High Level Client and Stakeholder Engagement:

Base Mapping
Province of Nova Scotia

Final Report

Prepared for:
Geographic Information Services
Province of Nova Scotia

July, 2015
Prepared by:
SEG Consulting Inc.
Halifax, Nova Scotia

Pierre Gareau
Geographic Information Services
Province of Nova Scotia

LETTER OF TRANSMITTAL

Re: High Level Client and Stakeholder Engagement – Base Mapping, Province of Nova Scotia

Dear Mr. Gareau,

The following Draft Report is submitted to your office in response to the Statement of Work for the above referenced project.

The Draft Report provides the results from a three-track engagement with clients and stakeholders of the Province of Nova Scotia's base mapping datasets. These engagements were:

- On-line Surveys
- Direct Interviews
- Base Mapping Workshop with Clients and Stakeholders

The Report also provides high level recommendations for your consideration regarding action that could be taken as a result of the feedback. As evidenced by the number of touches in the three-track engagement process, there has been a considerable consultation and analysis effort to prepare these recommendations.

SEG Consulting Inc. appreciates the opportunity to conduct this engagement on behalf of Geographic Information Services. We look forward to meeting with you to discuss this draft and set an agenda for completion of the Final Report.

Best regards,

Hugh MacKay
Senior Partner
SEG Consulting Inc.

Contents

1.0 Background to Project

Base mapping is the foundation of location-based information for the Province of Nova Scotia. It supports the Government of Nova Scotia's vision to achieve excellence in decision-making and service delivery.

Service Nova Scotia, as represented by Geographic Information Services, contracted SEG Consulting Inc. (SEG) to conduct a high level engagement of the Province of Nova Scotia's base mapping clients and stakeholders.

For the purposes of this report a 'client' of base mapping is defined as any user of the foundation geographic databases. This includes public sector entities at all levels, all private sector entities, including utilities, and, academia. A 'stakeholder' is defined as anyone whose professional activities include the collection, maintenance or distribution of one or more of the databases.

The goal of the project was to obtain suitable feedback and recommendations from clients and stakeholders to achieve continuous progress in provincial base mapping by implementing best practices in the specific areas of communications, the relevance of data sets, and the introduction of emerging technologies. The recommendations of this report fall under these three specific areas.

This engagement focused on the following foundation geographic datasets in the Province of Nova Scotia:

- Nova Scotia Air Photo Database (NSAPD)
- Nova Scotia Orthophoto Database (NSODB)
- Nova Scotia Topographic Database (NSTDB)

In addition, SEG was instructed to include questions regarding LiDAR, an acronym for Light Detection And Ranging, a relatively new mapping technology that measures distance to a target by illuminating the target with a laser sensor and measuring the time period and the amplitude of the reflected light received back at the sensor. Airborne LiDAR, using fixed-wing and rotary platforms, is now widely used for a host of mapping applications, but principally for the creation of Digital Elevation Models (DEMs), which are critical for orthophoto production, topographic mapping and key geomatics applications such flood plain mapping / modelling and line-of-sight analysis. Mobile ground-based LiDAR systems are also used for a variety of applications such as roadway and runway inspection and analysis.

2.0 Project Deliverable

The Project Deliverable from SEG is derived from the original Statement of Work. The Deliverable includes:

- A summary of clients and stakeholders that were engaged in the process
- A review of the engagement materials used
- A review of the approach and engagement process used
- Feedback from the clients and stakeholders
- High level recommendations for future base mapping activities in the Province of Nova Scotia

The summary of clients and stakeholders engaged in the project are included as appendices to this report, as are the engagement materials used. A review of the approach and engagement process used, feedback from the clients and stakeholders and high level recommendations for future base mapping activities in the Province of Nova Scotia, comprise the remaining sections of this report.

3.0 Project Approach and Methodology

Geographic Information Services provided SEG with initial lists of clients and stakeholders that could be engaged in the project. These included contacts in provincial departments and agencies, municipal staff, First Nations contacts, academics and private sector. A subsequent list of clients of the Nova Scotia Geomatics Centre was also provided. Geographic Information Services, by way of an introductory e-mail, informed the individuals on these lists about the base mapping engagement project and requested their participation in the project. SEG then followed up with all of the suggested individuals. In addition, through the support of the Geomatics Association of Nova Scotia (GANS), additional base mapping clients across the province were invited by SEG to participate in the engagement.

SEG prepared an on-line survey with a series of common questions for each of the 3 foundation geographic datasets. A similar series of questions was included to solicit feedback and recommendations on the use of LiDAR. The survey questions were submitted to and approved by Geographic Information Services prior to release to the clients and stakeholders. The survey is attached as Appendix A.

The online-survey was distributed through the use of Survey Monkey, an on-line survey service provider that provides customizable survey services that include data collection and summaries. The survey was distributed to a total of 250 clients and stakeholders. A total of 86 responses were submitted to SEG. A summary of the responses is provided as Appendix B.

The same survey questions were used to guide individual interviews with a select group of clients and stakeholders. The list of individuals for interviews was suggested by Geographic Information Services. The interviews were a discussion rather than a "fill-in the form" exercise. The individual interviews consisted of 9 telephone interviews with base mapping clients and 4 in-person interviews with stakeholders at the Nova Scotia Geomatics Centre. The individuals interviewed were encouraged to also complete the on-line survey. The comments and suggestions by the interviewees have been taken into consideration in forming the high level recommendations provided by SEG.

Invitations to participate in the Base Mapping Workshop were extended to a select group of clients and stakeholders suggested by Geographic Information Services. Unfortunately, many of these had to decline due to approaching fiscal year-end responsibilities. The scheduling challenge was further exacerbated by severe winter weather that caused multi-day office closures in the days preceding the Workshop, adding to the invitees schedule challenges for meeting year-end deadlines.

In spite of the scheduling challenges, 18 participants attended the Base Mapping Workshop, a strong indication of the value placed on this engagement by the participants. The participants represented an excellent cross section of both the user and stakeholder communities, from both government and the private sector. After an initial introduction of the Workshop goals, the attendees were divided into 3 groups for a breakout session. Each breakout group was asked to discuss and present on 2 of 6 common themes that were identified from feedback in the on-line surveys.

These common themes were:

- Data Currency
- Data Access
- Data Set Integration
- External Communications
- External Partnerships
- LiDAR

The comments and suggestions presented by the groups have been taken into consideration in forming the high level recommendations provided by SEG.

4.0 Summary of Clients and Stakeholders

On-line Survey

A total of 86 clients and stakeholders responded to the on-line survey. The respondents are summarized as follows:

Clients

- Provincial Government Clients - 26
    - Elections Nova Scotia - 1
    - Economic Development and Tourism - 1
    - Department of Agriculture - 1
    - Department of Environment - 3
    - Department of Fisheries and Aquaculture - 2
    - Department of Health and Wellness - 1
    - Department of Natural Resources - 11
    - Department of Transportation and Infrastructure Renewal - 4
    - Service Nova Scotia, Lands Program - 2
- Municipal Government Clients - 6
- Federal Government Clients - 3
- First Nations Clients - 1
- Academic Clients - 3
- Utilities Clients - 2
- Private Sector Clients - 20
- Non-Profit Clients - 3
- Individual Clients - 5

Stakeholders

- Service Nova Scotia, Architecture - 1
- Service Nova Scotia, GeoNOVA -1
- Service Nova Scotia, NS Geomatics Centre - 15

Interviews

A total of 9 individuals representing 6 client organizations participated in telephone interviews. These included:

- Nova Scotia Department of Fisheries and Aquaculture
- Nova Scotia Department of Health and Wellness
- Nova Scotia Department of Transportation and Infrastructure Renewal
- Service Nova Scotia, Land Registry Office
- Dalhousie University, GI Science Centre (2 interviewees)
- Applied Geomatics Research Group, Nova Scotia Community College (2 interviewees)

A total of 4 staff at the Nova Scotia Geomatics Centre in Amherst participated in face-to-face meetings. These meetings were focused on providing background information and context for the project.

Base Mapping Workshop

A total of 18 clients and stakeholders participated in the Base Mapping Workshop. These participants represented the following organizations:

- Nova Scotia Department of Health and Wellness
- Nova Scotia Department of Natural Resources
- Nova Scotia Department of Transportation and Infrastructure Renewal
- Service Nova Scotia, GeoNova
- Service Nova Scotia, Nova Scotia Geomatics Centre
- Service Nova Scotia, Architecture
- Eastcan Geomatics / Thompson Conn Survey
- SEG Consulting
- Geomatics Association of Nova Scotia

Some clients and stakeholders participated in multiple engagement activities with SEG, including completion of the on-line survey, meeting or teleconferencing for an interview and/or participating in the Base Mapping Workshop.

5.0 Feedback from Clients and Stakeholders

Feedback regarding each data set, as well as LiDAR, has been grouped into the specific areas of communications, the relevance of data sets, and the introduction of emerging technologies.

Nova Scotia Air Photo Database (NSAPDB)

- Communications - 31% of survey respondents indicated that the NSAPDB provides relevant communications regarding its products and services. 70% of respondents indicated that they would prefer to receive email alerts as the preferred method of communications. 10% of respondents indicated they would prefer a newsletter.

- Relevance of data sets - 65% of survey respondents indicated that the NSAPDB supports their geospatial activities with relevant products and services. The most prominent comments regarding challenges faced, related to out-of-date imagery, low resolution and inadequate scale.

- Introduction of new technologies – 54% of survey respondents indicated that the NSAPDB introduces advances in technology which align with the needs of the user

community. The most prominent comments regarding improvements included improved on-line accessibility / web services and digital data collection.

Nova Scotia Orthophoto Database (NSODB)

- Communications - 25% of survey respondents indicated that the NSODB provides relevant communications regarding its products and services. 74% of respondents indicated that they would prefer to receive email alerts as the preferred method of communications. 7% of respondents indicated they would prefer a newsletter.

- Relevance of data sets - 80% of survey respondents indicated that the NSODB supports their geospatial activities with relevant products and services. As with the NSAPDB, the most prominent comments regarding challenges faced, related to out-of-date imagery, low resolution and inadequate scale.

- Introduction of new technologies – 60% of survey respondents indicated that the NSODB introduces advances in technology which align with the needs of the user community. The most prominent comments regarding improvements included collection of LiDAR to support higher accuracy and higher resolution DEMs for orthophoto production and other applications.

