

A Framework for Monitoring & Evaluating Wildlife Resource Values

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INTRODUCTION

In British Columbia, impacts from forestry activities on wildlife habitat on Crown land are managed under the *Forest and Range Practices Act (FRPA)* and its regulations.¹ This Act implements a results-based approach to forest and range management. A main role of government under a results-based framework is to set out results (or processes to define those) and evaluate the effectiveness of forest and range practices to minimize impacts.

The Act sets objectives for 11 key forest and environmental values including biodiversity, cultural heritage resources, forage, recreation, resource features, riparian/fish, soils, timber, visual quality, water, and wildlife. These are referred to as "resource values."

The Forest and Range Evaluation Program (FREP) was established in 2003 to evaluate whether management practices under *FRPA* are effective at meeting the objectives set by government for its set of resource values. It will also



Mountain Caribou, photo credit: Jared Hobbs

FREP

RESOURCE VALUE FRAMEWORK

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The FREP Mission:

To be a world leader in Resource Stewardship Monitoring and effectiveness evaluations; providing the science-based information needed for decision-making and continuous improvement of British Columbia's forest and range practices, policies and legislation.

<http://www.for.gov.bc.ca/hfp/frep/index.htm>

1. For more information, see: <http://www.for.gov.bc.ca/tasb/legsregs/frpa/frpatoc.htm>

endeavour to determine whether these practices and their enabling legislation are meeting government's broader intent for the sustainable use of resource values. FREP is a multi-agency program led by the Ministry of Forests and Range in partnership with the Ministry of Environment, the Ministry of Agriculture and Lands, and the Ministry of Tourism, Culture and the Arts. For more information about FREP, see: <http://www.for.gov.bc.ca/hfp/frep/>

This document introduces a framework for monitoring and evaluating the wildlife resource value on Crown land in British Columbia.

WILDLIFE RESOURCE VALUE

The wildlife resource value (WRV) addresses species-specific (fine filter) habitat management practices enabled under *FRPA* (see highlighted box, "Wildlife Management Practices under *FRPA*"). These practices include:

- Ungulate winter ranges
- Wildlife habitat areas
- Specified areas
- General wildlife measures
- Wildlife habitat features

The legislative authority under *FRPA* for these practices is within the Government Actions Regulation, Sections 9–12.

For more on fine-filter mechanisms under *FRPA*, see:
<http://www.env.gov.bc.ca/wld/>



UNGULATE WINTER RANGES

Ungulate winter ranges (UWRs) are spatially defined areas established by the Minister of Environment to provide habitat necessary to meet the winter requirements of ungulates (see highlighted box, "Background – Ungulate Winter Ranges"). They provide ungulates with access to shallower snow and more forage than is available in areas where winter snows often restrict animal movements and bury terrestrial forage plants growing in the open and at high elevations. These ranges are often characterized by large trees, which intercept snow, relatively warm temperatures at low elevations, intense sun on southerly slopes, or wind scouring on exposed mountain slopes. Because UWRs provide crucial refuges for a large proportion of ungulate populations, they provide habitat that is essential to maintaining healthy ungulate populations.

BACKGROUND – UNGULATE WINTER RANGES

The first UWRs were established around 1970 for Columbian black-tailed deer on Vancouver Island. These early UWRs, which were negotiated agreements between the Fish and Wildlife Branch and the British Columbia Forest Service, reserved areas from logging for varying, often indefinite, periods of time. Over the succeeding 35 years, winter ranges have been identified for other species and other areas of the province, and measures that protected the winter ranges or constrained activities on them gradually became more formal. With the advent of the Forest Practices Code (FPC) in 1995 and *FRPA* in 2004, UWRs and objectives for their management were established legally. Establishment of UWRs under *FRPA* is on-going.

