COSEWIC
Assessment and Status Report

on the

American Badger
Taxidea taxus

jacksoni subspecies (*Taxidea taxus jacksoni*)
jeffersonii subspecies / Eastern population (*Taxidea taxus jeffersonii*)
jeffersonii subspecies / Western population (*Taxidea taxus jeffersonii*)
taxus subspecies (*Taxidea taxus taxus*)

in Canada

jacksoni subspecies - ENDANGERED
jeffersonii subspecies / Eastern population - ENDANGERED
jeffersonii subspecies / Western population - ENDANGERED
***taxus* subspecies - SPECIAL CONCERN**
2012

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC. 2012. COSEWIC assessment and status report on the American Badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. iv + 63 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

Previous report(s):

COSEWIC. 2000. COSEWIC assessment and update status report on the American badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 29 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Newhouse, N., and T. Kinley. 2000. Update COSEWIC status report on the American badger *Taxidea taxus* in Canada, *in* COSEWIC assessment and status report on the American badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-29 pp.

Stardom, R.P. 1979. COSEWIC status report on American badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 31 pp.

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COSEWIC
Assessment Summary

Assessment Summary – November 2012

Common name
American Badger - *jacksoni* subspecies

Scientific name
Taxidea taxus jacksoni

Status
Endangered

Reason for designation
Fewer than 200 of these large weasels remain in southwestern Ontario, where they are vulnerable to land-use changes and mortality from vehicles. Recent surveys suggest that the population is stable but threats continue or are increasing (e.g. road density) and the population remains at risk.

Occurrence
Ontario

Status history
The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000. The *jacksoni* subspecies was designated Endangered. Status re-examined and confirmed in November 2012.

Assessment Summary – November 2012

Common name
American Badger - *jeffersonii* subspecies - Eastern population

Scientific name
Taxidea taxus jeffersonii

Status
Endangered

Reason for designation
As few as 100 mature badgers live in the East Kootenay region where they are vulnerable to increasing threats from roadkill. The loss of open areas to forest succession and urban development is resulting in ongoing habitat decline.

Occurrence
British Columbia

Status history
The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the *jeffersonii* subspecies was designated Endangered. In November 2012, the *jeffersonii* subspecies was further split into two populations (Western and Eastern populations), and the Eastern population was designated Endangered.

Assessment Summary – November 2012

Common name
American Badger - *jeffersonii* subspecies - Western population

Scientific name
Taxidea taxus jeffersonii

Status
Endangered

Reason for designation
Fewer than 250 mature badgers live in the Okanagan Valley-Cariboo region where they are vulnerable to increasing threats of mortality from roadkill and habitat loss associated with the change of open areas to urban or forest environments.

Occurrence
British Columbia

Status history
The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the *jeffersonii* subspecies was designated Endangered. In November 2012, the *jeffersonii* subspecies was further split into two populations (Western and Eastern populations), and the Western population was designated Endangered.

Assessment Summary – November 2012

Common name
American Badger - *taxus* subspecies

Scientific name
Taxidea taxus taxus

Status
Special Concern

Reason for designation
In the Prairies, this mammal is subject to furbearer harvest but also unmonitored and unregulated mortality by landowners, and the application of rodenticides. The lack of monitoring of total mortality, the limited amount of habitat in cultivated areas, ongoing threat of roadkill, and the projected use of strychnine leads to concern for the species in a large part of its range.

Occurrence
Alberta, Saskatchewan, Manitoba, Ontario

Status history
The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the *taxus* subspecies was designated Not at Risk. Status re-examined and designated Special Concern in November 2012.

COSEWIC
Executive Summary

American Badger
Taxidea taxus

jacksoni subspecies (*Taxidea taxus jacksoni*)
jeffersonii subspecies / Eastern population (*Taxidea taxus jeffersonii*)
jeffersonii subspecies / Western population (*Taxidea taxus jeffersonii*)
taxus subspecies (Taxidea *taxus taxus*)

Wildlife Species Description and Significance

The American Badger (*Taxidea taxus*) is a medium-sized fossorial (burrowing) carnivore in the weasel (Mustelidae) family. They are well-adapted to digging, possessing a dorso-ventrally flattened body with a robust pectoral girdle and broad front paws used to excavate burrows and dig out prey. Four subspecies of American Badger are recognized, three of which occur in Canada. Mitochondrial DNA work found multiple distinct genetic groups in Canada. Four designatable units are recommended (Jeffersonii East and West, Taxus, and Jacksoni), each corresponding with the existing subspecies distribution of *T. t. taxus* and *jacksoni*, with *T. t. jeffersonii* divided into two DUs.

Distribution

American Badgers occur throughout the southern regions of the western and central Canadian provinces, from the east slopes of the Coast mountains in British Columbia, eastward to the boreal forest of south-eastern Manitoba. A disjunct population exists in south-western Ontario, largely centred on Norfolk County. In north-western Ontario, American Badgers are occasionally reported from the agricultural lands of the Rainy River and Fort Frances area, but these are considered non-residents from the United States. The Jeffersonii subspecies exists as two isolated subpopulations.

Habitat

American Badgers occur in non-forested grassland and shrubland biomes. Recent work has identified soil and prey availability to be the key defining features of habitat; coherent soils that can be burrowed into without collapsing are preferred. Closed-canopied forested areas generally are not used but early seral habitats along forest corridors can support prey populations that attract American Badgers into forest areas. Badgers are also known from alpine areas and wetlands. Agricultural areas support badgers provided there are sufficient hedgerows, fencerows and field edges. Cultivated fields are largely avoided. Habitat trends are generally declining across most of the species' Canadian range.

Biology

American Badgers breed in July and August with polygynous males often ranging widely to find females. Litter sizes average one to two kits. American Badgers do not hibernate, but movements are reduced in the winter and they may enter torpor for brief periods during extreme cold. Diet is highly varied, but usually focuses on fossorial (ground-burrowing) rodents, such as ground squirrel. Home ranges in Canada typically are much greater than those reported from the species' core range in the mid-western United States. In British Columbia, males range from 33 to 64 km^2, and females from 16 to 18 km^2.

Population Sizes and Trends

Population estimates are based on aerial and ground surveys and expert opinion associated with field research and public observations. The Jeffersonii West and East DUs contain fewer than 250 and 160 mature individuals, respectively, but the overall population trend is stable. No estimate or trend is available for the Taxus DU; fur returns between 1999 and 2010 average 734/yr but fluctuate widely with no clear overall trend. The Jacksoni DU is estimated to contain fewer than 200 adults; its population trend is unknown.

Threats and Limiting Factors

The main threats facing American Badgers throughout their range are road-kill and decline in habitat. Habitat loss and degradation result from housing development, forest in-growth and encroachment, orchards and vineyards, and cultivation (row-crop) agriculture. American Badgers are highly susceptible to road-kill. Persecution by landowners likely contributed to historic declines, and likely is an important ongoing mortality factor in the Taxus DU. American Badgers in the Taxus DU are trapped for their fur and incidentally killed by rodenticides.

Protection, Status, and Ranks

American Badgers in Ontario and British Columbia are currently considered Endangered by COSEWIC and are included on Schedule 1 of the federal *Species at Risk Act*. The *T. t. taxus* subspecies, occurring in Alberta, Saskatchewan and Manitoba, is considered Not at Risk. Federal land with suitable habitat occurs in British Columbia and Ontario. In Ontario, American Badgers are protected under the provincial *Endangered Species Act 2007,* which also has habitat regulations that protect some badger and Woodchuck (*Marmota monax*) burrows. In British Columbia, some badger habitat is managed under the provincial *Forest and Range Practices Act* as Wildlife Habitat Areas. American Badgers receive the highest conservation priority under the province's Conservation Framework. The province of Alberta considers American Badgers as Data Deficient. No rankings exist for the provinces of Saskatchewan and Manitoba.

TECHNICAL SUMMARY: *jacksoni* subspecies

Taxidea taxus jacksoni
American Badger *jacksoni* subspecies Blaireau d'Amérique de la sous-espèce *jacksoni*
Range of occurrence in Canada: Ontario

Demographic Information

Generation time. *Based on average age of breeding adult: age at first breeding = 1 year; average life span = 6 years.*	Average age of breeding adult estimated at 3 years
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	No
Estimated percent of continuing decline in total number of mature individuals within 6 years.	No apparent decline
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last 10 years.	None
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next 10 years. *Increase in human population in area increases risk of roadkill and habitat loss.*	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 year period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased?	No known decline. Threats that have not ceased include urban development and roadkill.
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence.	15,438 km²
Index of area of occupancy (IAO).	>2000 km²
Is the total population severely fragmented?	Unlikely
Number of locations. *Variation in road density and traffic volumes results in road kill events being separate threat events.*	Many
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	No
Is there an [observed, inferred, or projected] continuing decline in number of locations?	Unlikely
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Yes
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Total	<200

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not conducted

Threats (actual or imminent, to populations or habitats)

Threats to habitat: urban development, reforestation of fallow agricultural lands
Threats to populations: roadkill, possibly declining prey availability (Woodchuck)

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? **MI**: S4	
Is immigration known or possible? *St. Clair River and surrounding urban development isolates Ontario from nearest population in Michigan*.	Unlikely
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	Unknown / unlikely
Is rescue from outside populations likely?	Unlikely

Status History

The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000. The *jacksoni* subspecies was designated Endangered. Status re-examined and confirmed in November 2012.

Status and Reasons for Designation

Status:	**Alpha-numeric code:**
Endangered	D1
Reasons for designation: Fewer than 200 of these large weasels remain in southwestern Ontario, where they are vulnerable to land-use changes and mortality from vehicles. Recent surveys suggest that the population is stable but threats continue or are increasing (e.g. road density) and the population remains at risk.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable; decline not apparent.
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable; EO meets threatened status but population decline or fluctuation not apparent.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable; population size meets endangered status but population decline not apparent.
Criterion D (Very Small or Restricted Total Population): D1 Endangered; population at 200 mature individuals meets endangered status.
Criterion E (Quantitative Analysis): Not applicable; analysis not conducted.

TECHNICAL SUMMARY: *jeffersonii* subspecies (Eastern population)

Taxidea taxus jeffersonii
American Badger *jeffersonii* subspecies (Eastern population) Blaireau d'Amérique de la sous-espèce *jeffersonii* (Population de l'Est)
Range of occurrence in Canada: British Columbia

Demographic Information

Generation time. Based on average age of breeding adult: age at first breeding = 1 year; average life span = 6 years.	Average age of breeding adult estimated at 3 years
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	No
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	No known decline
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Possible increase, no quantified data
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Likely stable
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Likely stable
Are the causes of the decline clearly reversible and understood and ceased?	Most threats continue: roadkill, habitat loss. Some factors of historic declines (e.g. trapping) have ceased
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	40,532 km²
Index of area of occupancy (IAO)	>2000 km²
Is the total population severely fragmented?	Unlikely
Number of locations *Variation in road density and traffic volumes results in road kill events being separate threat events.*	Many
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	No
Is there an [observed, inferred, or projected] continuing decline in number of locations.	No
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Yes

Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Total	100 to 160

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not conducted

Threats (actual or imminent, to populations or habitats)

Habitat: housing development, forest in-growth and encroachment
Populations: roadkill.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? **MT:** S4; **ID:** S5, few badgers close to Canada in Idaho, majority of badgers in southern part of state.	
Is immigration known or possible?	Possible, but limited.
Would immigrants be adapted to survive in Canada?	Yes. Translocations have occurred from northwest Montana to East Kootenay
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely?	Possible

Status History

The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the *jeffersonii* subspecies was designated Endangered. In November 2012, the *jeffersonii* subspecies was further split into two populations (Western and Eastern populations), and the Eastern population was designated Endangered.

Status and Reasons for Designation

Status:	Alpha-numeric code:
Endangered	D1

Reasons for designation:
As few as 100 mature badgers live in the East Kootenay region where they are vulnerable to increasing threats from roadkill. The loss of open areas to forest succession and urban development is resulting in ongoing habitat decline.

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable; declines in some areas but not sufficient to meet critieria.
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable; distribution trend likely stable overall.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable; population trend likely stable overall.
Criterion D (Very Small or Restricted Total Population): Endangered. Population estimate of mature animals is 100-160.
Criterion E (Quantitative Analysis): Not applicable; not conducted.

TECHNICAL SUMMARY: *jeffersonii* subspecies (Western population)

Taxidea taxus jeffersonii
American Badger *jeffersonii* subspecies (Western population)
Range of occurrence in Canada: British Columbia

Blaireau d'Amérique de la sous-espèce *jeffersonii* (Population de l'Ouest)

Demographic Information

Generation time: Based on average age of breeding adult: age at first breeding = 1 year; average life span = 6 years.	3 years
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Inferred probable decline in Thompson/Okanagan; increase in Cariboo
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Likely stable across entire DU. Declines in Thompson/Okanagan. Increase in Cariboo sub-population.
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased?	Most threats continue: housing development; roadkill.
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	72,058 km²
Index of area of occupancy (IAO) (Always report 2x2 grid value).	>2000 km²
Is the total population severely fragmented?	Unknown within DU
Number of locations *Variation in road density and traffic volumes results in road kill events being separate threat events.*	Many
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	No
Is there an [observed, inferred, or projected] continuing decline in number of locations	No
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Yes, in part of DU area of occupancy; stable in other parts
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No

Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Cariboo	70-90
Thompson	30-50
Okanagan / Boundary	35-65
Nicola	15-40
Total	150-245

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not conducted

Threats (actual or imminent, to populations or habitats)

Habitat: housing development, forest in-growth and encroachment, orchards / vineyards
Populations: roadkill.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? **WA:** S4, few badgers close to Canada in Washington, majority of badgers in central part of state.	
Is immigration known or possible?	Possible, but unlikely
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	In parts of range, yes; but not in areas bordering rescue population in Washington state.
Is rescue from outside populations likely?	Unlikely

Status History

The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the *jeffersonii* subspecies was designated Endangered. In November 2012, the *jeffersonii* subspecies was further split into two populations (Western and Eastern populations), and the Western population was designated Endangered.

Status and Reasons for Designation

Status:	**Alpha-numeric code:**
Endangered	D1
Reasons for designation: Fewer than 250 mature badgers live in the Okanagan Valley-Cariboo region where they are vulnerable to increasing threats of mortality from roadkill and habitat loss associated with change of open areas to urban or forest environments.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals):
Not applicable; declines in some areas but not sufficient to meet criteria.
Criterion B (Small Distribution Range and Decline or Fluctuation):
Not applicable; distribution trend likely stable overall.
Criterion C (Small and Declining Number of Mature Individuals):
Not applicable; population trend likely stable overall.
Criterion D (Very Small or Restricted Total Population):
Endangered. Population estimate of mature animals is 150-245.
Criterion E (Quantitative Analysis):
Not applicable; not conducted.