Nova Scotia Topographic Database (NSTDB)

- Communications - 38% of survey respondents indicated that the NSTDB provides relevant communications regarding its products and services. 72% of respondents indicated that they would prefer to receive email alerts as the preferred method of communications. 6% of respondents indicated they would prefer a newsletter.

- Relevance of data sets - 80% of survey respondents indicated that the NSTDB supports their geospatial activities with relevant products and services. As with the NSAPDB and the NSODB, the most prominent comments regarding challenges faced, related to currency.

- Introduction of new technologies – 58% of survey respondents indicated that the NSTDB introduces advances in technology which align with the needs of the user community. The most prominent comments regarding improvements included collection of LiDAR and improved on-line accessibility / web services.

LiDAR

- 55% of survey respondents indicated that they are currently including LiDAR in their business activities.
- 40% of survey respondents indicated that they are aware that the Province of Nova Scotia has established specifications for the use of LiDAR.
- 94% of survey respondents indicated that DEMs are the LiDAR product that supports their business activities.
- Respondents' comments, recommendations and suggestions heavily favour increased collection of LiDAR, particularly for coastal zones and flood plains.

High Level Recommendations

These are high level recommendations prepared by SEG based exclusively on the client and stakeholder feedback. These recommendations are intended to indicate the areas of client dissatisfaction and suggest actions to increase client satisfaction.

The recommendations are grouped into the specific areas of communications, the relevance of data sets, and the introduction of emerging technologies, for each data set, as well as LiDAR.

It is beyond the scope of this project to assign priorities to or estimate the cost-to-implement these recommendations.

Nova Scotia Air Photo Database (NSAPDB)

Recommendation #1 - Communications
Design, test and execute a Client Communication Program for the NSAPDB.

As indicated by the 69% disapproval of Question #13, "*Does the NSAPDB provide relevant communications?*" there is a high level of client dissatisfaction with awareness and communication regarding the NSAPDB. It is recommended that a structured Client Communication Plan be designed and implemented using e-mail alerts. The implementation of a newsletter is not seen as a priority as only 11% of the respondents preferred this means of communications. The Client Communication Plan should feature two-way communications enabling clients to submit questions and suggestions followed by reply and action, if required, by GeoNOVA or other pertinent departments. This Communication Plan should be aligned with the similar suggestion for the NSODB and the NSTDB.

Recommendation #2 – Relevance of data sets
Undertake a detailed assessment of data collection options for the NSAPDB to enable increased frequency in updating the provincial imagery database.

The overarching feedback from the clients in regard to the NSAPDB is to increase the currency of the province-wide imagery database with more frequent capture of either air photos or satellite imagery. Responses to Question #10 "*What are the biggest challenges faced in using the NSAPDB*?" and Question #11 "*How could the NSAPDB be improved*?" overwhelmingly support this recommendation. Many respondents have indicated that the ten-year update cycle is simply too lengthy and negatively impacts on their ability to meet their business needs. Secondary concerns include accuracy, resolution and on-line tools. These concerns can be addressed in the proposed assessment by reviewing how other jurisdictions have addressed similar challenges and applying made-in-Nova Scotia solutions.

Recommendation #3 – Introduction of new technologies
Improve on-line accessibility / web services and continue with digital data collection for the NSAPDB.

It is understood that Geographic Information Services has initiated improvements to on-line accessibility and web services and that it will continue digital data collection for the NSAPDB. These improvements need to be conveyed to the user community through the implementation of recommendation #1, Design, test and execute a Client Communication Program for the NSAPDB.

Nova Scotia Orthophoto Database (NSODB)

Recommendation #4 - Communications
Design, test and execute a Client Communication Program for the NSODB.

As indicated by the 75% disapproval of Question #26, "*Does the NSODB provide relevant communications?*" there is a high level of client dissatisfaction with awareness and communication regarding the NSODB. It is recommended that a structured Client Communication Plan be designed and implemented using e-mail alerts. This Communication Plan should be aligned with the similar suggestion for the NSAPDB.

Recommendation #5 – Relevance of data sets
Undertake a detailed assessment of data collection options for the NSODB to enable increased frequency in updating the provincial imagery database.

The overarching feedback from the clients in regard to the NSODB mirrors that of the NSAPDB which is to increase the currency of the province-wide imagery database with more frequent capture of either air photos or satellite imagery. Responses to Question #23 "*What are the biggest challenges faced in using the NSODB*?" and Question #24 "*How could the NSODB be*

improved?" overwhelmingly support this recommendation. These concerns can be addressed in the proposed assessment by reviewing how other jurisdictions have addressed similar challenges and applying made-in-Nova Scotia solutions. This assessment could be conducted in conjunction with the recommended assessment for the NSAPDB.

Recommendation #6 – Introduction of new technologies
Undertake a detailed needs assessment and gap analysis for improving the quality of the provincial digital elevation model to support higher accuracy in the NSODB.

Survey respondents indicated that improvements to the NSODB require higher accuracy and higher resolution DEMs for improved orthophoto quality. It is still to be determined if there is wide-spread need for this with the principal clients of the NSODB. A needs assessment and a gap analysis would address this question. This should include an assessment regarding the applicability of LiDAR data for improving the provincial DEM. This would be done in conjunction with the LiDAR section recommendations.

Nova Scotia Topographic Database (NSTDB)

Recommendation #7
Design, test and execute a Client Communication Program for the NSTDB.

As indicated by the 62% disapproval of Question #39, "*Does the NSTDB provide relevant communications?*" there is a high level of client dissatisfaction with awareness and communication regarding the NSTDB. It is recommended that a structured Client Communication Plan be designed and implemented using e-mail alerts. This Communication Plan should be aligned with the similar suggestion for the NSAPDB and the NSODB.

Recommendation #8 – Relevance of data sets
Undertake a detailed assessment of data collection options for the NSTDB to enable increased frequency in updating the provincial imagery database.

As with the NSAPDB and the NSODB, the overarching feedback from the clients in regard to the NSTDB is to increase province-wide currency of the database. Responses to Question #36 "*What are the biggest challenges faced in using the NSTDB*?" and Question #37 "*How could the NSTDB be improved*?" support this recommendation. This assessment could be conducted in conjunction with the recommended assessment for the NSAPDB and the NSODB.

Recommendation #9 – Introduction of new technologies
Undertake a detailed needs assessment and gap analysis for improving the quality of the provincial NSTDB.

The most prominent comments regarding introduction of new technologies concerned LiDAR. It is still to be determined if there is wide-spread need for this with the principal clients of the NSTDB. An assessment of this could be done within the recommended assessment for establishing the applicability of LiDAR data for improving the provincial DEM. Again, this would be done in conjunction with the recommendation contained in the LiDAR section below.

LiDAR

Recommendation #10
Design, test and execute a comprehensive LIDAR strategy for the Province of Nova Scotia.

As indicated in the feedback to Questions #48 through #55, there is a high level of client interest and enthusiasm for LiDAR. This is, by far, the most closely followed of the advanced and emerging technologies in the field of geomatics. It is recommended that the Province show leadership in this area by commissioning and acting upon a high level strategic plan for systematic LiDAR coverage of the entirety of Nova Scotia, beginning with coastal and flood prone areas. Other advanced and emerging technologies of interest to the clients, such as Web Mapping Services (WMS), Web Feature Services (WFS), Unmanned Aerial Vehicles (UAVs) can, at this time, can be addressed in the Client Communication Plan.

Other

Recommendation #11
Implement an Awareness Campaign following the spirit of the Geomatics Strategy

Many of the consultation concerns that were brought forward as part of this study have strategic position statements in place under the Government of Nova Scotia's Geomatics Strategy entitled "*Better Informed, Better Decisions – Sharing the Power of Location-Based Information Across the Government of Nova Scotia".* Revisit the strategy and develop project plans related to the issues surrounding Goal 4 Awareness``.

The Geomatics Strategy supports continuous awareness of geomatics across government and Nova Scotia. Goal 4 of the strategy, "*To develop geomatics awareness across government*" can play a large role in achieving awareness around the NSAPD, NSTDB, and the NSODB. An Awareness Campaign should be developed to ensure the primary components of awareness are in place, such as skilled training around the use of these datasets which inherently creates awareness, tiered-level awareness based on the audience through slide decks, online

presentations, etc. The key is to proactively shed awareness across government on an ongoing basis. Some awareness has been implemented in government, but only at an ad hoc level. An awareness campaign, supported by government communication departments, could extend the awareness across many departments. This can only be accomplished by developing a geomatics awareness program that is outlined in a well defined executable plan.

Appendix A

On-line Survey Questionnaire

Base Mapping Province of Nova Scotia
Interview Questions - Clients & Stakeholders

Name: _____
Organization: _____
Email: _____**Telephone**: _____
Date: _____

Did you participate in the interviews conducted during the 2009 / 2010 *Strategic Directions Analysis of the Nova Scotia Topographic Database*? Yes _____ No ____

Have you been a user of one or more of the following foundation geographic databases in the Province of Nova Scotia?

- Nova Scotia Air Photo Database (NSAPDB)
- Nova Scotia Orthophoto Database (NSODB)
- Nova Scotia Topographic Database (NSTDB)

If yes, which database(s)? _____

If no, are you a stakeholder in the areas of data collection, data maintenance, data distribution, data application of one or more the databases? Yes ____ No ____

If yes, which database(s)? _____

If yes, in which area(s)? _____

A) Nova Scotia Air Photo Database (NSAPDB)

Which of the following NSAPDB Products and Services are relevant to your operations?

- Hard copy photographic prints _____
- Digital scans (600 and 1800 dpi) _____
- Enlargements _____
- Certificates of Authenticity _____

- DataLocator web application _____
- Other (please elaborate)

  _____

1) Does the NSAPDB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs? Yes: _____ No: _____

2) If yes, in what business activity and how?

Comments: _____

3) What do you like about the NSAPDB Products and Services and where does it provide value to your business needs?

Comments: _____

4) What are the biggest challenges you face in using the NSAPDB Products and Services?

Comments: _____

5) How could the NSAPDB Products and Services be improved?

Comments: _____

6) Are there specific products and services that you would like to see added to the NSAPDB offering?

