating their cultural heritage.

With funding from GeoConnections, Ecotrust Canada completed the first version of the Living Atlas in March 2010. The atlas supports a conservation economy that addresses the triple bottom line of economical, environmental and social benefits. A conservation economy creates healthy communities, provides good livelihoods and protects or restores the natural environment. Ecotrust Canada has been working strategically for the past ten years in the Clayoquot region to demonstrate that a conservation economy is not only achievable but preferable in the long run.

Gregory Kehm, project manager for the Living Atlas, gave GeoConnections credit for its assistance, noting that the program was a key source of funding and experience for the project. According to Mr. Kehm, "GeoConnections staff were fantastic in providing encouragement and technical support for the project's development and ultimate success." GeoConnections enabled "the application to move from a conceptual phase into a strong mature tool that is now cost-effective to further develop and freely share out."

The Living Atlas supports understanding and awareness of the region by presenting a variety of different thematic content types, including forest harvest areas, fish farms, place names, language areas, climate change, and indigenous foodsheds. The Atlas can deliver maps, multimedia, text and charts. It can be used to show how various elements in the region change over time. It enables decision makers to integrate data from many sources, develop models and visualize scenarios, providing valuable insights into social, environmental and economic issues that will improve decision making about resource use and allocation. The tool also displays cultural data, such as Nuu-chah-nulth place names, and photos, stories and videos about the region.

"During the recent launch and training session, users learned how to upload multimedia content to the site. The ability to share cultural and regional data via the Atlas with such ease was very impressive to all participants," said Grant Gilron, technical lead on the project. It is clear that the project created a tool that attracts and excites users of all ages, from elders to young children, from teachers to businessmen. According to Lorin Gaertner, GIS analyst with Ecotrust Canada, the Living Atlas "allows people to easily access complex data, without the high cost of commercial software or training."

The project partners used social networking technologies to disseminate results to a broader audience of people interested in community development, sustainability and innovation. The Living Atlas itself is part of the Aboriginal Mapping Network (www.nativemaps.org) and can be accessed freely by other communities who may be planning to develop similar atlases.

With input from businesses in the region, the Nuu-chahnulth Tribal Council and Ecotrust Canada are using the Atlas to track a number of economic indicators:

- Employment in local businesses that better reflects the region's demographics;
- Regionalized and economically viable commercial fisheries that involve First Nations;
- An economically viable forestry sector that offers increased employment to local residents and leadership from First Nations;



- · Increased local and regional markets and businesses; and
- A reduced carbon footprint.

The project applies advanced geospatial technology by incorporating "a real-world, practical implementation of WMS-T," said Mr. Gilron. WMS-T is a web mapping technology with an added time component that gives spatial data a chronological context. One interesting use of WMS-T is to represent climate change data. As Mr. Gilron describes it, "turning on the Mean Annual Precipitation or the Mean Annual Temperature themes, and selecting the different time periods on the time slider at the bottom of the map shows how this data has changed over time in the past, with implications for how it will change in the future."

The challenge before the Nuu-chah-nulth community is to move away from dependence on tourism, an income source that is highly dependent on the health of the financial market, and to look to more land- and oceanbased economic plans, such as forestry, commercial fisheries, energy and small business development. The Nuu-chah-nulth community can use the Living Atlas to help plan and develop a better economic future for the remote region's citizens, while protecting and even restoring the natural environment. Their success will provide a promising example of how geospatial tools and knowledge can benefit Canadians.

### Logic Model Final Outcome 21:

Decision makers increase their use of locationbased information to address issues in priority areas related to public health, public safety and security, sustainable development and the environment and Aboriginal matters.

### Montreal Hospitals Improve Emergency Room Management with an Online Atlas

Using geospatial information to manage health care has many proven benefits, including the ability to manage a group of hospitals and their resources almost as seamlessly as if it were one big hospital. Hospital administrators have to constantly deal with complex questions concerning the most efficient use of resources, while lives depend upon maintaining a clear picture of this rapidly changing data. An online atlas that enables administrators to see hospital capacity in a geospatial framework is one tool they can use to deal with their dilemma.

The island of Montreal has 24 hospitals and 22 emergency rooms (ERs) serving more than 3 million people annually. These hospitals handle about 750,000 ER visits and approximately 330,000 hospital admissions each year. With each hospital maintaining its own separate databases detailing the number of beds, ambulances and other equipment and resources that are available at any one time, the hospital



administrators lacked a clear view of the overall dynamics of Montreal public health care.

To remedy this situation, the Montreal Agency for Health and Social Services set out to create an online atlas that would integrate the hospitals' data and simplify the coordination of this huge public health care network. The Observatoire des hôpitaux de Montréal, an intranet web atlas available to the 10,000 employees of the Montreal health network, was completed in October 2009, with GeoConnections support. Partners included four sections of the Agency along with the Montreal Committee of the Heads of Emergency Rooms and private sector partners.

The Observatoire provides visual displays that show administrators the best options for any given ER situation, based on shared online data. These displays help decision makers quickly analyze data and coordinate resources such as beds, ambulances and equipment among the various hospitals.

"All the hospitals now see the same information at the same time," said Marc Bourguignon, project manager of the Observatoire project. "We spend much less time manually preparing information, reports are sent automatically and information arrives faster and is more fluid."

The Observatoire des hôpitaux de Montréal includes other data sets, such as those dealing with weather and street maps, which are based on the Web Map Service (WMS) standard of the CGDI. The province's 8-1-1 Info-Santé service, which offers Quebec residents 24hour medical advice, provides especially useful data that can help predict spikes in ER visits. For example, when flu-related calls to the 8-1-1 service rise significantly, officials know they must gear up for an increase in emergency room visits. The Observatoire was a notable success during the 2009 H1N1 influenza pandemic as the hospitals used it extensively to locate beds.

GeoConnections supported the Agency in adapting the Observatoire to the draft Open Geospatial Consortium (OGC) Table Joining Service (TJS) protocol, which is able to convey rich statistical information on a map better than the OGC Web Feature Service (WFS) standard. "We would never have been able to develop this capability without GeoConnections funding," said Mr. Bourguignon, adding that healthcare budgets do not usually permit the kind of development work that led them to adopt TJS, which they consider to be the way of the future.

Using the same technology, the Agency also makes available to the public a dynamic Internet atlas called Atlas Santé Montréal (emis.santemontreal.qc.ca/outils/ atlas-sante-montreal), which contains location-based information on a wide range of health issues including diabetes, cancer, mortality and hospitalization according to cause, life expectancy and mental health. "Some day, we may be able to provide the public with live online information such as flu updates and emergency room wait times," said Mr. Bourguignon. The provincial government is interested in creating similar atlases in other regions, and they may someday be linked. The ability of the Observatoire des hôpitaux de Montréal to provide administrators with visual displays of integrated health data for analysis has made it possible for the Montreal Agency for Health and Social Services to better deploy and manage its ER and other resources across its 24 separate hospitals. Beyond helping to manage ER and other resources, the atlas is expected to enable improved health crisis prevention measures and to monitor response times and wait times. The Montreal hospitals' ability to work more cooperatively through the health atlas demonstrates how geospatial information can improve the way large health organizations function.

### Logic Model Final Outcome 23:

Through a model partnership approach, federal and provincial governments, the private sector, academia and NGOs operate and evolve technical standards and infrastructure to meet common needs

### City of Vancouver Increases Situational Awareness Capabilities

As emergency management professionals build on the firm foundation provided by existing CGDI-compliant data and systems, systems developers continue to innovate and create new applications for emergency management that can be shared for the benefit of the entire public safety and security community. The mission of the Vancouver Office of Emergency Management (OEM) is to ensure that the City of Vancouver is prepared for, able to respond to and recover from emergencies and disasters. It coordinates emergency services and operational support during special events such as the 2010 Olympic and Paralympic Winter Games.

