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The Canadian Aquatic Biomonitoring Network (CABIN)

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NATIONAL CABIN TEAM
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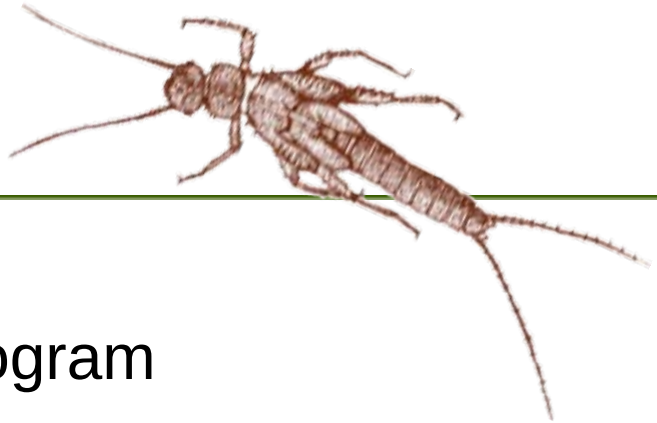
CABIN CANADIAN AQUATIC BIOMONITORING NETWORK

RCBA RÉSEAU CANADIEN DE BIOSURVEILLANCE AQUATIQUE

Overview



- What is CABIN?
- Implementation of National Program
- CABIN and the Reference Condition Approach (RCA)
- Main components of the national CABIN program
- Next Steps

What is CABIN?

- CABIN is a national, collaborative program and network for collecting, assessing and distributing information on the biological condition and biodiversity of aquatic ecosystems in Canada.
- CABIN provides a nationally standardized protocol for the collection of benthic macroinvertebrate samples and physical (eg. habitat, water chemistry) information to allow for aggregation and sharing of comparable data
- Uses the well-established Reference Condition Approach (RCA; Wright et al. 1984; Simpson & Norris 2000; Reynoldson et al. 1995) where test sites are assessed using a collection of ‘reference’ sites (eg. best available condition).

Why biomonitoring?

- Chemical water sampling provides a snapshot of conditions at the time of sample collection
- Biomonitoring integrates the condition over a longer period of time
- Biomonitoring tells you the state of the system (eg. ecological impairment can only be assessed by biological conditions)
- Biomonitoring enhances condition assessment based on chemical measures by validating assessments or identifying undetected problems

CABIN: A science-based approach

Canadian Aquatic Biomonitoring Network (CABIN) Development:

- Began in Great Lakes (1990) and Fraser River Basin (1994) through research program (Reynoldson et al. 1995; Rosenberg et al. 1999)
- Modeled after national biomonitoring programs in the UK and Australia
- Canada was **only** G8 country that did **not** have a national aquatic biomonitoring program, until national launch of CABIN monitoring program in 2006

National Implementation of CABIN

- CABIN expanded nationally in 2006, focused on building reference site collections (i.e. best available condition) across Canada
- Focus areas: 1) Federal lands - National Parks 2) basins with CABIN sites and existing status and trends water quality sites, and 3) basins with monitoring partnerships.

Objectives of using CABIN in Water Quality Monitoring:

- To add a biological "status/effects" component to the national water quality monitoring program
- To identify streams where aquatic biota indicate reduced water quality
- Advise and report on status of freshwater quality in Canada with comparable, consistent and scientifically defensible data

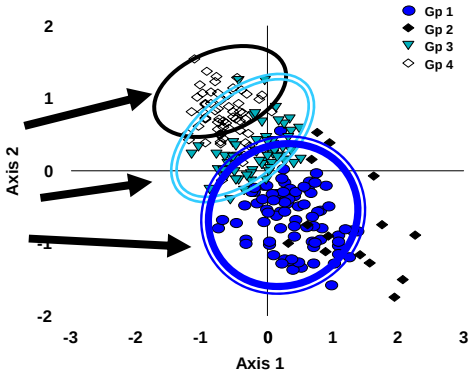
CABIN uses the Reference Condition Approach (RCA)