Comments: _____

7) Does the NSAPDB provide relevant communications regarding its products and services? Yes: _____ No: _____

Comments: _____

8) If communications are not timely or relevant, how would you recommend that this be improved?

Comments: _____

9) What method of communications would you prefer? (e-mail alert , Twitter, newsletter, other)

Comments: _____

10) Does the NSAPDB introduce advances in technology within the geomatics industry which align with the needs of the user community? Yes: _____ No: _____

Comments: _____

11) What advances in technology would you like to see the NSAPDB adopt?

Comments: _____

12) Does NSAPDB provide opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products? Yes _____ No _____

Comments: _____

13) Do you have any further comments, recommendations or suggestions in regard to the NSAPDB?

B) Nova Scotia Orthophoto Database (NSODB)

Which of the following NSODB Products and Services are relevant to your operations?

- Resource Series 1:10 000 map scale _____
- Large Scale Series 1: 2000 map scale _____
- DataLocator web application _____
- Other (please elaborate)

  _____

1) Does the NSODB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs? Yes: _____ No: _____

2) If yes, in what business activity and how?

Comments: _____

3) What do you like about the NSODB Products and Services and where does it provide value to your business needs?

Comments: _____

4) What are the biggest challenges you face in using the NSODB Products and Services?

Comments: _____

5) How could the NSODB Products and Services be improved?

Comments: _____

6) Are the specific products and services that you would like to see added to the NSODB offering?

_____

7) Does the NSODB provide relevant communications regarding its products and services? Yes: _____ No: _____

Comments: _____

8) If communications are not timely or relevant, how would you recommend that this be improved?

Comments: _____

9) What method of communications would you prefer? (e-mail alert , Twitter, newsletter, other)

Comments: _____

10) Does the NSODB introduce advances in technology within the geomatics industry which align with the needs of the user community? Yes: _____ No: _____

Comments: _____

11) What advances in technology would you like to see the NSODB adopt?

Comments: _____

12) Does NSODB investigate opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products? Yes _____ No _____

Comments: _____

13) Do you have any further comments, recommendations or suggestions in regard to the NSODB?

C) Nova Scotia Topographic Database (NSTDB)

Which of the following NSTDB Products and Services are relevant to your operations?

- Resource Series 1:10 000 map scale _____
- Large Scale Series 1: 1000, 1: 2000 and 1:1000 map scale _____
- DataLocator web application _____
- Other (please elaborate)

  _____

1) Does the NSTDB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs? Yes: _____ No: _____

2) If yes, in what business activity and how?

Comments: _____

3) What do you like about the NSTDB Products and Services and where does it provide value to your business needs?

Comments: _____

4) What are the biggest challenges you face in using the NSTDB Products and Services?

Comments: _____

5) How could the NSTDB Products and Services be improved?

Comments: _____

6) Are the specific products and services that you would like to see added to the NSTDB offering?

_____

7) Does the NSTDB provide timely and relevant communications regarding its products and services? Yes: _____ No: _____

Comments: _____

8) If communications are not timely or relevant, how would you recommend that this be improved?

Comments: _____

9) What method of communications would you prefer? (e-mail alert , Twitter, newsletter, other)

Comments: _____

10) Does the NSTDB introduce advances in technology (i.e. data collection sensors, web services, etc.) within the geomatics industry which align with the needs of the user community? Yes: _____ No: _____

Comments: _____

11) What advances in technology would you like to see the NSTDB adopt?

Comments: _____

12) Does NSTDB investigate opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products? Yes _____ No _____

Comments: _____

13) Does the NSTDB primary product, the 1: 10 000 vector database, contain appropriate data layers and relevant attributes? Yes _____ No _____

Comments: _____

14) Does the NSTDB offer appropriate formats and projections to support non-Provincial users? Yes _____ No _____

Comments: _____

15) Are NSTDB web services adequate to support your business needs? Yes _____ No _____

Comments: _____

16) Do you have any further comments, recommendations or suggestions in regard to the NSTDB?

Comments: _____

D) LiDAR

Raw and / or derived products from LiDAR are not currently included in any of the Province`s base mapping products. We are interested in your feedback on the use of LiDAR and related products as it pertains to base mapping in Nova Scotia.

1) Are you currently including LiDAR products in your business activities? Yes: _____ No: _____

2) If yes, in what business activity and how?

Comments: _____

3) Are you considering introducing LiDAR products to support your geospatial activities? Yes: _____ No: _____

Comments: _____

4) Are you aware that the Province of Nova Scotia has established specifications for its use of LiDAR data? Yes: _____ No: _____

5) If yes, do these specifications meet support your geospatial activities? Yes: _____ No: _____

Comments: _____

6) Which LiDAR collections would support your business operations?

- Aerial Bathymetric _____
- Aerial Topographic _____
- Terrestrial Fixed, for applications such as exteriors and interiors of structures _____
- Terrestrial Mobile, for applications such road or rail monitoring _____
- Others (please elaborate)

  _____

7) Which LiDAR products would support your business operations?

- Digital elevation models, including digital surface models and digital terrain models _____
- Breaklines _____
- Contours _____
- Intensity images _____
- Triangular Irregular Networks _____
- 3-D Models _____
- Others

  _____

8) What applications would LiDAR products support for your business operations?

- Coastal zone mapping _____
- Sea floor or river bed mapping _____
- Nautical charting _____
- Feature collection _____
- 3-D urban models _____
- Line-of-sight analysis _____
- Canopy models _____
- Flood plain modelling _____
- Forest inventory _____
- Biomass studies _____
- Land use mapping _____
- Transportation or utility corridor mapping _____
- Volumetric calculations _____
- Others

  _____

9) Do you have any further comments, recommendations or suggestions in regard to including LiDAR products on the NSTDB?

_____

Appendix B

Summary of On-line Survey Responses

A total of 85 responses were received from the on-line survey. However, 25 of the responses held little information. Most respondents tended to complete the sections of the survey that were relevant to their specific business activities. As a result, the number of respondents varies from section to section of the survey.
Feedback from the respondents is summarized below:

Q1: Contact Information

Q2: Did you participate in the interviews conducted during the 2009 / 2010 Strategic Directions Analysis of the Nova Scotia Topographic Database?

Respondents: 84

- Yes: 11 or 13.10%
- No: 73 or 86.90%

Q3: Have you been a user of one or more of the following foundation geographic databases in the Province of Nova Scotia?

Yes Respondents: 74

- Nova Scotia Air Photo Database: 49 or 66.22%
- Nova Scotia Orthophoto Database: 42 or 56.76%
- Nova Scotia Topographic Database: 74 or 100%

Q4: If no, are you a stakeholder in the areas of data collection, data maintenance, data distribution, data application of one or more the databases?

Yes Respondents: 13

Q5: If yes, which database?

Respondents: 31

All: 3
NSAPDB: 2
NSTDB: 4
Agricultural marshlands: 1
Municipal: 1

Comments:
NSODB – viewed through the Nova Scotia Civic Address Finder (NSCAF) application for property extent decision-making; NSTDB – used by mappers to make decisions regarding the property extents, also integrated with our GIS applications, used to modify property extents.

Q6: If yes, which area(s)?
Respondents: 33
This question was misunderstood by a number of respondents who assumed it referred to geographic area rather than a business area.

Data Collection: 2
Data Maintenance: 2
Data Distribution: 3
Data Application: 2
End user of product; distribution of photos to clients
Coastal: and Coastal Tributaries: 3
NSTDB data: Hydro network, road network, all features for base map purposes.
With respect to NS Geographic Names
Province -wide: 3
Western Nova Scotia: 2

Nova Scotia Air Photo Database

Q7: Which of the following NSAPDB Products and Services are relevant to your operations?
Respondents: 61

- Hard copy photographic prints 30 or 49.18%
- Digital scans (600 and 1800 dpi) 52 or 85.25%
- Enlargements 10 or 16.39%
- Certificates of Authenticity 6 or 9.84%
- Data Locator web application 43 or 70.49%

Comments (11):

- Our organization used to obtain the hard copy prints, but later we switched to using only the digital scans. Regardless, a layer crucial to determining which photos we needed is the aerial photo centroids layer. Presently we have dispensed with the digital scans and mainly use the 10k orthophoto sheets.
- These were used extensively when I worked in a previous position. These products were integral to clients' business needs, whether it was for research (surveying), project planning (culvert size design), forestry application/stewardship, or environmental monitoring and compliance. A portion of the clients had a personal

interest in obtaining a special airphoto or enlargement, and some required the certificate of authenticity for court proceedings.

Q8: Does the NSAPDB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs?

Respondents: 60

- Yes: 39 or 65.00%
- No: 21 or 35.00%

Comments (37):

- Air photos are an important data input in conducting flood assessments. While I do not conduct the flood assessments myself, I do point to the data needs required for them.
- From what I understand, the imagery within this database is used in order to create the ortho-rectified imagery dataset which we view on a daily basis through the Nova Scotia Civic Address Finder (NSCAF). Mappers and GIS staff use the imagery in conjunction with other resources to make decisions regarding the modification and updating of property extents throughout the province.
- Our organization is responsible for a number of land planning and activity review procedures ranging from land conservation, environmental assessment reviews, wetland loss/gain tracking, watercourse/wetland alteration approvals, etc. Detailed aerial imagery and derived products are essential to informed decision making and general best practices.
- In areas not covered by the 1:10k orthos they have been useful as reference files for Route location process.
- In my previous position, while the products were available for use, the format and technical barriers prevented maximizing the use. System Incompatibility actually lengthened task processing time and added complex steps which made the products unsuitable for maintenance activities (property) other than the hard copy photos.
- More current photography needed.
- Mostly for aiding in determining past and current land use.
- General base mapping where better products are not available.
- Land and aerial survey applications.
- Provides source data for the regular maintenance of the Topographic & Orthophoto databases.
- Civic addressing
- With respect to the NS Geographic Names Program....provides resource base mapping.
- Air photo.
- Environmental monitoring, environmental assessments.
- As a property mapper, the currency of the photography can help determine the land being occupied in relation to the property boundaries currently in Property Online.
- Verification layer to assist us in defining Electoral Boundaries and assignment of polling locations.

Q9: What do you like about the NSAPDB Products and Services and where does it provide value to your business needs?