With the completion of the City of Vancouver geospatial situational awareness data project, more pieces of the geospatial integration picture have been put in place, filling in some of the known gaps in the City of Vancouver's situational awareness profile. Funded in part by GeoConnections, the geospatial situational awareness project is based on CGDIendorsed standards and is part of the BC Multi-Agency Situational Awareness System (MASAS). The results of the project were successfully deployed on a pilot basis during the Games, contributing to a safe and secure event.

The main goal of the project was to create a real-time common operating picture of the City of Vancouver. Situational awareness in emergency management may be described as being supplied with enough intelligence about ongoing incidents to understand the impact of ever-changing information and events, and thus to be able to take action in time to produce a positive outcome. The system is used to consolidate geospatial situational awareness information from several systems and display it as a common operating picture during major special events and emergencies. The system also supports day-to-day situational awareness by alerting critical infrastructure operators about incidents that may impact their facilities.

"GeoConnections funding was very helpful. It essentially paid for all of the outside work that we had to bring in to do this. Also, this project definitely benefited from some of the other CGDI pieces already out there. We wouldn't have been able to pull up the data we need to issue the alerts if the Emergency Event Map Viewer wasn't available," said Daniel Stevens, Manager, OEM. The Emergency Event Map Viewer, a web application that feeds live data from police, fire and ambulance dispatch systems into a single view that can be updated every 20 seconds, was also partly funded by GeoConnections.

The project developed three data publishing components:

 Data publishing interfaces with the City of Vancouver's emergency management information system that allow users to combine a map view containing incident information with a view showing the plan of action, such as an evacuation plan;



Sample Map from the Road Ahead

- A publishing interface for a City of Vancouver 2. dataset that shows road closures related to construction, emergencies or special events; and
- 3. Development of a critical infrastructure alerting mechanism that uses live incident data and notifies stakeholders by automatic email should their facilities be threatened.

The project was limited primarily to the City of Vancouver, but it can also provide situational awareness to partners at a regional and provincial level. Information provided from the local level can also rise to the national level through the provincial systems that are part of the national MASAS. The City of Vancouver is able to provide the public with real time updates of road information from a data subset through The Road Ahead, a public website. Another data set is derived from a 2008 initiative, the Critical Infrastructure Assurance Program that provides important detail to the emergency management community.

The new system alerts critical infrastructure operators by e-mail, sometimes before the first responder agencies are on site. This provides lead time to act; for example, if a power outage occurs at a pumping station, the generator will take over, rapidly consuming a limited fuel supply. The alert gives the operator time to acquire and deliver more fuel if necessary. The Olympic Games provided

an ideal time to test the alerting system with live data in a controlled environment. The system issued alerts when any moderate or severe motor vehicle accident was reported within 100 metres of an Olympic lane. Olympic lanes were dedicated to authorized vehicles connecting key Olympic facilities to transport athletes, volunteers and the media.

By implementing the geospatial awareness data project, the City of Vancouver has improved its situational awareness profile internally and with external partners through the sharing of situational awareness data. The project will continue to be beneficial to the City of Vancouver by increasing situational awareness, shortening the time between an emergency event and the notification of key staff, and providing alerts based on decisionsupport logic for incident types that previously would have been in process for hours before all stakeholders could be notified. It will also provide public access to certain non-sensitive data, such as the City of Vancouver's road impacts information feed, which will benefit the general public, the media and other outside agencies.

### **Plans and Priorities for GeoConnections**

The 2010 federal budget announced renewed funding for the third phase of the GeoConnections program. The budget provides \$11 million in funding over the next two years to continue developing the Canadian Geospatial Data Infrastructure (CGDI) and providing consolidated geospatial information to Canadians via the Internet.

GeoConnections successfully delivered on its previous mandate to support CGDI users while demonstrating the value of improved access to geospatial information and the benefits of interoperable standards and technologies. GeoConnections will continue to work with stakeholders to develop and promote policies and standards to support the use of geospatial information.

GeoConnections will provide leadership and coordination for the use of geospatial data to aid effective decision making and, with key stakeholders, lead strategic geomatics policy development. The renewed priorities for GeoConnections are to promote awareness of new applications of geospatial information and to educate stakeholders on the importance of interoperable solutions through the adoption of operational policies and standards.

The objectives for the third phase of GeoConnections are as follows:

- To increase awareness of the benefits of using geospatial data and tools to achieve goals for social, economic and environmental priorities;
- To facilitate the integration and use of geospatial data to support effective decision making;

- To coordinate the development of national policies, standards and mechanisms and to support their implementation to ensure the maintenance and currency of geospatial data and its compatibility with global standards; and
- To keep Canada at the leading edge of accessing, sharing and using geospatial information via the Internet.

The renewed program will continue to coordinate geomatics activities in Canada, enabling interoperable data sharing and thus increasing economic sustainability and international competitiveness for the Canadian geomatics community. This activity will require that GeoConnections, in partnership with CGDI stakeholders, will develop and implement long-term national geomatics strategies and policies. GeoConnections will also continue to represent Canada in the Open Geospatial Consortium (OGC).

GeoConnections provided input for the Treasury Board Secretariat (TBS) Standard on Geospatial Data (2009). Federal departments are required to use the standard on metadata for geographic information and on the Web Map Server (WMS) interface. The program will continue to provide subject matter expertise and advice on the application and review of the TBS standard. This assistance will be provided in part through the participation of GeoConnections on the Inter-Agency Committee on Geomatics. Program staff will also encourage and assist federal government departments to implement other standards that GeoConnections has established as part of the CGDI. GeoConnections continues to engage and partner with stakeholders in the geomatics community. The outreach and engagement strategy includes taking part in the annual Canadian Geomatics Conference. As part of Natural Resources Canada's participation, GeoConnections will exhibit, present technical and strategic policy papers, serve at association committee meetings, and provide keynote speakers for upcoming events.

GeoConnections will work with the geomatics community to advance the operational policies and standards needed to complete the CGDI. The development of tools and resources will help organizations integrate the CGDI into their business practices. GeoConnections will continue to work with partners to build the CGDI, develop policies to support the use of geospatial information, encourage standards adoption and provide geomatics leadership and coordination in Canada.

The overall goal is to ensure that all Canadians effectively share and use geographical information about our land, people and natural resources to support economic, social and environmental priorities. The first two phases of GeoConnections made significant advances in this direction and the third phase will support continued progress.

### Annex 1: List of Projects Funded in 2009–2010

The 27 projects listed in the following table were started during 2009–2010. Details of most completed projects can be found at www.geoconnections.org/en/aboutGeo/projects.

