

Modernization of Environment Canada's Water Quality Data and Services:

Credible, Comparable National- Scale Access



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Outline

1. Data and information challenges at
2. Realities: Background
3. The three-point plan
 1. *Database standards: metadata etc*
 2. *Comparability*
 3. *Delivery*
4. RésEau demo



Data and Information Challenges

- 💧 Answering simple questions with complex data (*drinkable, fishable, swimmable, available?*)
- 💧 Distributed system (monitoring and data management)
- 💧 Different information needs to address a multitude of watershed issues...
- 💧 Diverse parameter nomenclature, methodologies and units of measure – Data Comparability?
- 💧 Data usability – can related data from different sources be integrated into common uses
- 💧 Diverse monitoring objectives
- 💧 Technology is *NOT* a barrier

Inability to access and synthesize existing monitoring program results for credible, national (and other spatial) assessments



Our Reality: EC's History 101

- **~1992 (Pre-program Review)**
 - Single, central database for water quality
 - Code standardization
 - Effective, dedicated and central data management group
- **Post Program Review**
 - Regional autonomy, evolution to independent, decentralized databases
- **2003**
 - National review exercise of variation in regional Codes and DBs
- **2005**
 - Data comparability assessment begins with NLET
 - Regional technical and Scientific committees set-up
 - Web Service Delivery of a “Chewable Chunk” of data - RésEau



Objective

To facilitate sharing, discovery, access and use of credible, comparable, national Scale water Quality data from EC's distributed monitoring networks

No centralized water quality “Data Warehouse”!



The Issue

Inability to access and synthesize existing monitoring program results for credible, national (and other spatial) assessments

Symptoms Include:

- Variable nomenclature (Dissolved Oxygen, Diss Oxy, D.O)
- Variable laboratory methods (Comparable??)
- Proliferation of redundant National VMV codes*
 - VMV codes
 - Variable database formats (Access, Sequel, Oracle)

* **VMV code** = *Valid Method Variable. 6 digit numeric code representing a parameter and method of analysis*



What do VMVs Look like?

106033	3307	Glyphosate	2862	Herbicides, other	1.0 ug/L
106034	3307	aminomethylphosphonic acid	3119	Herbicides, acidic	1.0 ug/L
106035	3307	Glufosinate	3319	Herbicides	1.0 ug/L
106036	3308	Trimethoprim	3570	Pharmaceuticals	5 ng/L
106037	3308	Pentoxifyline	3571	Pharmaceuticals	2 ng/L
106038	3308	Cyclophosphamide	3572	Pharmaceuticals	5 ng/L
106039	3308	Cabamazepine	3573	Pharmaceuticals	0.5 ng/L
106040	3308	Caffeine	3574	Pharmaceuticals	1 ng/L
106041	3308	Cotinine	3575	Pharmaceuticals	1 ng/L
106042	3308	Sulfacetamide	3576	Pharmaceuticals	25 ng/L
106043	3308	Sulfapyridine	3577	Pharmaceuticals	10 ng/L



Key Project Elements

1. *Modernize the data delivery:*

Purpose: To assess and remedy the critical barriers across the databases to facilitate access to national-scale data through interoperability

2. *Data Comparability*

Purpose: To ensure credible, comparable water quality data for national-program needs

3. *Services and Delivery:*

Purpose: To facilitate the Sharing, Discovery, Access and Use of EC's water quality data holdings



1 – Modernization of the DBs

1. *The Architecture: A reliable delivery vehicle*

1. Master dictionary of parameters and codes
2. Automated extractions to a “Flat”, controlled file
3. Web service for the file
4. Master dictionary of required look-up tables

2. *The Data: “Service Ready” data targets = long-term, active stations (chewable chunk)*

1. Full metadata of site including ALL parameters monitored
2. Post 1990 nutrient data from active, long-term stations
3. “Service Readiness” controlled by flags in database

Ongoing: Additional data from other parameter groups



2 – Data Comparability

The Assessment: Experienced Chemist familiar with the lab methods and VMV codes *

1. Examination of 1000s of parameter codes (Nutrients, Metals and Major Ions)
2. Useable document that could serve web apps, tools and services
3. Expandable as future demands increase

VMV code = Valid Method Variable. 6 digit numeric code representing a parameter and method of analysis

