

EVALUATING BADGER WILDLIFE HABITAT AREAS: PILOT STUDY RESULTS

Prepared by:
Kathy Paige and Laura Darling

Under the Forest and Range Evaluation Program, the Wildlife Resource Value Team addresses monitoring of habitat management practices enabled under the *Forest and Range Practices Act* (FRPA) that are directed at individual species, such as the legal establishment of Wildlife Habitat Areas (WHAs). Wildlife Habitat Areas are areas of important habitat established for species designated under FRPA as species at risk or regionally important wildlife.¹

The Wildlife Resource Value Team implements a provincial framework (see <http://www.for.gov.bc.ca/hfp/frep/values/wildlife.htm>) that recommends a standardized approach to evaluate the effectiveness of WHAs; the approach involves several important steps to ensure that appropriate indicators and methods are implemented.

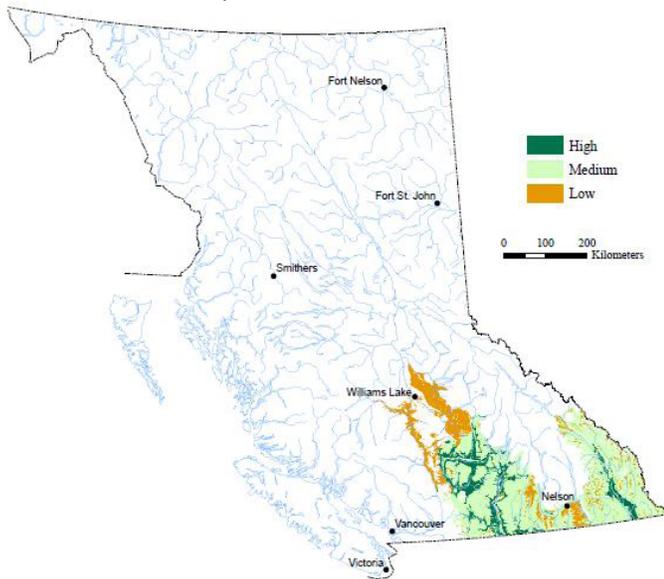


Figure 1. Habitat suitability

1 Regionally important wildlife are species that are not at risk but are of importance in a region of BC, rely on habitats that are not otherwise protected under the *Forest and Range Practices Act* and may be adversely impacted by forest or range practices.

FREP

EXTENSION NOTE #14

December 2010

This extension note describes how the recommended approach was applied in a pilot evaluation of nine WHAs established for Badgers, and provides preliminary results that will serve as a baseline for future evaluations. It is a summary of the FREP Report (FREP Report #25²) prepared by Trevor Kinley.



American Badger
Photo: Jared Hobbs

THE AMERICAN BADGER

The subspecies of American Badger (*Taxidea taxus*) that occurs in British Columbia is the *jeffersonii* subspecies, hereafter referred to as simply Badger. Badgers are medium-sized carnivores that prey on small mammals and rodents, primarily Columbian Ground Squirrels and Yellow-bellied Marmots.

In British Columbia, Badgers are found in the southern half of the province in a variety of open habitats such as grasslands, meadows, alpine and dry open forests. Distribution of Badger habitat by suitability class is illustrated in Figure 1.

Badgers spend a great deal of time underground in burrows that they dig with their muscular forelegs and large front claws. Burrows are used for resting, storing food and rearing young. Maternal dens tend to be larger and more structurally complex than those used for resting and they often show signs of repeated use (tracks, fresh dirt piles). Badger burrows are relatively large (up to 9 m long) and have an elliptical entrance about 20 to 30 cm wide.

2 <http://www.for.gov.bc.ca/hfp/frep/publications/reports.htm#rep25>

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>



There is usually a mound of dirt beside the burrow. Burrows are often reused by Badgers and other species. Many of the prey species preferred by Badgers also construct burrows. Badgers often hunt for prey by excavating prey from their burrows.

Because digging is so important to the Badger's way of life, suitable soil properties are required for good Badger habitat.