### Table 1: List of Projects Initiated in 2009–2010

Project Name	Thematic Area
User Needs Study for the Development of a Tool for Decision Making	Aboriginal
Geospatial Inter-jurisdictional Information Exchange Workshop	Aboriginal
First Nations Information Support Services (FNISS)—Phase 3	Aboriginal
Geomatics Training Guide and Workshops for Aboriginal Communities	Aboriginal
6th International Symposium on Spatial Data Quality	Common
Good Practices Guide Supporting Geomatics Use within Aboriginal Communities	Aboriginal
Regional Atlas Development Capacity Building and User Needs Assessment	Common
Analysis of Economic Impacts of CGDI and an Assessment of the Current Canadian Geomatics Industry	Common
Cloud Computing	Common
Geospatial Return on Investment-Phase1	Common
Support for the Chair, International Steering Committee for Global Mapping	Common
Data Needs Assessment for Integrated Land Management (ILM) Decision-Making Processes	Env/Sust-Dev
GeoWeb 2009	Env/Sust-Dev
Integrated Landscape Management Secretariat, Phase II	Env/Sust-Dev
Standards Council of Canada—LOA	Env/Sust/Dev
Analytical Framework for the Use of Geomatics in Public Health	Public Health
Building a GDSS to Address Extreme Heat and the Urban Heat Island Effect in the Greater Toronto Area	Public Health

Project Name	Thematic Area
Infectious Disease Simulation Tool—A Geospatial Decision Support System	Public Health
Public Health Geospatial Information Reference Framework	Public Health
Publication distribuée de données thématiques dans MEGAPHONE	Public Health
User Readiness Guide for the Use of Geomatics in Public Health	Public Health
Montreal Hospital Emergency Room Health Watch, Information and Surveillance Project	Public Health
Vancouver Coastal Health GIS Capacity Building	Public Health
BC Emergency Event Map Viewer (BCeMap)	Public Safety
Emergency Management and Public Safety for 2010 Olympics	Public Safety
Interoperable Canadian Emergency Management Symbology Project	Public Safety
Integration and Publishing of Geospatial Situational Awareness Data into City of Vancouver Emergency Management System	Public Safety

### **Annex 2:** RMAF Indicators

The table in this annex is derived from the GeoConnections Result-based Management Accountability Framework (RMAF). The data in the tables are based on projects completed by March 31, 2010, and derive from the program's project tracking software. Quality assurance of data entry into the project tracking software is ongoing, resulting in some discrepancies between numbers given in previous annual reports and numbers in this report. All reporting information for all years was recalculated for the current annual report, and should be considered as the most up-to-date data available.

### Table 2: GeoConnections Performance Framework for Indicator 1 (Outputs)

### Output: Federal and interprovincial infrastructure projects (national extents)<sup>11</sup>

Indicator: Number / proportion of projects completed

Annual Target / Program Target: 1 / 5

### 2009-2010 Results

Substantial progress was made towards establishing multi-agency systems (MASs) for the environment and sustainable development priority user community:

- GeoConnections supported the Bras d'Or Institute, Cape Breton University in the development of a science-based planning and reporting tool for ecosystem-based management of human activities directly affecting the health of an iconic estuary, the Bras d'Or Lakes of Cape Breton.
- GeoConnections partnered with the New Brunswick Emergency Measures Organization in the development of a Multi-Agency Situational Awareness System (MASAS). The system aggregates geospatially referenced incident information from diverse sources into a consolidated view which will be available to partners.
- GeoConnections supported the St. Lawrence Islands National Park, Parks Canada in the integration of multiple available data sources, ecological modeling tools, and socio-economic information into a decision support framework that will allow decision makers to assess future land use scenarios.
- GeoConnections partnered with Emergency Management BC to enhance the Emergency Management Information System currently implemented by EMBC. As part of the MASAS, the product will better enable emergency management practitioners to prepare for and mitigate the impacts of emergency incidents through timely sharing of geospatially referenced information.

<sup>&</sup>lt;sup>11</sup> This indicator refers to the creation of multi-agency systems (MASs) of significant regional or national scope. GeoConnections defines MASs as large, enterprise-wide or multi-agency systems that harvest, analyze, and present geospatial information from a number of diverse sources to support decision making within a specific line of national business. MASs include hardware, software applications and data resources. As components of the CGDI, MASs are based on standards and support the integration of multiple resources.

Output: Single agency infrastructure applications

Indicator: Number of projects completed

Annual Target / Program Target: 12 / 60

### 2009-2010 Results

A total of 21 user capacity, single-agency infrastructure projects were completed during the 2009–2010 fiscal year. The breakdown by user community is as follows:

- Aboriginal-2 projects
- Environment and sustainable development—5 projects
- Public health—7 projects
- Public safety-1 project
- Common—6 projects

### Output: Pre-CGDI user-readiness geomatics projects

Indicator: Number of projects completed

Annual Target / Program Target: 15 / 75

### 2009-2010 Results

A total of 17 capacity building and user needs assessment projects were completed in the 2009–2010 fiscal year. The breakdown by user community is as follows:

- Aboriginal-4 projects
- Environment and sustainable development-0 project
- Public health—7 projects
- Public safety-1 project
- Common—5 projects

### Output: Maintained agreements for existing national framework dataset

Indicator: National completion of framework datasets

Annual Target / Program Target: 1 / 6

2009-2010 Results

GeoConnections is contributing financially to two maintenance agreements:

• Maintenance of the GeoBase National Road Network (NRNv1) (production environment and validation process of data delivered by partners)

• Provincial and territorial pact for GeoBase NRNv1 (digital data transfer)

Output: New framework datasets are integrated(Content)

Indicator: Additional datasets integrated

Annual Target / Program Target: NA / 4

### 2009-2010 Results

Development of new national framework datasets is a multi-year effort, with significant progress having been made during the reporting period, as follows:

- Completed the contract to develop the municipal boundaries data model. The municipal boundaries conceptual model was elaborated in collaboration with the Centre for Topographic Information of Natural Resources Canada. It has been adopted by the Canadian Council on Geomatics (CCOG).
- The project was completed with Surveyor General Branch to have the First Nations and Aboriginal Lands layer available. This data layer is one of several administrative boundary data layers available on the GeoBase portal. Aboriginal lands data depict the administrative boundaries of reserves, settlement lands, and other aboriginal lands as defined by federal legislation.
- The creation of the National Hydro Network (NHN) has enhanced the existing "base mapping" description of the inland water to enable modern network and spatial analysis by drainage areas. The new layer has brought in a linear network with water flow directionality, toponyms and water related events (such as falls, dams, wharfs) as the foundation for advanced data analysis.
- Financial transfers to the provinces and territories continued under an agreement with Statistics Canada for the National Roads Network, version 2 (NRNv2).
- The Department of Fisheries and Oceans updated the needs analysis in bathymetric data and more specifically in integrated information from land and sea data to put together a seamless land-water Digital Elevation Map. Progress has been made in data harmonization, adjustment, standardization and quality control in the Atlantic and Central and Arctic regions.

Output: Distributed thematic datasets closest to source

Indicator: Datasets available through CGDI

Annual Target / Program Target: 4 / 20

### 2009-2010 Results

A total of 81 new thematic datasets closest to source were integrated in 2009–2010. The breakdown by user community is as follows:

- Public health—19 datasets
- Public safety-26 datasets
- Environment and sustainable development-32 datasets
- Aboriginal-0 dataset
- Common—4 datasets

Output: Highly available core services

Indicator: Reduced frequency of failed access to Discovery and GeoBase portals

Annual Target / Program Target: Decrease of 20% / Decrease of 90%

2009-2010 Results

Based on the March 2010 report, availability of the GeoBase Portal exceeded 99% during 2009–2010. Although exact figures are not available, uptime for the Discovery Portal (GDP) is close to 98%.

Output: Directed innovation technologies and tools

Indicator: Number / proportion of projects completed

Annual Target / Program Target: 3 / 15

2009-2010 Results

Twelve (12) directed innovation technologies and tools projects were completed in 2009–2010.

Output: % projects leverage including by partners

Indicator: Ratio of funds leveraged to funds invested

Annual Target / Program Target: 1 : 1

### 2009-2010 Results

Overall ratio: 1 to 1.76 (i.e., every dollar invested by GeoConnections resulted in \$1.76 invested by project proponents and partners, including in-kind contributions):

- User capacity: 1 to 1.59
- Content: 1 to 2.19
- Infrastructure: 1 to 1.87
- Policy: 1 to 0.84

**Output:** Best practices policy guides

Indicator: Number of guides produced

Annual Target / Program Target: NA / 3

2009-2010 Results

Work was completed on several best practices guides aimed at facilitating the dissemination of geospatial data by removing policy barriers and increasing the use of geomatics tools.