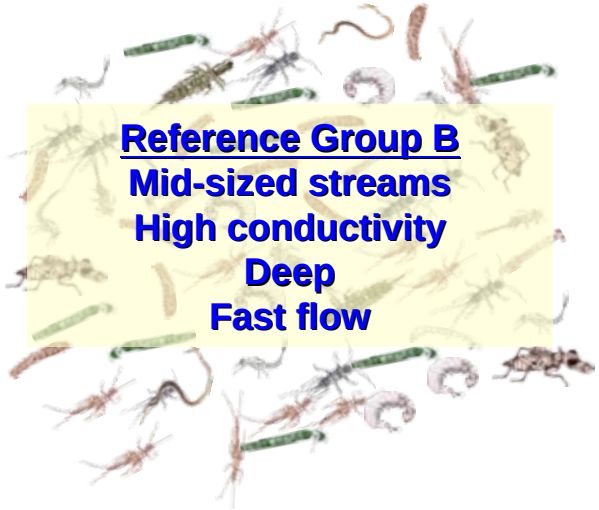
1) Measure the range of biological conditions and habitat attributes in various reference sites

2) Partition biological conditions into subsets (eg. reference groupings) based on the biological communities.

3) Develop models that will predict the biological community at a test site based on its habitat information.

4) Compare test site to appropriate reference subset





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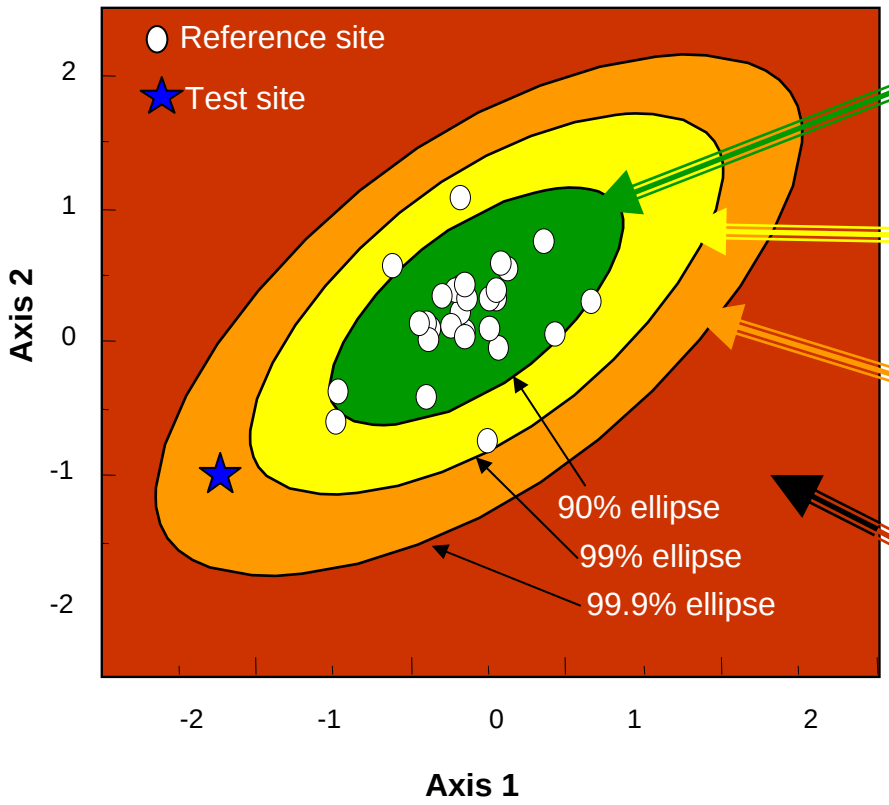
CABIN Assessment Approach: Categories of Biological Condition

Reference Conditions = Within 90% Ellipse



Similar

Mildly Divergent

Divergent

Highly Divergent

A useful environmental screening tool

Site requires monitoring

Sample and asses condition using CABIN
complement chemical monitoring assessment or identify sites of concern

