



DATA TOOL SELECTION
*An Introductory Guide for
Northern Indigenous
Stewardship Programs*

Tides Canada Indigenous Stewardship Data
Tools Solutions Initiative

June 2018

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1. Why Develop a Data Tools Selection Guide?

Indigenous stewardship initiatives, including Guardian and community-based monitoring (CBM) programs, serve to collect and make sense out of data in order to help indigenous decision-makers make good choices for the land, the water and wildlife.

As described in TNC Canada's Indigenous Guardians Toolkit (2017),

"Data are the concrete pieces of information that are produced by your monitoring activities. Data is collected, stored in some way, and analyzed so that the community can use it to make decisions or share it with external groups to inform and influence outcomes"

"Tools can range from paper forms, survey forms, or handheld devices like tablets, phones, laptops, etc. In some cases you may want to photograph or video document observations, or leave remote cameras behind to capture footage. Increasingly Guardian programs have been making creative use of tools like drones, mapping and GIS, social media and open-source and custom applications to gather and document information."

Choosing the right tools for your program can be complex and sometimes overwhelming. Keeping data management¹ approaches simple, relevant and appropriate for Guardians, monitors, Elders, hunters and other harvesters to use on the land or in the office is critical.

The Data Tools Selection Guide (the "Guide"), found in section 4, provides a five-step decision-making process that can be used to support Northern Indigenous stewardship managers as they work to choose appropriate data tools for their programs.

The process steps are not based on any exact science, because there is no "silver bullet", the "tech" environment is fast paced, and obsolescence is a driving factor. The Guide provides a number of important questions, background information, lessons learned from others and, most importantly, some considerations to think about before investing in and implementing a data management approach.

The guide is intended as a first step in what will likely be an ongoing conversation about data tools and therefore it should be treated as a living guidance document. Tides Canada encourages Northern Indigenous Stewards and other interested parties to keep working on the development of this guide as data management strategies and networks evolve throughout northern Canada!



Jonathan Yakeleya recording a marten track along the trail to Willow Lake in the Sahtú. Credit: GNWT-ENR

¹ Within this Report, the term "data management" is used to describe all of its various aspects, including data collection, data analysis and synthesis, data display, reporting and data sharing.

2. How was the Guide developed²?

The Guide content reflects information shared between Northern Indigenous Stewardship program managers and subject matter experts over the course of a two-day Tides Canada Data Tools Solutions Conversation in Somba Ké / Yellowknife³.

The goal of the conversation was to provide for networking and information exchange opportunities between Indigenous Stewardship program staff, subject matter experts and other resource people to address data tool needs and possible solutions.



Participants at the Tides Canada Data Tools Solutions Conversation, Somba Ké /Yellowknife, NT. March 7th-8th, 2018.

Specific workshop objectives included:

- To showcase northern programs and address data management needs and challenges “on the land”, “at the desk” and “in the community”;
- To discuss and identify lessons learned and the pros and cons of various data tools, and highlight innovative and emerging technologies. In doing so, the workshop aimed to build a data tools approach that could be used by Northern programs; and,
- Identify key opportunities to move forward individually and perhaps even collectively on specific initiatives related to the improvement of data management.

In order to identify innovative approaches and emerging technologies, Tides Canada invited a number of guests representing organizations that both support, or have been engaged directly in building indigenous stewardship programs, including, but not limited to:

- Lara Hoshizaki, Regional Monitoring Systems Coordinator, Coastal First Nations, Great Bear Initiative (Vancouver);
- Peter Pulsifer, Exchange for Local Observations and Knowledge of the Arctic project {ELOKA} Network (Ottawa);
- Morgan Voyageur, Athabasca Chipewyan First Nation Community-Based Monitoring Program (Fort Chipewyan, AB);
- Claire Hutton, TNC Canada (Victoria); and,
- Carolyn Dubois, Water Program Director, The Gordon Foundation (Toronto).

² Project Support to Tides Canada for the Needs Assessment and Workshop design/facilitation and development of the Guidance document provided by Shannon Ward (S.Ward Consulting) and Tee Lim (T.Lim Social Research and Consulting).

³ For additional information about the Conversation initiative and outcomes, including the project announcement, list of participants, Needs Assessment Report, conversation agenda, presentations and a draft data tools analysis matrix, please refer to the “Background Report -Tides Canada Data Tools Solutions Conversation”.

3. Northern Program Data Tool Needs and Interests⁴

Northern indigenous stewardship programs are engaged in a wide range of monitoring and research activities – a case of ‘doing everything’, with a majority of programs undertaking wildlife monitoring, surveillance of land use activities, traditional place name and cultural places research, water monitoring, and climate change research. All programs are engaged in a wide range of community-based monitoring activities “on the land”, “at the desk”, and “in the community” (see Table 1).