Respondents: 39

- It is more of a backdrop in the work we do and could be replaced with other sources, such as Google, LiDAR imagery, etc.
- Data requirement.
- I have personally not had ample experience comparing this dataset to other imagery datasets in our working environment to point out differences or preferences between the various datasets.
- I like that it exists... Not sure that I entirely understand the question. I believe that I've addressed this in my previous response. I do wish that the collection/update schedule was more frequent.
- The data allows for understanding of complex systems through combining the photos with field data.
- As a NS Government employee involved in activities at the coast and near-shore marine, my main interest is in NSAPDB in coastal geographic areas.
- Provides historical information related to foreshore growth and erosion.
- Typically air photos were taken at a scale that is too small to be of much value in land surveying. They are therefore only referred to occasionally in unusual circumstances but can be of extreme value in those cases.
- Currency and a set schedule to take new air photos every 10 years. The ten year cycles balances cost and needs. This is important to visualize new land features and coastal features that change with time for best practises in mapping and maintaining property line information.
- Usually the products are delivered promptly and in some cases provide a historic record of land activity in project areas.
- If the incompatibility issue was not present, then these products could be more easily integrated and add value to the decision making process with respect to maintenance. The products were/are fine and improvements could be to shorten the refresh rate from ten years to a shorter time frame. Some clients commented that 8-9 year old photos did not help their business needs. Especially in the forestry sector where volume calculations could be inaccurate due to trying to apply growth rate parameters to old information.
- Access on the web is great.
- The quality is good for Municipal purposes; it adds value by providing input where legal decisions are concerned.
- Fast and easy method for acquiring reasonably current air photos for smaller air surveys and/or orthos.
- Provides regular updates to the NSTDB and NSODB as well as meets DNR forest inventory needs. Provides high resolution aerial photography for the entire province, current to a 10-year cycle. Meets individual client needs.

- Essential to my job.
- Helps to validate feature names such as lakes and rivers etc and provides background for petition maps in layout design.
- The Data Locator is a great feature as users can (have?) the number and year and can have this information sent digitally or (a) hard copy may be purchased.
- Provides a means for us to be able to attract (mapping) projects utilizing new and historic photography for various applications.
- Air photos provide a snap shot in time. This provides value for a variety of reasons; specifically for land use information.
- Aerial photos are primarily used for stereo pair analysis for environmental purposes by terrestrial biologists. High resolution imagery is quite valuable.
- It gives a snapshot in time of the area in question in relation to property boundaries, and helps to provide better context of how or why a property is mapped the way it is.
- It provide us with good references for us to make better decisions related to electoral events and to better serve the citizens of Nova Scotia.

Q10: What are the biggest challenges you face in using the NSAPDB Products and Services?

Respondents: 47

- I am not a primary used of NSAPDB but recognize it is needed to conduct work linked to my area of expertise. The biggest challenge for me in knowing whether or not this data meets all the needs for flood assessments are where it might be improved.
- The quality and level of resolution.
- Dated nature of the imagery relative to our operational needs.
- The 10 year update schedule makes it difficult to accurately track changes to the landscape over time.
- Lack of GIS capacity within the department to know what to access and how to work with the products.
- Having access.
- Datasets for contours are divided by map tiles. Would be nice to have by county.
- Scales is too small.
- Currency in areas of change. Identifying trails and river features.
- Currency.
- Delivery mechanisms for the product to suit the business need. Some applications can get by with hard copy, others the soft copy, while even others need only a backdrop service to place behind/under other information. This is a difficult challenge to solve. IF, clients could either "clip" required spatial extent, or be able to download original photos from within their apps/download site, then delivery to client by choice becomes easier to deliver. The certificate of authenticity could digitally accompany any and all product by default.
- They are hard copy or scans.

- Currency of the products.
- Scanned paper photos are not ideal in most instances, and require georeferencing.
- Resolution of the raster data.
- You now have to go to Amherst to get photos and large numbers of older photos cannot be viewed on line. Some services are too far away and not available on-line.
- Maybe not as current as Google Earth.
- Getting access to topo and air photo web services through the CIO.
- Though I said that the Data Locator is a good feature, I do find it a bit cumbersome and the Search tool. (?)
- The cost of certifications is extravagant and cost much more than the photography itself. The lack of awareness of what products and services are available.
- Currency / scale.
- Getting large scale photos to support smaller parcels. Currently at 1:10,000 or 1:12,500 it is only valuable for larger parcels.

Q11: How could the NSAPDB Products and Services be improved?

Respondents: 46

- Higher resolution of all coastal areas.
- Given today's sources, the NSAPDB is more of a source specific to the preparation of other base data, i.e. topo and too may be fulfilled buy other solutions.
- Increased resolution is always beneficial in the identification of features on the ground. So, like any other imagery, the overall quality of the dataset could always be improved in this way.
- I've often thought that if satellite imagery could be obtained with a comparable resolution to the current aerial photography (i.e. good enough to derive the NSTDB features from) that it might replace the collection of air photos. It could cover the entire province in a couple of summer months, every few years and collect an infrared or near infrared band(s) to help assess vegetation health and growth. I know that presently Digital Globe offers such imagery at 30cm resolution.
- Accessible from a provincial GeoNOVA server.
- Make database more available or accessible on line so at least users can see what is available in a specific area.
- Seamless airphoto visualization.
- Advertise availability. Easy access.
- Inclusion of previews for older images in DataLocator. A method of evaluating the usefulness of the photo evidence at full resolution, possibly using a smaller pop-up window showing full resolution content as the user moves a pointer over the preview image.
- Allow for direct access through a member service rather than having to request products.

- Potential higher refresh rate, if economically feasible. While ten years has been the norm, this is not the best for making planning decisions which require up to date information.
- Acquire digital photography directly.
- Would like to see access to a digital database of ortho-rectified photos that includes all archived photos organized by their dates. This could be added as a base map layer to any map software similar to how Bing imagery is used in ArcGIS.
- Scan at a slightly higher resolution.
- Make purchase methodology on-line for users.
- Provided as a web service. More of a self-serve product.
- Entire data base be on line or services better located
- Be more current.
- Offering access to topo and air photo web services through the CIO.
- Maybe some thought into a less cluttered index for the NSAPDB could eliminate issues that may arise within the Search function.
- Data Locator is cumbersome and not user friendly. Access to information can be improved and better awareness as to available products and services.
- More frequent surveys; large scale options.
- It's easy enough to sort out holdings w. GeoNova and we have been grateful that NSGC has been able to provide us with GIS shapefiles of all NSAPD photo centroids. Even better though would be approximate bounding rectangles, and/or hyperlinks embedded in the shapefile attribute table which links to low-res thumbnails of the images posted on the NSGC website.
- Make the digital versions of these products easier to access.

Q12: Are there specific products and services that you would like to see added to the NSAPDB offering?

Respondents: 30

- Coastal bathymetric data.
- I'd love to have the orthophoto series offered in infrared like the old 1:63,360 series that was collected back in the 80's (not sure of the date). Again, really useful to help assess vegetation health and growth.
- Elevations.
- Georeferenced orthophotos.
- Would like to see the possibility of zooming into air photos in DataLocator and quick registration to overlay additional layers such as property lines, roads, and rivers.
- A digital map service at appropriate scales.
- Comprehensive elevation model with high enough resolution to allow for better panning with respect to climate change mitigation for industry, measuring potential sea level rise and impacts on property owners. Current model produced from current photos is not sufficient for reliable analysis.

- Current data uploaded to Google Earth.
- Web services.
- Better access to be able to identify all available photography in a given area including historic photography. Also a push to scan all available photography for on line viewing.

Q13: Does the NSAPDB provide relevant communications regarding its products and services?

Respondents: 48

- Yes: 15 or 31.25%
- No: 33 or 68.75%

Comments:

- I have not received any communications regarding NSAPDB, but that may be because I am not a primary user.
- Have never seen a product announcement come out from the NSAPDB... I have only selected "No" because I have never noticed any communications regarding NSAPDB. There may be sufficient communications for those who use the database more substantially, but I am unaware.
- I use Data Locator to determine currency and coverage so if that's up to date I'm usually OK.
- The next years flight planning was not always communicated to all regions consistently.
- I've never had any communications regarding products or services.
- Halifax is the largest municipality in N S but the photos are in Amherst the least central point for the province.
- I don't recall any communications regarding the NSAPDB. I could be mistaken however.
- Data Locator not user friendly for the average user. Also awareness needs to be improved.
- No updates are provided in DataLocator or elsewhere to say when new photography has been added and where it covers.

Q14: If communications are not timely or relevant, how would you recommend that this be improved?

Respondents: 30

Comments:

- Some progress-status reporting would be a good starting point. Only hearing about the NSAPDB when there is a program review is not sufficient.
- I generally contact the NSGC and chat with staff to find out what's new and exciting. I enjoy doing this, but sometimes it would be nice to get updates via a webpage or newsletter or something.
- Perhaps some form of registered user information bulletin could be useful.

- This can be improved using several methods. Email, twitter, web site, and possibly, and important addition: coverage map. The coverage map could show the acquisition areas by year (older and new), with upcoming areas highlighted.
- Maybe create a quarterly newsletter.
- Newly available photos could be indicated in DataLocator, if they are not already, Could also be included in the GeoNOVA "What's new page".
- Could contact each municipality as its area is flown.
- More on line access.
- Monthly updates or emails of any new activity within the NSAPDB. This should be sent to all users of this data.
- Users are not aware of what the latest imagery is available and what will be available next and when, hence better communication and promotion in this regard.
- Create a forum or distribution list to identify or notify any new plans, updates or changes to the program

Q15: What method of communications would you prefer?

Respondents:	56
Email alert:	39 or 69.64%
Twitter:	1 or 1.79%
Newsletter:	6 or 10.71%
Other:	10 or 17.86%

Comments regarding Other:

- Use the GeoNOVA website and link that to an email alert.
- Clear list of updated aspects of the data where the data is located.
- Anything but Twitter.
- Map service for acquisition areas. Upcoming acquisitions indicating proposed timeline for availability.
- The same day that new photography is available to the public, advise on DataLocator, GeoNOVA, GANS, etc...that new photography is available, the areas it covers, and what scale.

Q16: Does the NSAPDB introduce advances in technology within the geomatics industry which align with the needs of the user community?

Respondents:	39
• Yes:	21 or 53.85%
• No:	18 or 46.15%

Comments:

- I have selected "No", but a more accurate response is that I am unsure one way or the other.