WILDLIFE HABITAT AREAS

Wildlife habitat areas (WHAs) are spatially defined areas established by the Minister of Environment for a species-at-risk or regionally important wildlife (referred to as "Identified Wildlife") to meet the habitat requirements of such designated species (see highlighted box, "Background – Wildlife Habitat Areas"). Identified wildlife represent species that may be affected by forest and range management on Crown land, that are listed by the Committee on the Status of Endangered Wildlife in Canada, and (or) that are red- or blue-listed in British Columbia or considered regionally important wildlife. These species, which include vertebrates, invertebrates, vascular plants, and plant communities, form the basis of the Identified Wildlife Management Strategy.

BACKGROUND – WILDLIFE HABITAT AREAS

The first WHAs were enabled in 1999 under the FPC. At that time, 41 species, subspecies, and plant communities were designated as Identified Wildlife. Establishment of WHAs is on-going for the 85 species and plant communities currently identified as species at risk under *FRPA*.

WILDLIFE MANAGEMENT UNDER *FRPA*

Wildlife management under *FRPA* operates in a conservation model where coarse- and fine-filter practices complement each other. Coarse-filter conservation management maintains biodiversity on a broad scale by managing multiple habitats and species through tools such as protected areas, wildlife trees and wildlife tree patches, riparian area guidelines, landscape-scale management of old-growth forests, and strategic- and landscape-level planning. The spatially based mechanisms listed above are implemented under *FRPA* for wildlife provide fine-filter conservation of specific species and plant communities that cannot be achieved through other coarse-filter means.

SPECIFIED AREAS

A specified area is a spatially defined area established by the Minister of Environment for a species-at-risk, regionally important wildlife, or ungulate (see highlighted box, “Background – Specified Areas”). These areas are intended to address wide-ranging species or to manage habitat attributes over a broader landscape. Specified areas are managed through implementation of general wildlife measures.



Northern Goshawk, photo credit: Erica McLaren

BACKGROUND – SPECIFIED AREAS

A small number of specified areas have been applied under particular circumstances, to either address the broad range requirements of grizzly bear and caribou, or to limit disturbance from forest and range activities by adding temporal or spatial management considerations around particular WHAs and UWRs.

GENERAL WILDLIFE MEASURES

General wildlife measures are activities within WHAs, UWRs, and specified areas that:

1. minimize the effects of forest and range practices on limiting or important habitats; and
2. maintain the limiting habitats of ungulates or Identified Wildlife throughout their ranges.

WILDLIFE HABITAT FEATURES

Wildlife habitat features are features providing the physical ecosystem elements used by wildlife² to meet one or more of their important habitat requirements (see highlighted box, “Background – Wildlife Habitat Feature”). They are spatially located and are generally small areas. Examples include a significant mineral lick or wallow, a nest used by a bird, or a burrow used by a mammal. They may be established under *FRPA* by the Ministry of Environment to ensure that the features are not damaged or rendered ineffective by forest or range practices when no other means is available to provide special management.

BACKGROUND – WILDLIFE HABITAT FEATURES

No wildlife habitat features have been identified to date under *FRPA*; the Ministry of Environment has undertaken external consultation on a proposed list of features and supporting documentation.

MONITORING AND EVALUATION

Monitoring and evaluation activities are used to acquire information on the condition of a resource value (baseline, status, and trend monitoring), measure performance (implementation and compliance monitoring), and evaluate effectiveness of management actions (effectiveness monitoring) (see highlighted box, “Basic Terminology”). For the purpose of this document, the terms “effectiveness monitoring” and “effectiveness evaluations” are used interchangeably. For more information on these definitions, see http://www.for.gov.bc.ca/hfp/frep/site_files/technical/FRPA_Evaluator_Technical_Note_02.pdf.

An effectiveness evaluation may incorporate baseline, status, and/or trend monitoring, or implementation monitoring. Knowledge of non-compliance is important to enable interpretation of results of an effectiveness evaluation. In addition, the need to validate basic assumptions and acquire knowledge may be recommended to complement or improve effectiveness evaluations.

BASIC TERMINOLOGY

Monitoring is the act of conducting multiple surveys (measuring activities) over time or across areas to examine an object or activity in order to document its condition. Evaluation is the act of measuring progress towards stated objectives. Though evaluation is possible after a single survey, it is usually part of an ongoing process for doing better, whereby outputs and (or) outcomes are monitored (measured) over time and new information and results of the evaluation are linked to decision making.