Table 1 – Data Management Functions of Indigenous Stewardship Programs

| “On the Land!” (Data Gathering) | “At the Desk!” (Data Analysis / Data Display + Program Management) | “In the Community”! (Data communications) |
|--|--|--|
| <ul style="list-style-type: none"> • Sampling (<i>water, plants, etc.</i>) • Observing (<i>wildlife, weather, etc.</i>) • Patrolling (<i>travelling places, watching, checking, etc.</i>) • Listening and asking questions (<i>learning from Elders and knowledge holders - asking questions with maps and using video and audio tools to record the answers / stories</i>)⁵ • Teaching (<i>youth camps, storytelling, etc.</i>) | <ul style="list-style-type: none"> • Project Management / coordination (managing budget, people, and reporting, paying invoices) • Designing program elements (deciding who, what, when, where, how) • Entering data • Building maps using Geographic Information Systems (building the story) • Data analysis (looking at events, # of occurrences, # of incidents, etc.). • Building visual tools (showing the story with graphs, charts, etc.). • Cultural, Legal or socio-economic research (accessing data sets, building databases, etc.) | <ul style="list-style-type: none"> • Telling your membership about what you are doing and what you are learning (<i>presenting at public meeting, using social media, radio, PowerPoint, Prezi</i>). • Preparing plain language reports to support leadership with decisions respecting stewardship (<i>visual tools that relay information about what is happening on the land including maps, charts, graphs, pictures</i>). |

⁴ In the lead up to the Indigenous Stewardship Data Tools Solutions Workshop in Yellowknife, a Needs Assessment Survey was conducted to help Tides Canada learn more about what the successes and challenges have been especially with respect to the tools being used, and what the interests are to build more knowledge and strengthen skills and overall capacity. A Needs Assessment Report (found in the Background Report) was produced discussing current data management approaches, as well as the relevant gaps, longer-term goals, interests and objectives of the Northern programs Tides Canada is funding. Eleven participants from across the North were invited to complete the survey, largely comprised of Northern land and resource managers, coordinators and technicians.

⁵ This is also done “in the community” at an Elder’s home or at another location.

Key Data Management Challenges in the North

Key data management challenges faced by Northern program leads and their staff include:

- **Funding:** Northern organizations are frequently working with a patchwork of project resources for monitoring, and have a desire to move toward more stable, core funding that would support greater consistency in personnel and other program aspects.
- **Capacity and training:** Related to the funding concern, building community and program capacity is a prominent challenge, including training in the use of monitoring equipment.

“We’re always working with different people, there are challenges in training – having to train new people every time – and familiarization with the equipment.” – Ray Griffith, Lutsel’ke Dene First Nation

- **Equipment and technology:** Selecting appropriate tools for programs can be challenging given the many options available. Maintenance of devices can be expensive, and keeping up with changing technologies can be difficult. A wide range of tools (including GIS, mapping and other functions) currently being employed across the Northern programs, include:

- | | | |
|--|----------------|---|
| • Automatic Identification Systems (AIS) | • inReach | • ArcCatalog |
| • Trailmark | • GPS | • ESRI |
| • DataStream | • SPOT | • Excel and other Microsoft Office programs |
| • iPads and other tablets | • Google Earth | • Fulcrum |
| | • Google Maps | |
| | • ArcGIS | |
| | • ArcMap | |

“We need a tool capable of multimedia data collection and processing: GPS and mapping data, videos, photos, field notes, tape recordings – how do we coordinate all that into a data documentation and management system. What are the most effective multimedia data gathering tools that will feed into the most seamless platform, where we can do some processing over time as well as present the data in raw form and report on in various ways? - Peter Redvers, Kátł’odeeche First Nation

- **Operating environment:** Issues specific to Northern programs included the cold-weather conditions equipment that is required to perform in, as well as internet connectivity in remote settings;

“Also while the data gathering is easy to do in theory, there are challenges in practice: frozen batteries or fingers, rain, etc.”. – Peter Redvers, Kátł’odeeche First Nation



Traditional Knowledge Boreal Caribou field interview. Credit: Kátł’odeeche First Nation

- **Accessibility and making use of information:** Ensuring that information is actually used effectively and appropriately once collected was noted. Involvement of and communication with Elders was of particular concern.