- I think that because the NSAPDB is a government program (as it should be) it necessarily suffers from moving at the speed of government, which is to say very slowly.
- They appear to be a little behind the curve in some ways while being ahead in others. Technology refresh impacts ability for some systems to utilize photos. Land parcel maintenance is one such example.
- You are still scanning air photos for orthophotography.
- A fast and efficient way of obtaining reasonably current and reasonably high-resolution air photos.
- Using colour digital photography and airborne GPS and IMU for spatial referencing.

Q17: What advances in technology would you like to see the NSAPDB adopt?

Respondents: 37

Comments:

- There has been no communication on this point, so not sure what advances might be out there. An example for sure as to what types of topics the Topo program could be communicating to its community at large.
- Increased resolution would be nothing but beneficial to anyone who uses the dataset.
- I'd like to see them at least look at satellite imagery, or barring that, multispectral aerial photography.
- Web enabled services. Clip and extract (or download native photo) availability in different formats (jpg, tiff,)
- Embrace LiDAR and digital orthophotography collection.
- Would like to see access to a digital database of ortho-rectified photos that includes all archived photos organized by their dates. This could be added as a base map layer to any map software similar to how Bing imagery is used in ArcGIS.
- I assume that any advances would fall under the orthophoto program.
- Higher resolution imagery.
- Web services.
- Greater on line access.
- Would like the historic photography scanned.
- Digital acquisition of photography as opposed to being captured on film and scanned.

Q18: Does NSAPDB provide opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products?

Respondents: 26

- Yes: 14 or 53.85%
- No: 12 or 46.15%

Comments:

- I mostly work with private sector individuals who apply the NSAPDB in their work that we have contracted. Their experience in using the data and any transformations that have had to make would be valuable to help the data.
- Do not know.
- I selected "NO", but I am really unsure one way or the other.
- I really have no idea – how could I? I'm saying "Yes" to give them the benefit of the doubt.
- Is there more that could be done to increase the refresh rate of acquisition? Opportunities exist with respect to making historical photo coverages available for analysis. Having information over several years improves change detection analysis (measuring development) as well as environmental impacts from past development. Measuring shoreline erosion for climate change mitigation, habitat change for wildlife and species at risk, more accurately assessing resource depletion due to development, as in aggregate resources, mining impacts, forest volume change (clear-cut, forest management plans).
- Caveat is the partnership offerings are not lucrative to the private sector partner. Also the Government within these partnerships are in direct competition with private sector thereby making these partnerships difficult for private sector to flourish and survive the partnership.

Q19: Do you have any further comments, recommendations or suggestions in regard to the NSAPDB?

Respondents: 20

Comments:

- Keep up the good work; you're the backbone of geomatics and GIS in the province.
- I look forward to participating further in these discussions. I understand that NS does not have the resources of other jurisdictions. However, other jurisdictions do not possess the volume, completeness, or diversity of information that NS has. We've been doing this longer than anyone else; they look to us as a potential model for their implementations. We are leaders because we have many followers, and solutions to these complex constraints will require more of the innovative thinking that has meant NS remains a leader.
- It's good that you are reaching out.
- Open and honest communication with private sector companies if partnerships are to be successful.

Nova Scotia Orthophoto Database

Q20: Which of the following NSODB Products and Services are relevant to your operations?

Respondents: 49

- Resource Series 1:10,000 map scale 41 or 83.67%
- Large Scale Series 1:2,000 map scale 33 or 67.35%
- Data Locator web application 33 or 67.35%
- Other 6 or 12.24%

Other Comments:

- We use this dataset with the Nova Scotia Civic Address Finder (NSCAF) application.
- Depends on the activity (client business need). Some do not require great detail, while others do.

Q21: Does the NSODB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs?

Respondents: 45

Yes: 36 or 80.00%

No: 9 or 20.00%

If yes, in what business activity and how?

Comments:

The NSODB is a backdrop product mostly. It does not serve any analytical needs. As other sources are available, the currency of the NSODB will be a concern.

This imagery is used on a daily basis in conjunction with other resources to allow Mappers and GIS staff to make decisions regarding the updating and modification of property boundaries throughout the province.

Our organization is responsible for a number of land planning and activity review procedures ranging from land conservation, environmental assessment reviews, wetland loss/gain tracking, and watercourse. wetland alteration approvals, etc. Detailed aerial imagery and derived product re essential to informed decision making and general best practices.

- The 1:10 000 series is often used to enhance mapping during route and corridor selection as well as Open House plans and location diagrams.
- I work with the NS Civic Address File and NS Road Network. NSODB helps immensely with viewing.
- General base mapping.
- Land and aerial survey project planning.
- Essential to my work in civic addressing.
- The NSODB is used in my role within NSCAF in order to determine if civic points are located in the correct location.
- NS Geographic Names Program base data and research.
- Use more as a backdrop for projects
- As a consultant we support many clients' diverse needs and projects. NSODB imagery is often useful.
- Orthophotos allow us as property mappers to scale property boundaries directly against the orthophotos, to scale and measure distances for property boundaries accurately.

- Defining Electoral Boundaries and assignment of polling locations.

Q22: What do you like about the NSODB Products and Services and where does it provide value to your business needs?

Respondents: 35

Comments:

- Backdrop information.
- The coverage of this dataset is adequate for most day-to-day tasks.
- I like that the product can be easily obtained and used to create useful, current mapping products and can be draped on surfaces to provide very good highway planning tools.
- Speed, coverage.
- Allows me to see an aerial view of an area, helps when I can't actually be there in person.
- Web access.
- Good quality product, generally.
- It provides a valuable project planning data set.
- Accurate digital ortho-imagery of the entire province.
- The accuracy is excellent and are essential in all projects I've worked on.
- The NSODB is crucial to my daily tasks because it provides the primary means of determining if a civic point's position needs to be modified.
- Base data.
- Good visual and backdrop.
- Georeferenced product; this allows for easy use in GIS environment.
- Orthorectified. Consistent quality.
- Photos are stitched The ability to scale and measure without distortion.
- It provide us with good references for us to make better decisions related to electoral events and to better serve the citizens of Nova Scotia.

Q23: What are the biggest challenges you face in using the NSODB Products and Services?

Respondents: 32

Comments:

- Currency.
- Occasional cloud-cover and areas without coverage, which both affect the usefulness of the dataset.
- None really.
- Not having full provincial coverage available. And having very little of the Large scale orthos (1:2000, 1:1000)
- Recent availability. Difficult to find the service.
- Its relevancy wanes with the age of the photos.

- Price.
- MrSID compression does not facilitate conversion to other formats.
- Currency of data and/or higher resolution.
- More frequent updating.
- Access.
- The biggest challenge in using the NSODB is relying on outdated imagery that is unable to inform me about the accuracy of a new civic point's location.
- It's a snapshot in time.
- Costs.
- Lack of colour had historically been a limitation. Colour is welcome.
- Access to the orthophotos and orthophoto maps, and the inability to print to scale an orthophoto.

Q24: How could the NSODB Products and Services be improved?

Respondents: 32

Comments:

- Increase the quality and resolution in every coastal area of the province.
- It does not service any analytical needs. As other sources are available, the currency of the NSODB will be a concern.
- According to the application we use to view these products (NSCAF), there are occasionally some rural areas (in Richmond and Victoria counties, for example) which are not covered in the dataset. There are also rare occasions where cloud-cover obscures features, making that particular imagery useless to us.
- More frequent collection and updates would be super great.
- Access
- View digital orthophoto in DataLocator; make seamless orthophotos available. Crop sections of orthophoto to reduce size of the file and download to GIS or Map Library Module for the maintenance of property lines in NS.
- I would like to be able to access resources without having to go through a data distribution officer.
- One Stop, access point. Improved edge matching and colour enhancements with the B/W product. I observed areas with over enhancement as the result of too much stretching in the histogram.
- Make the updates more frequent.
- Digital acquisition of data.
- Downloadable orthophotos.
- Capture infrared band.
- Having complete colour coverage of the province for the resource series.
- More current data.
- Notification when products are ready for each municipality.
- Web services; more convenient access.

- Good from our perspective and how we use it.
- Currency / accuracy.
- The 10 year separation is often a challenge. Most clients want as current as possible and we end up relying on lower resolution satellite data. Or if historical information is sought, clients often want to look at a particular year. This is often the case with forest and land use related questions.
- The products are great; the access to them could be improved.

Q25: Are there specific products and services that you would like to see added to the NSODB offering?

Respondents: 18

Comments:

- Do not know.
- More coverage of the rural areas of Nova Scotia. Updating of imagery in areas that are sub-standard as a result of atmospheric interference.
- Infrared and near infrared would be really useful to both Environment and the forestry folks at DNR.
- No sure of other orthophotography (Pictometry for example) could be identified through the Data Locator.
- With a better DEM, we could offer a better 3D service where the photos are draped over the elevation model. This can be of great use for many diverse uses. Groundwater monitoring, agriculture, prospecting/mining to name a few.
- Digital orthophotography.
- Infrared photography.
- Potential (private sector) partnership opportunities.
- Increased coverage of more populated areas at 1:2,000 scale would be beneficial, even if on a semi-revision cycle (i.e. once every 10 years).

Q26: Does the NSODB provide relevant communications regarding its products and services?

Respondents: 32

- Yes: 8 or 25.00%
- No: 22 or 75.00%

Comments:

- As with the NSAPDB, we have not seen any product bulletins, etc.
- I have selected “No” because I have personally never received communications regarding this dataset.
- I don’t get any info on new products or updates or future plans. .... other than using Data Locator and the occasional visit to GeoNOVA.
- I work in the same building as the people working on the database, so I get a lot of verbal updates.

- Have never received communication regarding the product.
- We (DNR) receive the photos from Forestry, not through the Geomatics Centre.
- It's often through a colleague or networking with another geomatics professional that I find out what products have been made available, where it was done, and when it was released.

Q27: If communications are not timely or relevant, how would you recommend that this be improved?