British Columbia is the home to an estimated 230-340 Badgers

STATUS

In Canada, the *jeffersonii* Badger is nationally listed as Endangered under the federal *Species at Risk Act*. Likewise it is considered at risk in British Columbia, the only province where the subspecies occurs. It is at risk due to its small population, habitat loss and degradation, prey loss or reductions, road mortality, and illegal killing. A Recovery Strategy³ has been prepared (2008) to address the threats facing Badgers.

The American Badger is designated as a *species at risk* under the *Forest and Range Practices Act* which enables the designation of WHAs and associated management practices (General Wildlife Measures) to protect important Badger habitats as specified in the *Accounts and Measures for Managing Identified Wildlife* (2004).⁴

BADGER WILDLIFE HABITAT AREAS

Badger WHAs are established at important areas such as maternal dens, concentrations of burrows or sites that have abundant prey or suitable soils. The intent of the WHA is to maintain important habitat features for Badgers, such as soil condition suitable for burrows (e.g., coherent soil) and suitable prey habitats, as well as minimizing disturbance to Badgers during the breeding season.

There are currently 39 WHAs established for Badgers in B.C. totalling 2868.1 hectares (July 2010). These WHAs range in size from one to 244.5 hectares (average 73.5 hectares).

MONITORING OBJECTIVES AND QUESTIONS

The first step in designing an effectiveness monitoring project is to consider the objectives and questions the project is designed to address. The Wildlife Resource Value Framework poses a general provincial scale question for WHA effectiveness monitoring:

“Do WHAs maintain the habitat, structure and functions necessary to meet the goals of the area, and is the amount,

3 http://www.env.gov.bc.ca/wld/documents/recovery/rcvyrstrat/badger_jeffersonii_rcvry_strat18092008.pdf

4 <http://www.env.gov.bc.ca/wld/frpa/iwms/accounts.html>

quality and distribution of WHAs contributing effectively with the surrounding land base to ensure the survival of the species now and over time?”

This general question must be made specific to a species or project. For Badgers, the questions of interest are:

1. Are Badgers using the WHA and how regularly?
2. Does the habitat (and prey availability) within the WHA continue to be suitable for Badgers?
3. Are Badgers using the WHA to reproduce or rear kits?
4. Are activities within or adjacent to the WHA disturbing Badgers or their important habitats?
5. Are travel corridors between and adjacent to the WHA safe for Badgers?



*McGinty Lake Wildlife Habitat Area for Badgers
Photo: Trevor Kinley*

Thus the objective of the evaluation is to determine whether (and for what purpose) Badgers continue to use the WHA, whether the prey species continue to be present in the same densities and whether human activities currently or in future could prevent Badgers from using the WHAs.

CONCEPTUAL MODEL

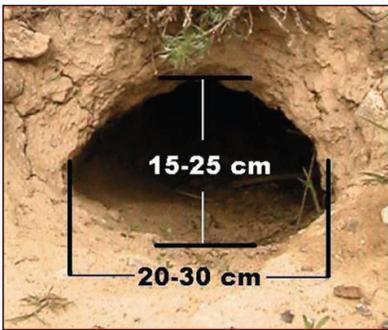
As part of the Badger WHA effectiveness monitoring protocol, a conceptual model was developed to demonstrate the relationships between Badgers, their habitat and associated threats. Conceptual models are useful for understanding and communicating important relationships, identifying important knowledge gaps and selecting monitoring indicators. Building a conceptual model is an important preliminary step in the development of monitoring protocols.

INDICATORS

Selecting appropriate indicators is a crucial step in effectiveness monitoring projects in order to obtain meaningful results. Because the relationship between quality

of Badger habitat and Badger populations is not known, indicators representing the condition of both population and habitat were selected.

Although the ideal indicator of the effectiveness of Badger WHAs is believed to be the amount and type of Badger activity within the WHA as measured through direct observation of the animals themselves, Badgers are difficult to detect for a variety of reasons: they are often active at night, solitary for most of the year, have relatively large home ranges, occur at low densities and spend a great deal of time underground. Therefore, in addition to direct observations, density of active burrows was selected as a reliable and measurable indicator of Badger use of the WHA. A burrow is considered active if there is evidence of recent activity such as fresh soil disturbance, Badger tracks, or a Badger is observed using the burrow.