TECHNICAL SUMMARY: *taxus* subspecies

Taxidea taxus taxus
American Badger *taxus* subspecies Blaireau d'Amérique de la sous-espèce *taxus*
Range of occurrence in Canada: Alberta, Saskatchewan, Manitoba, Ontario (Ontario records considered as extra-limital)

Demographic Information

Generation time. *Based on average age of breeding adult: age at first breeding = 1 year; average life span = 6 years.*	Average age of breeding adult estimated at 3 years
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals? *Furbearer records suggest population is stable. Concern exists over mortality rates from unreported deaths due to rodent poisoning and extermination killing.*	No known decline
Estimated percent of continuing decline in total number of mature individuals within 6 years.	No known decline, as judged by harvest records
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last 10 years.	Unknown
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next 10 years.	Stable or possible decline; percent unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any10 year period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased?	Some threats continue, e.g. roadkill, secondary poisoning, extermination killing
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence.	721,096 km²
Index of area of occupancy (IAO).	>2000
Is the total population severely fragmented?	Unlikely
Number of locations. *Variation in road density and traffic volumes results in road kill events being separate threat events.*	Many
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	No
Is there an [observed, inferred, or projected] continuing decline in number of locations?	Unlikely
Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Possibly. Range could be expanding northward, but habitat loss throughout AO continues.
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No

Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Surveys are not conducted but average of 734 badgers were trapped annually between 1999-2010; population likely well over 1000 mature animals.	
Total	Unknown

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not conducted

Threats (actual or imminent, to populations or habitats)

Habitat loss / degradation via cultivation agriculture; Mortality from roadkill, trapping, and secondary poisoning from anti-coagulent rodenticides.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? **MT**: S4; **ND**: SNR; **MN**: SNR, few badgers close to Canada in Minnesota; majority of badgers in southern part of state.	
Is immigration known or possible?	Possible and probable
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	Yes
Is rescue from outside populations likely?	Possible

Status History

The species was considered a single unit and designated Not at Risk in 1979. Each subspecies was given a separate designation in May 2000; the taxus subspecies was designated Not at Risk. Status re-examined and designated Special Concern in November 2012.

Status and Reasons for Designation

Status:	**Alpha-numeric code:**
Special Concern	Not applicable

Reasons for designation:

In the Prairies, this mammal is subject to furbearer harvest but also unmonitored and unregulated mortality by landowners, and the application of rodenticides. The lack of monitoring of total mortality, the limited amount of habitat in cultivated areas, ongoing threat of roadkill, and the projected use of strychnine leads to concern for the species in a large part of its range.

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable; decline not apparent. Possibly declining in parts of range but lack of monitoring negates ability to document magnitude.
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable; exceeds distribution threshold.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable; exceeds threshold for number of mature individuals.
Criterion D (Very Small or Restricted Total Population): Not applicable; population exceeds thresholds.
Criterion E (Quantitative Analysis): Not applicable; analysis not conducted.

PREFACE

The first COSEWIC treatment of American Badger (Stardom 1979) combined all badgers in Canada into a single population and classified them as “No Designation Required”. In 1995, the designation was changed to “Not at Risk”, in order to reflect new COSEWIC terminology. In May 2000, the Canadian population was assessed as three populations, based on the boundaries of each subspecies; *Taxidea taxus jeffersonii* (from British Columbia) and *T. t. jacksoni* (from south-western Ontario) were assessed as Endangered (COSEWIC 2000). *T. t. taxus* (Alberta to northwestern Ontario) was designated as Not at Risk (COSEWIC 2000). The current updated report recognizes the three subspecies as the basis for four designatable units: *T. t. jeffersonii* is divided into Jeffersonii West and East DUs while the range of *T. t. taxus* represents the Taxus DU, and *T. t. jacksoni* represents the Jacksoni DU.

Recovery teams were established in 2001 and 2006 for the populations in British Columbia, and Ontario, respectively (*jeffersonii* Badger Recovery Team 2008; Ontario American Badger Recovery Team 2010). Extensive surveys to establish distribution and abundance were since conducted in Jeffersonii and Jacksoni DUs, and the genetic structure of Badger in Canada have been published.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2012)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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COSEWIC Status Report

on the

American Badger
Taxidea taxus

jacksoni subspecies (*Taxidea taxus jacksoni*)
jeffersonii subspecies / Eastern population (*Taxidea taxus jeffersonii*)
jeffersonii subspecies / Western population (*Taxidea taxus jeffersonii*)
taxus subspecies (*Taxidea taxus taxus*)

in Canada

2012

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and Classification

The American Badger, *Taxidea taxus*, (Schreber 1778) is a member of the weasel family (Mustelidae) and the only species of badger occurring in North America. Other common names include Yellow Badger and North American Badger. In French, it is known as *blaireau d'Amérique*. In Canada, three subspecies of American Badger are currently recognized: *T. t. jacksoni*, *T. t. taxus* and *T. t. jeffersonii*. A fourth subspecies, *T. t. berlandieri* occurs in south-western United States and Mexico (Figure 1). These taxonomic divisions (after Long 1972) are based primarily on skull morphology and pelage colour, but also have been supported by recent genetic analysis (Ethier *et al.* 2012).

Figure 1. Approximate global distribution of American Badger (*Taxidea taxus*) subspecies (US and Mexican species-level distribution sources: Ruiz-Campos *et al.* 2002; NatureServe 2011; Canadian distribution based on data from this report). Subspecies linework adapted from COSEWIC (2000) with most recent data; *T. t. jacksoni* was formerly considered to occur throughout Wisconsin, Michigan's Upper Peninsula, most of Minnesota and extreme southeast Manitoba.

Information specific to Aboriginal Traditional Knowledge on American Badger was not made available for this report, as per agreement with the ATK subcommittee.

Morphological Description

American Badgers are medium-sized carnivores, with sandy-brown pelage and bold facial markings, including black cheek patches or 'badges' that give them their common name. They are adapted to a fossorial lifestyle, with a relatively dorso-ventrally flattened torso and robust fore-limbs and pectoral girdle for digging. Males weigh up to 12 kg and are 60 to 75 cm long; females are slightly smaller (Long 1973).

The *T. t. jacksoni* subspecies is described as having a darker-brown to black pelage, whereas *T. t. jeffersonii* individuals typically are more reddish, and *T. t. taxus* individuals are paler, with more hoary fur (Long 1972; Messick 1987).

Population Spatial Structure and Variability

Recent genetic analyses indicate that distinct populations exist in Canada and that populations in Ontario and British Columbia are more isolated from the central Prairie population than previously believed (Ethier *et al.* 2012). Genes from the mitochondrial control region were sampled from Canada and the bordering United States (Ontario, Michigan Upper Peninsula, Michigan Lower Peninsula, Manitoba, Saskatchewan, Alberta, Montana, and British Columbia's Kootenay, Thompson and Okanagan regions). The existing three subspecies categories were supported (AMOVA: $F_{st} = 0.40$, $p < 0.001$). Spatial analysis of molecular variation identified two additional genetic groups in Canada (SAMOVA: $F_{st} = 0.39$, $p < 0.001$).

The two additional groups occur within the *jeffersonii* and *taxus* subspecies. The *jeffersonii* subspecies exists as two populations separated by the Selkirk Mountains, which results in two distinct genetic groups (i.e., the Thompson / Okanagan, and Kootenay groups) (SAMOVA: $F_{st} = 0.53$, $p < 0.001$). In central Canada, the *taxus* subspecies was split into two distinct groups with individuals in Manitoba allied with those in Michigan's Upper Peninsula ($F_{st} = 0.04$, $p > 0.10$). Individuals from Alberta ($F_{st} = 0.16$, $p < 0.001$) and Saskatchewan ($F_{st} = 0.15$, $p < 0.001$) were similar ($F_{st} = -0.018$, $p > 0.10$) but differed significantly from those in Manitoba (Alberta; $F_{st} = 0.16$, $p < 0.001$, Saskatchewan; $F_{st} = 0.15$, $p < 0.001$). American Badgers in Montana (east of the continental divide) were allied with Alberta ($F_{st} = 0.02$, $p = 0.18$), Saskatchewan ($F_{st} = 0.01$, $p = 0.29$),) and Manitoba ($F_{st} = 0.05$, $p = 0.11$).

The Ethier *et al.* (2012) paper recommends that the distribution of the *jacksoni* subspecies be corrected to reflect that badgers in Michigan's Upper Peninsula belong instead to the *taxus* subspecies (Figure 1). Taxus individuals have been recorded in north-western Ontario but these are considered vagrants (see **Canadian Range** section). The established population in south-western Ontario belongs to the *jacksoni* subspecies and is genetically similar to badgers across the St. Clair River in lower Michigan ($F_{st} = 0.18$, $p < 0.10$).

Designatable Units

Although five genetic units were identified by Ethier *et al.* (2012) in Canada, this status report recognizes four designatable units. Two of the DUs (the *taxus* and *jacksoni* subspecies) are the same as those recognized in the earlier COSEWIC (2000) status report. The *T. t. jeffersonii* population in British Columbia is divided into two DUs, named the Jeffersonii East and Jeffersonii West DUs (Figure 2). The Taxus DU encompasses the entire Canadian distribution of the *taxus* sub-species in Alberta, Saskatchewan and Manitoba, as well as north-western Ontario (Figure 3). The Jacksoni DU occurs in south-western Ontario and comprises the *jacksoni* subspecies (Figure 4).

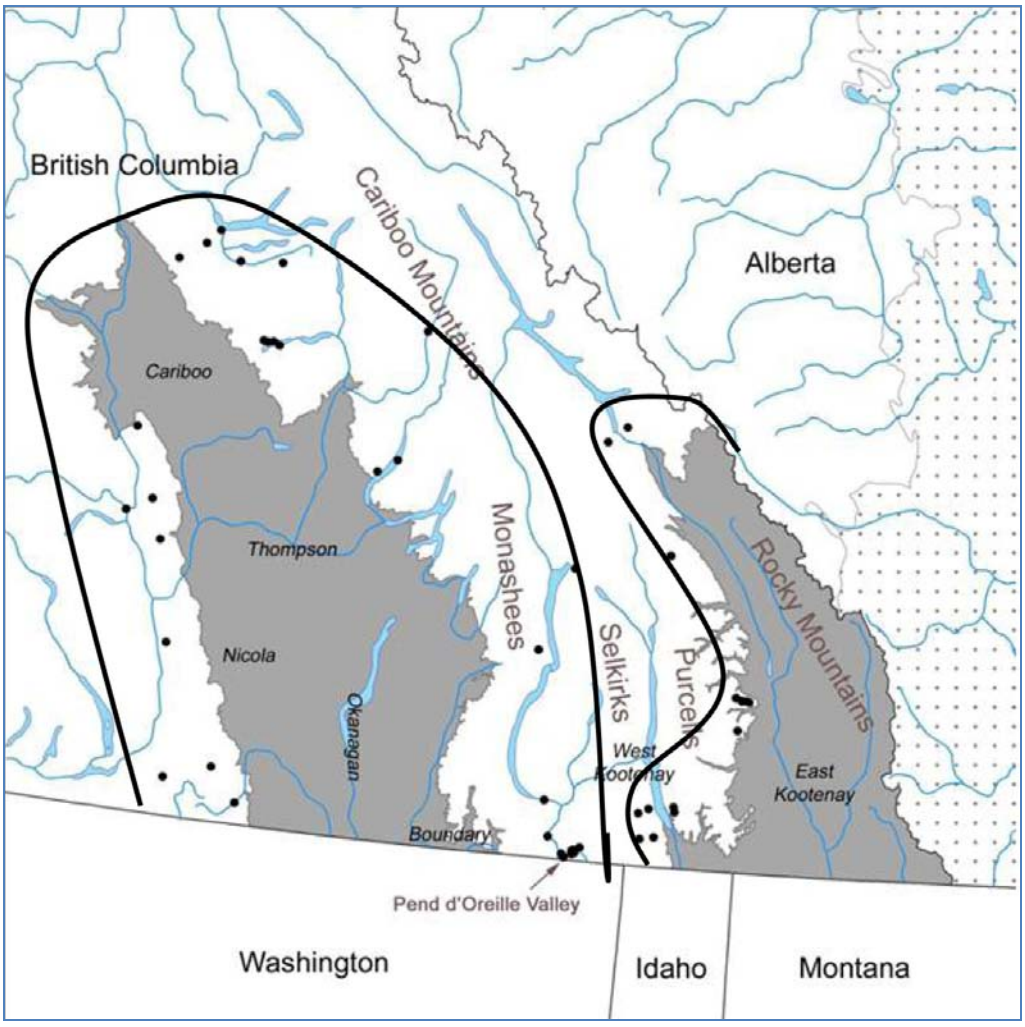

Figure 2. Range of American Badger (*Taxidea taxus*) in the western extent of the Taxus designatable unit (dotted) and Jeffersonii West and Jeffersonii East designatable units (core habitat shaded grey; solid black circles are extra-limital records made between 1985-2009 within the solid black lines of each DU). Approximate locations of sub-populations used in badger surveys (Table 2) are noted. The Selkirk Mountains are believed to be a significant barrier to movement between the east and west populations of the *T. t. jeffersonii* subspecies. Adapted from Weir and Almuedo (2010), Weir, R. pers. comm. (2012).

Figure 3. Range of American Badger (*Taxidea taxus*) in the Taxus designatable unit in Canada, based on COSEWIC 2000 and data in this report. The stippled area in the Rainy River ecoregion of north-western Ontario occasionally has badger of the same subspecies. The Jeffersonii DU (diagonal lines) begins at the Rocky Mountains.

Figure 4. Range of American Badger (*Taxidea taxus jacksoni*) in the Jacksoni DU in Canada, based on Ontario American Badger Recovery Team (2010). States in the United States and counties in south-western Ontario are labelled.