Footnote: Nutrients and Trace Metals are common parameter classes in EC's monitoring programs. They also constitute more than half of all parameters in EC's long-term monitoring programs



2 – Data Comparability (cont'd)

Comparability? =

***= Analytical Method (VMVx) = Analytical
Method (VMVy) = Analytical Method (VMVz)***



3 – VMV Services

*Users: Federal Departments, Provinces, Industry, Internationally
(UNEP GEMs water)*

1. The Architecture: The VMV Codes

1. **What?** Master dictionary of codes, methods and lookups
2. **How?** Web tools and enablement
3. **Why?** Internal and External clients – EC leadership

2. The Services: Web-enabled services to support VMV code users

1. *Single, reliable, centrally-coordinated VMV process*
2. *Lookup services for VMVs, methods and keywords*
3. *Automated VMV request form and service*

Ongoing: *Additional services as needed and append the dictionary*



Next Steps

1. **Data comparability of organic compounds and data from other jurisdictions**
2. **Expand data delivery to include additional parameter groups**
3. **Improve and provide access to the new VMV dictionary**
4. **Continue to optimize the VMV services**
5. **Improved provision of published and interpreted content**
6. **Water Quality “stories” with more tools built onto the data**
7. **Improved integration of quality with quantity, use etc.**



Summary

Credibility

- Data should be collected, managed, delivered and accounted for from the source by the experts
- Implement standards for content such as QA/QC protocols from field to laboratory to database to publication

Comparability

- Assessment of data comparability
- Implementation of metadata standards

Accessibility

- Expand and continue the principles of sharing, discovery, access and use of water quality data and information for all Canadians
- Continue to use the web services / interoperability approach through RésEau



How can data be delivered
more easily, credibly and
effectively??



Delivery Issues

- Increasing demand for data and information;
- Single source of comprehensive info a myth;
- Clearinghouse/warehouse model no longer relevant;
- Linking distributed info through web services is key

Solution?

practical on-line information system(s)

integrating data, information, tools and expertise
from distributed sources that support common
user needs



RésEau Sharing, Discovery and Access

The screenshot shows a Microsoft Internet Explorer browser window displaying the RésEau website. The browser title is "RésEau - Mapping - Microsoft Internet Explorer". The page layout includes a navigation menu on the left, a main content area with a map of Canada, and a search bar at the top. The navigation menu lists categories such as Air, Climate, Freshwater, Health, Land, Oceans, Pollution, Sustainable Development, Weather, and Aboriginal People. The main content area features a map of Canada with various cities labeled, including Whitehorse, Yellowknife, Edmonton, Regina, Winnipeg, Vancouver, Victoria, Toronto, and Ottawa. A search bar and navigation tools are visible at the top of the page content.

Navigation Menu (Left):

- Air
- Climate
- Freshwater
 - About water
 - What is it?
 - Where is it?
 - How much do we have?
 - How good is it?
 - How do we use it?
 - What about droughts and floods?
 - How do we manage it?
 - What can you do?
 - Research
 - Data and Information
 - RésEau Home
 - RésEau Demonstrations
 - Search for Information
 - Mapping Water Information
 - Explore Water Topics
 - Know Your Watershed
 - Educational Resources
 - Glossary
 - Freshwater maps
- Health
- Land
- Oceans
- Pollution
- Sustainable Development
- Weather
- Aboriginal People

Main Content Area (Top):

- Top header graphic
- Navigation tools: Full Map, Zoom In, Zoom Out, Pan, Identify Point, Search, Clear, Refresh Map
- Map of Canada showing major cities and water resources.
- Map controls: Select a location, Medium, QuickZoom, Map Size, Print, Help

RésEau Mapping

RésEau - Mapping Water Info

File Edit View Favorites Tools

Google

Air

Climate

Freshwater

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- Mapping Water Information**
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- Know Your Watershed
- Educational Tools, Resources
- Glossary
- Freshwater maps

Health

RésEau - Mapping - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Google Search 20 blocked Check AutoLink AutoFill Options

RésEau - Mapping

Full Map Zoom In Zoom Out Pan Identify Point Search Clear Refresh Map

Selected Layers

- [Water Quality Stations - Newfoundland and Labrador](#)
NA
- [Water Quality Stations - Pacific and Yukon Region](#)
NA
- [Southeast Environmental Association - Clean River Quest 2004](#)
NA
- [Prince Edward Island Public Water Data](#)
NA
- [Community Water Quality](#)
NA
- [Capitals \(Canada\)](#)
NA
- [NTDB 50K](#)

Select a location Medium Print Help

QuickZoom Map Size

Canada Canada

Know Your Watershed?