Dimensions of the entrance to a Badger burrow
Photo: Richard Klafki

Habitat condition for Badgers is best assessed using the abundance of preferred prey species. This may be difficult in areas where prey species vary from year to year or even season to season. However, Columbian Ground Squirrels are the dominant prey in some areas, such as the East Kootenays, and their numbers can be readily indexed using counts of recently occupied burrows.

Use of the WHA by Badgers and abundance of preferred prey species are considered to determine the functionality of the WHA (Figure 2). The three indicators considered are:

1. presence of female Badgers or family group;
2. density of occupied Badger burrows; and
3. density of recent ground squirrel burrows.

In addition to assessing the functionality of the WHA, the risk from known threats, such as roads or habitat changes that reduce the ability of Badgers to continue to use the WHA is also evaluated. The following six indicators were selected to assess the risk from key threats:

1. Area of suitable habitat lost
2. Change in percent canopy closure
3. Road density by road type
4. Distance of burrow to paved highway
5. Traffic volume on adjacent roads
6. Number of road mortalities

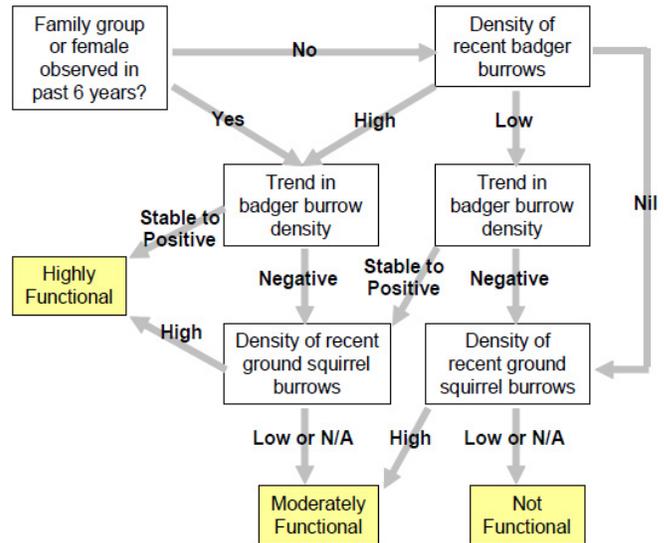


Figure 2. Determining functionality of Badger WHAs

MONITORING PROTOCOL

Following the selection of indicators, a draft monitoring protocol was prepared in 2006 and revised in 2007 after the first year of field testing. The monitoring protocol outlines GIS and field methods for measuring functionality and risk indicators.

The protocol presents a flow chart (Figure 2) to illustrate how indicators are used to determine the “functionality” of the WHA. WHAs are categorized as highly functional, moderately functional or not functional, based on indicator thresholds.

An effectiveness rating of a WHA is determined by considering both the current functionality of the WHA and the risk that the WHA will no longer continue to be used by Badgers in the immediate or long-term future (see Table 1). Risks are assessed both within the WHA and a 3 km radius which allows them to be categorized as immediate (presently up to 5 years), long-term (within 5 - 10 years) or low to no risk in the foreseeable future. The result is a WHA effectiveness rating between 1 and 5, where 5 is the most effective.

Table 1. Badger WHA Effectiveness Ratings

Functionality	Risk		
	Low - Nil	Long-term	Immediate
Highly functional	5	4	3
Moderately functional	4	3	2
Not functional	2	1	1

PILOT STUDY

In 2006 and 2007 a pilot study was conducted to test the monitoring protocol and collect baseline data. Nine WHAs (see Table 2), totalling 854 ha, were included in the pilot

evaluation, of which eight were in the Rocky Mountain Forest District and one was in the Kootenay Lake Forest District (4-107).

