Badger

Taxidea taxus jeffersonii

Original[1] prepared by Ian T. Adams and Trevor A. Kinley

Species Information

Taxonomy

Of the seven species of badgers, only the "American" Badger, *Taxidea taxus* (Schreber), occurs in North America. The subspecific classification accepted by COSEWIC and the CDC follows that proposed by Long (1972) and accepted with no or few modifications by Banfield (1974), Hall (1981), Long and Killingley (1983), and Messick (1987). Based on skull morphology, pelage colour, and range, the four subspecies are *T. taxus berlandieri*, *T. taxus jacksoni*, *T. taxus jeffersonii*, and *T. taxus taxus*. Only *T. taxus jeffersonii* occurs in British Columbia.

Description

The most distinctive features of the Badger is its posture and head colouration. It is a squat carnivore weighing 6–12 kg, with dense, coarse hair reaching nearly to the ground, typically giving the impression of an animal with very short legs. The head is characterized by alternating black and white bands, including a white dorsal stripe, black immediately anterior to the eyes, white immediately posterior to the eyes, black on the cheeks, and white immediately anterior to the ears. Other aids to field identification include dark brown to black legs; mottled body hair of mixed white, black, grey, and brown; extremely long claws (front claws often in excess of 5 cm); and rapid burrowing when disturbed or in pursuit of food. The *jeffersonii* subspecies is distinguished by its range (below), reddish brown colouration, large size, and short dorsal stripe. See Long and Killingley (1983) for a detailed morphological description, including subspecific characteristics.

Distribution

Global

The American Badger occurs only in central and western North America, from southern Canada to northern Mexico. Hall (1981) indicates the *jeffersonii* subspecies to occur from the Rockies westward as far north as southern British Columbia and as far south as the southern parts of Colorado, Utah, Nevada, and California.

British Columbia

Badgers occur within the drier parts of the Kootenays, southern interior, and central interior. The southern boundary follows the U.S. border from Alberta to the Similkameen River headwaters. The approximate western limit is the Cascade Mountains and middle section of the Fraser River (except in the lower Chilcotin drainage). The northern limit approximates a line from Alexis Creek to Quesnel Lake. The eastern boundary follows the west edge of the Cariboo and Monashee mountains to Lower Arrow Lake, then east across the Selkirk Mountains to Kootenay Lake, then north through the Purcell Mountains, Rocky Mountain Trench and Rocky Mountains to the Trans-Canada Highway, then east to the Alberta boundary and southeast along the provincial border.