“How do we deliver information to community members? Each group has a specific use of the data; how do we deliver it in an appropriate/useful way?” – Chloe Brogan, Inuvialuit Regional Corporation

“There is no real way for the communities to access and use the data. This raises the need for data platforms that go beyond simply reporting functions, and that can be interactive for the community” - Mike Low, DCFN, AAROM



Inuvialuit Harvest Study. Credit: Inuvialuit Regional Corporation

Specific Data Tool Interests

Northern Indigenous stewardship leads are particularly interested in increasing their capacity and knowledge with respect to:

- **Data sharing approaches:** How to share information and data sets both in the community and also regionally. At a regional level, to be useful, information standards need to be addressed so datasets can be compared and integrated in order paint a broad picture (e.g. Bathurst Caribou Range Planning).

“What are our different options for sharing data? NWT, Pan-Arctic, nationally? We have substantial baseline and comparative data – what do we do with it? We’re ready to share it with the world, but want to do it properly and ensure the safety of the information too. – Michael Birlea, Tł̨chq̨ Government

- **Data synthesis and display:** Related to the challenge of using data once collected and finding effective ways to present data.

“The challenge is to keep it interesting for the community members, while telling them all they need to know. Also the community members should not feel that we are withholding information, but we should also not overwhelm them with boring data.” – Sjoerd van der Wielen, Déline Got’j̨nq̨ Government

- **Traditional Knowledge:** Ensuring that Traditional Knowledge is considered and at the heart of any data management approach and that tools have the ability to incorporate it; and,
- **Multi-platform systems and incorporating narrative:** Need for integrated systems that can incorporate both narrative and data. Monitoring must also document stories, history, the how, what and why.

4. Data Tool Selection Guide

As outlined in the introduction, selecting data tools is not an easy task. This Guide has been developed to provide a methodical process, including key considerations that can guide Indigenous stewardship program managers as they select the appropriate options. The guide is simple and straightforward and is based on a five-step project management/strategic planning approach.

Steps and corresponding questions include:

1. **Clarifying Monitoring Goals, Objectives and General Methods:** “What” are you monitoring, “why” are you doing it and “how” will you do it?
2. **Considering Lessons Learned:** How can “lessons learned” from other groups help you in selecting the right data tool(s)?
3. **Framing Your Needs:** What information are you collecting, what are your “user needs”, and what is your Government’s operating environment?
4. **Matching your Needs with the Right Tool(s):** Given your internal requirements, what tools best fit your needs?
5. **Adaptive Management/Evaluation:** How do you know if the tools are working?

Figure 1 – Data Tool Selection Guide

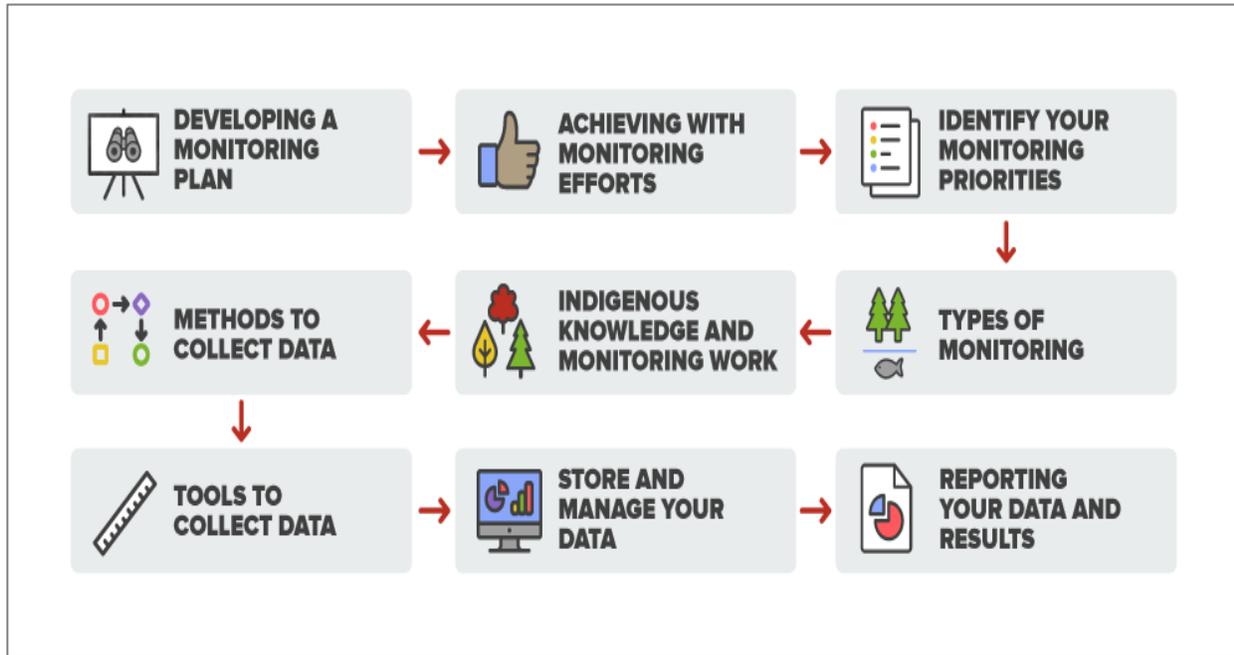


Step 1 – Clarifying Monitoring Goals, Objectives and General Methods: “What” are you monitoring, “why” are you doing it, and “how” will you do it?