For example, in fiscal 2009-2010, A Manager's Guide to Public Health Geomatics was released. It was aimed at building awareness about the business benefits within the executive levels of public health organizations and educating public health practitioners in the use of geospatial information for operational decision making. A Framework Data Guide was published in December 2009. This online resource was designed to introduce the concepts related to framework data, sources and uses. As well, a guide titled Good Practices Guide – success in building and keeping an Aboriginal mapping program profiles practices that lead to success when implementing an Aboriginal geomatics program in Canada. Work was also completed on a Geospatial Privacy Awareness and Risk Management Guide for Federal Agencies. This guide examined privacy-related risks and issues arising from the collection, use, retention, disclosure and disposition of personally identifiable geospatial information as well as identified privacy-related mitigation strategies for dealings with geospatial data.

### **Regional and Sectoral Funding Distributions**

Program expenditures such as salaries, operations and maintenance are excluded from the calculation of performance ratios, such as the geographic and sectoral distribution of funds. Project performance ratios are based on project expenditures only.

Data in Tables 3a, 3b and 3c are based on projects that ended by March 31, 2010. Ongoing efforts to ensure the accuracy of project reporting data have resulted in some adjustments to data reported in previous years.<sup>12</sup> To reconcile past annual reports with the present one, a breakdown of funding by region and sector is provided for each year.

The determination of regional funding is based on the postal address of the recipients. However, the scope of a project may have an impact beyond the region noted in these funding distributions. For example, the funds received by a project proponent that has a Toronto mailing address will be shown below as part of the total funding for Ontario, even though the project may be national in scope.

### **Table 3a:** GeoConnections Performance Framework for Indicator 2<br/>(Regional Funding Distribution Targets)

Distribution Target (project \$, excl. program operations)	Atlantic	Ontario	Québec	Prairies	BC & North
Target funding	10%-15%	20%-40%	10%-20%	10%-20%	20%-30%
2005–2006 actual funding <sup>13</sup>	17.79%	0%	0%	35.76%	12.49%
2006–2007 actual funding <sup>14</sup>	8.14%	48.90%	14.16%	0%	25.84%
2007–2008 actual funding <sup>15</sup>	10.25%	37.97%	21.70%	0%	22.30%
2008–2009 actual funding <sup>16</sup>	14.17%	53.21%	12.92%	2.61%	17.09%
2009–2010 actual funding <sup>17</sup>	20.58%	53.29%	9.76%	2.91%	12.13%
Cumulative total to March 31, 2010	14.19%	38.67%	11.71%	8.26%	17.97%

Note: Table 3b excludes funds directly disbursed to the private sector. These are shown separately in Table 3c

<sup>&</sup>lt;sup>12</sup> Discrepancies in reporting project data from one year to the next are generally attributable to one of the following: correction of data entry errors, including differing interpretations of how to categorize specific project characteristics (more than 30 people input data to GeoConnections project tracking software); slippage in the completion date of projects, resulting in a project being reclassified from one year into the next; and corrections to the amount of money being attributed to a project, as a result of recording actual versus estimated project costs. Except in the case of Table 3c, these year-to-year reporting discrepancies are minor, mostly less than a one-half percent variance. However, much larger discrepancies appear in Table 3c, largely because over the past year, GeoConnections staff has made a concerted effort to ensure the project proponents report all monies that flowed through to the private sector, where previously some project proponents were not reporting these numbers.

<sup>&</sup>lt;sup>13</sup> One project, worth 34% (\$19,000) of total GeoConnections funding for 2005–2006, went to a contractor based outside Canada.

<sup>&</sup>lt;sup>14</sup> One project, worth 3% (\$38,000) of total GeoConnections funding for 2006–2007, went to a project proponent based outside Canada.

<sup>15</sup> Three projects, worth 7% (\$399,780) of total GeoConnections funding for 2007–2008, went to a contractors based outside Canada.

<sup>&</sup>lt;sup>16</sup> No funds recipients based outside Canada completed projects in 2008–2009.

<sup>&</sup>lt;sup>17</sup> Between April 1, 2005, and March 31, 2010, GeoConnections funded five projects whose proponents were based outside Canada. These projects totalled 3.5% (\$456,780) of all project funding allocated during these four fiscal years.

### **Table 3b:** GeoConnections Performance Framework for Indicator 2(Sectoral Funding Distribution Targets)

Distribution Target (project	Government			NGO & Academic	Inter-
s, excl. program operations)	Federal	P/T	Local*	Local*	
Target funding	10%-20%	10%-20%	5%-10%	10%-20%	1%-5%
2005–2006 funding distribution	0%	0%	35.76%	17.79%	33.97%
2006–2007 funding distribution	18.63%	16.64%	16.35%	16.80%	2.96%
2007-2008 funding distribution	19.24%	19.87%	13.88%	21.83%	5.11%
2008–2009 funding distribution	22.19%	18.60%	19.79%	25.87%	0%
2009–2010 funding distribution	42.71%	6.42%	5.90%	14.47%	0.97%
Cumulative total to March 31, 2010	20.55%	12.31%	18.34%	19.35%	8.60%

\*Funding to local organizations includes monies contributed to projects run by municipal and Aboriginal band governments.

### Funding Flowed Through to Private Sector

Project proponents are required to submit financial reports to GeoConnections; the format of the reports requires an explicit notation of funds received from GeoConnections and that their projects "flowed through to industry." The percentage of "flow through to industry" funds is calculated by dividing the total "flow through" dollars reported by project proponents by the total of dollars GeoConnections contributes to all projects in a given period.

GeoConnections performance targets require:

- That 20%–40% of funding directed to all projects undertaken by proponents at all levels of government (federal, provincial and territorial, and local) flow through to the private sector, and
- That the private sector receive 50%–60% of GeoConnections funding, either directly or from funds flowing to them from project proponents in other sectors.<sup>18</sup> Table 3c illustrates the benefits that accrue to private industry as a result of GeoConnections funding.

<sup>18</sup> Other sectors are federal government agencies and departments; provincial and territorial agencies and departments; local government, including municipal and Aboriginal; non-governmental organizations and academia; and international organizations.

Distribution	Direct	G	overnmen	t			Direct &
larget (project \$, excl. program operations)	to Private	Federal	P/T	Local	NGO & Academic	national	Flow thro' to Private
Target funding	N/A		20%-40%		N/A	N/A	50%-60%
2005-2006 funding	12.49%	0%	0%	0%	0%	100%19	46.45%
2006-2007 funding	28.62%	88.55%	77.77%	71.43%	47.98%	100%20	80.76%
2007-2008 funding	20.07%	62.32%	67.38%	67.30%	63.86%	90.07%	73.34%
2008-2009 funding	13.55%	60.66%	54.06%	60.86%	40.76%	0%	61.65%
2009-2010 funding	29.52%	20.69%	6%	0%	7.93%	71.43%	40.59%
Cumulative total to March 31, 2010	20.85%	46.44%	41.04%	39.92%	32.11%	72.30%	60.56%

### Table 3c: GeoConnections Funding by Sector Flowed Through to Private Sector

<sup>19</sup> This figure represents a single international project (ID#5016) that was let as a sole source contract to OGC Inc.

<sup>20</sup> This figure represents a single international project (ID#5015) that was let as a sole source contract to OGC Inc.