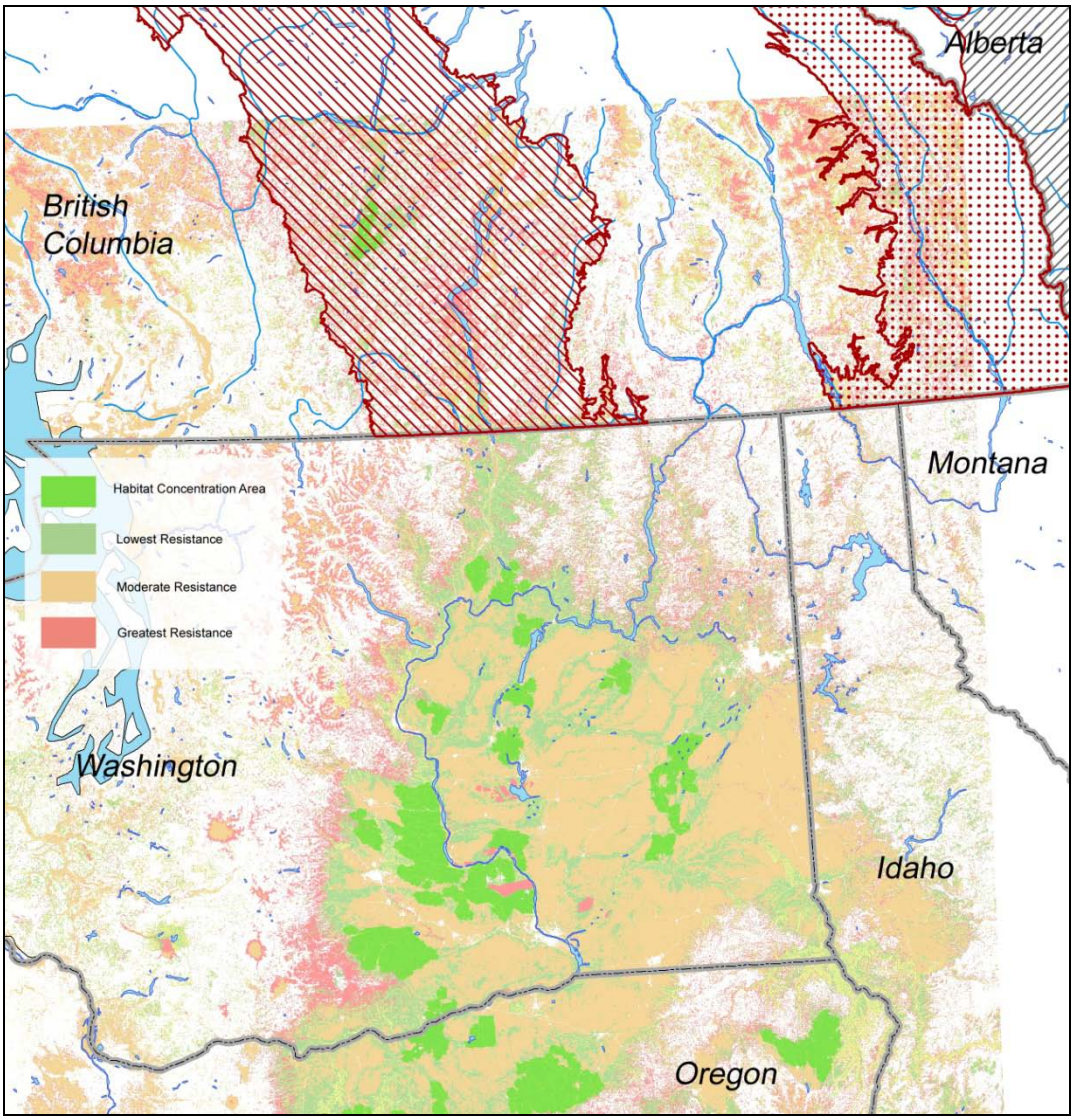

Figure 5. Landscape Resistance modelling output for American Badger, centred on Washington State (source: Washington Wildlife Habitat Connectivity Working Group 2010) and most relevant for western population of the Jeffersonii West designatable unit. Bright green areas are the best Badger habitat (Habitat Concentration Areas). Lower resistance values represent "easier" movement for badgers. Jeffersonii West (diagonal lines) and Jeffersonii East (stipple) DUs, and western extent of Taxus DU (forward diagonal lines) are shown.

In British Columbia, the *jeffersonii* subspecies exists as two distinct genotypes (Kyle *et al.* 2004; Ethier *et al.* 2012). The Canadian populations are analogous to two horns, with the head existing in the United States (Figure 1). The genetic differences reflect isolation of the populations caused by the Selkirk Mountains acting as a key geographic barrier to movement between west and east populations, and by poor habitat quality to the south, which limits movement from the United States (Figure 1, 5). Suitable habitat is very limited between the East Kootenay/ Flathead (Montana) population and the Okanagan population because of the Bitterroot Mountain range and Okonagan Highlands; the only plausible low-land linkage is through >100km of marginal

habitat (Sauder pers. comm. 2012; Weir pers. comm. 2012). Distribution records for badger in western Montana are relatively rare (State of Montana 2012), supporting the consensus that the area is low quality habitat and linkage of individuals from the 'horns' would be unlikely.

In the Taxus DU, genetic differences identified between Manitoba / Michigan Upper Peninsula and the Alberta / Saskatchewan groupings are noted (Ethier *et al.* 2012), but because there is no apparent geographical or biological barrier to explain this variation, the entire *taxus* subspecies is considered one DU. Also, *T. t. taxus* in Montana was allied with all three Canadian prairie provinces, which suggests connectivity in the region. The genetic analyses were based on mtDNA, a technique that can be biased if dispersal occurs mainly in males. American Badgers that occasionally occur in north-western Ontario near Rainy River and Fort Frances have been included as part of the *T. t. taxus* population (see **Canadian Range** section). These animals previously were considered *T. t. jacksoni* (COSEWIC 2000).

In the Jacksoni DU, American Badgers are geographically and genetically isolated from other badgers in Canada. Within the subspecies, current evidence shows no statistically significant difference in genetic distance between badgers in Michigan's Lower Peninsula and southern Ontario (Ethier *et al.* 2012), but does suggest very limited movement between these two areas. Lower Michigan represents the contact with core badger range in southern Ontario but the St. Clair River and surrounding urbanized landscape likely acts as a recent barrier to movement (see **Rescue Effect** section). The unique sub-species designation and apparent genetic isolation in Canada from other Canadian badger warrants their recognition as a separate designatable unit.

Special Significance

American Badgers are considered top predators in grassland / open forest ecosystems (Messick 1987). Their burrows benefit several species (Messick and Hornocker 1981; Poulin *et al.* 2005) and influence grassland / steppe ecosystem by mixing soil, and creating disturbed sites and microclimate (Eldridge 2004; Eldridge and Whitford 2008; Eldridge 2009).

American Badgers have been identified as "occasional agricultural pests" because of their diggings (Minta and Marsh 1988; Lindzey 1994). Concerns surround damage to machinery, crops and irrigation equipment by burrowing and/or associated soil mounds. Historical concerns of livestock breaking their legs by stepping in badger burrows were not supported by a survey of British Columbia ranchers that found almost no evidence for such damage (Weir *et al.* 2004a). Rather, 47% of ranchers considered badgers to be "beneficial", while 21% saw them as "detrimental" (n = 48 respondents).

DISTRIBUTION

Global Range

American Badgers occur throughout much of western/central North America (Long 1973; Messick 1987; COSEWIC 2000; Figure 1). Their range includes the southern portions of all western Canadian provinces, as well as southern Ontario. In the USA, American Badgers occur in most states west of the Mississippi River, except for Louisiana. They are also found north of the Ohio River in Michigan, and in Wisconsin, Illinois, Indiana and western Ohio. American Badgers range south as far as Oaxaca State, Mexico (NatureServe 2011).

Sub-species range maps used in the previous report (COSEWIC 2000) remain unaltered, except for *T. t. jacksoni*, which does not occur on upper Michigan (see **Population Spatial Structure and Variability** section).

Canadian Range

The extent of the American Badger range in Canada is little changed from COSEWIC (2000). The extent of occurrence values are based on national ecological zone mapping (Ecological Stratification Working Group 1995) and British Columbia's Biogeoclimatic Ecosystem Classification system (Meidinger and Pojar 1991). Use of large scale, ecosystem-based mapping that includes abiotic factors such as soil and climate has been shown to be a good model for home range attributes of other grassland species (Stevens *et al.* 2011). Given their large movements, generalist habitat and diet requirements, and difficulty in estimating population size, the broad ecosystem level of mapping used here is a suitable model for establishing extent of occurrence and area of occupancy in Canada.

<u>Jeffersonii East and West DUs</u>

The Jeffersonii West DU occurs within Okanagan, Boundary, Thompson, Nicola and Cariboo regions of south-central British Columbia (Figure 2). Their range is from the east slopes of the Coast Mountains and Fraser River, west into the Monashee Mountains and Kettle River drainage, and as far north as Williams Lake, British Columbia.

The Jeffersonii East DU occurs primarily within the East Kootenay region of south-eastern British Columbia (Figure 2). American Badgers are also known from the Creston area west of the East Kootenay. Most records are from the Rocky Mountain Trench (Kinley *et al.* 2011), from the US border at Grasmere, British Columbia north to Golden, British Columbia. The Elk Valley between the Rocky Mountain Trench and the Alberta border also supports badgers. There have been sightings of badgers at higher elevations in the Rocky Mountains and Purcell Mountains. However, there are occasional extra-limital sightings of American Badgers in this region; these animals likely are vagrants, rather than established breeding populations (Figure 2).

The landscape conditions between the two Jeffersonii DUs is not favourable to American Badger. The rugged Selkirk Mountain range and its wet, closed-canopied forests of Western Redcedar (*Thuja plicata*) and Western Hemlock (*Tsuga heterophylla*) generally do not support American Badgers, or their preferred prey; the Selkirk Range is considered a barrier between the two populations in British Columbia. Early seral forests resulting from forestry and fire and an extensive forestry road network are thought to have facilitated badgers and their prey to occupy habitats previously considered unavailable (Kinley pers. comm. 2012). The cluster of badger sightings in the Pend d'Oreille valley (Figure 2) may represent the northern limit of *jeffersonii* badger distribution from the United States (Kinley pers. comm. 2012). A few badger records are known from adjacent counties in north-east Washington State (Base pers. comm. 2011).

The EO for the West and East DUs is estimated at 72,058 and 40,532 km², respectively, based on the minimum convex polygon method of badger locations. The land between the two DUs is not included because the few badgers recorded in this area are considered vagrants. The index of area of occupancy (IAO) is above 2000 km², based on the 2 km x 2 km grid method.

Taxus DU

American Badgers occur throughout the Prairie ecological zone in the southern half of the three Prairie provinces (Figure 3). Badgers are known from the eastern prairie limits, east of Winnipeg and south of Lakes Winnipeg and Manitoba westward to the southern Alberta Rocky Mountains (Quinlan pers. comm. 2011). The northern range is harder to define but American Badgers range into the Boreal Transition ecoregion that borders most of the Prairie zone from Alberta to Manitoba (Ecological Stratification Working Group 1995). Large fen complexes likely limit northern expansion of badger range in Manitoba. Records exist for Riding Mountain National Park and surrounding areas (Vanderschuit pers. comm. 2011), Canadian Forces Base Shilo, near Brandon (Nernberg pers. comm. 2011), and Prince Albert National Park, SK. The Boreal Transition ecoregion northern range limit is well supported by pelt return data from Saskatchewan (Appendix A). In Alberta, the distribution corresponds well with that of Scobie (2002) which accounts for recent expansion northward and slightly west of the Prairie ecological zone. Area of occupancy in Alberta includes the provincial Grassland and Parkland Natural Regions (except for the Peace River Parkland subregion; Alberta

Natural Regions Committee 2006). Also included is the Rocky Mountain Natural Region south of the Bow River. The range limit northwest of Calgary has been retracted to exclude the boreal transition forests between the Rocky Mountains and Parkland ecosystems. American Badgers are known from Banff National Park (Casimir pers. comm. 2011); however, there is a much shorter transition between prairie and mountain systems in the Bow Valley and areas further south. No records exist north of the Bow River in the montane natural subregion (Figure 2, 3).

American Badgers occurring in north-western Ontario are likely *T. t. taxus* (see **Population Spatial Structure and Variability** section). Since 2000, three American Badgers have been reported in north-western Ontario (Figure 3; Ontario American Badger Recovery Team 2010). Badger occurrence in north-western Ontario is thought to be a series of colonization and extirpation events rather than representing a permanent, viable population (COSEWIC 2000). Individuals occasionally establish a home range in this region (Van den Broeck pers. comm. 2011). Occurrence is limited to a 3000 km^2 area of agricultural land between Rainy River and Fort Frances, Ontario. American Badger records from northern Minnesota are uncommon (Jannett *et al.* 2007; Erb pers. comm. 2011). A band of peatland habitat in northern Minnesota, approximately 100 km wide, likely limits badger movements from Minnesota into the Rainy River area (Van den Broeck pers. comm. 2011). As a result, badger occurrence in north-western Ontario most likely represents a series of rare, extra-limital forays. This area is included in the distribution for the Taxus DU, but is excluded from both the extent of occurrence (EO) and area of occupancy because the region is not continually occupied.

The EO for the Taxus DU in Canada, excluding north-western Ontario, is estimated at 721,096 km², based on the minimum convex polygon method of badger locations. The index of area of occupancy (IAO) is approximately 173,000 km^2, based on the 2 km x 2 km grid method.

Jacksoni DU

American Badgers of the *jacksoni* subspecies in south-western Ontario are isolated from other populations in Canada and the United States (Figure 4). Few records exists for the badger in Ontario. Since 2000, 42 sites have been confirmed using genetic tests from hair snares (Kyle pers. comm. 2011), 25 sites confirmed with positive burrow identification, and a further 83 sighting reports were confirmed or considered probable by the Natural Heritage Information Centre (NHIC; n=37; Ethier *et al.* 2010a,b) and the Ontario Badger Project (n=46). Some of these records would be repeated counts of the same individuals. Although the number of records has increased 3X since 2000 this simply reflects increased search effort and not increased population size; abundance and overall distribution remains mostly unchanged. The majority of records occur between Lake Erie and the 400-series highways, with the highest concentration in Norfolk County.

Beyond Norfolk County, badger sightings are fewer and more sporadic. Clusters of sightings both historic and recent do exist in some specific regions, such as the Melbourne-Strathroy-Komoka area, St. Catharines-Short Hills Provincial Park area, the Rodney-West Lorne-Dutton area, the Goderich-Clinton area, and parts of Bruce and Grey Counties. Whether these represent small sub-populations or simply dispersing individuals is unknown. Until 2009, there was no specific sampling effort outside the Norfolk area, thus the scarcity of sightings can be at least partly attributed to reduced effort (Ethier *et al.* 2010a,b).

The extent of occurrence (EO) for the Great Lakes Plains population in Canada is estimated at 15,438 km², based on the minimum convex polygon method of badger locations. The index of area of occupancy (IAO) is above 2000 km^2, based on the 2 km x 2 km grid method.

Search Effort

Data were obtained from numerous sources including: aerial surveys (Ontario), public reports of badger observations, data from badger-focused research projects, sightings from professional biologists working on other species in badger range, provincial Conservation Data Centres, trapping records, provincial and federal Canadian agencies (including Parks Canada, Canadian Wildlife Service and Department of National Defence) and US state wildlife departments.

Most data are based on voluntary reports of sightings, road-kills, and incidental trapping. Since 2000, more effort has been made at increasing public awareness and reporting sightings, particularly in areas with active badger research projects (Table 1). Efforts to solicit public sightings in Alberta, Saskatchewan or Manitoba are not known. Location data are also included in British Columbia for American Badgers relocated using radiotelemetry.

Table 1. Project areas and years in which badger sightings were collected within the Jacksoni designatable unit, and Jeffersonii East and West designatable units.

Project Area	Years Collected	Reference
Jacksoni DU		
Norfolk County, ON	2000-2010	Ontario Badger Recovery Team
South-western ON	2009-2010	Ethier *et al.* 2010a,b
Jeffersonii East DU		
Kootenay, BC	1996-2006	Newhouse 2006
Jeffersonii West DU		
Thompson – Okanagan, BC	1999-2006	Weir *et al.* 2003
Cariboo, BC	2003-2007	Hoodicoff and Packham 2007

Badger locations in Alberta, provided by Alberta's Fisheries and Wildlife Management Information Service (FWMIS), originate from various sources, mostly involving wildlife habitat surveys for the petroleum industry. Locations represent 326 sightings between 1993 and 2010, with 81% of sightings between 2004 and 2010.

Location data in Saskatchewan were collected between 1996 and 2010 (80% of reports were between 2004 and 2010) by Nature Saskatchewan's Operation Burrowing Owl program. Landowners reported badgers on their properties, with location accuracy limited to a quarter section of land (65 ha).

Fur statistics are available from Alberta, Saskatchewan and Manitoba. Statistics Canada (2005, 2010, 2011) summarizes total provincial harvest numbers based on either: a) direct submissions from trappers regardless of whether the pelt was sold or; b) data supplied to the provincial wildlife officials by agents, export permits or auction houses on the total number of pelts traded. Data are also available from Saskatchewan between 1999-2010, based on number of pelts sold per year, by wildlife management zone and northern fur block (Appendix A).