Understanding the overarching vision of why you want to collect and use data in the first place is an essential starting point in developing a monitoring plan and selecting the right data tools. Your program should be based upon foundational principles and clear goals and objectives. If your core program

principles and objectives are in place, developing your data collection, synthesis and display approaches (technical or otherwise) will flow more readily. Clarifying the “what” and the “why” will assist you in setting priorities, identifying audiences, knowing where the data is going and will help to identify the proper indicators (e.g. water sampling, collection of specific plants to identify potential contaminants, etc.).

Figure 2 – Indigenous Guardians Toolkit (TNC Canada) – The Big Picture of Monitoring⁶



As illustrated in the Indigenous Guardian Toolkit (figure 2) if the big picture is in place and you have properly identified your goals and objectives, and what you will monitor, only then can you determine:

- What **methods** you will use to collect data;
- What **tools** you will use to collect data;
- How the data will be stored and managed; and,
- How your program will **share** and **report** on their results.

Before you select a data tool, you must also be clear about “how” you will gather and collect the data (the general methods you will use). Will you sample water from a specific lake or river? Are you collecting information from Elders or knowledge holders about the history of a contaminated site? Are you visiting a seismic line to observe how wildlife is being impacted? Different data collection activities require unique methods and likely require different tools.

Tying the overarching vision of the monitoring program to community self-determination is a key consideration in informing and reclaiming monitoring activities, allowing stewards and others involved

⁶ (<https://www.indigenousguardianstoolkit.ca>)

to understand and feel part of this larger vision. Information collected should be assisting your organization to meet its stewardship goals and objectives, for example protecting indigenous and treaty rights in the context of territorial /federal/industry projects, so it is important to bear in mind the implications and power of the information (see the discussion on p. 9 regarding “Reclaiming Monitoring”).

Step 2 – Considering Lessons Learned: How can “lessons learned” from other groups help you in selecting the right data tool?

Mature Indigenous Stewardship initiatives in other traditional territories have gained experience with data tool selection, testing and evaluation, for example groups in coastal British Columbia that are part of the Great Bear Initiative (*see case study on p.11*) using the Coast Tracker tool, or the Athabaska Chipewyan First Nation and its development of the GeoKeeper Application. It is important to consider some of the lessons learned resulting from the experiences of others, look carefully at failed projects in the ‘data hub graveyard’ and try not to repeat mistakes⁷.

There are emerging research and support networks resulting from similar conversations around data tools and data sovereignty as they relate to indigenous stewardship and monitoring initiatives that can be considered at this stage. Here are a list of a few resources and reports that Tides Canada is aware of:

- <https://eloka-arctic.org/index.html>
- Ecotrust ‘Referrals Software: an analysis of options’ (<http://ecotrust.ca/wp-content/uploads/2017/08/AMN-Referrals-Tools-Analysis-sm.pdf>) and
- WWF report ‘Community-based monitoring, reporting and verification know-how: Sharing knowledge from practice’ http://d2ouvy59p0dg6k.cloudfront.net/downloads/cmrv_web.pdf).

Key lessons learned specific to data tools that should be considered include:

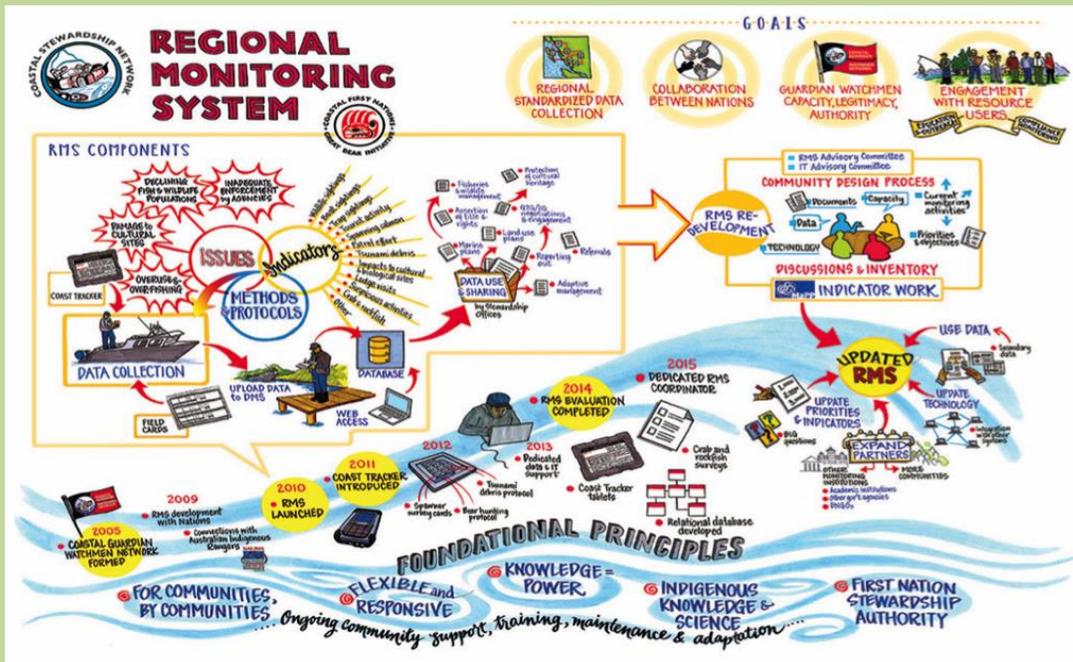
- **Scale:** Consider starting small – with pen and paper, even! – Then scale up. It’s easy to get overwhelmed – start by doing a few things really well, rather than a lot of things poorly;
- **Training and capacity building is key:** Invest money in people, not technology! At the end of the day it doesn’t matter so much what tools you are using, as technology changes rapidly: what matters are the concepts, and that people are comfortable and confident engaging in this work, across different devices and applications over time.
- **Programs not projects:** Data is always evolving, so to be effective it is important to treat data management as a long-term program, not as a short-term term project. You’re “never done developing software!
- **Incorporate/include monitoring and data management into your annual work plans and organizational budget:** Monitoring and data management take considerable human and fiscal resources. Make sure you are factoring this function into budget and human resource plans.

⁷ ‘Mackenzie DataStream: A data-sharing platform for shared water stewardship’ presentation by Carolyn Dubois, Water Program Director, The Gordon Foundation.

Case Study: The Coastal Stewardship Network - Data Tools that Match Foundational Principles and Program Goals

The Coastal First Nations Regional Monitoring System (RMS) came about because the Guardian Watchmen and Stewardship Offices wanted to: Know more about what is happening in their territories;; Be in control of their own data;; Learn about what other Nations are doing; and Work together to monitor issues and indicators they are all concerned about. The evolution of the Coastal Stewardship Network Regional Monitoring System is shown below, including:

- Overarching goals and foundational principles;
- The issues, indicators, methods and protocols that form the basis of their Regional Monitoring System; and
- The many ways the data they collect is used, shared and reported on.



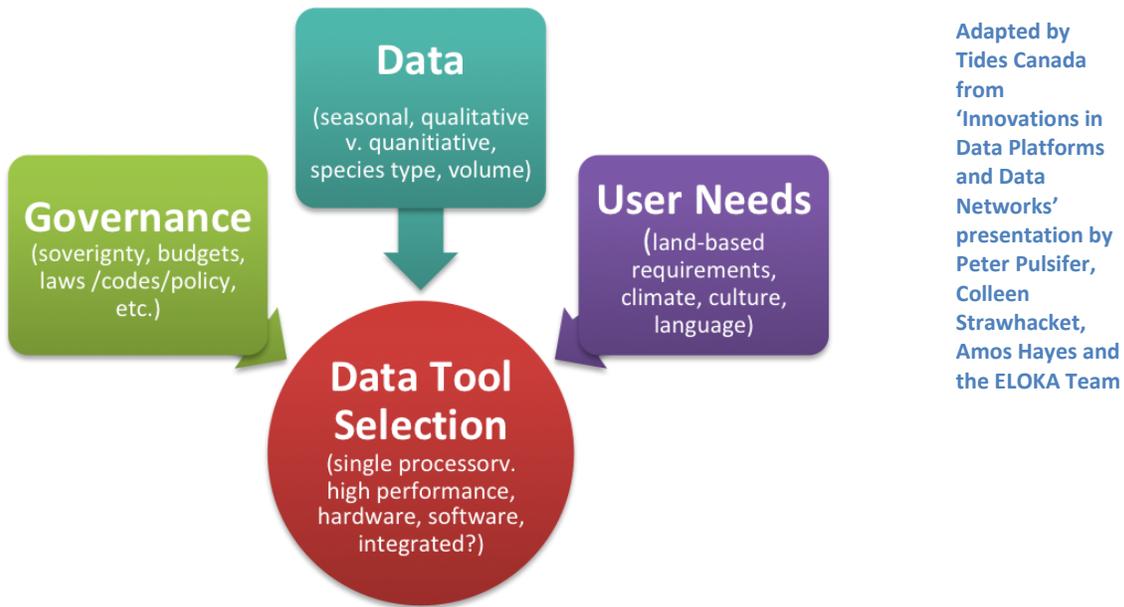
Source - Great Bear Initiative – Coastal Stewardship Network (L.Hoshizaki).