Forest regions and districts

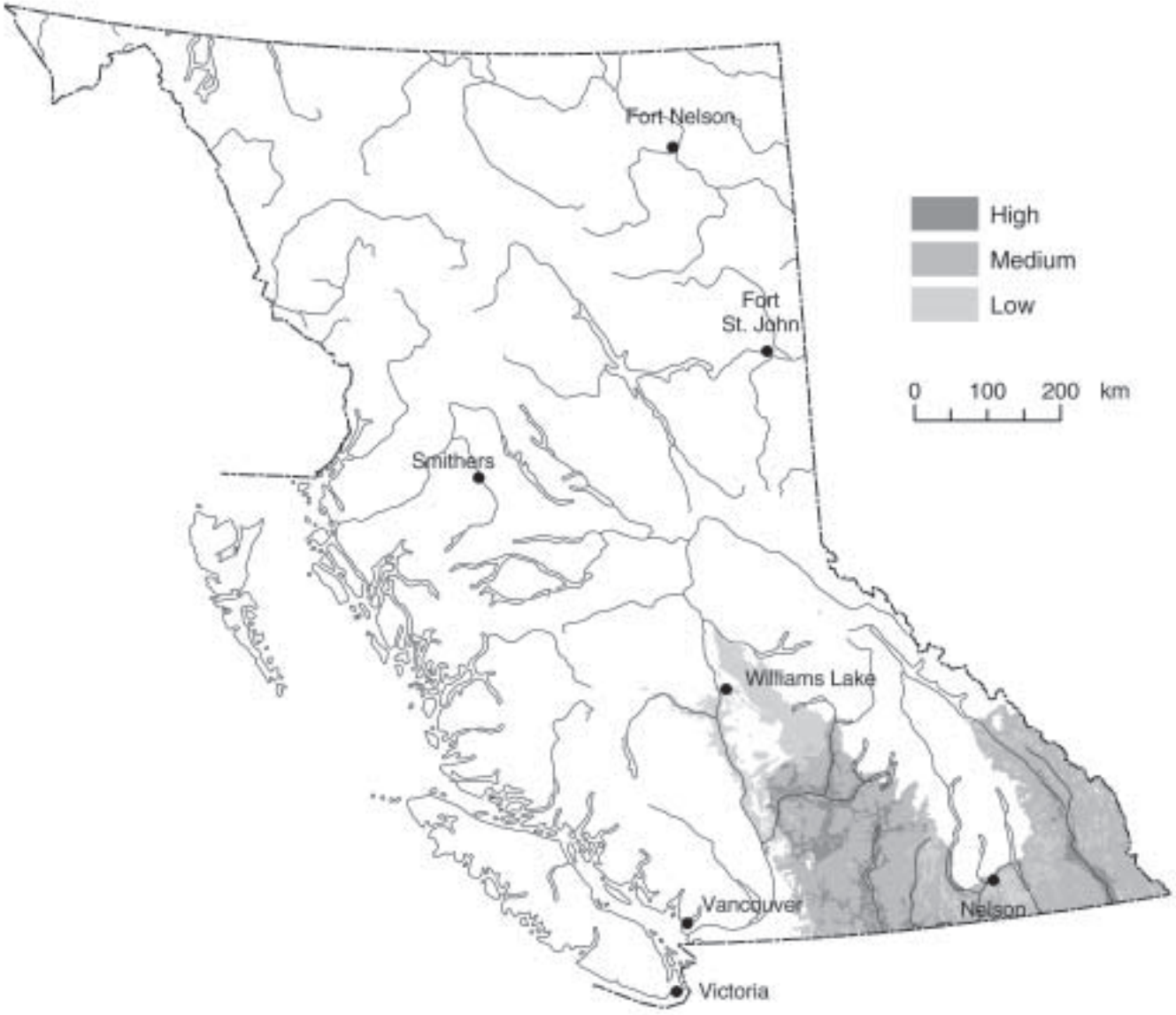
Southern Interior: 100 Mile House, Arrow Boundary, Cascades, Central Cariboo, Chilcotin (extreme east-central only), Columbia (southeast only), Headwaters (south only), Kamloops, Kootenay Lake (south only), Okanagan Shuswap, Quesnel (extreme south-central only), Rocky Mountain

Coast: Chilliwack (extreme east only)

1 Draft account for Volume 1 prepared by L. Gyug.

Badger

(Taxidea taxus)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several ecosystem classifications (Ecoregion, Biogeoclimatic and Broad Ecosystem Inventory) as well as current knowledge of the species' habitat preferences. This species may or may not occur in all areas indicated.