Effectiveness evaluations assess the ability of a management action to achieve stated management goals and objectives. FREP will assess whether policies and practices under *FRPA* for the conservation of species-at-risk, regionally important wildlife, and ungulates are achieving management goals, objectives, and desired conditions. These assessments will provide forest managers and decision makers with information to make any necessary changes.

2. Including plants, all types of vertebrates and invertebrates, and rare plant communities.

Evaluations can be extremely detailed, long-term commitments, or quick assessments designed to identify key areas of concern. They go far beyond tallying the number of hectares protected or documenting successful elimination of a known threat from an area. Rather, they illustrate the value of a prescribed management action and can provide evidence to recommend changes to or justify imposition of management practices or constraints (see highlighted box, "Protecting Wildlife Values with UWRs and WHAs").



Sampling for Rocky Mountain Tailed Frog,
photo credit: Pierre Friele

FRREP recognizes three levels of monitoring intensity: routine, extensive, and intensive. These intensity levels reflect the differing effort, costs, and complexity associated with the monitoring, which in turn depend on the monitoring questions, indicators, and methods, the resources available, and the particular circumstances surrounding the object of monitoring. Levels of intensity are not sequential—projects must be initiated at a level that reflects program priorities and information needs. All three levels can provide valuable information on status, trends, implementation issues, and effectiveness.

PROTECTING WILDLIFE VALUES WITH UWRs AND WHAs

Designation of UWRs and WHAs represents a major conservation investment by the province and an opportunity cost for other uses (including the habitat needs of other species). For several reasons, however, a level of uncertainty exists about the potential impact of these mechanisms for protecting wildlife values under FRPA. First, they are discrete patches of habitat or habitat elements established to address specific habitat requirements within a managed landscape. Although it is assumed that other habitat requirements will be addressed through other means (e.g., fine- or coarse-filter models), this protection is not confirmed. Second, although based on the best available information, much remains unknown about species-habitat relationships, responses to management actions, or whether current actions will be effective in the long run. Third, they are often negotiated agreements that are shaped by economic, land status, legal, and political constraints, and not just biological need.

WILDLIFE RESOURCE VALUE FRAMEWORK

A WRV framework was developed because of the number and variety of species that must be addressed, the nature of these species (rare and elusive), and the inherent complexity of monitoring wildlife. This framework provides a prioritized and standardized approach for evaluating wildlife habitat practices under FRPA (see highlighted box, "Principles Guiding WRV Effectiveness Evaluations"). Periodic updates are expected as more is learned about conducting effectiveness evaluations.

The WRV framework consists of:

- a procedure for setting monitoring and evaluation priorities;
- a guide for conducting monitoring and evaluation projects;
- a guide for selecting indicators using conceptual models;
- a guide to developing and testing monitoring protocols;
- standardized monitoring protocols;
- implementation plans for specific wildlife habitat practices (e.g., WHAs); and
- research facilitation.

Documents for the WRV framework are available at:
<http://www.for.gov.bc.ca/hfp/frep/values/wildlife.htm>

PRINCIPLES GUIDING WILDLIFE RESOURCE VALUE EFFECTIVENESS EVALUATIONS

1. Effectiveness evaluations are intended to help managers—not critique them. The goal is to improve forestry and range use policies and management practices that guide establishment and management of these FRPA mechanisms.
2. A clear and objective process for ranking issues, setting priorities, and selecting projects must guide the WRV effectiveness evaluation program.
3. Effectiveness evaluations will vary across the province, reflecting local ecosystems and conditions; however, use of established methods, consistency in methods among regions, and common objectives across species and regions will strengthen the overall results.
4. Local managers should participate in priority-setting and project design and lead effectiveness evaluations; efforts should be co-ordinated around the province to improve efficiency.