Stages of evaluation, re-development and updating of their Regional Monitoring System are also outlined. An important element of the RMS for the Coastal Stewardship Network is the **hardware and software (the technical tools)** used by Guardians for the various functions including collection, storage, data management and access. For more information about CSN’s hardware and software tools see the Background Report.

Step 3 – Framing Your Needs: What information are you collecting? What are your “user needs”? What is your Government/organization’s operating environment?

Once you have your monitoring goals in place with clear objectives, you’ve identified the general methods you will need to use and you’ve considered lessons learned, consider carrying out a focussed needs assessment of your organizational and program needs and constraints.

Figure 3 - ‘Frames’ to consider when choosing a tool



Undertaking an assessment of your organization’s specific needs and constraints will help in further scoping the type of tool or tools you will require. As shown in Figure 3, broad frames to consider when carrying out the assessment include:

- **The Data** - The data itself is the most important factor in selecting your tool(s). If your program focus is collecting traditional knowledge regarding an endangered plant species, or if you are collecting water samples near to a mining development to assess water quality, your tools will need to adequately gather, analyze and display that particular type of data.
- **Governance** - Your organization may have codes in place (traditional/informal or formalized in law) for how data is to be shared or kept confidential within your organization, which could
- **User Needs** - Your user needs reflect the landscape/community and/or regional conditions you are operating within. What are your field conditions? For example, it is likely that in the North you will need a tool that can function in a cold climate.

Specific considerations are listed in Table 2.

Reclaiming Monitoring



Dahti Tsetso with the Dehcho First Nations describing the Dehcho K'ehodi program to potential program partners. Credit: Tides Canada

An instructive theme that quickly emerged at the workshop was the importance of reclaiming information and the process of monitoring (some participants referred to this as 'decolonizing monitoring'), which means emphasizing the cultural context and importance of being "on the land" and harvesting as the main focal point, with monitoring activities flowing from this. Prominence was placed on the need to reclaim the 'power' of traditional and local knowledge, shifting entrenched power dynamics and demonstrating the validity of this knowledge and the power that it has.

*A number of groups at the workshop shared the challenges that monitoring presents when approached from a western context, including co-management processes. Monitoring in this context tends to be built on a western land and resource management model that drives data collection and doesn't always align with the interests or rights of Indigenous Stewards (See Heeks, R. 1999. *The Tyranny of Participation in Information Systems: Learning from Development Projects*. Institute for Development Policy and Management. University of Manchester).*

Participants highlighted the importance of terminology and framing in monitoring approaches, noting the distance of 'data management' concepts from Indigenous knowledge systems. Concerns of Elders and others were raised about supporting a monitoring process that could be turned against communities, as had been experienced in the past. Data sovereignty was seen as a key component of monitoring, ensuring that agreements and protocols are in place to ensure for the appropriate protection and use of data collected and provided by communities.