In Ontario, badger sighting reports have been collected opportunistically since 2000 by the Ontario Badger Recovery Team and relayed to the Natural Heritage Information Centre. Aerial surveys were conducted in 2006-2007, on 400 km^2 (in 2006) and 300 km^2 (2007) of southwestern Ontario, followed by ground-truthing of suspected badger activity (Sadowski *et al.* 2007). In 2009, the Ontario Badger Project began an intensive public outreach program across south-western Ontario, concurrent with burrow monitoring, hair collection for genetic analysis, and radio-telemetry (Sayers and Kyle 2011). This project distributed brochures and media about badgers and established a web page for sightings from the public.

HABITAT

Habitat Requirements

While American Badger habitat traditionally has been considered grassland, steppe and open forest (Messick and Hornocker 1981; Messick 1987), recent work has shown American Badgers use open or roaded areas within forested environments (Apps *et al.* 2002; Hoodicoff 2003; Jannett *et al.* 2007; Weir and Almuedo 2010). The primary requirements for American Badgers appear to be soil conditions suitable for digging and availability of prey populations, rather than specific vegetative habitat associations.

The *jeffersonii* Badger Recovery Team (2008) uses the term “soil coherence” as a measure of the soil’s ability to maintain its structure (i.e., not collapse) when tunnelled. American Badgers tend to prefer coherent coarse silts to fine sand with low coarse material content (Messick and Hornocker 1981; Messick 1987; Apps *et al.* 2002; Hoodicoff 2003; Weir *et al.* 2003; Hoodicoff and Packham 2007; Duquette 2008; Ethier *et al.* 2010a; Kinley *et al.* 2011). Aeolian soil deposits in the Cariboo region were highly predictive of localized badger activity (Hoodicoff and Packham 2007). In Ontario, badger records closely correlated with areas of sandy and loam soils (Ethier *et al.* 2010a,b). This result was particularly true of the Norfolk Sand Plain, the boundary of which approximates the extent of badger activity. Badger records are far less frequent in areas with heavy clay soils, e.g., Kent and Lambton counties (Ethier *et al.* 2010a,b). Specific soils associations for the Prairie population are unknown beyond requirements of low colluvial material and cohesion while digging.

American Badgers are often in close proximity to linear corridors, including roads, fencerows, field edges, and hedgerows (Warner and Ver Steeg 1995; Apps *et al.* 2002; Duquette 2008). This tendency is particularly true in forested areas, where badgers likely follow roads to access prey populations that have colonized forest openings created by forestry or wildfire. American Badgers do not typically inhabit cultivated fields (Messick and Hornocker 1981) but use the uncultivated areas around the fields (Warner and Ver Steeg 1995; Duqette 2008).

In mountainous regions, American Badgers use early seral habitats within forested landscapes. These areas are typically non-forested or open-forest patches created by forestry activities (i.e., recent cut-blocks), wildfire, and ski-hill developments (Weir *et al.* 2003; Kinley and Newhouse 2008). Predictive habitat modelling in the East Kootenay region of the Jeffersonii East DU identified a broad range of habitat features, including low elevation, shallow slope, low crown closure, brunisol soils with low colluviums, and high solar radiation (Kinley *et al.* 2011). In the Cariboo region of Jeffersonii West DU, American Badgers may be associated with wetland habitats (Hoodicoff and Packham 2007).

In eastern North America, non-forested ecosystems remain key habitats, but tallgrass and other grassland habitat was never a major constituent of southern Ontario’s landscape. American Badgers in southern Ontario may have adapted somewhat to this more fragmented and varied landscape. In Ohio, *T. t. jacksoni* use an agricultural mosaic landscape very similar to south-western Ontario. Recent studies from Ohio found American Badgers selected for wetland, grassland and agricultural habitats (Duquette 2008).

Habitat Trends

Jeffersonii West DU

American Badger habitat in the Jeffersonii West DU is declining. Sources of habitat degradation and loss include forest in-growth and encroachment, residential development, agricultural activities including orchards, vineyards, cultivation agriculture, over-grazed livestock pasture and invasive weeds. Habitat is very limiting to badgers in the Okanagan and Similkameen valleys, which are primarily Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones (Meidinger and Pojar 1991). Lea (2008) assessed losses of this ecosystem since European settlement in the mid-1800s. He estimates that overall "gentle slope grassland and shrub-steppe ecosystems" have declined 61% in area since settlement. On gentle slopes, which are a predictor of badger habitat (Kinley *et al.* 2011), the remaining native area is mostly in fair to poor range condition. For three ecological communities selected by Lea (2008), an average of 91% of area was classified as "fair" and "poor" range condition. Steeper slopes, with much lower livestock use, had only 32% of area classified as fair and poor.

Most bottom habitats in the south Okanagan and Similkameen are the Antelope-Brush – Needle-and-thread Grass plant community (Iverson *et al.* 2005). Most vineyards in the Okanagan valley that were not converted from previous orchards have been planted on Antelope-Brush – Needle-and-thread Grass plant community (Dyer pers. comm. 2011). Vineyard area increased 20% between 2004 and 2006 and is projected to peak provincially at 4000 ha, mostly in the Okanagan Valley (Lea 2008). Vineyards and orchards represent semi-permeable habitat. American Badgers are able to move through them and likely use the peripheries of the planted areas, similar to their use of row-crops elsewhere. However, they face reductions in prey populations and burrowing opportunities, and increases in persecution.

Loss of current badger habitat to urban or rural housing development is likely to continue. The human population in the Okanagan valley is projected to grow at a rate of over 1% annually between 2010 and 2030. Larger centres such as Vernon and Kelowna project annual growth levels of 1.5% (RDNO 2008; City of Kelowna 2010). North and Central Okanagan valleys are among the leaders in projected provincial growth rates, while the Cariboo region has much lower predicted population growth through 2031.

Jeffersonii East DU

American Badger habitat in the Jeffersonii East DU is likely stable overall with small declines in certain areas. Forest in-growth and encroachment have significantly contributed to loss of open forest and grassland habitats, respectively from historical levels (Kirby and Campbell 1999; Gayton 2001; Turner and Krannitz 2001; Wikeem and Wikeem 2004). In-growth refers to the infill of open forest ecosystems with greater density and canopy closure of trees, while encroachment is the establishment of tree growth on grasslands previously devoid of forests. Fire suppression is the primary cause of forest in-growth and encroachment. Very often, the forests generated by in-

growth and encroachment are dense stands of Douglas Fir (*Pseudotsuga menziesii*) and Lodgepole Pine (*Pinus contorta*). These stands are not suitable habitat for badger prey, especially ground squirrels and marmots.

In-growth and encroachment has been documented across the badger range in British Columbia (Table 2). Current efforts focus on restoring these areas to their former open forest and grassland condition. In the Kootenay region, restoration efforts in the Rocky Mountain Trench seek to increase grassland, open range and open forest ecosystems from 39% of valley bottom habitat (in 2004) to 52% by 2030 (Harris 2010). Specific targets are not available for other regions. Projected human population growth in the East Kootenay region is low.

Table 2. Estimated area of grassland and open forest in west and east populations of the Jeffersonii East and West DUs exposed to encroachment and in-growth in the last 100 years, approximately.

DU	Region	ha lost	notes	Source
East	Kootenay	16,500	up to 50% lost; rate estimated at 3% annually prior to Trench restoration program	Kirby and Campbell 1999
West	South Okanagan / Similkameen	5,000	approx. 20% lost	Turner and Krannitz 2001
	Thompson	47,000		Kirby and Campbell 1999
	Cariboo / Chilcotin	42,000	11% lost	Steele *et al.* 2007

Taxus DU

Long-term decline of native grasslands across the Canadian prairies has been dramatic; 99.9% of tallgrass and mixed grass prairies in Manitoba, 81.3% of mixed grass and 85.8% of shortgrass prairie in Saskatchewan and 61% of mixed grass prairie in Alberta are estimated to have been lost since European settlement (Samson and Knopf 1994). The conversion of grassland to crop production represents habitat loss to American Badgers because they generally avoid tilled fields (Duquette 2008) and cultivated areas (Messick and Hornocker 1981). American Badgers use these agricultural lands, but movements are likely restricted to roadways and corridors between cultivated fields. Conversion of native prairie to cattle pasture is less of a concern as Badgers regularly use these lands. However, some landowners dislike badgers on their property and kill them (Wellicome pers. comm. 2011). Therefore, the extent to which Badger can use farmland is indirectly linked to farmer attitudes. No data are available on numbers of American Badgers killed in this manner.

Habitat trend data for the past 10 years are not available, though large-scale changes in amount of converted land has not occurred recently. There may be significant changes in the future. The federal government announced in the 2012 budget that it is divesting nearly 1 million acres of federal prairie pasture land to the

provinces. The lands were purchased since 1937 to stabilize soil, diversify prairies, and establish best management practices and grazing land to communities under the *Prairie Farm Rehabilitation Act*. Numerous rare species, including badger, use these pastures. It is unknown how much habitat will be retained under provincial control but significant conversion of pasture to cropfields or other non-compatible land use will be detrimental to Badger in the prairies. The impact of increased oil and gas or wind turbine development is not known at the scale of the DU.

Jacksoni DU

Prior to European settlement, most of southern Ontario was forested and likely not ideal habitat for American Badgers. Open habitats, such as tallgrass prairie and savannah, were scattered over a wide area, from the southern tip of Ontario to Georgian Bay and Kingston. These areas were estimated to cover 1000 km^2 (Bakowsky and Riley 1994) and likely constituted the majority of habitat available to American Badgers. Less than 3% of this habitat remains (Tallgrass Ontario 2011). Historic habitat transition in southern Ontario following settlement from forest cover to primarily agriculture likely increased the amount of open habitat, including fallow fields, pastures, and edge. Suitable Badger habitat in Ontario has decreased in the last several decades. Human population size in the south-western portion of Ontario is projected to increase from 1.60 to 1.82 million by 2036 (Ontario Ministry of Finance 2011). Middlesex and Elgin Counties – both in the area of occupancy – are expected to grow the fastest (32.5 and 21.7 %, respectively; Ontario Ministry of Finance 2011).

Available Badger habitat on agricultural land can be expected to decrease. Statistics Canada census data shows that average farm size increased from 206 to 233 acres between 1996 and 2006 (McGree 2007) by reducing the area of fallow edge habitat around farmlands, habitats that are often used by American Badgers for movement and foraging (Duquette 2008). These data also indicate a substantial decrease in summer fallow areas and pastures, both of which provide suitable habitat for American Badgers.

BIOLOGY

There has been little new information on basic badger biology published since the previous status report (COSEWIC 2000). Research projects in British Columbia have updated litter size and dietary information particular to that province, but most knowledge of badger biology remains unchanged.

Life Cycle and Reproduction

American Badgers mate in July and August with polygynous males seeking out females (Messick and Hornocker 1981). Implantation is delayed until late winter, followed by parturition in March or April. Less than half of females breed during their first summer (Messick and Hornocker 1981; Newhouse 2006); males do not mature until over 1 year of age (Messick 1987). Litter size ranges from one to five (Lindzey 1982).

Physiology and Adaptability

American Badgers have been recorded from below sea level to greater than 3600 m (Kyle *et al.* 2004), generally preferring open habitat types. They are physiologically and behaviourally adapted to deal with extreme food and temperature fluctuations (Harlow and Seal 1981; Harlow and Miller 1984). During winter, American Badgers reduce their activity to conserve energy, occasionally remaining in their burrows for extended periods and entering a shallow torpor (Harlow and Seal 1981).

Badger use of golf courses, abandoned buildings, and roadsides suggests that they generally are tolerant of humans. In some instances, human-caused landscape alterations (e.g., forest harvest) create suitable badger habitat because early seral habitat conditions favour prey populations, which then attract American Badgers. Road networks facilitate badger movements, and they readily burrow into soil deposits exposed by roadside cutbanks. However, as detailed in the **Habitat Trends** section, there are limits to this tolerance.

Diet

American Badgers have a wide diet breadth (Azevedo *et al.* 2006). Primary prey species are fossorial sciurid rodents, usually ground squirrels. Where they occur, marmot are also key components, including Woodchucks (*Marmota monax*) in Ontario (Dobbyn 1994), Yellow-bellied Marmots (*M. flaviventris*) in the Thompson and Okanagan region of British Columbia (Hoodicoff 2003; Weir *et al.* 2003;) and Hoary Marmots (*M. caligata*) in alpine environments (Hoodicoff 2006). Pocket gophers, voles, and mice are common components of the badger diet, especially in areas without abundant ground squirrels or marmots (Messick 1987; Hoodicoff 2006). American Badgers readily supplement their diet with insects, birds, reptiles and amphibians (Messick 1987; Hoodicoff 2006; Kinley and Newhouse 2008).

Some American Badgers exhibit regional specializations, taking advantage of local prey opportunities. In Ontario, Eastern Cottontails (*Sylvilagus floridanus*) are thought to be preferred (Dobbyn 1994). In the Cariboo region of British Columbia, American Badgers feed on Muskrat (*Ondatra zibethicus*) in wetland habitats (Hoodicoff and Packham 2007).

Dispersal and Home Range

Juvenile American Badgers typically disperse during their first summer (Messick and Hornocker 1981). Dispersers may traverse seemingly unsuitable habitat, crossing major physiogeographic barriers, including roads, rivers, wetlands and mountains. The maximum reported dispersal distance is 52 km for females and 110 km for males (Messick and Hornocker 1981); however, the large home range sizes reported from British Columbia (Weir *et al.* 2003; Kinley and Newhouse 2008; Hoodicoff *et al.* 2009) suggest much greater dispersal distances may occur. In western Canada, average dispersal is approximately 11 km at 106 days of age (Kinley and Newhouse 2008). Badger movement is much greater during summer than winter (Sargeant and Warner 1972; Hoodicoff 2003; Paulson 2007; Duquette 2008).

Home range estimates for American Badgers vary greatly across their range (Table 3), likely in response to prey availability (Minta 1993). Where dense colonies of ground squirrels occur, American Badgers require little movement and can occur in high densities (Messick 1987). Male home range size is thought to be more dependent upon female availability (Minta 1993). Using data in Table 3, the home range size from nine studies averaged 97 km^2 (range 2-301 km^2) for males and 12 km^2 (range 2-19 km^2) for females. Home range size can be especially large for males in populations with low densities (e.g. 301 km^2 in Kootenay, British Columbia) (Weir *et al.* 2003; Kinley and Newhouse 2008; Hoodicoff *et al.* 2009; but see Duquette 2008).

Table 3. Home range estimates, in km^2, for American Badger in various locations across their range. MCP = 100% minimum convex polygon method; 95% FK = 95% fixed kernel method.

	Males			Females			
Location	**MCP**	**95%FK**	***n***	**MCP**	**95%FK**	***n***	**Source**
Illinois	44		6	13		7	Warner and Ver Steeg 1995
	35	49	5	17	16	9	Duquette 2008
Ohio	3	4	3	5	7	2	Duquette 2008
NW Utah	6		2	2		5	Lindzey 1978
Wyoming	3		18	8		15	Minta 1993
Wyoming		12	8		3	6	Goodrich and Buskirk 1998
SW Idaho	3		2	2		3	Messick and Hornocker 1981
BC: Kootenay	301	64	9	35	18	7	Kinley and Newhouse 2008
BC: Cariboo	26		19	19		10	Hoodicoff and Packham 2007
BC: Thompson	88	33	8	10	16	1	Weir *et al.* 2003; Hoodicoff *et al.* 2009.