### **Annex 3:** Evaluation via Program and Project Analysis

The data in Table 4 are based on projects that began after March 31, 2009. The functional program area responsible for delivering each outcome is noted in parentheses after the description of the outcome.

### Table 4: Evaluation via Program and Project Analysis

Outcome	2009–2010 Results	Cumulative Progress
2. New CGDI systems, portals and applications build awareness in decision-makers and other end- users of the benefits of the CGDI (User Capacity)	Four (4) new portals or systems resulted from the 27 projects that began during 2009-2010.	One hundred and twenty-eight (128) new portals or systems resulted from the 257 projects that have been started since the beginning of the second phase of GeoConnections.
4. Increased awareness by data producing agencies of standard user-centric design methodologies and user data requirements (Content)	Eighteen (18) of the projects that started during this reporting period explicitly incorporated standard user- centered design features.	One hundred and ninety-eight (198) of the 257 projects funded during this phase of GeoConnections explicitly incorporated standard user-centred design features.
7. Users are able to use processes to produce data that are derived from other scales or sources (Content)	Twelve (12) new guides or technical documents were produced by project proponents of projects whose funding began during this reporting period.	A total of 76 new guides or technical documents were produced by all project proponents of projects whose funding began prior to the end of the current reporting period.
8. Users aware of or are able to use reusable, current and relevant data (Content)	The projects that began during 2009- 2010 resulted in 4 new datasets being integrated into CGDI-linked systems.	Eighty-eight (88) of the projects funded in this phase of GeoConnections have made their datasets available through the CGDI.

<ul> <li>10. Users recognize the value of regionally integrated information in addressing numerous interjurisdictional issues using the CGDI<sup>21</sup> (Content)</li> </ul>	Two projects contributing to new regional atlases were begun during the reporting period.	Forty-one (41) projects of federal-interprovincial extent and contributing to eleven (11) regional atlas projects have been funded since the start of GeoConnections II.
17. Priority user communities are using relevant, authoritative geospatial data in operational CGDI systems from closest point to source (Content)	Six (6) of the projects initiated during 2009–2010 created closest-to-source datasets.	Of the 257 projects that began between April 1, 2005, and March 31, 2010, 82 created closest-to-source datasets.
<ol> <li>Multiple CGDI operational systems access common regionally integrated information, reducing duplication and improving user effectiveness (Content)</li> </ol>	There were no regional atlas projects completed during this reporting period.	The 11 regional atlas projects funded so far contributed a total of 96 new datasets that are now integrated into the CGDI.

<sup>&</sup>lt;sup>21</sup> This measure relates to the creation of new "regional atlases." 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 from diverse backgrounds.

### Annex 4: Survey Results

GeoConnections conducted an online survey of potential and actual stakeholders in the four priority user communities and four priority sectors reported in Section called "Summary of User Survey" above. GeoConnections used its stakeholder database to compile a list of potential respondents to the survey. Information in the database helped to identify the sector or community to which the stakeholder organizations belonged. The table below shows the distribution of organizations that were contacted among user communities and sectors.

Community or Sector	Number
Federal Government	145
Provincial, Territorial or Municipal Government	130
Academic and Non-governmental Organizations (NGOs)	123
Private Sector	132
Public Health	130
Public Safety and Security	161
Environment and Sustainable Development	137
Matters of Importance to Aboriginal Communities	178
Total	1,136

### Table 5: Potential Respondents by Community or Sector

### **Overall Results**

Invitations to participate were sent via e-mail to 1,136 potential or actual stakeholders, all of whom are involved with geospatial data. Undeliverable e-mails were returned from 282 e-mail addresses, and completed responses numbered 165. Although the response rate for last year's survey was 21%, the response rate of 16.5% for the present survey is still relatively high for such surveys and indicates the importance attached to GeoConnections by stakeholders. The survey provides quantitative data to establish the success of GeoConnections in meeting the outcomes of its logic model, as identified in the following summary of the overall results. The margin of error on the estimates for the overall sample is plus or minus 7%, 95 times out of a hundred.

### **Logic Model Immediate Outcome 3**: Users are aware of and prepared to leverage the CGDI.

Among those who responded to the question regarding their familiarity with GeoConnections and the Canadian Geospatial Data Infrastructure (CGDI), 80% reported that they had heard of them: 40% said they were "very familiar" and 42% were "somewhat familiar" with GeoConnections and the CGDI. The number of those responding that they were "very familiar" is similar to the 42% from last year's survey.

Respondents were asked how they gain access to the CGDI and 55% of those who responded reported that they access it through a federal government portal, 20% through a provincial or territorial portal, and 9% through a portal run by a non-governmental organization (NGO). These numbers closely parallel the results from the previous year.

Among users of GeoConnections or the CGDI, just over half use these services to access portals such as the GeoConnections Discovery Portal, GeoBase, GeoGratis and the Atlas of Canada (57%) and to access geospatial data, maps and imagery (53%). Approximately one-third to one-quarter use the CGDI to find best practice guides and policy advice (31%), to access CGDI-endorsed standards and guidance documents (25%), to find geospatial services (25%) and to share geospatial data, maps and imagery (24%). A small group responded that they go to the CGDI to use tools to disseminate their own geospatial information (15%).22 These figures are close to those generated by last year's survey, with some important exceptions. In the present survey, 9% more users report using GeoConnections or the CGDI to access portals, suggesting further uptake of services supported by Natural Resources Canada. On the other hand, 8% fewer respondents in the

survey report using GeoConnections to access CGDI standards, suggesting that the standards may have been internalized. Differences in the other figures are within the margin of error.

**Logic Model Immediate Outcome 9:** Users are aware of the value of integrating regional information in provincial/territorial and national information systems.

When asked what scale of geographic coverage users require for geospatial information, the largest percentage of respondents answered provincial (24%) or regional (23%) scale. Fewer respondents required information at the national (16%), municipal (12%), international (12%) or interprovincial (5%) levels. With one exception, these results match the results from the previous year within one percentage point. The exception is for users of regional data, as there are 7% fewer respondents choosing this category than in the previous year.

Users were asked where they obtain geomatic data and reported getting it from the following sources: the federal government (71%), provincial or territorial governments (69%), internally (68%), regional or municipal governments (57%), the geomatics industry (44%), mass market sources like Google (55%), not-for-profit organizations (33%) or international governments (23%).<sup>23</sup> Once again, the results closely match those from last year's survey, with the exception of those who report getting their data from the geomatics industry. This year, those who report the industry as a source are 11% fewer, suggesting that the distribution of geomatics data is moving beyond specialized sources.

 $<sup>^{\</sup>rm 22}$  Percentages add up to more than 100% because respondents could endorse multiple responses.

<sup>&</sup>lt;sup>23</sup> Percentages add up to more than 100% because respondents could endorse multiple responses.

### Logic Model Immediate Outcome 14: Stakeholders are aware of key decision/ business areas where the CGDI can benefit them, key policy/cultural barriers to its uptake and potential approaches to overcoming these barriers.

Of the respondents who answered the question regarding sharing data, 86% reported that they share geospatial data either internally or externally. Of the few that did not share data, the reasons given were, in order of frequency, privacy and confidentiality, licensing and ownership, and trust and political issues. Unlike the results from the previous year, standardization and compatibility issues were the least likely reasons for not sharing data. This change suggests that the work of GeoConnections to identify and endorse standards for the CGDI has had a measurable effect over the past year. In results similar to last year, 69% of respondents said that their organizations were sharing geospatial information with other organizations more frequently than they were five years ago. Only 4% who answered this question were sharing data less frequently.