RESULTS

Results are preliminary as several of the indicators require trend information to be evaluated. These results establish the baselines for future comparisons.

The preliminary evaluation found that of the nine WHAs included in the pilot study, three were considered to be highly functioning with low to no risk (4-091, 4-102, 4-107), two were highly functioning but had long-term risks (4-090 and 4-103) and four (4-088, 4-089, 4-092, 4-106) were considered to be moderately functioning with low to no risk (Table 2).

Table 2. Preliminary Results For Nine Badger Whas

WHA #	Area (ha)	Presence of female or family	Burrow density		Risk	Effectiveness Rating ^a
			Badgers	Ground Squirrel		
4-088	235.8	No	Low	Low	Low-Nil	4
4-089	145.4	No	Low	Low	Low-Nil	4
4-090	225.3	Yes	High	High	Long-term	4
4-091	111.6	Yes	Low	Low	Low-Nil	5
4-092	26.6	No	Low	Low	Low-Nil	4
4-102	59.0	Yes	Low	High	Low-Nil	5
4-103	9.4	No	High	High	Long-term	4
4-106	37.0	No	Low	Low	Low-Nil	4
4-107	4.0	No	Low	High	Low-Nil	5

a rating 4 = moderately functioning, with low to nil risk level; or highly functional with long-term risk level;
rating 5 = highly functional with low to nil risk level.

DISCUSSION

Although the results are preliminary, they do provide insight into the current and long-term effectiveness of the nine Badger WHAs included in this study. None of the nine WHAs require changes to management at this time. A change in management is recommended for WHAs with an effectiveness rating of 3 or less. An effectiveness rating of 1 or 2 requires immediate action and/or more intensive monitoring.

Currently the main threat to the effectiveness of Badger WHAs is roads. Road mortality on highways is a major cause of mortality for Badgers. Two WHAs, 4-090 and 4-103, are considered to have long-term risk due to roads. It will be important to continue to monitor the impact of the roads on the effectiveness of the WHAs as this may influence placement of future WHAs or lead to mitigation measures. Also additional indicators of other emerging non-forest or range disturbances may need to be investigated (e.g., off-road vehicle use).

The current approach recommended for evaluating Badger WHAs involves monitoring trends over time (i.e., repeated visits to the same WHAs). The Badger monitoring protocol

recommends revisiting sites every two to six years depending on the indicator. This approach is recommended because WHAs are rare but permanent features on the landscape often with unique management.

Even though Badger WHAs are relatively rare, the number that can be monitored depends on the cost of monitoring which is related to the size and accessibility of WHAs. An average size WHA requires approximately five days to collect data and an additional five days to analyze and interpret results.

In an effort to reduce the cost and effort of monitoring Badger WHAs, a provincial study design will be prepared to address important statistical and design considerations prior to implementing provincial effectiveness monitoring of Badger WHAs.

In addition, before the protocol is applied in areas where Columbian Ground Squirrels are not the primary prey species, as they were in the pilot study area, methods for indexing other prey species will be included. Prey species provide an indication of habitat condition. Originally range condition was included as an indicator of habitat condition for Badgers but was dropped because the relationship between Badger prey and range condition varies. Instead more specific monitoring of prey species will be conducted.

Results of the pilot evaluation will be used to finalize the draft monitoring protocol (2007) and develop a provincial plan for monitoring Badger WHAs. For more information on this pilot evaluation refer to FREP Report #25 and consultant reports available from the Wildlife Resource Value home page: <http://www.for.gov.bc.ca/hfp/frep/values/wildlife.htm>



*South McGinty Lake WHA
Photo: Nancy Newhouse*

ACKNOWLEDGEMENTS

The Wildlife Resource Value Team acknowledges the efforts of the consultants who developed the Badger WHA monitoring protocol and implemented field trials: Trevor Kinley, Nancy Newhouse, Corinna Hoodicoff and Hillary Page.

More information about FREP visit:
<http://www.for.gov.bc.ca/hfp/frep/>

Peter Bradford (Peter.Bradford@gov.bc.ca)
or (250) 356-2134