Interspecific Interactions

American Badgers have the ability to influence prey population numbers as a top-level predator in grassland and open forest ecosystems (Proulx 2010; Proulx and MacKenzie 2012). Badger diggings are considered highly beneficial to a wide range of soil functions (Eldridge 2004). Examples include water infiltration, as areas around the base of burrow mounds are moisture-rich in comparison to surrounding soils, which benefits plant recruitment in arid and semi-arid ecosystems (Eldridge 2009). Burrows dug by American Badgers are used by other species including Burrowing Owl (*Athene cunicularia*; Poulin *et al.* 2005), Swift Fox (*Vulpes velox*; Cotterill 1997), arthropods, lizards and snakes, small mammals, and lagomorphs (Messick and Hornocker 1981).

European Badgers (*Meles meles*) have been implicated as reservoirs for the agent causing bovine tuberculosis, *Mycobacterium bovis*, in the United Kingdom (Woodroffe *et al.* 2006), but American Badgers, which are not closely related to *M. meles*, (Koepfli *et al.* 2008) are not considered carriers of the disease (Schmitt *et al.* 2002).

POPULATION SIZES AND TRENDS

Sampling Effort and Methods

Population size is estimated from genetic analysis of hair samples from scent posts, observations of active burrows, and mapping of habitat availability. American Badgers are difficult to study using conventional mark-recapture methods because they are nocturnal, occur in low densities, and range over wide areas. Direct observations of American Badgers are rare, thus monitoring abundance often relies on recognizing badger sign, such as burrows. Caution is required though because multiple individuals will use a single burrow and individuals use multiple burrows (Newhouse 2006). Extensive research projects and recovery team actions have resulted in estimates of population size in much of their range in Ontario and British Columbia. Requests for sightings from the public have been used in both areas. Population information in the Prairies is restricted mainly to fur pelt return data.

Abundance, Fluctuations and Trends

Jeffersonii West and East DUs

Population estimates for the Jeffersonii West DU range from 150 to 245 mature individuals. The trend of the population varies by region, with some sub-populations stable to increasing, while others are thought to be declining (Table 4).

Table 4. Regional population estimates for American Badger in Jeffersonii East and West designatable units.

Population	Region	Estimate	Trend	Source[1]
West	Cariboo	70-90	steady to increasing	a
	Thompson	30-50	declining	b
	Okanagan / Boundary / Similkameen	35-65	declining	b
	Nicola	15-40?	?	b
	Southern Mountains West total	150-245	declining	
East	Kootenay	100-160	steady to increasing	b, c

[1] Information sources:
a: Klafki pers. comm. (2011); b: *jeffersonii* Badger Recovery Team (2008); c: Kinley pers. comm. (2011).

Estimates come from a variety of sources. In the Cariboo region, researchers monitoring burrow occupancy used hair snagging techniques to identify the total number of individuals encountered. Between 2003 and 2008, they estimated 72 individuals were recorded (95% CI = 67-83) (Klafki pers. comm. 2011). Using expert opinion based on this hair snagging work, as well as other extensive badger research in the area, the Cariboo region current estimate of mature individuals ranges from 70 to 90.

Elsewhere, American Badger abundance is based on expert opinion formed from a combination of research projects (e.g. Hoodicoff 2003; Weir *et al.* 2003; Newhouse 2006; Kinley and Newhouse 2008) and reports of public sightings. Between 2001 and 2008, public sightings were actively sought and biologists could discount multiple sightings of the same animal based on the known location of radio-tagged, or tracked animals. As a result, expert opinion of regional population size at the time (as reported in *jeffersonii* Badger Recovery Team 2008) was considered quite reliable. Badger sightings are still solicited in the British Columbia Hunting Regulations synopsis (BC Ministry of Forests, Lands and Natural Resource Operations 2012) and most reports are received during the fall hunting season (Weir pers. comm. 2012). These estimates lack a comparison to radio-tagged animals and there is likely an overestimate based on public sightings (Kinley pers. comm. 2011; Weir pers. comm. 2012). Badger numbers in the Nicola are unknown (Table 4). In the mid-2000s, the provincial recovery strategy (*jeffersonii* Badger Recovery Team 2008) estimated between 25 and 30 individuals. Today's estimate is 15 to 40 Badgers.

Historical population estimates of American Badgers in British Columbia are not available. However, fur records indicate that the number of pelts traded annually in the 1920s was greater than the entire estimated population for British Columbia today (*jeffersonii* Badger Recovery Team 2008). Widespread wildfires through much of the British Columbia southern interior in the early 1900s likely increased early seral habitats, which could have increased badger populations at this time.

Other evidence of declines in the past 20 years is provided by the *jeffersonii* Badger Recovery Team (2008) including: very few females detected in a study near Kamloops (Hoodicoff 2003; Weir *et al.* 2003), very low percentage of juveniles compared to studies elsewhere with stable or growing badger populations; and

declining anecdotal badger reports by landowners. However, biologists in the Cariboo (Packham pers. comm. 2011) and East Kootenay (Kinley pers. comm. 2011) suspect badger populations in these regions have possibly increased slightly in the past 10 years. In the past two years (2010-2011) a number of reports have been received from the North Okanagan where previously very few, if any, reports were received in previous years. These reports include at least 3 separate females with kits in 2011 (Weir pers. comm. 2012).

Taxus DU

A population estimate for the Prairie DU is unavailable. Scobie (2002) used numbers from COSEWIC (2000) that ranged from 1000 to 10,000 individuals, based on a 1999 survey of Alberta wildlife managers. Estimates from COSEWIC (2000) for Saskatchewan (13,700 to 28,900) and Manitoba (3000 to 5000) were also derived from the same survey. No work has refined those estimates or reliably addresses population trends over the past 10 years.

Fur records from Alberta suggest significant declines from historical population levels: in 1928, 18,000 pelts were recorded from just Alberta (Scobie 2002). Recent fur data on the annual number of pelts sold from Alberta, Saskatchewan and Manitoba fluctuate from 353 to 1474 (Table 5; Appendix A). The overall trend for Alberta and Saskatchewan is an increase in annual number of pelts sold between 1999 and 2010. In Manitoba, there is no apparent trend.

Table 5. Total pelts sold annually per province and for entire Taxus designatable unit from 1999 to 2009. Total southern Saskatchewan trapping licences sold in parentheses. Sources: Statistics Canada 2005; 2010; 2011; Saskatchewan provincial fur database.

Year[1]	Alberta	Saskatchewan	Manitoba	total
1999-2000	76	190 (907)	87	353
2000-01	170	207 (1052)	122	499
2001-02	133	237 (1055)	120	490
2002-03	163	370[2] (1207)	270	803
2003-04	513	721 (1403)	240	1474
2004-05	128	233 (1126)	125	486
2005-06	323	303 (1174)	148	774
2006-07	354	498 (1461)	211	1063
2007-08	373	450 (1351)	156	979
2008-09	133	336 (1258)	155	624
2009-10	172	267[3] (1172)	91	530
Total	2538	3812	1725	8075
Mean	230.7	346.5	156.8	734.1
SD	137.5	158.6	59.6	331.3

[1]"Fur Year" runs July 1 to June 30.
[2]Statistics Canada (2005) reported a '0' for 2002-03, Saskatchewan fur data base reported '370'.
[3]Statistics Canada (2011) reported '249' for 2009-10, Saskatchewan fur data base reported '267'.

The generally high and constant trap returns suggest a resilient or stable population, albeit subject to fluctuations. These data must, however, be considered with caution because they do not account for effort or pelt price, which are known to affect harvest rates (Poole and Mowat 2001). Therefore, the number of pelts sold does not necessarily reflect the total number of American Badgers trapped each year, and the number of Badgers trapped is not necessarily an indicator of population size. Some pelts do not enter the commercial auction process and are therefore not included in total harvest estimates. In Saskatchewan, annual number of Badger pelts sold strongly correlates with both the number of trapping licences sold for the southern half of the province and number of Coyote (*Canis latrans*) pelts, suggesting Badger harvest is incidental Coyote harvest. American Badger pelt returns also correlate more closely to Coyote pelt price than Badger pelt price (Appendix A).

Jacksoni DU

A population abundance estimate is not available for the Jacksoni DU. The number of adult breeding American Badgers in Ontario was estimated to be fewer than 200 adults in 2000; only 39 records were made between 1980-1998, the maximum harvested from 1981-1990 was seven (in 1982/83), and no pelts were recorded after 1991 with a trap season open until at least 2000 (COSEWIC 2000). Since 2000, fieldwork and expert opinion continues to indicate the population has fewer than 200 adults. An aerial survey was conducted in 2006 and 2007 over 700 km^2 of Brant and Norfolk counties and recorded only a few suspected den sites (Sadowski *et al.* 2007). In 2010, hair samples collected from 172 hair snag traps in burrows across an area from Stratford to Port Dover to Strathroy identified a total of 31 probable individual badgers (Sayers and Kyle 2011). In the same study area, a total of 36 confirmed or credible reports were provided by the public in a region-wide public outreach program (Sayers and Kyle 2011). It is not known how many of these were separate animals.

Trend data are not available. The earliest official record in Ontario is from 1895, with only sporadic records for the next several decades (Lintack and Voigt 1983) and no evident patterns in the recent data on sightings.

Rescue Effect

Jeffersonii West and East DUs

The opportunity for American Badgers to re-colonize the Jeffersonii West DU from Washington State is very unlikely due to the uncertain status of American Badger in northern Washington and the extensive valley bottom developments in the Okanagan River valley. State wildlife managers have concerns over the species' status (Sato pers. comm. 2011), even though the State of Washington ranks American Badgers as S4, and there are occasional badger sightings from the three north-eastern-most counties of the State (Base pers. comm. 2011). Connectivity modelling for American Badger in Washington indicates that badgers face significant "landscape resistance" against dispersal north into the Canadian Okanagan and Kettle River valleys (Washington Wildlife Habitat Connectivity Working Group 2010) and that core range in that state is at least 100 km south of the Canadian border (Figure 5, Sato pers. comm. 2011).

The likelihood for rescue for the Jeffersonii East DU is better than in the western population, but still not strong. Badgers occasionally are reported from the Kootenai River (same as Kootenay River in Canada) basin in the Idaho panhandle, but are considered uncommon (Wakkinnen pers. comm. 2011). In north-western Montana, American Badger is considered common in the Flathead valley around Kalispell, MT (Williams pers. comm. 2011). The Cabinet and Yaak mountains that divide Montana and the Idaho panhandle are likely permeable to badgers, but the extent of movements between Idaho and Montana is unknown. The animals would be able to survive in Canada; north-western Montana was the source population for recent translocations in the Kootenay, 75 to 100 km from the Canadian border (Kinley and Newhouse 2008).

Overall, because of low population density, and landscape resistance to movement in the US, particularly adjacent to the western population, it is suspected that the possibility for rescue is limited.

Taxus DU

American Badger habitat is continuous with most of the Canada-US border from Manitoba to the Rocky Mountains. In most cases, this border region contains suitable undeveloped habitat and there are no significant impediments to Badger movement across it. If *T. t. taxus* was extirpated from its Canadian range, rescue from adjacent states would be feasible, assuming the factors leading to the Canadian extirpation did not occur in the US as well.

Jacksoni DU

American Badgers in south-western Ontario are functionally isolated from other jurisdictions. The St. Clair and Detroit Rivers between Michigan and Ontario are roughly 0.5 km wide, a distance badgers are capable of swimming. However, recent genetic data (Ethier *et al.* 2012) suggests movement between Michigan and southern Ontario has not been frequent in recent times and badger occurrence close to these rivers on either side of the border is uncommon.

Rescue effect from neighbouring Michigan is unlikely given extensive urban development along the St. Clair and Detroit Rivers. Reporting of trapping data in Michigan became voluntary in 2002 and no records exist from St. Clair County, Michigan (across the St. Clair River from Lambton County, Ontario) (Bump pers. comm. 2011). In Ontario, there are no known records for Essex County, and only a few, mostly historical, records from eastern Lambton and Kent Counties. Badgers are not known from New York State (Baginski pers. comm. 2010) and therefore rescue would not be expected into Canadian range from the east.

THREATS AND LIMITING FACTORS

Major threats to American Badgers in Canada are road mortality and habitat loss. Threats specific to the Jeffersonii East and West DUs and Jacksoni DU are summarized by the *jeffersonii* (Table 6) and Ontario Badger Recovery Teams (Table 7), respectively. American Badgers in the Taxus DU encounter additional threats from hunting, trapping and secondary poisoning, though the degree to which these mortality sources affect prairie badger populations is not known due to lack of monitoring. All threats are compounded by badger life-history characteristics of low population densities and low reproductive rates.

Table 6. Threats experienced by American Badger in the Jeffersonii designatable unit. Threats are ranked by severity, spatial distribution (widespread or local), occurrence (chronic or episodic), and trend. Adapted from *jeffersonii* Badger Recovery Team 2008.

Threat	Severity	DU	Spatial	Occurrence	Trend
Habitat loss & degradation:					
urban/rural/highway development	high	East; West	widespread	episodic	Continuing / increasing
forest in-growth & encroachment	medium-high	East; West	widespread	chronic	steady to Decreasing
poor range management	medium-high	East; West	local	chronic	?
reservoir flooding	low, locally moderate	East	local	chronic	No new reservoirs, but loss of historic habitat continuing
cultivation agricultural	low	Mostly West; some East	widespread	chronic	Continuing

Threat	Severity	DU	Spatial	Occurrence	Trend
vineyards & orchards	low to locally high	West	local	chronic	Increasing (vineyards)
Road mortality	high	East; West	widespread	chronic	Increasing traffic volumes
Trapping	Historically high	East; West	widespread	episodic	No trapping season since 1967
Persecution	low-moderate	East; West	widespread	chronic	Decreasing
Loss of prey	low	East; West	widespread	episodic	unknown
Secondary poisoning via prey	unknown, likely low	East; West	local	episodic	Decreasing

Table 7. Threats experienced by American Badger in the Jacksoni designatable unit. Threats are ranked by severity, spatial distribution (widespread or local), occurrence (chronic or episodic), and trend. Adapted from Ontario Badger Recovery Team 2010.

Threat	Description	Severity	Occurrence	Trend
Habitat loss & degradation	loss of grasslands, soils, prey	high	current	continuous
Road mortality	increased mortality	medium-high	current	continuous
Predation	primarily coyote and dog	low	current	recurring
Persecution	discriminate killing	low-medium	current	recurring
Incidental trapping	non-target killing	low-medium	current	recurring
Disease	canine distemper and tularemia	low	current	recurring

The IUCN Threat Calculator was completed for all designatable units (Appendix B). The Jeffersonii West DU has an overall threat impact of High, with one high threat and six low threat ranked threats, and was similar to Jeffersonii East, with one high and five low ranked threats. The Taxus DU has an overall threat impact ranging from either Very High (two high, one medium, five low) to High (one high, one medium, six low). The threat in the Taxus DU is high because of the potential problems with secondary poisoning and extermination killing over most of the range. The Jacksoni DU has an overall threat impact of High (one high, one medium, and four low).