Ecoprovinces and ecosections

CEI: CAB, CAP, CHP (lowest elevations only), FRB

SIM: COC, EKT, EPM, FLV, MCR, SCM, SFH, SHH (extreme south only), SPK

SOI: HOR, NOB, NOH, NTU, OKR, PAR, SOB, SOH, STU, THB

Biogeoclimatic units

AT

BG: xh1, xh2, xh3, xw, xw1, xw2

ESSF: dc1, dc2, dcp, dk, dkp, mw, mwp, wc1, wc4, wcp, wm, wmp, xc, xcp

ICH: dw, mk1, mk2, mk3, mw1, mw2, mw3, xw

IDF: dk1, dk2, dk3, dm1, dm2, mw, mw1, mw2, un, xh1, xh2, xm, xw, xw2

MS: dk, dm1, dm2, un, xk

PP: dh1, dh2, xh1, xh2

SBPS: mk

SBS: dw1, dw2, mc1, mm, un

Broad ecosystem units

Southern Interior Forest: AC, DF, DL, DP, EF, IG, IH, IS, PP, RB, RD, SD

Central and Northern Forest: LP, SF, SL

Subalpine Parkland and Krummholz: FP, WB

Shrub and Herb Dominated: AB, BS, MS, SS

Non-forested Subalpine and Alpine: AG, AM, AT, SG, SM

Sparsely Vegetated: UV

Urban and Agricultural: CF, MI, OV, RM, TC, TR, UR

Elevation

Badger occurrence is usually greatest near valley bottoms but at least some populations make regular use of all elevations, including the alpine. Minimum elevations are 300–800 m, depending on the region, while the maximum elevation is about 2800 m.

Life History

Diet and foraging behaviour

Badgers are adapted to capturing fossorial prey, which is their primary diet in most locations (Lampe 1982; Salt 1976). However, badgers supplement their diet with a wide variety of mammals, birds, eggs, reptiles, amphibians, invertebrates, and plants (Messick 1987). Fecal and stomach samples have included Columbian Ground Squirrels, Yellow-bellied Marmots, Northern Pocket Gophers, Red-backed Voles, Deer Mice, Great-Basin Pocket Gopher, ungulates, insects, sparrows, Common Loon, leporid, sucker, salmonid, Yellow-Bellied Racer, Western Rattlesnake, Long-Toed Salamander, frog or toad, and unidentified remains (Newhouse and Kinley 2002; H. Davis, Artemis Wildlife Consultants, unpubl. data; C. Hoodicoff, Univ. Victoria, unpubl. data; D. Nagorsen, formerly Royal B.C. Mus., pers. comm.; N. Newhouse, Sylvan Consulting Ltd., unpubl. data).

Dens function as sites for resting, food storage, and parturition, and as central nodes from which foraging is based. In Utah, Lindzey (1978) found that only 15% of all dens used by badgers were dug immediately before their use and some dens were reused numerous times by the same badger. Newhouse (1999) noted that 60% of radio-locations were in reused burrows, and also documented different badgers using the same burrow at different times. Maternal dens differ from those used for diurnal resting in that they are more structurally complex with larger soil mounds at the entrance (Lindzey 1976). A high degree of individual and interannual variation in winter torpor has also been noted, with some individuals active throughout most of the winter and others remaining in one burrow for up to 98 days (Newhouse 1997).

Reproduction

Badgers are promiscuous, with breeding occurring in late July and August (Messick and Hornocker 1981). Implantation is delayed until February, with parturition occurring in late March or early April. Litter sizes range from one to five kits (Lindzey 1982). Litter sizes among radio-tagged females in the East Kootenay and Thompson-Okanagan have varied from zero to three, recorded 6–10 weeks post-partum, although members of the public have reported local litters of up to four (Newhouse and Kinley 2002; Weir and Hoodicoff 2002; N. Newhouse, Sylvan Consulting Ltd., unpubl. data).

Home range and movement

As of 2000, mean home ranges in the East Kootenay were 51 km^2 for females and 450 km^2 for males, based on the minimum convex polygon (MCP) method. Another subsample of badgers recently radio-tagged at the southern end of the East Kootenay appears to have considerably smaller ranges, but data are not yet complete. Mean home ranges in the Thompson-Okanagan region are similar to those in the East Kootenay (Weir and Hoodicoff 2002). Home ranges in British Columbia are much larger than those found in Idaho, Wyoming, and Illinois (2–44 km^2 based on MCP; Messick and Hornocker 1981; Minta 1993; Warner and Ver Steeg 1995).

Juvenile dispersal generally occurs in June through August, but cases of dispersal not occurring until the age of 1 year have been recorded (N. Newhouse, unpubl. data).

Habitat

Structural stage

For forested habitat types in which older structural stages are characterized by closed-canopy forest, structural stage is critical. In such cases, prey abundance can sometimes be very high in structural stages 0 and 1, but typically diminishes rapidly after that.