MONITORING PRIORITIES

Wildlife resource value monitoring priorities are determined through two steps. The first step involves ranking priority evaluation questions. This step is completed by the FREP Resource Evaluation Working Group, a strategic committee overseeing development and implementation of FREP (see “Organizational Structure”, Figure 1). This working group reviews and ranks priority monitoring questions proposed by Resource Value Teams for all *FRPA* resource values.³

For the WRV, these questions are general. For example, the question for UWRs and WHAs is similar:

- Do WHAs/UWRs maintain the habitats, structures, and functions necessary to meet the goals of the WHA/UWR, and is the amount, quality, and distribution of WHAs/UWRs contributing effectively with the surrounding land base (including protected areas and managed land base) to ensure the survival of the species now and over time?

The general questions must be further refined into more specific questions for each species. These specific questions may relate to particular management actions, the current or future condition of habitat or species, or risk from stressors (see highlighted box, “Examples of Monitoring Questions”).

EXAMPLES OF MONITORING QUESTIONS

Species Condition:

- To what extent does the UWR/WHA receive use by the target species?
- What is the abundance and distribution of the target species in WHAs compared to unmanaged sites?

Habitat Condition:

- To what degree does the UWR/WHA maintain suitable habitat conditions to meet the requirements of the target species?

Risk:

- What are the short- and long-term risks to the UWR/WHA from identified pressures?

Habitat Supply:

- How much suitable habitat occurs within the range of the target species/herd/population, how is it distributed, and what is its status?
- How will available suitable habitat change over time?

The second step is the ranking of species and ecosystems. Criteria used to establish species-specific priorities include:

- conservation priority as determined by the Ministry of Environment’s Conservation Framework;⁴
- management investment (number and size of WHAs/UWRs); and
- importance of the practice (e.g., WHA, UWR) to the species’ overall conservation.

A document describing this process is available on the FREP WRV web page.



Mountain Goat, photo credit: Jared Hobbs

EVALUATION PROCEDURE AND GUIDE

Monitoring and evaluation projects require significant planning to ensure their success. The steps outlined below require consideration during the development of a monitoring project. A guidance document is available on the FREP WRV web page.

STEPS

- | | |
|--------------------|---|
| Planning | 1. Frame monitoring objectives and questions |
| | 2. Develop conceptual model |
| | 3. Select indicators and thresholds |
| | 4. Consider study design |
| Design & Implement | 5. Develop protocol (if one is not available) |
| | 6. Pilot-test protocol |
| | 7. Prepare project charter and work plan |
| | 8. Collect and analyze data |
| Evaluate & Report | 9. Report results |
| | 10. Make recommendations |

3. For more information, see: <http://www.for.gov.bc.ca/hfp/frep/about/questions.htm>.

4. For more information, see: <http://www.env.gov.bc.ca/conservationframework/>.

INDICATORS AND CONCEPTUAL MODELS

Indicators are the measurable attributes or characteristics of a resource value that can provide reliable information about the status of the resource. Good indicators provide sensitive and efficient measures of a known (or strongly suspected) relationship between the species or habitat condition and management actions.

Indicators are best selected in a logical and structured process. Conceptual models are a useful tool to select indicators in a transparent and defensible manner by demonstrating known or assumed cause-and-effect relationships and the direction of those relationships. A guidance document describing conceptual models and indicator selection is available on the FREP WRV web page.

One or more indicators are typically selected to measure the biological condition of the species of concern or its habitat. Often, both species and habitat indicators are selected because of the lack of information or certainty associated with species-habitat relationships. Knowledge of species condition is considered important when evaluating effectiveness of species-specific (fine filter) management actions. In addition, the risk to the species or its habitat may also be considered (see Table 1). The combination of indicators selected depends on the specific situation.

Condition indicators are used to assign a rating of "excellent," "good," or "poor." Risk indicators are used to assign a rating of "high," "moderate," or "low." Both condition and risk are considered within either a simple decision table (Table 2) or through more complicated analysis when evaluating effectiveness.