Table 2 – Specific Considerations related to Data, User Needs and Governance

| Frames | Considerations |
|-------------------|---|
| The Data | <ul style="list-style-type: none"> • What types of information are you looking to collect? For example: <ul style="list-style-type: none"> ○ Water data (e.g. quality, turbidity) ○ Wildlife data (e.g. observations, tagging) ○ Traditional place names, cultural places research (e.g. mapping and interviews with knowledge holders) ○ Weather data (e.g. meteorological data collection) ○ Climate change data (e.g. permafrost conditions) ○ Land use activity (e.g. traditional, industrial, recreational) ○ Other? |
| Governance | <ul style="list-style-type: none"> • Security/sovereignty: <ul style="list-style-type: none"> ○ How important is security to my organization? Do we need a tool to help support our sovereignty over the data and how it is used? ○ If so, what tools offer the most security? ○ Can the tool support the level of administrative and public access levels that we require? ○ What agreements and protocols need to be put in place to ensure security and appropriate use – are policy and legal tools required to support this? ○ When we are sharing our data regionally or at a territorial level, how can a tool help protect it and ensure it is being used in ways that does not decontextualize it and frames it properly? • Cost-effective: <ul style="list-style-type: none"> ○ Does our work fit better using an Open source (not always free) approach or proprietary? ○ What sort of licensing is involved – are their annual fees? ○ Does it require expensive satellite data? How is the information hosted and what are the costs involved? • Collaboration and regional capacity: <ul style="list-style-type: none"> ○ Are there cost-sharing and common infrastructure opportunities that can be leveraged? ○ Are there regional data sharing and exchange opportunities? This is important for aquatic and migratory species. ○ Is there potential for a regional structure than can provide guidance, information and resources as opposed to communities going it alone? |
| User Needs | <ul style="list-style-type: none"> • Culturally Relevant: <ul style="list-style-type: none"> ○ Does the tool address our way of doing things – does it support local activity and local knowledge, as opposed to the reverse? ○ Can we incorporate our language? ○ Can it present data in a way that makes sense to my Elders and my community and supports traditional perspectives of landscape/changes to it (audio, visual)? ○ Can the tool support story telling? ○ Will this tool support and encourage land-based activity? |

| | |
|--|---|
| | <ul style="list-style-type: none"> • Northern climate and remote conditions: <ul style="list-style-type: none"> ○ Can this tool perform in -40°C? ○ Can we expect the battery to last? ○ Can we use it when there is low bandwidth? ○ We are often in dangerous/remote conditions – does the tool provide safety features? |
|--|---|

Step 4 – Matching the Tool(s) with our Needs - What data tool characteristics best fit with our situation and what do we need out of that tool?

You may need multiple tools or you may find a solution in a single tool to achieve your program goals that meets your needs “on the land”, “at the desk” and “In the community”. Examples of tools and how they apply to various stewardship functions include:

Table 3 – Hardware and Software Categories

| Types of Tools | “On the Land!” (Data Gathering) | “At the Desk!” (Data Analysis / Data Display + Program Management) | “In the Community”! (Data communications) |
|---|---------------------------------|--|---|
| Hardware | | | |
| • iPads / Other Tablets | √ | √ | √ |
| • GPS (e.g. inReach/Spot) | √ | | |
| • Cellphones | √ | | |
| • Automatic Identification Systems (AIS) | √ | | |
| Software | | | |
| • Geobrowsers (Google Earth/Maps) | √ | √ | √ |
| • Mapping / Geographic Information Systems (e.g. ArcGIS / Arc Map) | | √ | √ |
| • Information Management (ArcCatalogue / Excel) | | √ | √ |
| • Integrated platform software / apps (e.g. Coast Tracker, Geokeeper, Kobo Toolbox, Nunaliit, Trailmark, Fulcrum) | √ | √ | √ |

You should also keep in mind what the display goal is for the data. It might be the development of a data listing or a catalogue of information (Elders stories), the development of a community website to share traditional knowledge of various kinds, an Atlas showing traditional place names, or a portal

connected to products/output resulting from your community-based monitoring program⁸. Envisioning the display goal may also assist you in identifying the right platforms/tools to consider.

You will want to also think about the following technical considerations at this stage in the process to assess the best data tool fit⁹:

- **Multi-use/integrated:** Can we use the tool “on the land”, “at the desk” and “in the community”? Is that important? Does the tool record audio and visual information alongside data? Does it link to other functions of a guardian e.g. enforcement?
- **Easy and desirable to use:** How easy will this tool be for guardians/field personnel to use? Does it require significant training? Might incentives be required to encourage use (e.g. paid Guardians and monitors)?
- **Compatibility/interoperability:** Will this tool work well with other tools we are using? Can I easily sync/download data between devices, and between systems?
- **Flexibility/customizable:** Can we adapt it to community interests? Can we adapt this tool to my organization’s needs? Does it allow us to make our own forms, and use our logo and branding? Can it address subjective requirements like comments and notes versus simple checkboxes?
- **Accessible:** Can we access this tool as open source? Will our information be in the “cloud”, or on an in-house/remote server and what will work best for our organization? Will this tool appeal in its “look and feel” to youth, Elders? How easy is it to share information?
- **Capacity/analytical:** Can the tool support the integrity of the data? Does it have a high capacity for data storage?
- **Complexity:** Can the tool handle nested data structures (multiple categories)?