When asked to identify the three main barriers that prevent their organization from using geospatial information, only 27 respondents answered the question and the most frequent reasons cited related to cost. The next most common reason was licensing. Lack of software and staff members skilled to use it was another common issue. Only a few respondents answered that they did not know how geospatial data could be useful to them or how they could find it.

Not surprisingly, the most frequently cited options to overcome barriers were technical, more training, more equipment, or more data made available without cost. More experience was also mentioned as a way to overcome barriers. Two respondents said that the geomatics industry needs to make people aware of how geospatial data can support their business and decision making.

### **Logic Model Intermediate Outcome 16:** Priority user communities have increased their capacity to use the CGDI to meet their decision-making requirements.

On the evidence of the present survey, expenditures on and the use of geospatial data to meet decision-making requirements have been steadily increasing over the past five years. For instance, on average, respondents reported that 41% of their organizations' budgets were devoted to activities involving geomatics, up slightly from last year. In this year's survey, respondents were similarly divided between those who said their budgets had increased (40%) and those who said their budgets had decreased (42%) in the past five years. Only 18% said their budgets had stayed the same. Last year, half of respondents (51%) said that their geomatics budgets had increased in the last five years, while 19% reported that they had decreased. The budgets of the remaining respondents (31%) in last year's survey had stayed the same. The changing budget expenditures between the two surveys may be related more to the state of the economy than to the state of the geomatics industry.

In contrast to last year, respondents are using more geospatial data than they previously reported. For instance, in last year's survey, 72% of respondents reported increased use compared to five years ago, while this year 78% reported increased use. The increase in usage is likely due to respondent's answers regarding no change in usage over the past five years: in this year's survey, 17% of respondents said they are using it about the same compared to 26% of respondents in last year's survey. In this year's survey, only 6% reported using it less.

Projections about usage over the next five years are the same as the results from last year's survey: 74% reported that they expect their organizations to use geospatial data more frequently in the next five years, while 25% reported that their organizations anticipate using geospatial information with about the same frequency over the next five years and only one respondent among the 164 who answered this question said that his or her organization anticipates using geospatial information less frequently. These results bode well for the future of geomatics in Canada.

**Logic Model Immediate Outcome 20:** As benefits outweigh costs, organizations transform business processes, including policies and culture to adopt the CGDI.

According to the survey results, the amount of time spent per week searching for geospatial information was relatively low. Only 9% reported that employees spend over 35 hours a week searching for geospatial information. Almost half of respondents (47%) said that staff members at their organizations spend less than five hours a week searching for information and 27% spend five to ten hours. The relatively low amount of time spent searching for geospatial information suggests that respondent organizations have identified their sources of geospatial information and do not have to spend time looking for it.

The survey results suggest that staff at the responding organizations spend more time using geospatial information than searching for it. This result is encouraging as using geospatial data is clearly a more productive activity than searching for it.

Nearly one third of respondents (31%) said that staff members spend over 35 hours a week using geospatial data. At the low end of the scale, 21% of respondents reported that employees spent less than five hours using this data, a change from the 28% who answered in this way on the previous survey. A majority fell in between, with 15% spending five to ten hours, 16% spending 10 to 20 hours and 17% spending 20 to 35 hours, all of these figures being slightly higher than last year. These findings indicate that, even more so than in 2008–2009, the use of geospatial information has been integrated into the business processes of those organizations.

The frequency with which respondent organizations use GeoConnections and the CGDI to access geospatial data or services was not high. Only 5% reported using it daily, 21% use it weekly, 27% monthly and 47% less than once a month. All of these figures are comparable to last year. Respondents may not be aware that some of the services they use are supported by the CGDI.

When asked what the main driver is behind the increase or decrease in the use of geospatial information for their organization, the most frequently cited drivers were accessibility of data (49%), organizational capacity to use geospatial data (49%) and changes in business processes (36%). These results are comparable with last year's. The implementation of standards (26%) and cost of data (21%) were also cited as drivers for increased use. Taken together, the answers to these two questions suggest that the increasing accessibility of data and organizational changes among user communities have combined to increase the use of geomatics data by decision makers. Organizations continue to transform their businesses to include the use of geospatial information.

### Results by Sector and User Community

Survey respondents were asked to identify the sector to which their organization belonged and their organization's main area of focus. The following tables show the results for these two questions compared to the invitations to participate that were sent to organizations by sector and user community.

On the basis of respondents' self-identification of their sector, respondents in provincial, territorial and municipal governments were the most likely to respond to the survey, while private sector employees were the least likely to respond. According to user community, respondents in the environment and sustainable development field were most likely to respond, while respondents whose interest was in matters of importance to Aboriginal communities were least likely to respond. Under "Other," there was a miscellaneous group, over half of whom were federal government employees. Because of the small sample sizes by sector and user community, results should be interpreted with caution.

### Table 6: Responses by Sector

Sector	Invited	Received
Federal Government	145	56
Provincial, Territorial or Municipal Government	130	65
Academic and Non-governmental Organizations	123	40
Private Sector	132	26
Total	530	187

User Community	Invited	Received
Public Health	130	15
Public Safety and Security	161	42
Environmental and Sustainable Development	137	56
Matters of Importance to Aboriginal Communities	178	19
Other	0	55
Total	606	187

### **Table 7:** Responses by User Community

### Logic Model Immediate Outcome 3:

Users are aware of and prepared to leverage the CGDI.

Awareness of the CGDI was generally high among all sectors, but it was somewhat greater within the private sector, where 96% of respondents responded that they had heard of the CGDI. The NGO and academic sector was next in awareness, registering at 86%. Respondents from various levels of governments registered levels of awareness between 73% and 76%.

Beyond simply having heard of the CGDI, according to sector, private sector respondents reported the highest level of awareness of GeoConnections, 62% responding that they were very familiar with the program. No other sector approached this level of awareness, although approximately 30% of respondents from various levels of government said they were very familiar with the program. Only three respondents said they were not familiar with GeoConnections at all. Awareness of GeoConnections according to the focus of an organization was greatest for those in the environment and sustainable development community, with 90% of respondents with this focus reporting that they had heard of the program. Public health practitioners followed, with 77% of them reporting familiarity with the program. Nearly three quarters of Aboriginal (74%) and public safety and security (73%) respondents had heard of GeoConnections. These figures are similar to those uncovered through last year's survey, except that awareness of GeoConnections has increased in the environment and sustainable development community (from 83% to 90%) and in the public safety and security community (from 50% to 73%).

Half of respondents (50% to 52%) from all sectors, except the private, reported using a federal government portal to access the CGDI. While the response group from the private sector was relatively small (26), 73% of them said they used a federal portal to get to the

CGDI. Approximately a quarter of respondents from all sectors (23% to 27%), except the federal government, said they used a provincial or territorial government portal to access the CGDI, while only 7% of federal government respondents use this gateway. Other than the non-governmental portals that 22.5% of NGO and academic respondents report using, no other means of access to the CGDI is statistically significant. There were no significant differences among user communities in the way they gain access to the CGDI.

Over half of respondents use GeoConnections and the CGDI to access geospatial maps and imagery (53%) and to access geospatial portals (57%). Among user communities, respondents from the environment and sustainable development community were more likely to identify these uses. The public health community was less likely to use the CGDI for geospatial maps and imagery. Approximately a quarter of all respondents used the CGDI for sharing data (24%), finding geospatial services (25%), or accessing CGDI-endorsed standards and guides (25%). Respondents from the environment and sustainable development communities were somewhat more likely to use it for sharing or finding geospatial services.