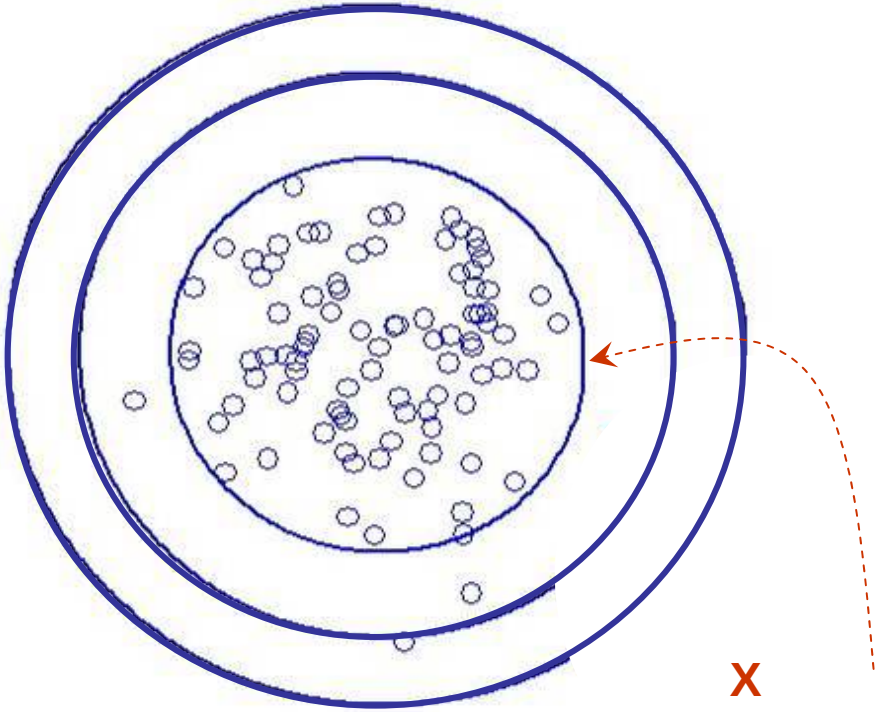
Site is not what is expected: Divergent

Site in reference condition: Similar

Site specific testing to determine cause of stress
(chemical sampling, sampling along a gradient, toxicity testing, experimentation)

Action taken to improve site quality

Sub-watershed application of CABIN:
Trends in condition over time



Sensitive for tracking changes in stream condition over time

e.g. Quinsam River benthic community moves closer to reference condition from 2001 to 2006

Components of the National CABIN Program

1. Network Implementation & Partnerships – sampling using standard protocol
2. Online shared data/information management (national database); online data analysis and reporting tools
3. National training program – *new!*
4. CABIN research and development
5. QA/QC program

CABIN
Canadian Aquatic Biomonitoring Network
Welcome

1. Network Implementation & Partnerships – sampling using standard protocol

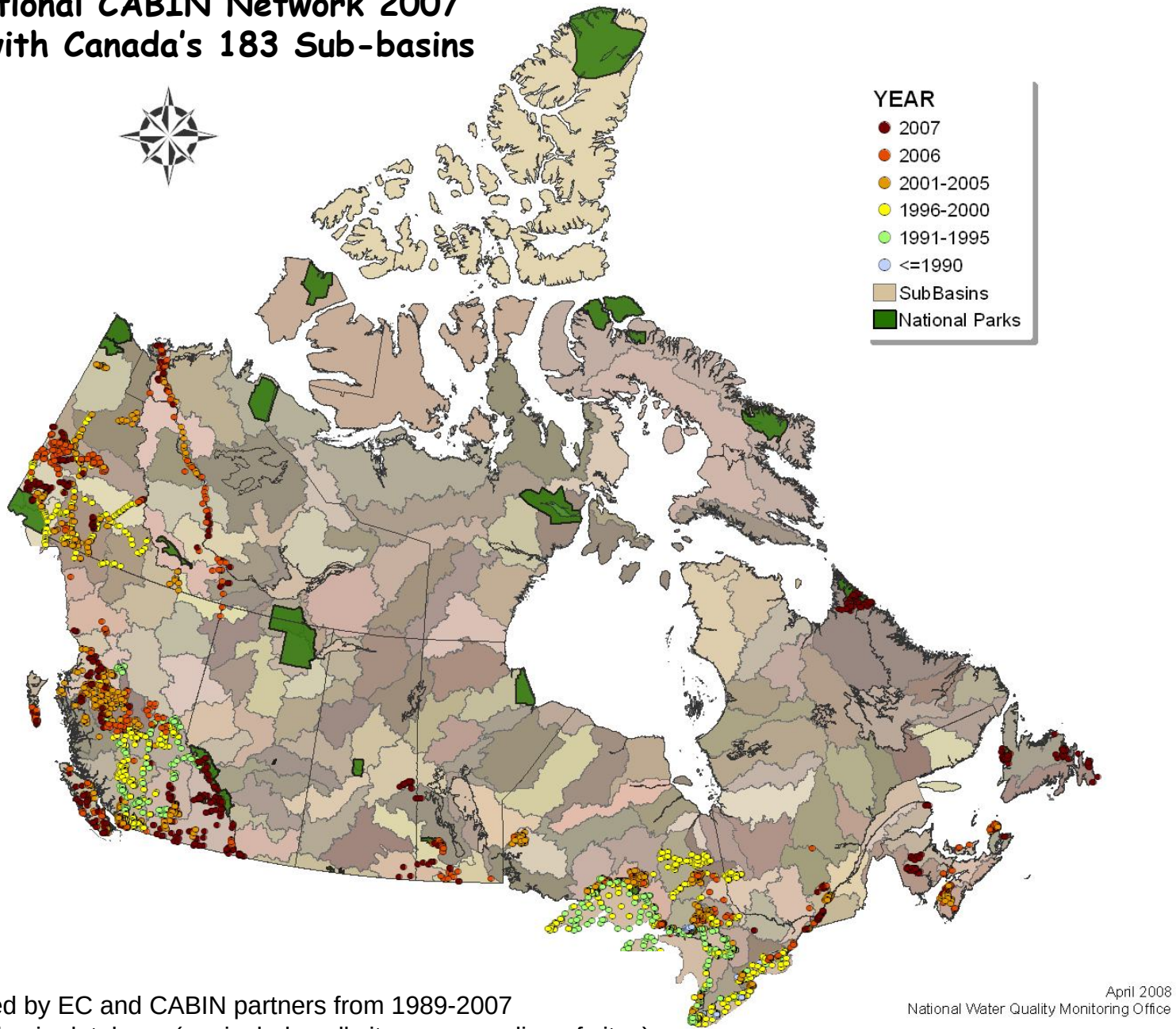
CABIN is a "network of networks" – Partnership are key:

- Parks Canada (Ecological Integrity Monitoring program)
- Provinces & Territories
- Universities: Univ. of New Brunswick – Canadian Rivers Institute, Univ. of British Columbia, Univ. of Western
- First Nations & Community Groups
- Department of Fisheries and Oceans

CABIN provides a nationally standardized protocol for comparable data

- Interest in making data interoperable (eg. historic data collected using different protocols)

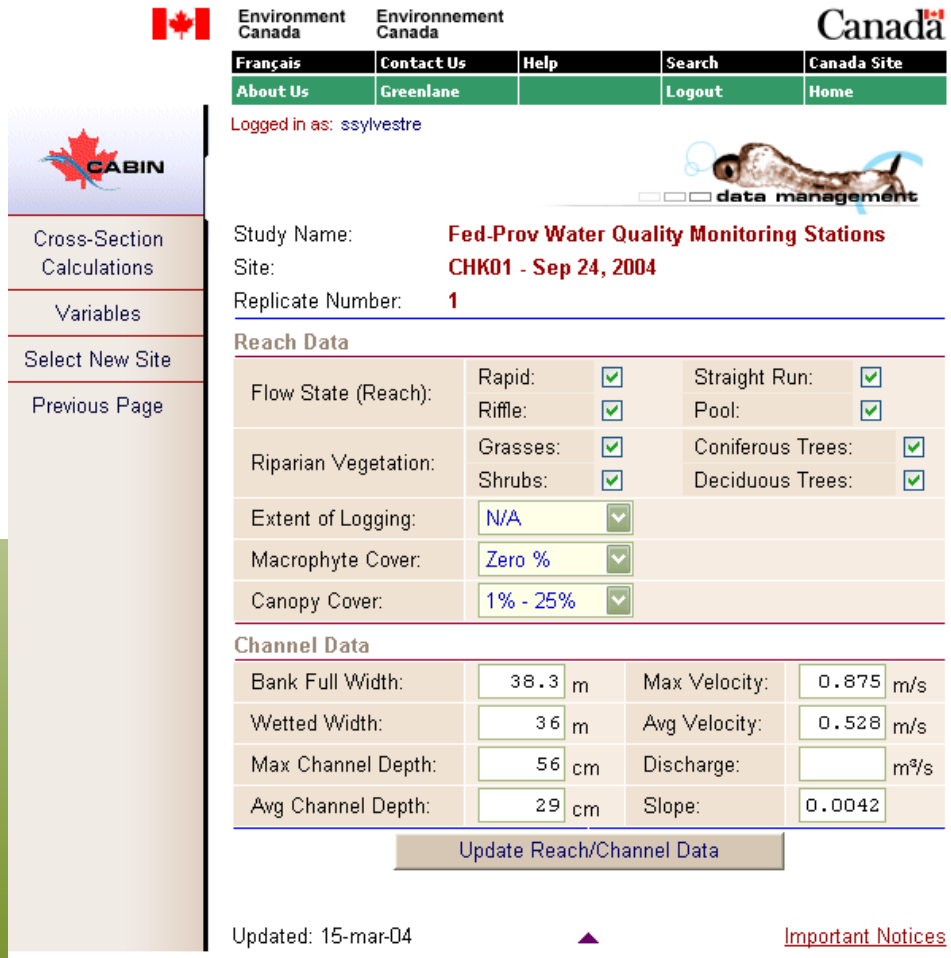
The National CABIN Network 2007 shown with Canada's 183 Sub-basins