For open-canopied and non-forested habitat types, the importance of grassland structural stages varies according to local prey base. In areas where Columbian Ground Squirrels are present, vegetative structure may play a relatively insignificant role. However, where ground squirrels are not present, badgers are more reliant on microtine rodents (mice and voles). At these sites, mid- to late-seral, highly structured grasslands are important habitat features for badger prey.

Important habitats and habitat features

In British Columbia most badger activity is at low elevations in dry regions (BG, PP, IDF) within native or non-native grasslands, open forests of Douglas-fir or ponderosa pine, and disturbed sites such as roadsides and agricultural fields. However, badgers have also been documented using cutblocks, burns, early-seral forests of several species composition, other open sites in the ICH, MS, ESSF biogeoclimatic zones and parts of the SBPS and SBS and occasionally the AT (Apps et al. 2002; Weir and Hoodicoff 2002). Newhouse and Kinley (2000) documented individual male badgers regularly travelling between the IDF and the AT biogeoclimatic zones. Badgers are also adaptable by region and by season to a wide variety of food sources. Badgers appear to be relatively tolerant of human presence, as evidenced by their use of golf courses, abandoned buildings, and roadsides (Newhouse 1999), although there are presumably upper limits to the level of habitat alteration, number of movement barriers, or amount of direct human disturbance that badgers will tolerate.

Burrowing and foraging

Badger burrow and hunting sites are typically within sites dominated by grass, forbs, or low shrubs, either in non-forest, open forest, or very young forest. Badgers are typically found in or near colonies of prey species, such as Columbian Ground Squirrels or Yellow-Bellied Marmots. Ground squirrels appear to slightly favour sites with a preponderance of forbs relative to grass and shrubs. However, without these species, badgers may rely on more evenly dispersed microtine rodents.

A variety of soil types are used, but the most common types are moderately coarse-textured Brunisols with low to moderate (<35%) coarse fragment content, originating from glaciofluvial and glaciolacustrine parent material. Where available, Chernozems are probably also selected. Badgers that occur in areas with predominantly morainal deposits (e.g., ESSF, MS forests) may be limited to using disturbed soils (e.g., overburden, road fill) or small areas with glaciofluvial deposits in these areas. Although badgers sometimes burrow along disturbed road rights-of-way, the high mortality risk associated with such locations probably outweighs any habitat value there. Distance from other mortality or harassment risks such as dogs are another important habitat feature. Because badgers

maintain and use several burrows over a large home range, identifying a burrow as "active" or "inactive" is difficult. Burrows are readily reused by both badgers and other species (e.g., Burrowing Owl).

Conservation and Management

Status

The Badger is on the provincial *Red List* in British Columbia. In Canada, it is listed as *Endangered* (COSEWIC 2002). (See Summary of ABI status in BC and adjacent jurisdictions at bottom of page.)

Trends

Population trends

The most recent estimate for badger numbers in the province is <200 breeding adults (Adams et al. 2002). This is considerably lower than an earlier estimate of 300–1000 (Rahme et al. 1995). It is not clear whether this difference is due to recent population declines or simply a lack of information with which to make the earlier estimate. Pelt records do indicate a much larger population historically, with 200–350 pelts reported annually from British Columbia in 5 years within the 1920s, and this presumably represents only a portion of the total kill (Adams et al. 2002). In addition, there are examples of badgers disappearing (or nearly so) from relatively large areas in the recent past, such as the apparent near extirpation of badgers from the upper Columbia Valley in the past decade. However, even within areas of relatively healthy badger populations, numbers likely oscillate somewhat with changes in prey densities. Thus, the medium- to long-term trend in badger numbers has been downward, with the short-term trend unknown.

In southeast British Columbia, the average annual mortality was 23% among adults and 45% among juveniles (<1 yr), with causes of mortality among study animals including roadkill, probable predation by cougar, train kill, old age, predation by bobcat, and unknown. Trapping and shooting also resulted in the death of untagged animals (Newhouse and Kinley 2002).

