

Wetland Ways



12

Interim Guidelines for
Wetland Protection and Conservation in British Columbia

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Chapter Twelve

MONITORING AND REPORTING

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These interim guidelines will be updated using experience from pilot testing and feedback from user groups. If you would like to comment on these guidelines, please send your comments to wsp@gov.bc.ca

Cover photos: Ministry of Environment, Judith Cullington



CHAPTER 12: MONITORING AND REPORTING

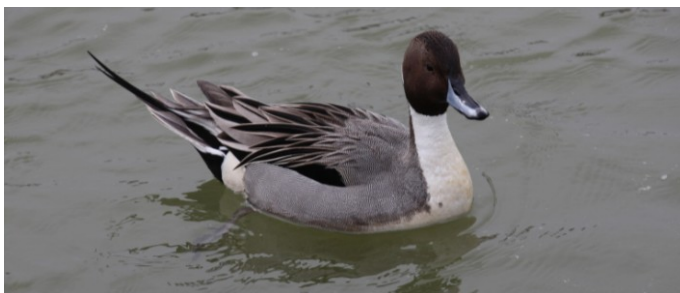
12.1. INTRODUCTION

This chapter provides an overview of the key concepts and procedures involved in wetland monitoring.

- ♦ *Wetland assessments* generally focus on overall wetland ecosystem health. Information from assessments can be used to determine management priorities including development of monitoring plans. Assessment involves the use of judgement, comparison, or prediction. Wetland assessments are discussed in [CHAPTER 2: GENERAL GUIDELINES](#).
- ♦ *Wetland monitoring* involves measurement over time of specific wetland features known to indicate changes in wetland extent, condition, threatening processes, or management activities including restoration and enhancement. Monitoring programs also consider spatial and scale components. Data collected on these *indicators*¹ are analyzed to identify change and trends.

The outline provided can be used whether the monitoring is aimed at determining the success of specific enhancement or restoration activities, or for following up on the use and effectiveness of best management practices.

Monitoring required under permit will be normally be undertaken by specialist contracted by the permittee. This chapter is intended primarily for use by stewardship groups who are managing a local wetland based on specific interest such as protection, enhancement, or restoration as well as the impacts of adjacent activities (e.g., agriculture or development).



Northern Pintail Duck. PHOTO: ROBERT COX

¹ *Definitions* can be found in the [GLOSSARY](#).



12.2. TYPES OF MONITORING

Monitoring may be undertaken for a variety of reasons. Monitoring programs generally occur along a continuum and the results from one phase of monitoring often support other monitoring programs. Forms of monitoring include the following.

- ♦ **Baseline Monitoring:** Documents the starting point used to determine status and trends of bio-physical indicators features, for example estimates of species distribution, or water quality levels that exist prior to the disturbance or management activity being monitored.
- ♦ **Trend Monitoring:** Documents the long-term changes (increasing, decreasing, or stable) of an indicator or group of indicators.
- ♦ **Implementation Monitoring:** Determines the extent to which non-legally binding measures such as best management practices have been implemented. Guidelines may not have been implemented at all or implemented incorrectly.
- ♦ **Effectiveness Monitoring:** Assesses whether best management practices or guidelines are achieving their intended goals or outcomes in eliminating or minimizing environmental impacts. Failure to achieve stated objectives may occur if the recommended guidelines are inadequate or inappropriate.
- ♦ **Compliance monitoring:** Determines the degree to which legally binding measures (regulations, permit conditions) have been implemented, for example legal requirements under the *Forest and Range Practices Act*.

The students at Bench Lake Elementary School in North Cowichan prepared a plea to their local government to monitor water quality from the storm drains flowing into Somenos Marsh.
<http://www.youtube.com/watch?v=QBQall20lc0>

12.3. GUIDELINES

12.3.1. Program Development

IDENTIFY THE OVERALL PLAN AND PROJECT TEAM

- Develop a project plan that addresses the various tasks, processes, and factors that will be required for successful project completion. This will include monitoring objectives, project design, sampling protocols, data management, and reporting.
- Assign and clearly identify responsibilities for various aspects of the monitoring program. Bring in additional expertise if needed (e.g., biological, computer mapping, and data management).