Credit: Dehcho-Aboriginal Aquatic Resource and Oceans Management Program

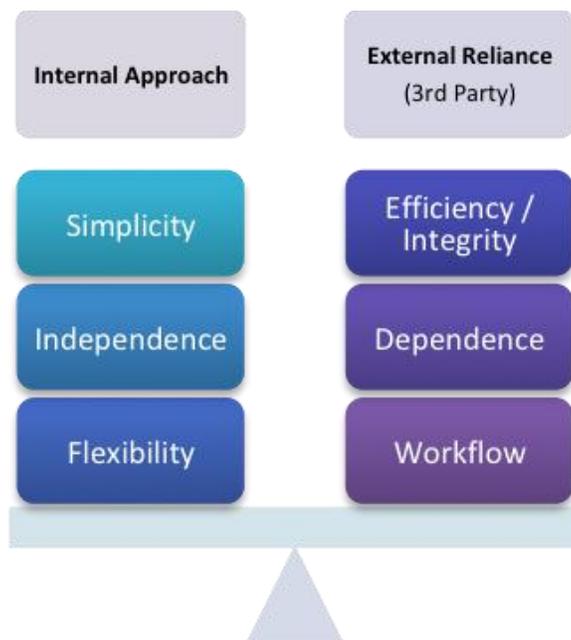
Then you may also want to take into account a number of program-driven factors and decide on the desired level of investment in terms of cost, and organizational effort (see Figure 4).

⁸ Sample applications discussed by Peter Pulsifer Exchange for Local Observations and Knowledge of the Arctic (ELOKA) at the Tides Canada Data Tool Solutions Workshop.

⁹ A number of tools were tested or discussed at the Tides Canada Data Tools Solutions Conversation in Yellowknife, including pros, cons and questions for each. To access this list, please refer to the Background Report, Appendix 5. It is by no means an exhaustive list, but may be a useful refresher in thinking through many of the considerations listed.

- **Independence versus Dependence:** This involves the degree to which third-party involvement in your program (and access to your data) is acceptable, versus tools that your program has full autonomy over. For example, third-party data storage comes with concerns around data sovereignty and the potential for data to be held ‘hostage’ in some cases. However, independent tools come with a major cost and capacity consideration: does your organization have the internal IT capacity to develop and maintain a fully independent system?
- **Flexibility versus Structured Workflow:** The degree to which you can maintain flexibility in your tools relates to how controlled and streamlined your workflow can be. For example, when doing a survey, using Yes/No, pick lists, check boxes and other controlled fields can result in a very streamlined workflow that makes training staff easy and provides consistent results. However, there is little flexibility if a respondent would like to include information that is not provided as an option in the survey.
- **Simplicity versus Efficiency/Data Integrity:** Microsoft Excel is in wide use by many of the Northern programs represented at the workshop, and while often simple and accessible, challenges arise around coding and data integrity as data sets get larger and/or more complex. More advanced tools such as relational database software can be more efficient and better manage data integrity, however a higher level of expertise is required to configure and manage this type of database. Additionally, dependence on Excel-specific formulae can pose ‘interoperability’ constraints – the ability to exchange and make use of the information collected in different ways and on different platforms. Without sufficient attention, information can be lost when the data is exported for use in other systems.

Figure 4 – Internal or External Approach?¹⁰



¹⁰ Adapted from a discussion between Peter Pulsifer and Kát'odeeche First Nation staff at the Tides Data Tools Solutions Conversation, March 7th-8th, 2018.

Step 5 – Evaluation and Adaptive Management - How will you evaluate to determine if these tools are working?

As a best practice, you should test, review and adapt data tools after you've been working with them for a couple of years, or when it makes sense. This can be done by using a simple program and evaluation process¹¹. It might be part of a broader evaluation of the whole program, or focused simply on a review of the data tools themselves. For example, the Coast Tracker app (used by the Nations under the Coastal Stewardship Network) was tested vigorously by members. During an evaluation process, limitations were identified (e.g. Coast Tracker was not very good at handling a nested data structure) and the CSN is now in the process of developing a "Coast Tracker 3" app, which can handle more complex data collections/surveys. In addition to updating technology and data tools, the evolution of the CSN's system also included updating and tweaking program priorities and indicators and expanding the partners involved. It has been an iterative and adaptive process.

You may need to hire outside expertise. If you go that route, be sure to hire software developers or technical advisors with proven track records in assisting and supporting Indigenous Stewardship programs to address these challenging questions.



Ross River Dena Council and Dechinta Bush University Indigenous Boreal Guardian pilot program. Credit: Norman and Josh Barichello

¹¹ The Indigenous Guardians Toolkit references 'Indigenous Approaches to Program Evaluation' <https://www.ccsa-nccah.ca/docs/context/FS-IndigenousApproachesProgramEvaluation-EN/pdf>