Habitat trends

Throughout the regions of British Columbia that were historically dominated by grassland, shrub-steppe, and open forest, habitat has been lost over the past century due to forest encroachment and in-growth (as defined by Kirby and Campbell 1999). In some places, the pace of such losses may have slowed somewhat in recent years with the initiation of habitat restoration burns. Within more densely forested areas, some habitat has been created temporarily through logging (particularly where new forests have been slow to regrow). However, in areas with moderate to short historic fire-return intervals, gains from forest harvesting have probably been outpaced by the prevention of forest fires and the replanting of trees after burns. Post-harvesting habitat is generally short lived due to current stocking densities and "free-to-grow" requirements. Habitat has also been lost to human settlement, highways, intensive agriculture, gravel/sand pits, hydroelectric reservoirs, and the elimination of ground squirrel colonies. Thus, both the short- and long-term trends in habitat have been downward.

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

AB	BC	CA	ID	MT	OR	WA	Canada	Global
S4	S1	S4	S5	S4	S4	S5[a]	N4	G5[b]

a Badgers will soon be under review in Washington where wildlife managers have significant concerns over its status, especially close to the British Columbia border (H. Allen, pers. comm.).

b There is no global ranking for the Taxidea taxus jeffersonii subspecies. This rank reflects the global rank for the entire Taxidea taxus species.

Threats

Several threats exist to badgers and their habitat (Table 1). Some of these are historical and likely led to the initial decline in badger numbers across the province but have since been at least partially abated. Other threats continue or are increasing.

Population threats

A large proportion of known death of instrumented badgers results from highway mortality. Their vulnerability to roadkill is due to several factors:

- Badgers prefer open valley bottom habitats, where highways are most often constructed.
- Large home ranges (especially males) may increase the frequency of encounters with highways.
- Disturbed soils adjacent to highways are ideal digging substrates for both badgers and their prey.
- Prey densities may be higher near highways because rights-of-way are maintained in early successional, grassy stages.
- Badgers' fearless behaviour, typical of most mustelids, leaves them vulnerable to road kills.
- Badgers are most active at night, when drivers will have the most difficulty seeing a relatively small, low-to-the-ground animal.
- Badgers may use roadside ditches and right-of-ways as extensive linear movement corridors.

Extermination of prey species such as ground squirrels, marmots, and pocket gophers may reduce food available to badgers. Secondary effects from consuming poisoned prey may also have harmful results on badgers. Habitat degradation due to poor range practices has also likely led to reductions in prey species with subsequent effects on badger population levels.

Badgers are killed by landowners who either directly fear them or consider them nuisance animals whose diggings may damage machinery or pose a threat to livestock.

The observed low reproductive output in British Columbia may inhibit badgers' ability to recover from lowered population levels. Banci and Proulx

Table 1. List of probable continuing and historic threats to badger populations and habitat in British Columbia ranked by relative impact (predominant or contributing), spatial distribution of the threat (widespread or local), temporal impacts (chronic, episodic, or ephemeral), and degree to which the threat has been reduced. (Source: Adams et al. 2002).

Threat	Impact	Spatial	Temporal	Continuing
Trapping	predominant	widespread	episodic	yes
Persecution	contributing [a]	widespread	chronic	partially
Urban development	predominant	widespread	episodic	increasing
Cultivation	contributing	widespread	chronic	no
Viniculture & orchards	contributing	local	chronic	no
Forest in-growth & encroachment	contributing	widespread	chronic	partially
Reservoir flooding	contributing [b]	local	chronic	no
Highway mortality	predominant	widespread	chronic	increasing
Extermination of prey	contributing	widespread	episodic	no
Secondary poisoning via prey	contributing	local	ephemeral	partially

a Degree of persecution is unknown. Impact is potentially substantial at a local level.

b Across all of British Columbia, reservoir flooding has likely had limited impact on population numbers. However at a local level (e.g., Lake Koocanusa in southern Rocky Mountain Trench), impacts are likely predominant.

(1999) classified the badger as a low resiliency species in British Columbia (i.e., with a low capability to recover from a reduction in numbers). They attribute the low resiliency to the fact that badger populations have a relatively low reproductive rate, extensive dispersal movements, and high human-caused mortality other than trapping. Human-caused mortality should be kept to a minimum (i.e., <10%) (Banci and Proulx 1999).