- Identify training needs. Develop and implement a training program to ensure the project team can effectively carry out the required functions. Important training areas include sampling protocols, use of field equipment, sampling techniques, data recording, and management and field safety.
- Gather all available information and data including aerial photos, maps, existing bio-physical information, and ongoing watershed activities. Draw on local knowledge and expertise.

12.3.2. Project Design

Project design is perhaps the most critical component of any monitoring program. Many monitoring projects are unsuccessful because sufficient time and energy was not devoted towards designing the monitoring plan. Make sure you are confident the project design will address the goals and objectives and is feasible (logistically and financially) and achievable.

DETERMINE THE TYPE OF MONITORING

- Clearly identify the type of monitoring that will be undertaken and be aware that in some cases more than one type of monitoring may be required, (e.g., you may need to do implementation monitoring to determine if best management practices have been used, before conducting effectiveness monitoring).

CLEARLY DEFINE OBJECTIVES

- Identify the specific goals and objectives of the monitoring program. The goals and objectives should answer specific questions or lead to specific conclusions.



Emergent vegetation. PHOTO: JUDITH CULLINGTON



- Determine which indicators will best answer the questions that have been identified. Indicators can be measured individually or as part of a group of associated measurements (e.g., water quality measurements such as pH, dissolved oxygen, and turbidity are often measured at the same time/location).

USE ESTABLISHED PROTOCOLS

- Use established protocols (sampling design and processes) to ensure that information collected can be analyzed and interpreted to provide meaningful information. Use of common methodologies allows information to be shared more broadly and improves confidence in the results. Data from poor sampling design cannot be ‘saved’ by statistical manipulation.

DETERMINE SAMPLING LOCATION AND FREQUENCY

- Consider specific data requirements for field sampling such as measurement parameters, scale and frequency of sampling and the data accuracy (closeness of measurement to true value) and precision (closeness of repeated measurements to the same value) necessary to answer the identified questions.
- Ensure that proposed sampling times, methods and locations will not have a negative impact on sensitive habitats or disturb species during critical breeding and rearing periods.
- Incorporate reference or control sites in the design to determine if best management practices or enhancement and restoration activities are achieving desired outcomes.



Water quality sampling. PHOTO: SARMA LIEPENS



Soil analysis.
PHOTO: SARMA LIEPENS

CONSIDER COSTS

- Determine the costs of carrying out the program. Logistics, sampling frequency, complexity of the design, requirements for lab analysis and data management, and analysis all need to be considered.
- Ensure that all necessary funding is in place before initiating the monitoring program. Tailor the program to funding availability rather than risk being unable to complete the project.

SEEK PROFESSIONAL HELP

- Obtain an independent review of the monitoring proposal, particularly if it involves complex sampling components. An independent review by an appropriately qualified professional(s) will ensure that the goals and objectives can be met with the proposed program. It is better to go back and redesign the project than find out at the end that the information will not answer the questions posed.

12.3.3. Sampling

ENSURE THAT SAMPLING WILL BE ACCURATE

- Pilot test sampling design and indicators to ensure that the program can be carried out in a timely and cost effective manner. Refine the sampling program if required and document the changes and the rationale in the program plan.
- Collect and record all field data in a consistent manner. Where possible have one person responsible for collecting specific information throughout the program to limit subjectivity.
- Ensure that all equipment is properly calibrated and functioning correctly.
- Only collect relevant information to maximize data reliability.

REVIEW INFORMATION REGULARLY

- Review and analyze data frequently and assess results against the initial objectives. Where necessary revisit the program and refine to achieve useful results—don't wait until the program is completed.