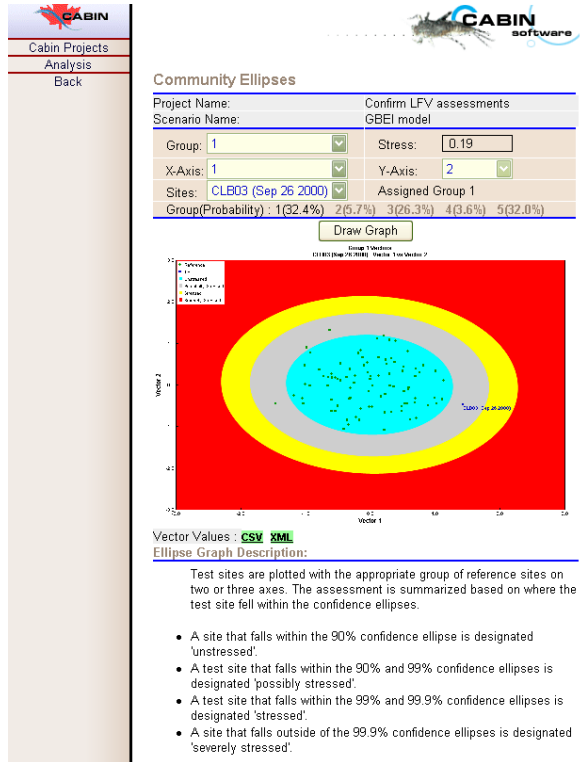
Includes:

- Data collected by EC and CABIN partners from 1989-2007
- >6000 samples in database (eg. includes all sites, re-sampling of sites)
- ~ 850 reference sites

2. Online National Website and Tools



- Shared online database
- Online resources
- Mapping tool
- Analytical tools (eg. metrics, multivariate analyses)
- Reporting tool



http://cabin.cciw.ca/cabin/

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3. CABIN National Training Program

New!

- Developed over last year due to high demand for CABIN training from aquatic ecosystem monitoring partners across Canada (eg. government agencies, community groups, academia)

- 5 **online learning modules** followed by a regionally based, in-person **certification workshop**
- Specialized CABIN training workshops in the north (International Polar Year project)

- Delivered by EC National CABIN team and the Canadian Rivers Institute (CRI; **http://www.unb.ca/cri/Courses.html#Stats**)

Canadian Rivers Institute

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CABIN National Training Program

Online Module Breakdown:

Module 1: Introduction to biomonitoring and CABIN

Module 2: Study design, Site Selection, and Reference Condition Approach

Module 3: Standard CABIN field sampling protocols for wadeable streams

Module 4: Sample processing and taxonomy

Module 5: CABIN assessment & reporting

- **Data entry module**
- **QAQC summary module**
- **FAQ section**
- **Glossary**
- **Required readings/online library access to literature**
- **Self-tests (not graded)**
- **Quizzes, assignments, online discussions (all graded)**
- **Regional, in person certification workshop**

Structure of Online CABIN Training

Module 1 – Introduction to Biomonitoring and CABIN

Module 2 – Study Design, Site Selection, and RCA

Module 3 – CABIN Field Protocol
Access to Data Entry

Module 3 – CABIN Field Protocol

In-Person Certification Workshop

WHO?
Project leads/scientists
Field Technicians
Students

Module 4 – Sample Processing and Taxonomy
(optional)