Habitat threats

There are several threats to badger habitat, including:

- highway construction
- urban development
- cultivation agriculture
- viniculture and orchard development
- forest in-growth and encroachment
- gravel and sand pits
- reservoir flooding
- poor range practices
- unfettered motorized access to grassland and open-forest ecosystems

Many of these threats present semi-permeable barriers to badgers. They readily cross highways; are known to swim across reservoirs; and will use cultivated fields, orchards, and ginseng farms. However, all of these represent varying degrees of habitat degradation, often as a result of reduced prey availability and increased mortality risk.

An important aspect regarding badger habitat loss is that impacts are exacerbated by negative human attitudes toward badgers. Badgers have been sighted at golf courses, ginseng farms, mine sites, ski hills; and within urban areas. However, humans tend to be intolerant (sometimes fearful) of badgers and either exterminate them directly or remove their prey.

Legal Protection and Habitat Conservation

Badgers have been protected from trapping and hunting under the provincial *Wildlife Act.* However, under Section 26 of the *Wildlife Act*, any species not listed as threatened or endangered and deemed to be a menace to domestic animals or birds may be killed by the property owner. Although red-listed by the B.C. Conservation Data Centre, badgers are not formally listed as threatened or endangered under the *Wildlife Act*.

Most prey species, including Columbian Ground Squirrel, Yellow-bellied Marmot, Northern Pocket Gopher, *Peromyscus* spp., and arvicolid rodents (voles) are protected on Crown land. However all are listed under Schedule B of the designation and exemption regulations of the *Wildlife Act* and may be legally killed on private land to protect property.

Protected areas currently provide little conservation value. In the East Kootenay region, protected areas represent 15% of the area available, but only 3% of probable badger habitat (Apps et al. 2002). Conversely, private lands represent 9% of the study area, but 35% of probable habitat (Apps et al. 2002). Despite new protected areas in the Okanagan region, a similar situation exists there. Further, badger home ranges are larger than most protected areas with probable badger habitat.

Large protected areas with suitable badger habitat include Kootenay National Park, Kikomun Creek Provincial Park, Lac du Bois Grasslands Provincial Park, Okanagan Mountain Provincial Park, White Lake Grasslands Provincial Park, and South Okanagan Grasslands Provincial Park. Outside of these parks, no significant habitat conservation actions have been taken specifically for badgers although badgers have been identified as part of the rationale for acquisition of conservation lands by non-profit organizations, and for restoring habitat within landscapes historically dominated by open habitats.

A functioning *jeffersonii* badger Recovery Team is in place under provincial jurisdiction with the B.C. Ministry of Water, Land and Air Protection as the lead agency. A draft recovery strategy (Adams et al. 2002) is under review and actions toward increasing badger populations in British Columbia are under way.

The Wildlife Habitat Feature designation under the results based code may be sufficient to protect and maintain badger burrows, especially maternal dens, provided that a 20-m radius (or one tree length, whichever is less) around the burrow is kept free of machinery impacts and soil disturbance. Characteristics or evidence of a maternal den include larger than average burrow (lots of dirt and signs of repeated use such as tracks, fresh digging), repeated sightings of adult badger within a small area, sighting of badger kits, and documented historic use. Burrows may also be protected on cutblocks using wildlife tree retention areas.

Livestock grazing practices on Crown rangelands should adhere to prescribed range use plans as administered by the Ministry of Forests under the results based code.

Identified Wildlife Provisions

Sustainable resources management and planning recommendations

The highest quality badger habitats occur in Natural Disturbance Type 4 (NDT4). Sites are characterized by:

- frequent, stand-maintaining fires
- generally open grassland or sparsely treed areas
- high densities of prey populations
- Brunisol and Chernozem soil types with fine sandy loam structure (generally friable soils without large rocks).