The number of locations for each DU is considered to be 'many'. Although mortality from vehicles is a common threat, each mortality event is considered separate due to the varying road density, traffic volumes, and vulnerability of badgers across the DUs. Hunting, trapping and secondary poisoning in the Taxus DU would similarly be considered separate events.

Roads

American Badgers are particularly susceptible to mortality from vehicles (road-kill) because they have large home ranges and their prey often are attracted to roadside conditions of quality forage (grass) and friable soils (Weir *et al.* 2004b).

Highway mortality is very high in some areas of the Jeffersonii West DU. Thirty-six percent (5 of 14) of radio-tagged American Badgers in the Thompson / Okanagan sub-population were killed on highways between 1999 and 2002 (Hoodicoff *et al.* 2009). Most of these mortalities occurred during July when peak traffic volumes coincide with greatest badger movements by males during the breeding season (Weir *et al.* 2004b). In the Cariboo sub-population, 18% of study animals died from vehicle collisions in four years (*jeffersonii* Badger Recovery Team 2008). The major north-south highway that bisects the Cariboo region is currently being twinned, which may result in increased mortality. Road-kill rates in the Jeffersonii East DU are lower than the Thompson / Okanagan sub-population, but still the leading cause of mortality (Kinley and Newhouse 2008).

Data on road-kill in the Taxus DU is not collected but road-kill likely is a concern. American Badgers suffer high rates of documented road-kill in similar ecosystems in southern Idaho (Messick and Hornocker 1981) and Nebraska (Case 1978).

In the Jacksoni DU, 11 road-kills have been recorded over the past decade. Highways 401, 402 and particularly 403 north of the Norfolk Sand Plain, may also function as barriers to dispersal where concrete medians have been erected over extensive stretches. The actual number of road-kills is unknown. Southern Ontario has a very high road density and all badger home ranges likely include numerous roads and highways (Figure 6).

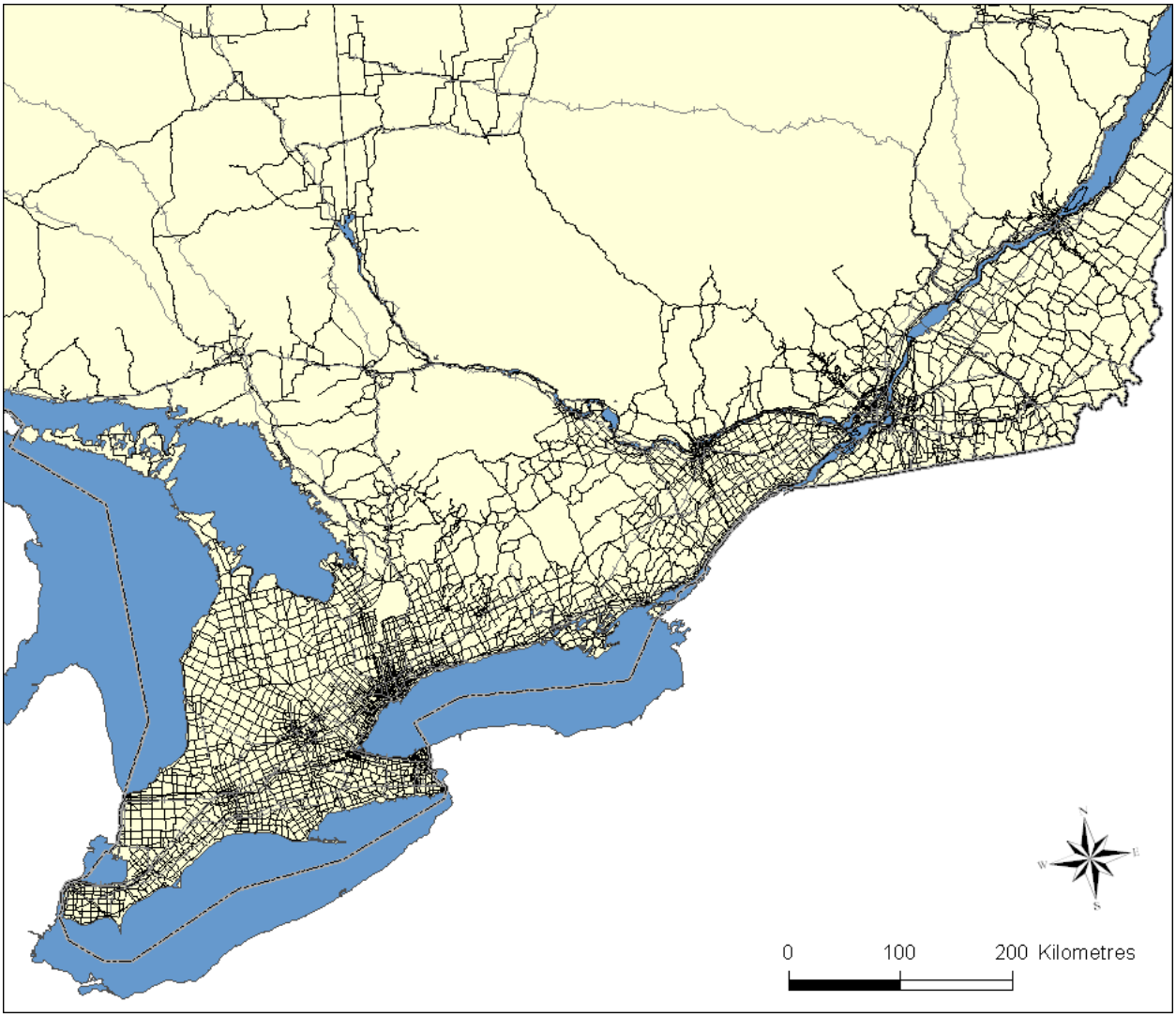

Figure 6. Relative amount of paved roadway in southern Ontario as an indication of the threat of road-related mortality of American Badger in the Jacksoni designatable unit. The range of the Jacksoni DU is shown in Figure 4. (Jenny Wu, COSEWIC Secretariat)

Habitat Loss

Habitat loss results from various sources, primarily urban development, forest in-growth and encroachment into open forest and grassland ecosystems, fire suppression, intensive agriculture, and highway right-of-ways. In the Jeffersonii DUs, core badger habitat in major valley bottoms such as the Okanagan, Thompson and Rocky Mountain Trench coincides with areas of potential human activity and development. The majority of private land in the area is in valley bottoms where there are few protected areas. Forest in-growth and encroachment also impact badger habitat (see **Habitat Trends** section). Loss of habitat to agriculture is a concern in the Taxus and Jacksoni DUs and, to a lesser extent, in the two Jeffersonii DUs populations. In the Taxus DU, American Badgers are thought to use less than 2% of the available landscape within agricultural

areas (Proulx pers. comm. 2011). Significant amounts of pasture land may be lost to conversion with the removal of lands associated with the Prairie Rehabilitation Rehabilitation Act (see **Habitat Trends** section).

Hunting and Trapping

Open trapping seasons on American Badger exist in Alberta, Saskatchewan and Manitoba. In Alberta, Badgers may be killed on private land without licence by persons with right of access. In Saskatchewan and Manitoba, landowners may kill unlimited numbers of American Badgers on their lands in defence of property. Data on the number of American Badgers shot by landowners in the Taxus DU are not available; however, they are routinely killed on private land (Wellicome pers. comm. 2011). Minimum total harvest (based on fur pelt returns) in Alberta, Saskatchewan and Manitoba between 1999 and 2010 is 8075 Badgers, with an annual average of 734 (SD = 331.3) (Table 5, Appendix A). These numbers represent minimum harvest, as many more badgers are likely killed on private land each year. There is no hunting or trapping season in British Columbia or Ontario (see **Legal Protection and Status** section). Killing badgers on private land in defence of property is legal in British Columbia.

Disease

Necropsies on road-killed American Badgers from Ontario (n=12) have identified three cases of tularemia and five cases of leptospirosis. The presence of leptospires in the liver of two specimens suggests that those individuals had systemic infections, which may have negatively affected their health (Campbell pers. comm. 2011). These diseases may represent a serious threat to population viability but badger susceptibility and rates of transmission are poorly understood. The plague bacterium, *Yersinia pestis*, is occasionally found in American Badgers (Messick *et al.* 1983; Dyer and Huffman 1999) but they are thought to be resistant to the disease (Messick and Hornocker 1981).

Loss of Prey

Woodchucks, a known prey item for American Badgers in south-western Ontario, may have experienced declines over the last few decades (Sutherland pers. comm. 2010). Opinions from farmers across southern Ontario indicate that Woodchucks have nearly disappeared from the landscape during the past 20 - 40 years. Whether this reduction has negatively affected American Badgers is unclear because Badger consume many prey species. Invasive weeds, as well as forest in-growth and encroachment, may also reduce prey populations.

Secondary Poisoning

Badgers are at risk of mortality from consuming prey containing rodenticides (e.g. strychnine, chlorophacinone) used for pest control of various fossorial rodent species (Proulx 2011; Proulx and MacKenzie 2012). In south-western Saskatchewan, American Badgers died within nine days of feeding on Richardson Ground Squirrels (*Urocittelus*

richardsonii) that had been treated with chlorophacinone (Proulx *et al.* 2009 in Proulx and MacKenzie 2012). The number of American Badgers per kilometre of road (based on spotlighting surveys) in areas with 20% of area treated with rodenticide (strychnine and chlorophacinone) was significantly higher (2.2 times greater) than in areas where application was 90% of the area (Proulx and MacKenzie 2012). The strychnine used over much of the region was a lower dosage, 'ineffective' type (Proulx 2010) because the more effective 2% Liquid Strychnine Concentrate (LSC) had been banned since the early 1990s. In February 2012, the federal government removed the ban and the more efficient strychnine is available for widespread use (Benoit 2012). It is expected that mortality rates on Badger will increase with use of the new rodenticide.

PROTECTION, STATUS, AND RANKS

Legal Protection and Status

Jeffersonii West and East DUs

In British Columbia, American Badgers are listed as furbearers, but there has been no trapping season for them since 1967 (*jeffersonii* Badger Recovery Team 2008). The BC Conservation Data Centre includes American Badger on the province's "red list"; however, this listing has no legal bearing. American Badger is not listed as endangered in the provincial *Wildlife Act* and if deemed a "menace to a domestic animal or bird" on private property can be hunted or trapped by the landowner. Under the province's Conservation Framework, American Badgers receive the highest priority for Goal 3, which is to "maintain the diversity of native species and ecosystems" (BC Ministry of Environment 2011).

Taxus DU

In Alberta, American Badgers were considered "Sensitive" in a provincial review (Scobie 2002) and are ranked "Data Deficient" (Alberta ESCC 2002). There is no official ranking for the species in Saskatchewan, or Manitoba. Badgers are furbearers in each province with no restrictions on harvest rates.

Jacksoni DU

In Ontario, American Badgers are considered 'Endangered' and are legally protected under the province's *Endangered Species Act, 2007* (ESA). The habitat of American Badger is protected under Ontario Regulation 242/08.

Non-Legal Status and Ranks

General Status ranks for American Badger (CESCC 2006) in Canada range from At Risk (1) to Secure (4). Rankings by NatureServe (2011) are similar (Table 8).

Table 8. Conservation rankings for American Badger by WildSpecies.ca (CESCC 2006) and NatureServe (2011).

Rank Level	Jurisdiction	Wild Species	G-Rank
Global			G5
National	Canada	3	N4
	United States		N5
Subnational	British Columbia	1	S1
	Alberta	3	S4
	Saskatchewan	3	S3S4
	Manitoba	4	S4
	Ontario	1	S2
	Washington		S4
	Idaho		S5
	Montana		S4
	North Dakota		SNR
	Minnesota		SNR
	Michigan		S4
	Ohio		S2

Habitat Protection and Ownership

Jeffersonii West and East DUs

Under the BC *Forest and Range Practices Act*, American Badgers are listed as an "Identified Wildlife Species". Under this legislation, "Wildlife Habitat Areas" (WHAs) can be established to protect badger habitat from forest and range activities. Measures are described to protect badger habitat, including burrows, especially maternal dens (Adams and Kinley 2004). Currently there are 40 approved badger WHAs in British Columbia (Table 9). Twenty-one of the 31 WHAs (representing 96% of the 2019 ha total area) occur in the Cariboo region of the Jeffersonii West DU.

Table 9. Summary statistics of Wildlife Habitat Areas in British Columbia established to protect American Badger habitat of the Jeffersonii designatable unit.

	Designatable Unit		
Data	**West**	**East**	**Total**
Number of WHAs	31	9	40
Total area (ha)	2019	854	2873
mean (ha)	65	95	72
standard deviation (ha)	64.0	89.8	70.4
Minimum (ha)	1	4	1
Maximum (ha)	245	236	245

T. t. jeffersonii is listed on the federal *Species at Risk Act* Schedule 1 with full protection on federal land. There are numerous parcels of federal land on which American Badgers occur. Federal areas include Yoho and Kootenay National Park (a very small portion of the park is considered badger habitat), Dominion Coal Blocks, near Fernie, BC (Weir and Davis 2005); several First Nation reserves, the Columbia National Wildlife Area, Department of National Defence lands, First Nation Reserves and Vaseux – Bighorn National Wildlife Area. The total amount of federal land containing badger habitat is unknown. American Badgers occur in numerous provincial parks, and private lands owned by conservation organizations (e.g. The Nature Trust of British Columbia, Nature Conservancy of Canada, The Land Conservancy of British Columbia).

The British Columbia government also designates Wildlife Management Areas under the provincial *Wildlife Act*. In these areas, site-specific management objectives are outlined primarily to protect wildlife habitat. There are five Wildlife Management Areas in B.C. within badger range.

Taxus DU

The broad distribution of American Badgers throughout the Prairie provinces includes numerous protected areas such as provincial parks, six national parks, National Wildlife Areas, ecological reserves and other classifications. Numerous First Nations reserves also support badgers. The amount of badger habitat, or population is not known for these sites.

Jacksoni DU

Habitat regulations in the Ontario *Endangered Species Act, 2007* protect known badger dens that are in use or have been used in the past 12 months, including a 5-metre radius around the entrance to all badger dens. Very few dens have, however, been confirmed. Woodchuck burrows within 850 metres of the den are also protected. Greater than 95% of all confirmed badger burrows in Ontario were identified on privately owned lands.

T. t. jacksoni is listed on the federal *Species at Risk Act* Schedule 1. American Badger occurs on numerous parcels of land where the *Species at Risk Act* applies including federal land and First Nation reserves. There are three National Wildlife Areas within the *T. t. jacksoni* extent of occurrence in Ontario. These National Wildlife Areas primarily protect wetland habitats but may contain American Badger because wetlands are used by badger in nearby Ohio (Duquette 2008). Numerous provincial parks, Conservation Areas and conservation land holdings protect badger habitat to varying degrees.

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BIOGRAPHICAL SUMMARY OF REPORT WRITERS

Ian Adams holds an MSc in Wildlife Biology from the University of Guelph. He initiated the *jeffersonii* Badger Recovery Team in British Columbia in 2001, was the Team Chair through 2005 and lead author of the recovery strategy for American Badger (*jeffersonii* subspecies) in British Columbia. He has worked as a biologist throughout western Canada and northern Ontario and taught undergraduate biology courses at the College of the Rockies in Cranbrook, BC. He currently lives and works as a consulting biologist in Cranbrook, BC.