Respondents: 21

- Some progress-status reporting would be a good starting point. Only hearing about the NSODB when there is a program review is not sufficient.
- I generally have to contact the NSGC and chat with staff to find out what's new and exciting. I enjoy doing this, but sometimes it would be nice to get updates via a webpage or newsletter or something.
- Some sort of membership to a NS geographic data group.
- Service to show up-coming acquisitions and expected time frame for availability.
- A scheduled posting, possibly quarterly?
- DataLocator could have a "What's New" splash page or button.
- More interaction through e-mails, newsletters, and consultation with private industry and users of the various datasets.
- Create a forum or distribution list to identify or notify any new plans, updates or changes to the program.

Q28: What method of communications would you prefer?

Respondents: 40

- Email alert: 31 or 73.81%
- Twitter: 1 or 2.38%
- Newsletter: 3 or 7.14%
- Other: 7 or 16.67%

Other Comments:

- Use the GeoNOVA website and link that to an email alert.
- Please, no Twitter.
- I like how it currently is.
- Anything but Twitter. Twitter is annoying.
- Announce on DataLocator, GeoNOVA or GANS websites, social media, etc...what products have been made available, where it was done, and when it was released.

Q29: Does the NSODB introduce advances in technology within the geomatics industry which align with the needs of the user community?

Respondents: 25

- Yes: 15 or 60.00%
- No: 10 or 40.00%

Comments:

- I have selected "No"; however, a more accurate answer is that I am unsure.
- I think that because the NSAPDB is a government program (as it should be) it necessarily suffers from moving at the speed of government, which is to say very slowly.
- I know they are looking into new technologies to help with data collection. Cost being the main drawback.
- Large scale program aligned with needs from user community but I am unaware if anything has been introduced since then.
- They have recently began to create GeoPDF versions of their digital products that allow the user to have 1 file and give them the options to show which layers of the map are relevant to them.

Q30: What advances in technology would you like to see the NSODB adopt?

Respondents: 24

- There has been no communication on this point, so not sure what advances might be out there. An example for sure as to what types of topics the Topo program could be communicating to its community at large.
- Direct digital acquisition with LiDAR.
- Review use of data collection using LiDAR technology.

Q31: Does NSODB investigate opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products?

Respondents: 21

- Yes: 9 or 42.86%
- No: 12 or 57.14%

Comments:

- Do not know.
- I have selected "No" because, however I am actually just uncertain.
- Partnerships to share in data collection, like LIDAR, would be a boon.
- Many opportunities for partnering with private sector.

- They reach out to municipalities to gauge interest in having their municipalities covered in the large scale NSODB.

Q32: Do you have any further comments, recommendations or suggestions in regard to the NSODB?

Respondents: 9

No: 1

Nova Scotia Topographic Database

Q33: Which of the following NSTDB Products and Services are relevant to your operations?

Respondents: 54

- Resource Series 1:10,000 map scale 18 or 33.33%
- Large Scale Series 1:2,000 map scale 8 or 14.81%
- Data Locator web application 13 or 24.07%
- Other 15 or 27.78%

Other Comments:

- All of the above (6)

Q34: Does the NSTDB support your geospatial activities with relevant products and service in terms of currency, accuracy and distribution to meet your business needs?

Respondents: 55

- Yes: 44 or 80.00%
- No: 11 or 20.00%

If yes, in what business activity and how?

Comments:

- Topographic data is extremely important for conducting flood assessments as well as understanding things like sea-level rise, storm surge, infrastructure vulnerability, etc. However, the NSTDB is not accurate enough for most of this work to be conducted at smaller scales. For this, we typically rely on LiDAR. Where LiDAR is not available, we are forced to use the NSTDB.
- For the most part at the 10k scale. The dated nature of the larger scales make them less important but large scale is what we often need.
- The topographic database is used (in some capacity or another) in nearly every property boundary modification that is performed as part of our day-to-day operations. Shoreline features are used most prevalently, but other topographic contours are also used by both Mappers and GIS personnel in order to make decisions on property extents. In many cases, features within the topographic database are used as property boundaries themselves.

- Our organization is responsible for a number of land planning and activity review procedures ranging from lad conservation, environmental assessment reviews, wetland loss/gain tracking, and watercourse/wetland alteration approvals, etc. Detailed aerial imagery and derived product re essential to informed decision making and general best practices. Every department, group, agency and organization in the province uses the NSTDB as the basis for all of its mapping. Without these layers there would be no mapping or map analysis and informed decision making would take a backseat to guesswork and speculation.
- General base mapping.
- Project planning purposes and smaller survey applications.
- Reconciling the NSCAF points and the NSTDB points.
- Vectors for updating DNR Property mapping, custom map products, web services.
- NSTDB data is the base layer for Property Online.
- Defining Electoral Boundaries and assignment of polling locations.

Q35: What do you like about the NSTDB Products and Services and where does it provide value to your business needs?

- It's the only province wide topographic dataset available.
- The NSTDB is the provincial authoritative base for all dept to work from – we depend upon it to ensure data sharing amongst depts. Are aligned. Otherwise substantive efforts would be spent getting data from different depts. correlated.
- Coverage is very extensive.
- Digital formats available online; base map products.
- I like the product, and that it is delivered in GIS and CAD formats. It is used as base mapping for route and corridor selection, constraint mapping open house plans, etc.
- It has certainly evolved over the years, and diversified. That is a good indicator that the product is being used, and clients would like to have even more, or less, as the case may be. being able to choose which layers to turn on is an advantage. Choose only what you need without taking/turning it all on.
- Web access.
- Any extra information I can get on an area I am working on, helps me to make decisions.
- Because of lack of currency, these data are usually only used as cartographic base map layers.
- Single source.
- Fast and effective tool for project planning.
- Provides an up-to-date vector-based topographic database of the province. Incorporates the Nova Scotia Road Network (NSRN) and Nova Scotia Hydrographic Network (NSHN) datasets. There is no duplication between these products.
- Essential to my job in civic addressing and very informative and accurate.
- Authoritative source of the provincial road network.

- Excellent base data and helps me with my name search enquiries from private and public sector etc.
- The latest NSTDB is based on low level photography which provides for greater accuracy and potentially more detail. Better accuracy of data means better accuracy for client's projects.
- Provides base information that is used frequently.
- NSTDB is excellent. The 10k series data provides higher accuracy more detailed information for hydro, buildings, land use than federal datasets. Also the addition of resource roads, trails and tracks are invaluable in the NS Road network.
- It provides topographic context to property mapping issues.
- It provide us with good references for us to make better decisions related to electoral events and to better serve the citizens of Nova Scotia.

Q36: What are the biggest challenges you face in using the NSTDB products and Services?

- It's not accurate enough for flood assessments and vulnerability analysis.
- Symbology – in a digital world – too much emphasis on a hardcopy symbolization approach. 10k is not 10k anymore in a digital sense.
- Data licensing is antiquated relative to flexible data sharing with our partners. Taking an open data approach would mean we would not have to bring in SNS when we want to share.
- Shorelines (especially coastal ones) can change drastically over time, causing that particular aspect of the dataset to become inaccurate within a shorter span of tie that the rest of the dataset.
- Keeping abreast of updates.
- Lack of up to date base maps
- Currency
- Technology prevented integration with the parcel maintenance functionality. System incompatibility prevented maximizing use or even updating of the NSTDB features for parcel mapping.
- Technological barriers with respect to accessing relevant layers within the NSTDB. Lately, the map services have been suffering.
- Lack of currency.
- The lack of currency, we are currently using 2008 products! Seven years old already.
- Outdated data.
- Currency.
- More frequent updates.
- Access; currency.
- Web services.
- Text is an issue when downloading.
- Scale / currency.

- Currency of the data.

Q37: How could the NSTDB Products and Services be improved?

- Improved accuracy. Not sure if this is possible.
- Currency is an issue – 10-year cycle is not acceptable at an operational level. Coordinated approach to collection, forget fair and even collection over 10 years. If, by e.g. there is a substantive activity (provincially) in SW Nova, then collect and update there, then move to the next area needing attention. Perhaps then every 7-10 yrs do an overview for provincial consistency.
- Improve the availability of new versions of this dataset within our applications. This may not necessarily be a problem with the data provider, but I have been informed that some aspects of this dataset have updated versions. However, we have yet to integrate these versions within our operations.
- Notification of updates. Maybe host a workshop with selected provincial users representing the breadth of use in the province and the folks responsible for the NSTDB to brainstorm possible improvements.
- Development of digital format cartographic quality product available to line departments.
- More detailed mapping in more areas. Past cost sharing formulas with partner organizations (municipal units) meant that some areas were not refreshed because they did not see the benefits. How can we change that so more will buy into having better information?
- More current data.
- Improved digitization of features by using better input! There is a plethora of more accurate data out there - ask Municipalities to provide their data to you to improve yours! The accuracy needs to be improved for the data to be useful for anything more than very general analysis.
- More detailed data and faster refresh cycle for updates.
- More frequent updates.
- Make available via map service - which is currently underway.
- More effective access; improved currency/maintenance; improved governance.
- Updated DEM's and contours as a by-product of greater accuracy achieved through lower level photography now being flown. Be able to download data by county.
- Improve scales (large scale), frequency of updates, improved elevation data.
- Some small wish list items: - Making hydro data more conducive to hydrological modeling via a (hydro network layer) akin to as with NRCAN's Hydro network NHN data (formerly Geobase) which shows network connectivity. - Would be nice to have additional information on road networks. Further parsing of highway numbers, road speed, lanes, etc. would be great for modeling. - addition of water body labels within Hydro network polygons. - Explicit labeling of 1st, 2nd, 3rd order water features as is done in NB. We can do this but it would be nice for everyone to agree on it universally.

- Update the currency of the data to something less than 9-10 years, and notify the users of new releases or updates of that data.

Q38: Are there specific products and services that you would like to see added to the NSTDB offering?

- Look Up Tables for all TIR roads/highways/streets
- Web mapping services with cartographics – too many depts. Are going this alone, or starting too. We are quite willing to work with them if we cannot get timely delivery from SNS.
- Detailed elevation model/contours.
- Link to forestry and mineral databases, including depth to water table and wetlands.
- Survey grade data.
- LiDAR derived data, annotation.
- Smart text attached to features.
- Web services through the CIO.
- Yes, a corridor along the coast of NS and other low lying areas of high flood potential with contour intervals of 2m or less utilizing the better accuracy that can be achieved with the 12,500 scale photography.
- Would be interesting to have the NSDNR Forest inventory data integrated as a "Vegetated Area" layer akin to NRCANs vegetated area layer used in Canvec and based on Satellite data. Also a specific file/layer to show source date for various themes would be useful, particularly if available at a provincial level.
- Just the GeoPDF files, which are now becoming available.
- Options to turn on/off specific features.