Slightly less than half of respondents from most sectors confirm the overall emphasis of going to GeoConnections and the CGDI to use geospatial data or access geospatial portals. The private sector in particular reports using the CGDI to access portals (73%) and data (69%), and the NGO and academic sector (60%) use it to access portals. Federal government respondents were least likely (39%) to use the CGDI and GeoConnections to access portals. NGO and academic (43%) and private sector (39%) respondents were the most likely to report using GeoConnections and the CGDI to find services.

The range across sectors for those using GeoConnections and the CGDI to share geospatial data is from 25% for both the federal government and NGO and academic sectors to 31% for the private sector. Fewer respondents reported using these services to find best practice guides, with the private sector (31%) and NGOs and academics (40%) scoring highest. Private sector respondents were the most interested in CGDI-endorsed standards and guidance documents (39%), while 28% of NGO and academic respondents looked to GeoConnections and the CGDI for them. Relatively few respondents (15%) use the CGDI to disseminate their own geospatial information, and this response did not vary significantly among sectors and communities.

### Logic Model Immediate Outcome 9:

Users are aware of the value of integrating regional information in provincial/territorial and national information systems.

According to sector, local, provincial-territorial and Aboriginal governments reported the highest interest in provincial (37%) and regional (36%) geospatial data. NGOs and academics (29%) were also interested in regional scale data. Only the private sector expressed a statistically significant interest in international data (38%) and a quarter of respondents from the sector were also interested in regional data. Only federal government respondents were interested in national scale data (42%). Some respondents (25%) in the local, provincialterritorial and Aboriginal government sectorpresumably those from municipal governments-were interested in municipal scale data. No other sector expressed an interest in data at that scale and no sector was interested in data at the scale of interprovincial regions (Atlantic, Central, Prairie, Pacific and Northern).

Analyzed according to user community, those working with matters of importance to Aboriginal communities were most likely to require geospatial information on a regional scale (63%). Otherwise, roughly 20% to 30% of respondents across all communities reported requiring regional and provincial scale data. With one exception, respondents from no community reported in significant numbers needing interprovincial, national or international data. Interestingly, respondents from the public safety community responded in almost equal numbers that they needed regional (20%), provincial (22%) and national (20%) data. The only communities to report use of municipal data were the public safety (17%) and public health (23%) communities.

The most common sources of data for all sectors and communities were the federal government (71%), provincial-territorial governments (69%), internal sources (68%), regional-municipal governments (57%) and mass market sources (55%). The local, provincialterritorial and Aboriginal government sector was the most likely (79%) to source data internally, and 82% of respondents from that sector also reported getting data from provincial-territorial sources, which may mean the same thing. The academic and NGO sector was the only sector likely to source data from notfor-profit organizations (55%) and the private sector the only one likely to source data from the geomatics industry (54%). The private sector was the sector most likely to get data from the mass market (77%). The same percentage (77%) of private sector and federal government respondents reported getting data from federal government sources. The private sector was the only sector to report using international government sources of data, with 42% of respondents saying they got data from this source.

The environment and sustainable development user community (80%) and those interested in matters of importance to Aboriginal communities (80%) were most likely to get their geomatics data from the federal government (80%), although 90% of respondents from the latter community said they got data from regional and municipal sources. Internal sources were reported by 79% of respondents from both the Aboriginal and environmental communities. Almost three-quarters of respondents from environmental (73%), public health (73%) and Aboriginal (74%) communities reported using provincial-territorial government sources. Only among the public safety community did significant numbers (69%) report using mass market sources. Logic Model Immediate Outcome 14: Stakeholders are aware of key decision/business areas where the CGDI can benefit them, key policy/cultural barriers to its uptake and potential approaches to overcoming these barriers.

A majority of respondents from all sectors reported they were sharing data more frequently than five years ago, from 55% for the private sector to 69% for local, provincial and Aboriginal governments to 71% for the federal government and 76% for NGOs and academics. The highest percentage of respondents who reported sharing data less frequently was from the private sector (9%). Respondents in the environment and sustainable development community were more likely to report that they are sharing data more frequently, while respondents who were not part of one of the priority communities ("Other") were more likely to respond that they are sharing data about the same as in the previous five years. Few respondents from any community said they were sharing data less frequently.

### **Logic Model Intermediate Outcome 16:** Priority user communities have increased their capacity to use the CGDI to meet their decision-making requirements.

Fewer respondents than the previous year reported that their geomatics budgets had increased in the past five years. Among sectors, 55% of NGO and academic respondents said their budgets had increased and 44% of local, provincial and Aboriginal sector respondents said the same. Only 35% of private sector respondents reported higher geomatics budgets, but the least likely to report budget increases were respondents from the federal government (27%). Among sectors, federal government respondents were also the most likely to say their budgets had decreased (49%). Among communities, respondents in the public safety community were most likely to say their budgets had increased and respondents in the public health community were most likely to say their budgets had decreased.

An increase in the frequency of geomatics data use over the past five years was reported by all sectors, the highest percentage among NGO and academic respondents (87%). Respondents from all levels of government responded that their use of geomatics data had increased by 78 to 80% over the last five years. The private sector was the least consistent in reporting an increase in the use of geomatics data (57%) and the most likely (13%) to report decreased use. Among user communities, public health respondents were most likely to report increased use (90%) and environment and sustainable development respondents least likely (75%). The latter community, however, has been an early adopter of geomatics.

Local, provincial and Aboriginal government respondents were the most likely to predict an increase in the use of geomatics data over the next five years (82%) and private sector respondents the least likely (65%). As with increased frequency of use over the past five years, the public health community was the most likely to predict increased use over the coming five years (90%), followed closely by the public safety community (85%). The lowest score by community on this question was among those interested in matters of importance to Aboriginal communities, only 67% of whom predicted increased use.

All sectors and communities use geomatics data more frequently now than they did five years ago. Only one respondent across all sectors and user communities predicted less use of geomatics data over the next five years. Clearly, no sector or community anticipates using geomatics less frequently over the next five years.

### Logic Model Immediate Outcome 20:

As benefits outweigh costs, organizations transform businesses processes, including policies and culture to adopt the CGDI.

Regarding the number of hours spent each week in searching for data, responses were concentrated in the less than five hours a week (47%) and the five to ten hour ranges (27%). According to sector, those in the private sector spent the most time per week searching for data, with 39% reporting they spent five to ten hours per week. In the NGO and academic sector, 38% reported searching for five to ten hours a week. Few respondents reported searching for more than 35 hours per week, and those who did were mainly in the federal (13%) and NGO and academic (12%) sectors. According to community, public health (83%) respondents were the most likely to report searching for data for less than five hours a week. No significant numbers by community reported searching more than 35 hours a week, with the greatest number to select this response concentrated under "Other" (22%). The responses to this question suggest that most users of geomatics information know where to find the data they need.

The picture regarding use is almost the opposite, with 31% of all respondents reporting they spend over 35 hours per week using geomatics data and 21% reporting less than five hours a week. Respondents who reported using geomatics data more than 35 hours a week are evenly spread across all sectors, although looked at according to community, heavy data users are found more in the environment and sustainable development community (31%) and under "Other" (47%). Once again, the survey results suggest that the public health community spends the least time using geospatial information, with 39% reporting less than five hours a week spent using data. Among those concerned with matters of interest to Aboriginal communities, 32% rated their time spent using geospatial data at less than five hours a week.

Only a small percentage of respondents (5%) from any sector said they use the GeoConnections website or the CGDI daily. Private sector (27%) and NGO and academic respondents (30%) were most likely to report that they use them weekly, although 43% of the latter said they use them less than once a month. Private sector respondents also reported the heaviest monthly use (41%). Employees from all levels of government were the most likely to say they use the GeoConnections website or the CGDI less than once a month (52% to 54%).