Danielle Ethier has a BSc from the University of Guelph, and an MSc from Trent University, with a thesis on *Taxidea taxus jacksoni* in southwestern Ontario. From 2008 to 2010, Danielle helped develop and manage the Ontario Badger Project and outreach campaign, which solicited sighting reports of badgers from across south-western Ontario. She is currently working as a Species-at-Risk Biologist with the Ontario Ministry of Natural Resources.

Josh Sayers was involved in the development of the Ontario Badger Project, was project coordinator in 2010 and will be filling the role of lead biologist in 2012 and 2013. In addition to badgers, he has been involved with field research on numerous other mammal and bird species across North America.

COLLECTIONS EXAMINED

No collections were examined.

Appendix A: Saskatchewan Fur Data

Data on American Badger populations in the Taxus DU are limited to trap harvest returns. The following appendix details trap data from Saskatchewan; it is presented here to illustrate the difficulty in using trap data to determine population trends for the DU because of the potential bias in trap data when effort is not known.

Detailed trapping data on American Badger for Saskatchewan for the period 1999/2000 to 2009/2010 were provided by Saskatchewan Ministry of Environment. From 1999 to 2010, 3793 American Badgers were sold, province-wide. Of these, 3633 (96%) originated from the southern Wildlife Management Zones (Table A-1). For the WMZs, the annual number of pelts sold per zone was 5.7 (SD = 3.4) for the 11-year period. This mean ranged from a low of 3.0 in 2000-01 to a high of 12.2 in 2003-04. The high returns for Saskatchewan in 2003-2004 are consistent with a similar peak in Alberta and, to a lesser extent, Manitoba (which was slightly higher in 2002-03). This may reflect a peak in the Taxus DU. Pelt returns declined drastically in each prairie province in 2004-2005, compared to 2003-04: AB = 75.0%, SK = 67.7%; MB = 47.9% (Table 5).

The distribution of the majority of Badger pelt records coincides with the area of occupancy range limit proposed for American Badgers (Figure A-1). This area includes the Boreal Transition ecoregion and portions of the Mid-Boreal Uplands ecoregion encircled by the Boreal Transition (Ecological Stratification Working Group 1995). Pelt return data support inclusion of these areas within the area of occupancy for American Badger. The few (approx. 30; 0.8% of total) pelt returns that extend beyond the area of occupancy are from trapping areas that straddle the line (e.g. H-75, H-25), or are close to it. The Mid-Boreal Lowlands ecoregion to the north-east of the area of occupancy in Saskatchewan is characterized by numerous bogs and fens with mixed forest cover. Though soils may be suitable to digging, typical prey are likely absent (Ecological Stratification Working Group 1995).

Caution Regarding Data

Harvest data should be considered with caution because they are not necessarily a measure of badger population size or trend; factors that can influence the number of pelts traded include number of trappers, individual effort of trappers, target species, market prices and whether pelts enter the commercial fur system can influence the number of pelts submitted for sale (Poole and Mowat 2001). The province is only “aware” of a pelt once it is reported by the fur dealer; individual trappers are not required to report their catch). Pelts attributed to a particular FCB or WMZ were not necessarily trapped in that location.

Trapping effort in particular can influence pelt returns. In the case of Saskatchewan between 1999-2000 and 2009-2010, pelt returns closely follow the number of trapping licences sold for the southern Wildlife Management Zones (Figure A-2) and the two are closely correlated (Figure A-3). In turn, trapping effort is influenced by social factors and economics. Pelt price of the target species is important, as is pelt price of other species which are seen as key drivers of trapping activity. The number of badger pelts traded was more closely correlated to Coyote pelt price (R^2 = 0.34) than American Badger pelt price (R^2 = 0.14) between 1999-2000 and 2009-2010 (Table A-2; Statistics Canada 2005; 2010; 2011).

The number of badger pelts traded correlates with the number of coyote pelts traded in Saskatchewan over the same time period (Figure A-4). The significant drop in badger pelt returns from 2003-04 to 2004-05 also occurred for Coyote: 35,701 in 2003-04 to 19,957 in 2004-05 (45.1% decline). These results suggest the primary target of trapping in southern Saskatchewan is Coyote and badger pelt data are a function of effort to trap Coyotes. As such, badger pelt data should not be used as an indicator of population trend for American Badgers.

Table A-1. Summary statistics of annual American Badger pelt returns from Saskatchewan, 1999-2000 to 2009-2010. n = number of Fur Conservation Blocks and Wildlife Management Zones reporting at least one badger pelt (maximum = 88 province wide; 58 southern WMZ's).

	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	Total
Province Wide												
total	190	204	237	370	716	230	299	495	450	335	267	3793
mean	2.2	2.3	2.7	4.2	8.1	2.6	3.4	5.6	5.1	3.8	3.0	43.1
SD	3.7	4.2	4.4	9.6	13.8	4.3	5.3	7.8	11.2	7.5	7.1	57.2
n	46	49	48	52	58	41	49	57	54	44	41	88
Southern Zones												
# south licence	907	1052	1055	1207	1403	1126	1174	1461	1351	1258	1172	
total	183	172	230	354	706	222	277	488	439	331	231	3633
mean	3.2	3.0	4.0	6.1	12.2	3.8	4.8	8.4	7.6	5.7	4.0	62.6
SD	4.2	3.8	5.0	11.4	15.6	4.9	5.5	8.4	13.2	8.7	7.4	61.8
n	41	42	42	45	52	36	45	51	48	41	39	58
total per 10 licence	2.0	1.6	2.2	2.9	5.0	2.0	2.4	3.3	3.2	2.6	2.0	

Table A-2: Summary of American Badger and Coyote trapping statistics for Saskatchewan, 1999-2000 to 2009-2010.

				mean pelt price	
Year	Licences sold	Badger pelts	Coyote pelts	Badger	Coyote
99-00	907	190	13,339	$ 26.77	$ 30.12
00-01	1052	204	18,187	$ 32.32	$ 27.07
01-02	1055	237	18,843	$ 41.89	$ 37.74
02-03	1207	370	n.a.	n.a.	n.a.
03-04	1403	721	35,701	$ 36.24	$ 46.24
04-05	1126	233	19,597	$ 35.51	$ 39.53
05-06	1174	303	16,565	$ 40.14	$ 43.49
06-07	1461	498	28,803	$ 44.46	$ 56.33
07-08	1351	450	26,849	$ 62.38	$ 33.28
08-09	1258	336	17,723	$ 34.52	$ 25.14
09-10	1172	267	14,207	$ 34.36	$ 27.87

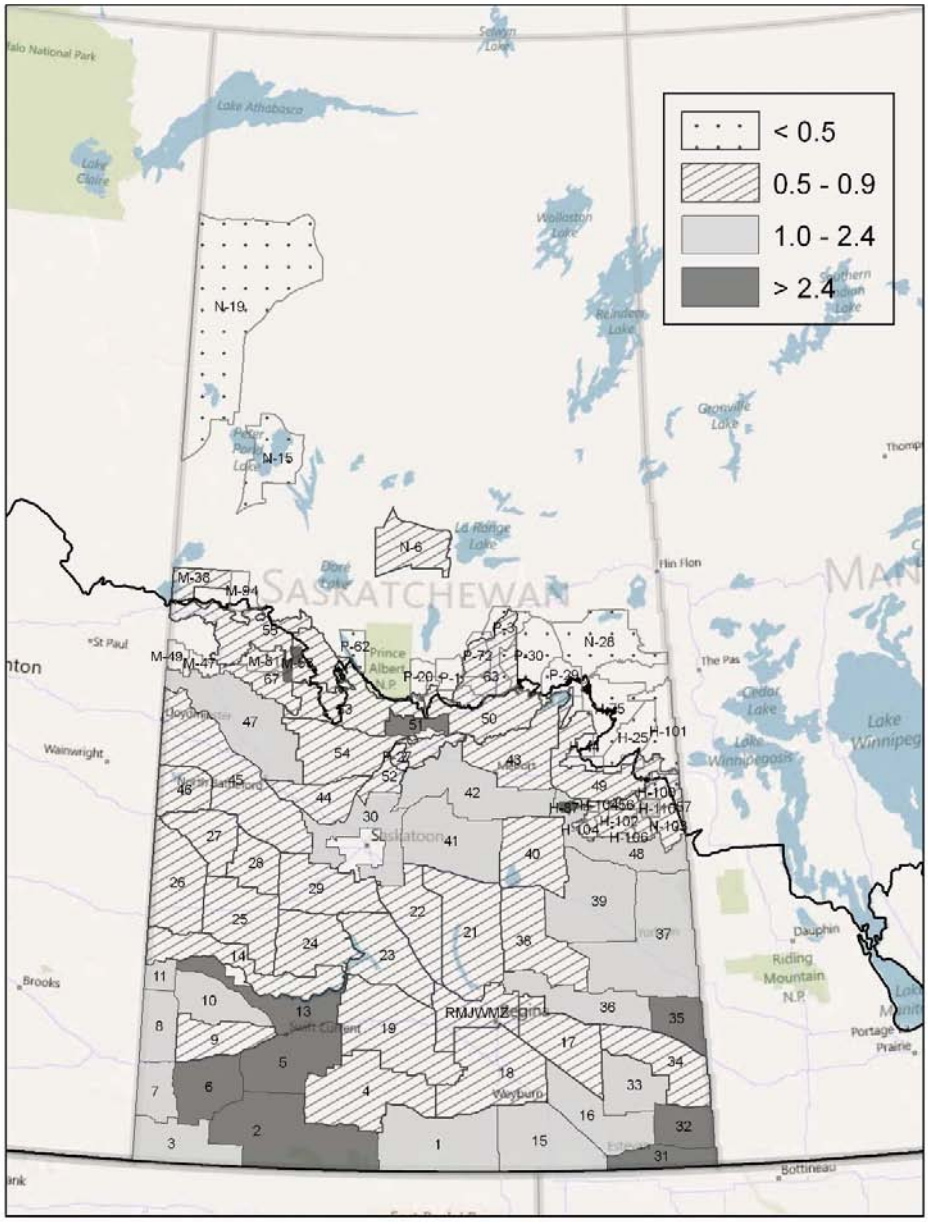

Figure A-1: Total American Badger pelts traded between 1999-2000 and 2009-2010 per 100km^2 of Wildlife Management Zone (WMZ) and Fur Conservation Block (FCB) in Saskatchewan. Data are grouped into density categories shown in legend. Block labels indicated WMZ (number only) or FCB (letter-number) designation. Thick black line indicates range limit of area of occurrence.

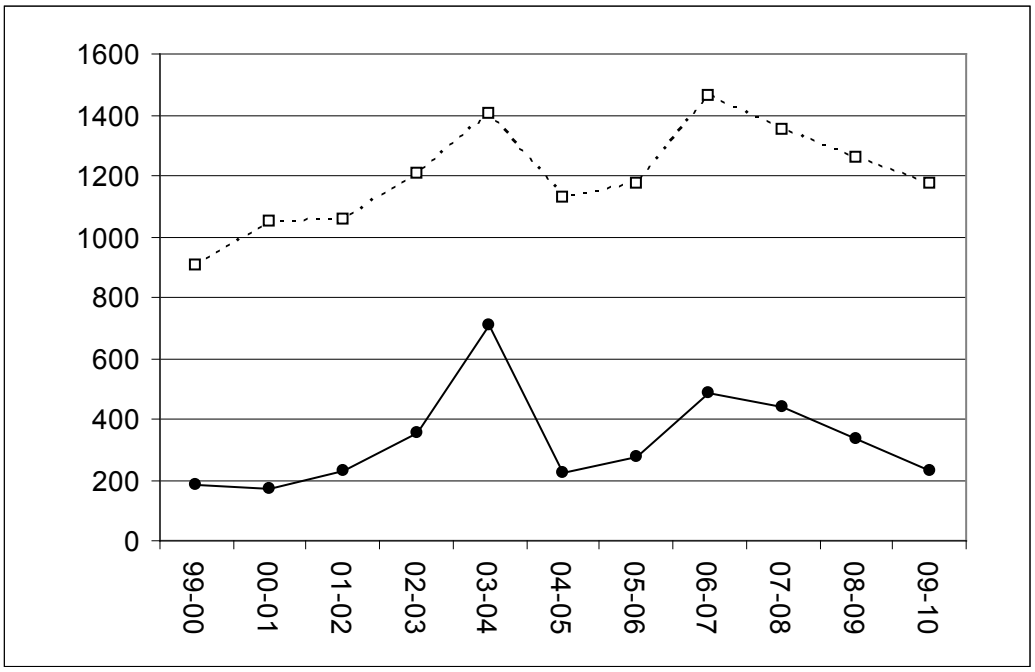

Figure A-2: Total American Badger pelts traded (solid line and circles) and total trapping licences sold (dashed line and open squares) in southern Saskatchewan Wildlife Management Zones between 1999/2000 and 2009/2010.

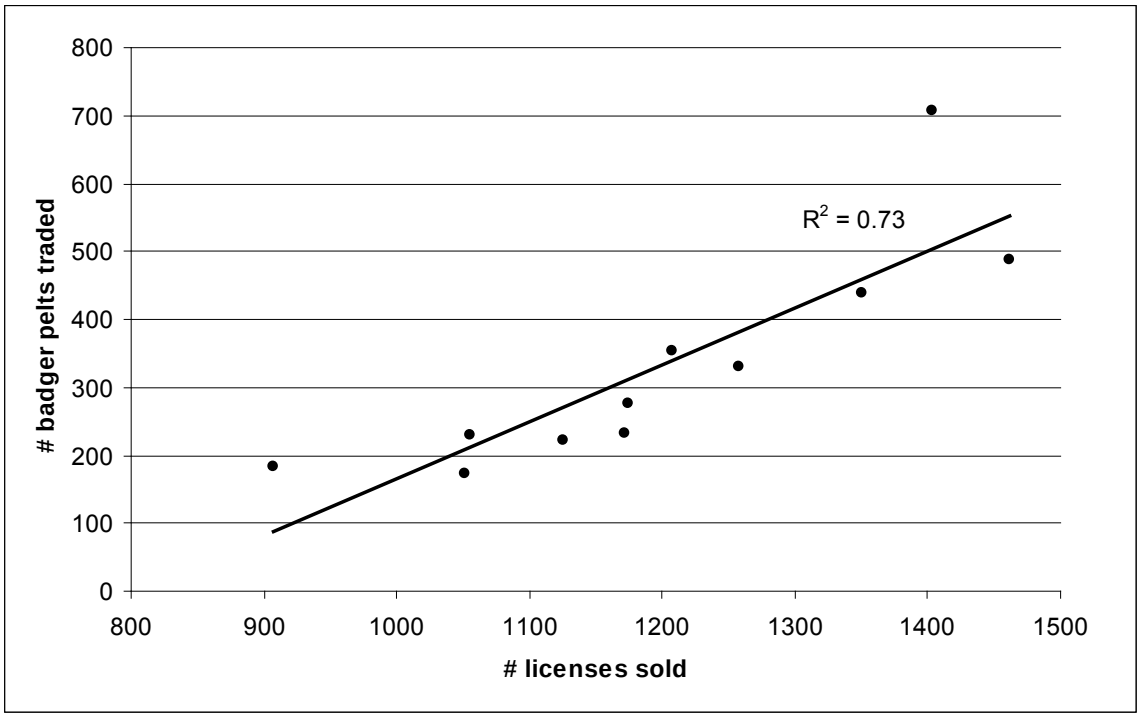

Figure A-3: Correlation between number of trapping licences sold and number of American Badger pelts traded between 1999/2000 and 2009/2010 for southern Saskatchewan Wildlife Management Zones. Line is a linear best fit.