Know Your Watershed

Bonne Bay

* Click Thumbnail image to get Larger Map

Local



Regional



Ocean Drainage Watershed



Information about this watershed. Click heading to open / close items: [Open All](#)

Places in this watershed (0)

Citizen-based groups involved in this watershed(0)

Government websites / reports concerning this watershed (7)

Other websites / reports concerning this watershed (0)

Indian Reserves in this watershed (0)

Watersheds Upstream (1)

Watersheds Downstream (1)



Air

Climate

Freshwater

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-
-
- Glossary
- Freshwater maps

Health

Land

Oceans

Pollution

Sustainable Development

Weather

Aboriginal Peoples

Photo Gallery



Trout river gulch,
Gros Morne National
Park, Newfoundland.



Baker Brook Pond,
Gros Morne National
Park, Newfoundland.



Trout River Pond
glacial trough,
Newfoundland.



Access to Data Across Jurisdictions!

Environment, Energy and Forestry

HOME / PUBLIC WATER DATA / TEXT SEARCH /

Public Water Data

Phosphorus, Total ($\mu\text{g/L}$)

Date	Phosphorus, Total ($\mu\text{g/L}$)
Aug 10,99	62.70
Aug 8,00	25.08
Aug 7,01	58.00
Aug 5,02	112.86
Aug 4,03	50.16

Station Number: SPB 8B
Station Name: St. Peter's Bay - centre of bay near Dingwell Pt.
Latitude: 46.4285
Longitude: -62.6595

» Download All Raw Data for Station SPB 8B
Download

» Print All Raw Data for Station SPB 8B
Print

» View Station SPB 8B on a Map
View

Station SPB 8B Water Data

- » Temperature
- » Salinity
- » Phosphorus, Total
- » Chlorophyll a
- » Tidal Stage
- » Sample Depth
- » Nitrogen, Total
- » Secchi Depth
- » Oxygen, Diss

Prince Edward Island CANADA

Official Website

[Gov. Home](#)

- [Pesticide Use and Regulation](#)
- [Public Water Data](#)
- [Eastern Kings Wind Farm Project](#)
- [PEI Wind Atlas](#)
- [Residential Energy Assistance Plan](#)
- [Government Guide](#)
- [Prince Edward Island Wind-Hydrogen Village](#)
- [Forestry Contact Information](#)
- [Forest, Fish and Wildlife Division - Programs and Services](#)