Table 1. Examples of condition and risk indicators

Condition Indicators	Risks Indicators
Site Level	Short Term
Presence and abundance of species or habitat attributes required by species	Road density, area of permanent habitat loss, stream crossing density, susceptibility to mountain pine beetle

Landscape Level	Long Term
Amount, distribution, and suitability of protected or managed lands that contribute to conservation of the species	Large-scale dynamics (e.g., climate change, natural disturbance)

Table 2. Example evaluation matrix

Condition	Risk		
	Low	Moderate	High
Excellent	Effective	Effective	At risk
Good	Effective	At risk	At risk
Poor	At risk	Not effective	Not effective

Depending on the "effectiveness" outcome, several management responses may result (see "Input to Decision Making" below). For instance, an effective WHA will require little to no action, a WHA at risk may require more frequent or more intensive monitoring or some management intervention. A WHA considered not effective may require restoration or relocation (if possible) or research.



Pacific Giant Salamander, photo credit: William Leonard

MONITORING PROTOCOLS

Monitoring protocols direct data collection in a standardized manner. Provincial protocols have been completed for several wildlife species and priority monitoring protocols continue to be developed in coordination with regional leads. A guidance document is available on the FREP WRV web page.

IMPLEMENTATION PLANS

Program-level implementation plans will be developed for each FRPA wildlife habitat practice (WHA, UWR, etc.). As of January 2009, almost 6 million hectares of Crown land in British Columbia had been designated as UWRs or WHAs for 45 species. Through various processes, both the Ministries of Environment and Forests and Range have determined that a need exists to confirm whether UWRs and WHAs are effective in meeting their objectives. Both ministries have identified effectiveness evaluations as one of their highest priorities in the immediate future. Specific work plans will be developed for projects.

RESEARCH FACILITATION

For many species, knowledge gaps impede monitoring and evaluation. To encourage and facilitate research into the uncertainties surrounding the effectiveness of wildlife habitat practices, a list of important questions or topic areas will be posted on the FREP WRV web page, co-operative projects among agencies and academia will be encouraged and support provided whenever possible.

ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

The Ministry of Environment is the lead agency tasked with developing and implementing WRV evaluations. The specific roles and responsibilities will be outlined in the Ministry's Monitoring Implementation Plan, which is currently under development (2009).

In general, regional-level monitoring and evaluation is co-ordinated between FREP's provincial WRV team and regional team leads who then collaborate with Ministry of Forests and Range districts (see Figure 1).

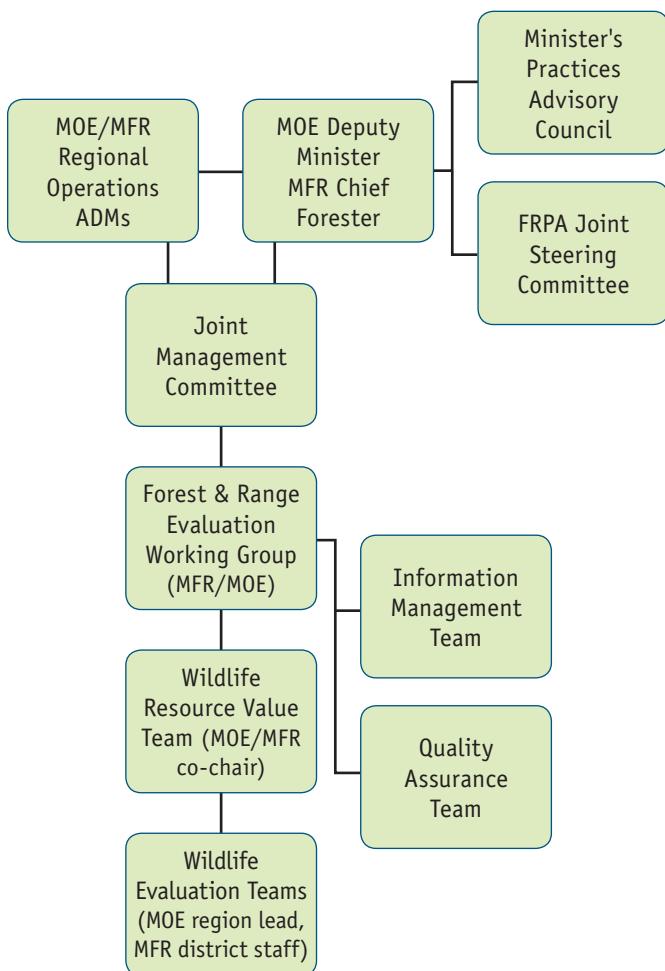


Figure 1. Organizational structure

PROVINCIAL WRV TEAM RESPONSIBILITIES

- Facilitate development of a practical and consistent science-based program to inform wildlife management under *FRPA*.
- Provide guidance on how to plan, design, implement, and report on effectiveness evaluations.
- Ensure evaluation results are reported to senior management in a timely manner.