12.3.4. Reporting

ESTABLISH REPORTING PROTOCOLS

- Identify your key audiences and their information needs. Use a suitable language and approach when providing information on the



Great Blue Heron.
PHOTO: JUDITH CULLINGTON

monitoring results. Are you providing the information in a manner that is clear and meaningful?

- Seek an external review of draft reports and communication material. Outside review will generally improve the quality of the report and ensure that the information is being presented clearly and appropriately for the intended audience.
- Share information widely with members of the monitoring team and partners. Make sure all records are archived for easy reference and retrieval.

EVALUATE THE MONITORING PLAN

- Undertake a review and evaluation of the monitoring plan at pre-determined intervals and at conclusion to assess performance. Identify and implement improvements to the monitoring plan before proceeding with further monitoring activities.

12.4. REFERENCES AND FURTHER READING

Government Offices

B.C. Ministry of Environment regional offices.

<http://www.env.gov.bc.ca/main/regions.html>

Fisheries and Oceans Canada offices. [http://www.pac.dfo-](http://www.pac.dfo-mpo.gc.ca/pages/default_e.htm)

[mpo.gc.ca/pages/default_e.htm](http://www.pac.dfo-mpo.gc.ca/pages/default_e.htm)

Websites

B.C. legislation. <http://www.bclaws.ca/>

Federal legislation. <http://laws.justice.gc.ca/>

B.C. Ministry of Environment, Water Quality Procedure Guides and Sampling Manuals.

http://www.env.gov.bc.ca/wat/wq/wq_procedure.html

Environment Canada, Ecological Monitoring and Assessment Network.

<http://www.eman-rese.ca/eman/>

Queensland Government. 2008. Wetlands Info.

<http://www.epa.qld.gov.au/wetlandinfo/site/SupportTools.html>

Society of Wetland Scientists. <http://www.sws.org/>. Features numerous links to other wetland-related sites.

U.S. Army Corps of Engineers.

<http://www.wetlands.com/coe/87manapd.htm>. Lots of technical information, including definitions and methods.



USEPA. Monitoring and Assessing Water Quality.

<http://www.epa.gov/owow/monitoring/>

USEPA. Water Quality Monitoring-Bioassessment.

<http://www.epa.gov/ehtpages/watewaterqualitymobioassessment.html>

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<http://library.marist.edu/diglib/EnvSci/archives/signhabi/danielson/danielson-monitoringwetlands.html>

Hall, Frederick C. 2002. Photo point monitoring handbook: part a- field procedures. US Dept. of Agriculture. Forest Service. Portland.

<http://www.fs.fed.us/pnw/pubs/gtr526/>

Hall, Frederick C. 2002. Photo point handbook: part B-concepts and analysis. U.S. Dept. of Agriculture. Forest Service. Portland.

<http://www.fs.fed.us/pnw/pubs/gtr526/>

New South Wales/Storm Water Trust. 2004. A toolkit for water quality monitoring for local government. Australia.

http://www.wsroc.com.au/wqm/st_constructed_wetland_monitoring.html

NOAA. An introduction and users guide to wetland restoration, creation and enhancement.

<http://www.nmfs.noaa.gov/habitat/habitatconservation/publications/introfinal.pdf>

Pilz, David, Heidi L. Ballard and Eric T. Jones. 2005. Broadening participation in biological monitoring: guidelines for scientists and managers institute for culture and ecology.

<http://www.ifcae.org/projects/ncssf3/IFCAE-ParticipatoryMonitoringGuidelines-2005.pdf>

U.S. Dept. of Agriculture. Stream visual assessment protocol. 1998. Technical Note 99-1.

USEPA. 2001. Volunteer wetland monitoring. an introduction and resource guide.

<http://www.epa.gov/owow/wetlands/monitor/volmonitor.html>

Witten, Matthew. 1998. Volunteer wetland monitoring manuals: an annotated bibliography. Volunteer Monitor: Volume 10, Number 1 pp. 26-28.