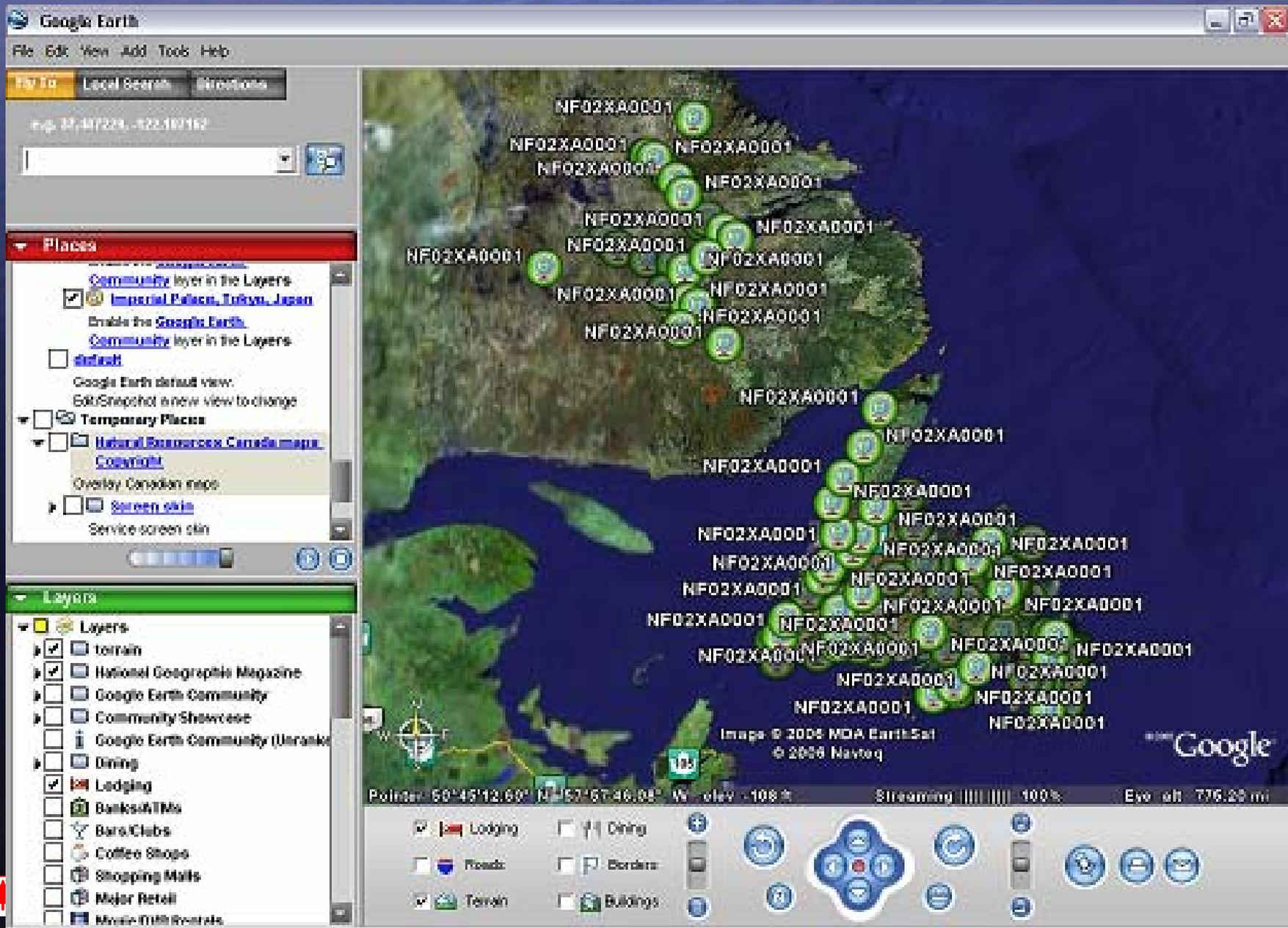
- [News Releases](#)
- [Feedback](#)
- [Printer Friendly View](#)
- [Site Map](#)

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Flexibility of Services – Google Earth!



RésEau data discovery and access

Environment Canada / Environnement Canada

Canada

Français	Contact Us	Help	Search	Canada Site
What's New	Your Environment	Information/Publications	Weather	Home
About Us	Data Extraction	Charting		Help
Map				

Envirodat Data Extraction

Select Criteria:

Projects:

- AP2112 | COMPLIANCE AND ENFORCEMENT
- AP2113 | CEPA MONITORING AND FIELD INVESTIGATIONS
- AP2114 | ASSESSMENT OF PESTICIDE PROGRAMS/PROBLEMS
- AP2122 | DECOMMISSIONING-SITE INVESTIGATIONS
- AP2125 | CONTAMINATED SITES REMEDIATION

Stations:

- NB01AD0009 | LITTLE RIVER AT HWY BRIDGE NEAR
- NB01AD0010 | FOLEY BROOK IMMEDIATELY ABOVE HWY, 3.2
- NB01AD0011 | GREW BROOK IMMEDIATELY ABOVE HWY, 4.5
- NB01AD0012 | MADAWASKA RIVER AT ROAD BRIDGE AT ST. JACQUES
- NB01AD0013 | ST. FRANCIS RIVER AT PICNIC SITE

Provinces:

- NB
- NF
- NS
- PEI

Find

Append to current selection

Find

Append to current selection

BIOTA:
Atlantic Salmon, Sea Trout,
Brook Trout, Arctic Char,
Stickleback and American Eel.
Western Brook is in Scheduled

0 | Drainage Area | Barren | Forested | Organic | Lakes

6 (Km)

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