The focus of the following recommendations and measures are based on management in these areas. However, badgers in British Columbia are known to use NDT3 sites that have not been restocked, often following logging operations or severe fires. These NDT3 sites may represent a significant portion of the provincial badger population but are much more difficult to manage under current fire suppression, restocking, and Free-to-Grow requirements.

- ❖ Maintain areas of high habitat value for badgers.
- ❖ Maximize connectivity between areas of higher habitat value by minimizing urbanization and conversion of agricultural land to residential, industrial, or other developments.
- ❖ Maintain seral stage and structure on all habitats to support prey base.
- ❖ Maintain lowest possible road densities.
- ❖ Continue/increase restoration activities that reduce forest in-growth and encroachment.
- ❖ Reduce re-stocking rates in NDT4 zones (no planting wherever possible).
- ❖ Create and maintain a range of successional and structural stages of grassland and open forest ecosystems with structure and cover attractive to ground squirrels and other prey species.
- ❖ Leave larger, older trees to provide more ecological stability.

Wildlife habitat area

Goal

Protect critical habitat such as concentrations of burrow sites, especially maternal dens, and concentrations of prey species or friable soil habitat.

Feature

Establish WHAs in areas identified as critical badger habitat (e.g., concentration of burrows, abundant prey sources, and localized preferred friable soil types including moderately coarse-textured Brunisols originating from glaciofluvial and glaciolacustrine parent material) by the Regional Recovery Action Groups established by the National Recovery Team.

Size

Generally 2–100 ha, depending on site characteristics such as badger population density, soil types, number of burrows, and frequency of use.

Design

Design WHAs to include known burrows and/or prey concentrations and areas of suitable habitat. Use soil or geologic boundaries wherever possible.

General wildlife measures

Goals

1. Maintain important habitat features including sufficient structure/litter to provide hiding cover, open- or non-forested land, grasslands in a range of seral stages, friable soils, and prey.

2. Control forest encroachment and in-growth.
3. Manage livestock grazing to maintain suitable habitat for prey species (Columbian Ground Squirrel, Yellow-bellied Marmot, microtine rodents).
4. Minimize disturbance during the breeding season.

Measures

Access

- Do not develop any new road access.
- Restrict access to active maternal areas between 1 May and 15 August. Active areas may be identified by observed sightings of family groups (>1 badger) or other means (e.g., radio-telemetry). Active closures need only be in place for the current season.
- Close all established roads after resource extraction is completed.

Harvesting and silviculture

- Harvest as required to support ecological restoration. Reduce stocking densities (<75 stems/ha; target of 20 stems/ha) and free-to-grow requirements.
- Leave a selection of live and dead trees to maintain site ecology.

Pesticides

- Do not use pesticides.

Range

- Do not place livestock attractants in WHA.
- Manage livestock grazing to ensure proper conditions (seral and structural stages) for prey species. Conditions will vary depending on the prey species present.

Additional Management Considerations

Where appropriate, apply restoration treatments to maintain/create grassland and open forest conditions suitable as badger habitat.

Where feasible, maintain disturbed, early seral NDT3 sites as badger habitat by delaying and/or reducing restocking.

Encourage private land stewardship.

Protect prey species. Do not use rodenticides.

Off-road vehicle use (e.g., ATVs) should be restricted in areas of high badger use.

Information Needs

1. Predator–prey interactions including ecological requirements of various prey species, importance of Columbian Ground Squirrels as prey; implications of range/forest management strategies on prey species.
2. Distribution and abundance of badgers beyond Thompson and East Kootenay regions.
3. Contribution of NDT3 and alpine sites to provincial badger population, habitat supply, and connectivity.

Cross References

Bighorn Sheep, Burrowing Owl, "Columbian" Sharp-tailed Grouse, Grasshopper Sparrow, Long-billed Curlew, Racer, Sage Thrasher, "Sagebrush" Brewer's Sparrow, Sonora Skipper, Sooty Hairstreak, Western Rattlesnake, White-headed Woodpecker

antelope-brush–bluebunch wheatgrass, Douglas-fir–snowberry–balsamroot, ponderosa pine–bluebunch wheatgrass–silky lupine

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