Module 5 – Data Analysis
Access to Analytical Tools

WHO?
Provincial, Territorial, Federal biologists
Project leaders; consultants

Module 4 – Sample Processing and Taxonomy
Access to Data Entry

WHO?
Taxonomists
Project leaders
Community Groups
Students

Suppl. Module - Data Entry

WHO?
Data Entry Technicians

Blackboard Learning System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address https://learning.unb.ca/webct/urw/lc5116001.tp0/cobaltMainFrame.dowebct Go Links

Google Go Bookmarks 107 blocked Check AutoLink AutoFill Send to Settings

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Development - M Grey Development

Course Tools
- Course Content
- Announcements
- Calendar
- Chat
- Discussions
- Learning Modules
- Mail
- Media Library
- Roster
- Web Links
- Who's Online

My Tools
- My Grades
- My Progress

Your location: **Home Page**

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Welcome to the Canadian Aquatic Biomonitoring Network (CABIN) online training program.

This program consists of non-credit modules that comprise the CABIN training certificate. For certificate completion, there is also a face-to-face workshop that must be completed within your region. For more information on these workshops, please contact: johndoe@ec.gc.ca.

Program Details

Learning Modules

Useful Links

Course Evaluation

Help Using Blackboard

FAQs
CABIN Frequently Asked Questions

Glossary
An alphabetical list of terms relating to this course, and their descriptions.

Course Announcements

Done Internet

Blackboard Learning System - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address https://learning.unb.ca/webct/urw/lc5116001.tp0/cobaltMainFrame.dowebct Go Links
Google Go Bookmarks 138 blocked Check AutoLink AutoFill Send to Settings

Module 2: Reference Condition Approach

Study Design, Site Selection, & Predictive Models

2.1 Introduction to Study Design and the reference condition approach

2.2 Site Selection

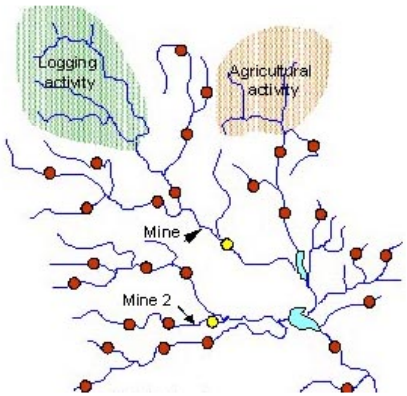
2.3 Model Building

2.3.2 How to model variation among reference sites

Required readings

Assessment activities

References and further reading



The CABIN modules are designed to provide participants with the necessary skills and knowledge to successfully conduct assessments of river health, to an acceptable standard, using CABIN methods; and to provide uniformity and consistency in the application of CABIN methods.

Learning outcome - Module 2

- Participants will have an understanding of the steps involved in study design, selection of reference sites and the concept behind the reference condition approach and predictive models. Participants will receive will receive data user access to data in the CABIN database.

Done Internet
Start EN

4. CABIN Research & Development

- Research and development of CABIN are ongoing to continue to improve the evolving program**.**

Examples of Research (*Aquatic Ecosystem Impacts Research Division)*

- DNA barcode library of Canadian benthic invertebrates in collaboration with the Canadian Barcode of Life Project
- Digital archiving of the CABIN reference collection in support of development of a Canadian National Identification key
- Development of advanced analytical tools for site and watershed classification of ecological condition (eg. Canada-wide models of ecosystem structure and function based on species traits and tolerances)

5. Quality Assurance/Quality Control Program

- **QA/QC steps occur throughout CABIN program**
  - ✓ Study design and re-sampling for temporal variation
  - ✓ Field preparation and sampling
  - ✓ Post-sampling checks and sample storage
  - ✓ Sample processing (eg. standard method for sub-sampling)
  - ✓ Sample sorting (eg. 95% sorting efficiency)
  - ✓ Taxa identification and voucher specimen collection
  - ✓ Data entry and management

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Next Steps

- National CABIN Progress Report - 2008
- National CABIN team and partners continue to expand CABIN across Canada building reference database and completing reference collections
- Expand CABIN in the North (International Polar Year project)
- Deliver National Training Program –*2008/9*
- Build new partnerships
- Work toward incorporation of CABIN into the "Canadian Environmental Sustainability Indicators" (CESI) Water Quality Indicator program

Thank you!

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