In the analysis of the responses according to user community, the most frequent usage was reported by the environment and sustainable development community and by those interested in matters of importance to Aboriginal communities. A quarter of respondents from the environmental community reported using the GeoConnections website and the CGDI weekly or monthly. A third of Aboriginal users reported using them weekly; and a quarter, monthly. In contrast, most public health respondents reported using the GeoConnections website and the CGDI less than once a month (89%), only one respondent reported using them monthly, and no respondents reported using them daily or weekly. The results for this question may derive from a lack of awareness of exactly what the CGDI is; respondents might be using it without knowing.

Several interesting trends emerged when accessibility of data and organizational capacity, the two most important drivers to increased use of geomatics data, were grouped by sectors and user communities. Respondents who chose accessibility were spread evenly across all sectors, but were minimally represented in the public health community (27%) and heavily represented in the environmental community (61%). The explanation may be that, since public health respondents have rarely been users of geomatics data, accessibility has never been an issue for them. Environmental respondents, on the other hand, were among the first users of geomatics data, so increasing accessibility of data is important to them.

On the other hand, organizational capacity was fairly evenly spread across all communities as a driver of increased use. However, organizational capacity was not a significant factor behind increased use for the private sector. Presumably, the private sector is represented by companies in the geomatics industry and they have always had the organizational capacity to use geospatial data.

In contrast with the previous survey, cost and changes in business processes were less significant as drivers of increased use of geomatics data. The NGO and academic sector showed the highest emphasis on cost, with 25% reporting it was a factor in their use of geomatics data. According to the user community, 23% of the environment and sustainable development community users chose cost. Changes in business processes were most important for the local, provincialterritorial and Aboriginal government sectors (45%). According to the user community, 45% of respondents from the public safety community chose changes in business processes, perhaps a reflection of the aggressive uptake of geomatics by this community in recent years.

# Annex 5: 2009–2010 Financial Reports

# Table 8: Budget and Spending, 2005-2010

Total	60,000.00 \$											-
Year 5 2009-2010	\$13,000.00	\$0.00	\$0.00	\$13,000.00	\$2,500.00	\$15,600.00	(\$3,300.00)	(\$182.40)	\$12,117.60	\$11,966.10	\$151.50	-
Year 4 2008–2009	\$12,000.00	\$3,500.00	\$0.00	\$15,500.00	\$1,300.00	\$18,000.00	(\$3,280.00)	(\$182.10)	\$14,537.90	\$13,454.00	\$1,083.90	
Year 3 2007-2008	\$12,000.00	\$2,500.00	\$42.00	\$14,542.00	(\$6,400.00)	\$15,842.00	I	(\$172.80)	\$15,669.20	\$14,167.20	\$1,502.00	-
Year 2 2006-2007	\$12,000.00	\$1,500.00	\$0.00	\$13,500.00	I	\$7,100.00		(\$169.40)	\$6,930.60	\$6,806.80	\$123.80	t
Year 1 2005-2006	\$11,000.00	(\$7,900.00)	\$0.00	\$3,100.00		\$3,100.00	1	(\$165.70)	\$2,934.30	\$2,779.20	\$155.00	
Amounts in Thousands of Dollars	Approved by Treasury Board Secretariat	Reprofile from Year 1	Adjustment <sup>24</sup>	Budget after re-profiling Year 1	Reprofile from Year 2	Budget after re-profiling Year 2	Reprofile from Year 4	Employee Benefits & Pension (20%)	Actual Budget	Actual Spending <sup>25</sup>	Lapses	

Note: The Actual Spending for Year 1 was increased from \$2,547.20 to \$2,779,20 to account for internal expenses. Hence, the Lapses amount of \$387.00 for that same year was adjusted to \$155.00

<sup>24</sup> Adjustment can include carry-forward from previous years, loans, or money transfers for GeoConnections to administer.

<sup>25</sup> The Year 6 (2010-2011) extension reported in the Annual Report of 2008-2009 was not implemented following a strategic review of Budget 2010.

### Table 9: Budget 2009-2010

	User Capacity	Content	Infrastructure & Architecture	Policy	Secretariat	TOTAL	
O&M (Operations)	\$991,727	\$1,420,984	\$1,082,897	\$587,028	\$3,323,064.00	\$7,405,700	
Grants & Contributions	\$2,019,506	\$575,259	\$83,859	\$368,542	\$752,834	\$3,800,000	
Salary	\$0.00	\$0.00	\$0.00	\$0.00	\$912,000	\$912,000	
TOTAL						\$12,117,600	

## Table 10: Expenditures 2009-2010

TOTAL	\$4,537,457	\$1,526,044	\$3,047,166	\$2,855,473	\$11,966,140
Secretariat	\$511,366	\$1,526,044	\$0.00	\$2 855,473	\$4,892,883
Policy	\$587,028	\$0.00	\$368,542	\$0.00	\$955,570
Infrastructure & Architecture	\$1,082,897	\$0.00	\$83,859	\$0.00	\$1,166,756
Content	\$1,364,439	\$0.00	\$575,259	\$0.00	\$1,939,698
User Capacity	\$991,727	\$0.00	\$2,019,506	\$0.00	\$3,011,233
	O&M (Operations)	Lapses, Taxes & Losses	Grants & Contributions	Salary	TOTAL

### Annex 6: Program Logic Model

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### Annex 7: Acronym Look-up Table

ВСеМар	BC Emergency Event Map Viewer					
CAPAN	Canadian Association for Public Alerting and Notification					
CAP-CP	Common Alerting Protocol–Canadian Profile					
CGDI	Canadian Geospatial Data Infrastructure					
CCOG	Canadian Council on Geomatics					
CDED	Canadian Digital Elevation Data					
CGDI	Canadian Geospatial Data Infrastructure					
COINAtlantic	Coastal and Ocean Information Network Atlantic					
DEM	Digital elevation mapping					
EMBC	Emergency Management British Columbia					
ER	Emergency room					
ESRI	Environmental Systems Research Institute					
FNISS	First Nations Information Support Services					
FRI	Foothills Research Institute					
GIS	Geographic Information System					
GOC	Government of Canada					
HAMN	Hamilton Air Monitoring Network					
IACG	Inter-Agency Committee on Geomatics					
ILM	Integrated Landscape Management					
IMAGINE	Integrated Management and Geospatial Information Network for the Environment					
KML	Keyhole Markup Language					
MAS	Multi-Agency System					
MASAS	Multi-Agency Situational Awareness System					
MEGAPHONE	Montreal Epidemiological and Geographical Analysis of Population Health Outcomes and Neighbourhood Effects					
NGO	Non-governmental organization					
NHN	National Hydro Network					
NRCan	Natural Resources Canada					
NRN	National Road Network					
OEM	Office of Emergency Management					
OGC	Open Geospatial Consortium Inc.					
PHAC	Public Health Agency of Canada					
PRI	Policy Research Initiative					

RMAF	Results-based Management Accountability Framework						
TJS	Table Joining Service						
TBS	Treasury Board Secretariat						
UNA	User Needs Assessment						
WFS	Web Feature Service						
WMS	Web Map Service						
NIDM	National Infrastructure Data Model						
NRCan	Natural Resources Canada						
NRN	National Road Network						
OEM	Office of Emergency Management						
OGC	Open Geospatial Consortium, Inc.						
РНАС	Public Health Agency of Canada						
PRI	Policy Research Initiative						
RMAF	Results-based Management Accountability Framework						
TJS	Table Joining Service						
TBS	Treasury Board Secretariat						
UNA	User Needs Assessment						
WFS	Web Feature Service						
WMS	Web Map Service						

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