Q39: Does the NSTDB provide timely and relevant communications regarding its products and services?

Respondents: 42

- Yes: 16 or 38.10%
- No: 26 or 61.90%

Comments:

- I have selected “No” simply because I have never personally received any official communications regarding this dataset.
- I rely on Data Locator and occasional visits to Provincial mapping sites.
- Sort of. There is a refresh rate for the mapping; however communication of upgrades was not consistent. The Southern region was not always aware of the updates in other regions.
- I say no but I also do not follow their website, I'm sure there are updates there if one chooses to view them.
- Never received any communications regarding the products.
- GeoNOVA is great.

- New releases or updates of data are usually discovered by word of mouth from colleagues or other geomatics professionals.

Q40: If communications are not timely and relevant, how would you recommend that this be improved?

- Development of a maintenance schedule
- Some progress-status reporting would be a good starting point. Only hearing about the NSTDB when there is a program review is not sufficient.
- I generally have to contact the NSGC and chat with staff to find out what's new and exciting. I enjoy doing this, but sometimes it would be nice to get updates via a webpage or newsletter or something.
- A registered membership with information bulletins.
- Scheduled communications, possibly quarterly and definitely digital for ease of storage.
- Via DataLocator and GeoNOVA website.
- Email each municipality as their data becomes available.
- I wouldn't mind seeing an email to receive updates and notifications.
- Create a forum or distribution list to identify or notify any new plans, updates or changes to the program

Q41: What method of communications would you prefer?

Respondents: 50

- Email alert: 36 or 72.00%
- Twitter: 1 or 2.00%
- Newsletter: 3 or 6.00%
- Other: 10 or 20.00%

Other Comments:

- Use the GeoNOVA website and link that to an email alert.
- A service displaying planned refresh and anticipated dates.
- I like the current form of information.
- Advice on DataLocator, GeoNOVA and GANS websites, social media, etc....when new data is available, what areas is covers, and when it was acquired.

Q42: Does the NSTDB introduce advances in technology within the geomatics industry which align with the needs of the user community?

Respondents: 36

- Yes: 21 or 58.33%
- No: 15 or 41.67%

Comments

- None that I am aware of.

- As a likely source provider, we have not been even approached in the last 2 years to discuss data sharing. TIR sits on several datasets that the topo program would not have to collect any longer – if we strive to work together to share information.
- I have selected "No", but more accurately, I am just unsure.
- I think that because the NSAPDB is a government program (as it should be) it necessarily suffers from moving at the speed of government, which is to say very ++9999999999***-
- I've stumbled across the web based Nova Scotia Coordinate Referencing System Viewer and the Atlas of Nova Scotia, but did not see any announcements of the products.
- Using softcopy photogrammetry, NSCF GPS roads. Airborne GPS & IMU instead of aero-triangulation.
- Would be nice to have a WMS/WFS service or the like that works well. Haven't ever had luck with the previously released versions. They either don't work or are too slow to use. (forgot to mention: Web service for NSOPDB would be excellent!)
- Some exploration with acquiring elevation data using LIDAR was explored, to create a better DEM for the province. To my knowledge it was abandoned due to the costs involved, even on a test area.

Q43: What advances in technology would you like to see the NSTDB adopt?

- Anything that would allow for better vertical accuracy.
- LiDAR with multi-spectral image overlay; drone technology for remote field verification.
- Some component of crowd sourcing with municipalities, and other professionals (not the general public). IE, when a demolition permit is issued to remove a structure, we need a mechanism to ensure the structure is removed from the NSTDB in a timely fashion.
- Not technology, but better use of water table data from NSE.
- Web services.
- The addition of smart text.
- More web services through the CIO.
- A LIDAR-based DEM for the province.

Q44: Does NSTDB investigate opportunities for partnerships with the private sector and with other public sector entities that offer the potential for increased benefits to clients, such as effectiveness in data collection, maintenance and distribution; offering more relevant products and services; creating value added products?

Respondents:	32
• Yes:	18 or 56.25%
• No:	14 or 43.75%

Comments:

- Unknown at this time.
- As noted in Q#42, TIR has not been approached. TIR has indicated an interest but little uptake from the Topo program. Regarding the private sector – the program has been too inwardly focused to this point – do not consider contracting out as examples of partnerships with private sector.
- I have selected "No", but more accurately, I am just unsure.
- Not that I am aware of.
- Uses data from source custodians/providers for DL boundaries (i.e. parks, wilderness areas, protected areas, Indian reserves, etc.)
- It reaches out to the municipalities to gauge interest on large scale mapping of their areas, specifically for hydrographic and elevation features in their areas.

Q45: Does the NSTDB primary product, the 1:10,000 vector database contain appropriate data layers and relevant attributes?

Respondents:	44
• Yes:	39 or 88.64%
• No:	5 or 11.36%

Comments:

- For certain applications.
- The actions of the 2009 report were never really given any serious consideration i.e. there were recommendations that the program was not prepared to investigate and or come up with creative ways to initiate them.
- Yes, this is currently very good, but it could be improved on. The first thing I do when I receive an update of the NSTDB is to create a look-up table to join the feature descriptions from the metadata to the actual data. I get why we still use the alphanumeric feature codes, but most users (i.e. everyone at NS Environment) cannot decipher them so I permanently join the feature descriptions to all the data sets. This really doesn't bloat the data file size at all. It's a small thing that makes a big difference for end users. It'd be great if it was done before it was distributed. I think it'd be great if the NS gazetteer was distributed not only as a point file, but also as a look-up table with codes linking the names to the appropriate feature in each of the other NSTDB layers. End users could choose how they wished to use it. This code wouldn't have to be considered the primary unique key for any NSTDB layer, but could be applied to all features in all the layers of the NSTDB. This provides the advantage of only having to change a single value in a table to institute a global name change. Stream orders in the NSHN. Hell yeah. The DNR netlin roads layer doesn't have anywhere near the usefulness of the NSRN, but it does manage to contain resource road features that are not present in the NSRN. Could a workflow or procedure be developed to include these features from the DNR layer, or even better to obtain them straight from the source? Make ArcGIS style sets, layer files, and map templates available to provincial

employees to allow for some provincial standardization of mapping and cartography in the future. If you can provide staff with a product that saves them time and is better than what they can create themselves, trust me, they will use it. Okay... I can think of lots more, but this is fine for now and I'm getting off topic anyhow.

- Seems to cover appropriate features and attributes.
- Data layers are appropriate but the attribute tables are usually pretty messy and quite confusing.
- Should consider integrating the NSDNR wetlands layer.
- Could use a review of the data model. Proper unique IDs and standards (e.g. domains could be improved)
- Generally yes.
- There are some that are more relevant than others, but none of them are what I would consider inappropriate.

Q46: Does the NSTDB offer appropriate formats and projections to support non-Provincial users?

Respondents: 37

- Yes: 33 or 89.19%
- No: 4 or 10.81%

Comments:

- For certain applications
- I really don't know I am a provincial user.
- Although there is a large opportunity to be more proactive on the projection side of the equation, both in terms of variety and education – they have the right people in place now to do so.
- As it is available in ATS77 or NSAD83.
- Not for web mapping.
- We always use UTM Zone 20 and shapefiles.
- The formats are fairly standard and widely accepted. As far as I know everything is geographic is projected in UTM 20 or MTM 4 & 5, with ATS77 and NAD83 datums. Any users wishing to have other projections and datums are required to select one and convert to their desired projections.

Q47: Do you have any further comments, recommendations or suggestions in regard to the NSTDB?

Comments:

- Having had experience with trying to teach Geomatics students at COGS/NSCC while using NSTDB datasets, I suggest that the data get cleaned much more thoroughly before it is released. There were grave errors that caused much delay and frustration with the students that I think reflects poorly on those creating the NSTDB.

- Don't do away with simple tiled shape file downloading for NSTDB. A lot of people will request newer web services and interactive downloading but we've invested a lot of development in building tools to work with the tiled data and it works extremely well for desktop folks who are accessing data in a non enterprise GIS environment.

LiDAR

Q48: Are you currently including LiDAR products in your business activities?

Respondents:	51
• Yes:	28 or 54.90%
• No:	23 or 45.10%

Comments:

- Flood assessment, sea-level rise impact, infrastructure vulnerability, coastal vulnerability.
- DEM from LiDAR for trail development in remote areas.
- Transportation planning.
- Climate change and flood mapping.
- TIR has obtained LiDAR for several project areas, usually narrow swaths of both existing and planned Highways. It has been used in both the Highway Planning and Design stages.
- LiDAR is used for a variety of activities including: hydrological modeling, creating line-of-sight for tower placement, topographic mapping where NSTDB contours are not adequate, creating hill-shades for cartographic purposes, flood mapping, shoreline erosion mapping, also use of the multiband imagery that comes along with the LiDAR data.
- Clients sometimes request LiDAR derived data for DEMs, DSMs on occasion. We usually refer them to private collection firms. Most do not want to eat the cost and they generally go without.

Q49: Are you considering introducing LiDAR products to support your geospatial activities?

Respondents:	47
• Yes:	29 or 61.70%
• No:	18 or 38.30%

Comments:

- We have funded a number of projects that require LiDAR and have paid for LiDAR to be collected on numerous occasions.
- We do LiDAR acquisitions now and will continue to do so.

- It would be nice if we could. There are huge benefits across many disciplines that could make it cost effective.
- The Municipality already does.
- Clients will likely have interest in using LiDAR data.
- Stantec has lots of use for LiDAR if it was available. In GIS we get asked for it a lot.

Q50: Are you aware that the Province of Nova Scotia has established specifications for its use of LiDAR data?

Respondents: 52

- Yes: 21 or 40.38%
- No: 31 or 59.62%

Q51: If yes, do these specifications meet and support your geospatial activities?

Respondents: 19

- Yes: 14 or 73.68%
- No: 5 or 26.32%

Comments:

- I rely on others to identify whether or not the LiDAR specification meet their needs. To date, I have not heard that it does not.
- Probably.
- I haven't seen them; don't know where to access them?
- I am not aware of a proper requirements gathering exercise that has taken place specifically for LiDAR so I cannot say the specs would or would not meet our clients' needs.