REGIONAL RESPONSIBILITIES

- Implement standardized protocols and co-ordinate data collection.
- Analyze data, report results, and make recommendations.

LINKAGES AND DEPENDENCIES

- Compliance monitoring provides data on the implementation of *FRPA* practices, which is important information within an effectiveness evaluation.
- Ministry of Environment's Conservation Framework and Monitoring Strategy (currently under development) will supply important linkages to guide effectiveness monitoring priorities and co-ordinate monitoring efforts within the Ministry.
- Co-ordinating effectiveness monitoring with species-monitoring efforts (e.g., those conducted by the Ministry or Recovery Teams) is important to ensure a consistent approach. It will also enable comparisons with species trends observed in areas without specific protection thereby offering insights about the contribution of *FRPA* conservation mechanisms in a species' decline or growth.
- Protocols and results may be useful to other FREP resource values or the Forest Practices Board investigations where wildlife is of interest.
- Addressing knowledge gaps is often best addressed by co-ordinating with research institutions and programs.

DATA MANAGEMENT AND QUALITY CONTROL

The credibility and transparency of the WRV effectiveness evaluation program depends on ensuring consistency, efficiency, and data quality. Acceptance by decision makers, land and wildlife managers, stakeholders, and the public will be enhanced if data quality can be controlled and assured. FREP is building a certified quality management system and an information management system. All aspects of data collection, management, and reporting, from the field to office to data warehouse to FREP website, will be rigorously managed to ensure accuracy and reliability.

Specifically, high quality data can be achieved through peer review, adequate training for field staff, selection and use of qualified contractors (where required), and adherence to the FREP Quality Assurance Framework and Quality Control Protocols. The ministries expect that data from WRV effectiveness evaluations will be included in the FREP information system.

REPORTING

Annual reports, pilot studies, and results will be published through FREP series publications. All reports are posted to the FREP website and are available on WRV team Sharepoint site (contact the WRV team for access). Templates for report formats will be developed.

INPUT TO DECISION MAKING

Monitoring results will be used to revise WRV recommendations concerning species-specific habitat management practices enabled under *FRPA*. Specifically, evaluations may recommend changes to:

- boundaries;
- location;
- amount and distribution of habitat conserved;
- specific management practices;
- timber supply policy limits; and
- frequency or intensity of monitoring.

The process of recommending revisions and reporting results is similar for the various wildlife habitat practices (e.g., WHAs, UWRs, general wildlife measures, wildlife habitat features). Final evaluation recommendations are submitted to the WRV team for peer review and submission through the generalized steps outlined in Figure 2. However, the actual process will depend on the decision required. For instance, minor changes may not require a decision by a statutory decision maker. Other changes, particularly those requiring legislative or policy changes, will require a decision by the Joint Steering Committee and ultimately the statutory decision maker, which is the Deputy Minister of Environment.



American Badger, photo credit: Tim McAllister



Figure 2. Reporting procedure

MEASURES OF SUCCESS

The level of success achieved through this framework for monitoring and evaluating wildlife resource values will be measured by the direct program outputs, including:

- development and implementation of standard monitoring protocols;
- collection of high-quality data; and
- completion of effectiveness evaluations that influence decision making.

In addition, an important component of the monitoring framework is the advancement of knowledge related to species habitat requirements, monitoring and capacity to conduct evaluations.

For further information about the FREP wildlife resource value monitoring program or to view supporting documents and project reports, visit the FREP WRV web page at:
<http://www.for.gov.bc.ca/hfp/frep/values/wildlife.htm>