Q52: Which LiDAR collections would support your business operations?

Respondents: 45

- Aerial Bathymetric: 27 or 60.00%
- Aerial Topographic: 44 or 97.78%
- Terrestrial Fixed: 21 or 46.67%
- Terrestrial Mobile: 17 or 37.78%

Comments:

- I believe we will be looking into LiDAR-Bathy for bridge work, we already use aerial topo, we have a faro scanner and will be using it for Structures and perhaps interiors of salt dome sheds and we have an ARAN vehicle that scans for surface condition.
- Each has its intended audience. That is based on the business need. Bathymetric is of little use for road construction, but invaluable for climate change.
- No requirements at this time, but LiDAR use could definitely provide benefits to our clients.

Q53: Which LiDAR products would support your business operations?

Respondents:	46
• Digital elevation models	43 or 93.48%
• Breaklines	21 or 45.65%
• Contours	38 or 82.61%
• Intensity images	16 or 34.78%
• Triangular Irregular Networks	18 or 39.13%
• 3-D Models	26 or 56.52%
• Other	7 or 15.22%

Q54: What applications would LiDAR products support for your business operations?

Respondents:	45
• Coastal zone mapping	7 or 2.22%
• Sea floor or river bed mapping	2
• Nautical charting	0
• Feature collection	6 or 4.44%
• 3-D urban models	3
• Line-of-sight analysis	3
• Canopy models	0
• Flood plain modelling	6
• Forest inventory	3 or 4.44%
• Biomass studies	0
• Land use mapping	12 or 13.33%
• Transportation or utility corridor mapping	7 or 6.67%
• Volumetric calculations	5 or 4.44%
• Other	28 or 64.44%

Comments:

- At least ten of the above apply.
- All the above. These are diverse activities and LiDAR would assist in all of them. Here are some more: mineral exploration, historical flood/storm data, aggregate volumes, contaminant modelling (flow), the number of uses will only become more numerous as time moves forward.
- Canopy height models.
- Many of the above.

- All of the above (x 4 responses)

Q55: Do you have any further comments, recommendations or suggestions in regard to including LiDAR products on the NSTDB?

Respondents: 16

Comments:

- LiDAR is essentially a prerequisite for conducting accurate flood assessments. As this is the bulk of my work, we have collected a number of individual LiDAR data sets across the province. I recognize that this is not the most cost effective way to acquire LiDAR. Any further LiDAR collection should be for large areas so as to capture economies of scale.
- Multiple areas of use are sometimes used within departments.
- LiDAR should be thought of as a product to supplement our other base products, NOT a replacement.
- The initial investment in LiDAR is more substantial than the alternatives. However, based on my experience in the GIS-industry prior to working with the province, I believe LiDAR is the ideal direction to move in terms of a (mostly) all-inclusive and incredibly accurate way of gathering multiple datasets simultaneously. It also opens the path to the eventual (and inevitable) transition into more modern methods of analyzing ad displaying information.
- LiDAR which is consistent both in scale and temporally for the entire province is very necessary for decision making purposes.
- The inclusion for LiDAR data would widen the opportunities for more accurate and current data used in today`s applications and provide opportunities for new business and services in public and private ventures.
- Please make it open source, in raw (cloud data) as well as in processed formats.
- Don`t brush it off as too expensive. There is a demand for the product that the average geospatial professional or organization cannot afford.
- Let's find a way to get it for the whole province.
- Definitely support use of LiDAR products in the NSTDB.
- Currently, I am suspect of the Province's ability to provide LiDAR data in a manner that would be beneficial to the receiver but I remain hopeful that it will work out. I would hope that they would make the raw data available and not just the products!
- Don't brush it off as too expensive. There is a demand for the product that the average geospatial professional or organization cannot afford.

On-line Survey Summary

Relevant Products and Services?	# of Respondents	Yes	No
NSAPDB: Q8	60	65 %	35%
NSODB: Q21	45	80%	20%
NSTDB: Q34	55	80%	20%

Predominant Responses: NSAPDB

Q9: What do you like about the NSAPDB Products and Services and where does it provide value to your business needs?

- Province-wide coverage; Provides historical information; Products are delivered promptly; Access on web; Quality is good; Regular scheduled updates;

Q10: What are the biggest challenges you face in using NSAPDB Products and Services?

- Currency; Resolution; Scale; Quality; Web services

Q11: How could the NSAPDB Products and Services be improved?

- Digital capture; Increase data collection cycle; Data Locator is cumbersome; Product awareness and communication are low; Higher resolution; Seamless visualization; Increase web accessibility;

Predominant Responses: NSODB

Q22: What do you like about the NSODB Products and Services and where does it provide value to your business needs?

- Accuracy; Coverage; Georeferenced backdrop; Quality; Web access

Q23: What are the biggest challenges you face in using NSODB Products and Services?

- Cost; Coverage; Currency; Web access

Q24: How could the NSODB Products and Services be improved?

- Digital capture; Increase data collection cycle; Full, province-wide colour coverage; Resolution in coastal areas; Increase web accessibility; Infrared band; Product awareness and communication are low

Predominant Responses: NSTDB

Q35: What do you like about the NSTDB Products and Services and where does it provide value to your business needs?

- Authoritative base for all provincial departments to work from; province-wide coverage; on-line assess; Single source for topographic data;

Q36: What are the biggest challenges you face in using NSTDB Products and Services?

- Accuracy; Currency; Licensing; Symbology

Q37: How could the NSTDB Products and Services be improved?

- Improved accuracy; Increase data collection cycle; Increased detail; Increased updates; Integration of hydro and road network layers; Needs-based collection rather than cycle; Product awareness and communication are low;

Relevant Communications	**# of Respondents**	**Yes**	**No**
NSAPDB: Q13	48	31 %	69%
NSODB: Q26	32	25%	75%
NSTDB: Q39	42	38%	62%

Q15: What method of communications would you prefer for the NSAPDB?

- Email alert – 70%; Newsletter – 11%; Other 18%; Twitter 2%

Q28: What method of communications would you prefer for the NSODB?

- Email alert – 74%; Newsletter – 7.0%; Other 17%; Twitter 2.0%

Q41: What method of communications would you prefer for the NSTDB?

- Email alert – 72%; Newsletter – 6%; Other 20%; Twitter 2%

Technology Advancements	# of Respondents	Yes	No
NSAPDB: Q16	39	54%	46%
NSODB: Q29	25	60%	40%
NSTDB: Q42	36	58%	42%

Q17: What advances in technology would you like to see the NSAPDB adopt?

- Digital data collection; Higher resolution imagery; Multispectral imagery; Satellite imagery to increase update cycle; Web enabled services

Q30: What advances in technology would you like to see the NSODB adopt?

- As above for aerial photography

Q43: What advances in technology would you like to see the NSTDB adopt?

- Higher accuracy elevation data; web services

LiDAR	# of Respondents	Yes	No
Currently including LiDAR in activities?	51	55%	45%
Currently including LiDAR in activities?	47	62%	38%
Aware of Provincial LiDAR Specifications?	52	40%	60%

Which LiDAR products would support your	# of Respondents	Percentage of Respondents

business operations?		
Digital Elevation Models	43	93%
Contours	38	83%
3-D Models	26	57%
Breaklines	21	46%
Triangular Irregular Networks	18	39%
Intensity Images	16	35%
Other	7	15%

Appendix C

Province of Nova Scotia Base Mapping Workshop Agenda

Halifax Club, 1682 Hollis Street, Halifax
25 March 2015

AGENDA

1:00 PM **Opening Remarks, Hugh MacKay, SEG Consulting Inc.**

1:10 **Overview of the Province of Nova Scotia foundation geographic datasets, Pierre Gareau, Geographic Information Services, Service Nova Scotia**

- **Nova Scotia Air Photo Database (NSAPD)**
- **Nova Scotia Orthophoto Database (NSODB)**
- **Nova Scotia Topographic Database (NSTDB)**

1:20 **The On-Line Client Survey: Initial results, Hugh MacKay**

1:30 **Breakout Groups for discussion of On-line Client Survey**

2:15 **Coffee Break**

2:30 **Results of Breakout Group discussions**

3:15 **Additional relevant issues**

3:45 **Workshop Summary, Hugh MacKay**

4:00 **Adjournment**

Appendix D

Province of Nova Scotia Base Mapping Workshop Discussions

Halifax Club, 1682 Hollis Street, Halifax

25 March 2015

Presentation Themes

THEME 1 - Data Currency

Many survey respondents commented that the foundation data sets tend to age quickly. The dated nature of the data sets presents challenges in meeting business requirements. Many comments were directed towards more frequent updates. Some clients procure alternative data sets, such as satellite imagery, open source data or contract for their own aerial data capture.

THEME 2 - Data Access

Many survey respondents commented that data access via Web Mapping Service (WMS) and Web Features Service (WFS) would vastly increase their efficiency. Others commented that purchasing policies and procedures should be more client friendly Comments were also made that if WMS is introduced, that the tiled data should not be immediately eliminated as organizations have invested in building tools to work with that format.

THEME 3 - Data Set Integration

Some survey respondents commented that it is difficult to integrate the Data sets with the data sets of other provincial and federal agencies. Yet this is a common requirement to meet business requirements.

THEME 4 - External Communications

Many survey respondents commented they receive no proactive communications regarding the databases, but would be pleased to do so. Prominent amongst the suggestions were email alerts, a regular newsletter in digital format and updates via DataLocator and GeoNOVA website.

THEME 5 – External Partnerships

Survey respondents with partnership experience commented that the SNS – GIS external partnerships typically work well, but many others are unaware of partnership opportunities. Cost sharing arrangements have been a challenge for some potential partners. There is a general desire for the introduction of more partnering for the creation of new products without antiquated and cumbersome data licensing.

THEME 6 – LiDAR Considerations for Nova Scotia

Survey respondents overwhelmingly indicated that they are currently using, or will be an interested in using, LiDAR data in their business activities. Interest is primarily in topographic LiDAR, but there is significant interest in bathymetric LiDAR as well. Respondents have many applications of interest with coastal zone mapping, flood plain mapping and planning processes prominent with a call for the creation of a higher accuracy / high resolution a DEM database on regional or provincial levels.