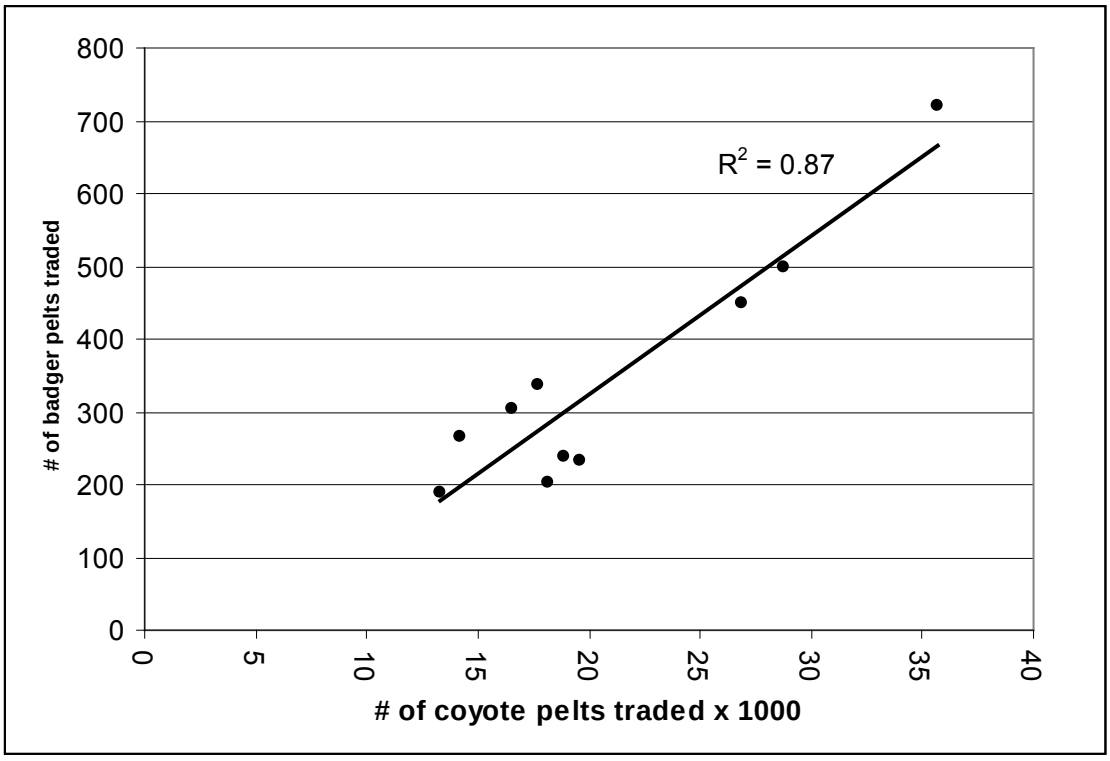

Figure A-4: Correlation between number of Coyote pelts traded and number of American Badger pelts traded in Saskatchewan between 1999-2000 and 2009-2010 (2002-03 data missing). Line is a linear best fit.

Appendix B: IUCN Threats Calculator

Table B-1. Summary sheet for threats on the four designatable units for American Badger.

		high range	low range
Jeffersonii West	Very High	0	0
	High	1	1
	Medium	0	0
	Low	6	6
	Calculated Overall Threat Impact:	**High**	**High**
Jeffersonii East	Very High	0	0
	High	1	1
	Medium	0	0
	Low	5	5
	Calculated Overall Threat Impact:	**High**	**High**
Taxus	Very High	0	0
	High	2	1
	Medium	1	1
	Low	5	6
	Calculated Overall Threat Impact:	**Very High**	**High**
Jacksoni	Very High	0	0
	High	1	1
	Medium	1	1
	Low	4	4
	Calculated Overall Threat Impact:	**High**	**High**

Table B-2. Threats calculator results for the *jeffersonii* subspecies (Western population).

Species or Ecosystem Scientific Name	American Badger *jefferonii* subspecies (Western population), *Taxidea taxus jefferonii*
Date:	10/11/2011
Assessor(s):	Ian Adams; David Fraser

Overall Threat Impact Calculation Help:

		Level 1 Threat Impact Counts	
Threat Impact		**high range**	**low range**
A	Very High	0	0
B	High	1	1
C	Medium	0	0
D	Low	6	6
Calculated Overall Threat Impact:		High	High

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	Residential & commercial development	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
1.1	Housing & urban areas	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	Human population growth expected most in Okanagan and Kamloops areas
1.2	Commercial & industrial areas		Negligible	Negligible (<1%)	Moderate - Slight (1-30%)	High (Continuing)	
1.3	Tourism & recreation areas		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Golf courses create habitat for badgers and their prey, but both (particularly prey species) are actively discouraged from using the golf courses. Number of new golf courses to be built is unknown. Ski hills create mid- to high-elevation habitat; number of new ski hills is unknown - likely very few, if any.
2	Agriculture & aquaculture	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	
2.1	Annual & perennial non-timber crops	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	vineyards; orchards; cultivation agriculture
2.3	Livestock farming & ranching		Not a Threat	Large - Restricted (11-70%)	Neutral or Potential Benefit	High (Continuing)	pasture lands are usually suitable badger habitat provided rancher is favourable to badger presence
3	Energy production & mining		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	
3.2	Mining & quarrying		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	active mines can reduce habitat availability; longer term, reclaimed mines create badger habitat, provided soil is suitable.
4	Transportation & service corridors	B	High	Pervasive (71-100%)	Serious (31-70%)	High (Continuing)	
4.1	Roads & railroads	B	High	Pervasive (71-100%)	Serious (31-70%)	High (Continuing)	most badgers have a highway or major road wihtin their home range or close to it.
4.2	Utility & service lines		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Deforested corridors (hydro, pipeline, etc.) create habitat for badger and their prey. Can also provide movement corridors for badgers and prey to access other habitat patches
5	Biological resource use	D	Low	Restricted - Small (1-30%)	Moderate - Slight (1-30%)	High (Continuing)	
5.1	Hunting & collecting terrestrial animals	D	Low	Restricted - Small (1-30%)	Moderate - Slight (1-30%)	High (Continuing)	Some extermination killing on private land is anticipated; levels unknown, presumed low to very low. Secondary poisoning affects badgers consuming prey poisoned with rodenticides, particularly anticoagulents. Amount of rodent poisoning activity is unknown, likely low. Threat is likely episodic and greatest during high ground squirrel / pocket gopher outbreaks.
5.3	Logging & wood harvesting		Not a Threat	Large - Restricted (11-70%)	Neutral or Potential Benefit	High (Continuing)	grassland and open forest restoration will benefit badgers and their prey; logging and associated road construction, creates habitat for badger and prey. But see Threat 4.1 - Roadkill rates are lower on logging roads, but badgers are killed by vehicles on all roads.
6	Human intrusions & disturbance	D	Low	Large (31-70%)	Slight (1-10%)	High (Continuing)	

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
6.1	Recreational activities	D	Low	Large (31-70%)	Slight (1-10%)	High (Continuing)	recreational use of badger habitat likely widespread, but low impact on badgers. Localized high impacts caused by off-road vehicle damage (e.g. ATVs) in sensitive grassland areas.
6.2	War, civil unrest & military exercises		Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	very small amounts of Dept National Defence lands within range; effects are anticipated to be negligible.
6.3	Work & other activities		Negligible	Large (31-70%)	Negligible (<1%)	High (Continuing)	extensive forestry and agricultural activities throughout area of occupancy; impact of this activity anticipated to be negligible
7	Natural system modifications	D	Low	Small (1-10%)	Moderate (11-30%)	High (Continuing)	
7.1	Fire & fire suppression	D	Low	Small (1-10%)	Moderate (11-30%)	High (Continuing)	forest in-growth and encroachment is a significant factor in habitat loss; work on-going to reduce this throughout the population's range extent. Fire itself generally benefits badgers by removing canopy cover and improving habitat conditions for prey species
7.2	Dams & water management/use		Negligible	Negligible (<1%)	Extreme (71-100%)	High (Continuing)	very small area of badger habitat inundated by water impoundment within this population's EO (e.g. Kamloops Lake)
7.3	Other ecosystem modifications		Not a Threat	Restricted - Small (1-30%)	Neutral or Potential Benefit	Moderate (Possibly in the short term, < 10 yrs/3 gen)	large areas affected mountain pine beetle, especially in Cariboo region, will likely benefit badgers and their prey
8	Invasive & other problematic species & genes	D	Low	Large - Restricted (11-70%)	Slight (1-10%)	High (Continuing)	
8.1	Invasive non-native/alien species	D	Low	Large - Restricted (11-70%)	Slight (1-10%)	High (Continuing)	invasive plants may reduce forage opportunities and degrade habitat for badger prey species (Columbian Ground Squirrel, Yellow-bellied Marmot). Invasive weeds are widespread, but the extent of their impact in this regard is poorly known.
11	Climate change & severe weather		Not a Threat	Unknown	Neutral or Potential Benefit	Unknown	
11.1	Habitat shifting & alteration		Not a Threat	Unknown	Neutral or Potential Benefit	Unknown	climate change models and habitat shifting predicted for BC's southern interior is likely to benefit badgers. Scope & Timing left as unknown to reflect uncertainties over climate change rate and impacts.

Table B-3. Threats calculator results for the *jeffersonii* subspecies (Eastern population).

Species or Ecosystem Scientific Name American Badger *jefferonii* subspecies (Eastern population), *Taxidea taxus jefferonii*

Date:

Assessor(s): Ian Adams; David Fraser

Overall Threat Impact Calculation Help:

		Level 1 Threat Impact Counts	
Threat Impact		**high range**	**low range**
A	Very High	0	0
B	High	1	1
C	Medium	0	0
D	Low	5	5
Calculated Overall Threat Impact:		High	High

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	Residential & commercial development	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
1.1	Housing & urban areas	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	minor new housing anticipated in East Kootenay region
1.2	Commercial & industrial areas		Negligible	Negligible (<1%)	Moderate - Slight (1-30%)	High (Continuing)	
1.3	Tourism & recreation areas		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Golf courses create habitat for badgers and their prey, but both (particularly prey species) are actively discouraged from using the golf courses. Number of new golf courses to be built is unknown. Ski hills create mid- to high-elevation habitat; no new ski hills are anticipated.
2	Agriculture & aquaculture		Negligible	Negligible (<1%)	Slight (1-10%)	High (Continuing)	
2.1	Annual & perennial non-timber crops		Negligible	Negligible (<1%)	Slight (1-10%)	High (Continuing)	orchards; cultivation agriculture
2.2	Wood & pulp plantations						
2.3	Livestock farming & ranching		Not a Threat	Restricted - Small (1-30%)	Neutral or Potential Benefit	High (Continuing)	pasture lands are usually suitable badger habitat provided rancher is favourable to badger presence. Possibly some loss of ranch lands to housing development
2.4	Marine & freshwater aquaculture						
3	Energy production & mining		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	
3.1	Oil & gas drilling						
3.2	Mining & quarrying		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	active mines can reduce habitat availability; longer term, reclaimed mines create badger habitat, provided soil is suitable.
3.3	Renewable energy						
4	Transportation & service corridors	B	High	Pervasive - Large (31-100%)	Serious (31-70%)	High (Continuing)	
4.1	Roads & railroads	B	High	Pervasive - Large (31-100%)	Serious (31-70%)	High (Continuing)	most badgers have a highway or major road wihtin their home range or close to it.

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
4.2	Utility & service lines		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Deforested corridors (hydro, pipeline, etc.) create habitat for badger and their prey. Can also provide movement corridors for badgers and prey to access other habitat patches
5	Biological resource use	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
5.1	Hunting & collecting terrestrial animals	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	Some extermination killing on private land is anticipated; levels unknown, presumed low to very low. Secondary poisoning affects badgers consuming prey poisoned with rodenticides, particularly anticoagulents. Amount of rodent poisoning activity is unknown, likely low. Threat is likely episodic and greatest during high ground squirrel / pocket gopher outbreaks.
5.2	Gathering terrestrial plants						
5.3	Logging & wood harvesting		Not a Threat	Large - Restricted (11-70%)	Neutral or Potential Benefit	High (Continuing)	grassland and open forest restoration will benefit badgers and their prey; logging creates habitat for badger and prey; large areas affected mountain pine beetle, will likely benefit badgers and their prey
5.4	Fishing & harvesting aquatic resources						
6	Human intrusions & disturbance	D	Low	Large (31-70%)	Slight (1-10%)	High (Continuing)	
6.1	Recreational activities	D	Low	Large (31-70%)	Slight (1-10%)	High (Continuing)	
6.3	Work & other activities		Negligible	Large (31-70%)	Negligible (<1%)	High (Continuing)	extensive forestry and agricultural activities throughout area of occupancy; impact of this activity anticipated to be negligible
7	Natural system modifications	D	Low	Restricted (11-30%)	Moderate (11-30%)	High (Continuing)	
7.1	Fire & fire suppression	D	Low	Restricted (11-30%)	Moderate (11-30%)	High (Continuing)	forest in-growth and encroachment is a significant factor in habitat loss; work on-going to reduce this throughout the population's range extent. Fire itself generally benefits badgers by removing canopy cover and improving habitat conditions for prey species
7.2	Dams & water management/use		Negligible	Negligible (<1%)	Extreme (71-100%)	High (Continuing)	no new impoundments anticipated
8	Invasive & other problematic species & genes	D	Low	Large - Restricted (11-70%)	Slight (1-10%)	High (Continuing)	
8.1	Invasive non-native/alien species	D	Low	Large - Restricted (11-70%)	Slight (1-10%)	High (Continuing)	invasive plants may reduce forage opportunities and degrade habitat for badger prey species (Columbian Ground Squirrele). Invasive weeds are widespread, but the extent of their impact in this regard is poorly known.
11	Climate change & severe weather		Not a Threat	Unknown	Neutral or Potential Benefit	Unknown	
11.1	Habitat shifting & alteration		Not a Threat	Unknown	Neutral or Potential Benefit	Unknown	climate change models and habitat shifting predicted for BC's southern interior is likely to benefit badgers. Scope & Timing left as unknown to reflect uncertainties over climate change rate and impacts.

Table B-4. Threats calculator results for the *taxus* subspecies.

Species or Ecosystem Scientific Name American Badger *taxus* subspecies, *Taxidea taxus taxus*

Date: 23/12/2011

Assessor(s): Ian Adams

Overall Threat Impact Calculation Help:

Threat Impact		Level 1 Threat Impact Counts: high range	low range
A	Very High	0	0
B	High	2	1
C	Medium	1	1
D	Low	5	6
Calculated Overall Threat Impact:		Very High	High

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	Residential & commercial development	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
1.1	Housing & urban areas	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	Housing development rates unknown and variable. In some cases (e.g. near Calgary, Saskatoon, urban sprawl onto prairie habitat is a concern. Given large Area of Occupancy, this may affect less than 1% of population.
1.2	Commercial & industrial areas		Negligible	Negligible (<1%)	Moderate - Slight (1-30%)	High (Continuing)	Commercial / industrial expansion onto prairie would reduce habitat avialability - this scenario is likely very minor and would represent a very small portion of Area of Occupancy.
1.3	Tourism & recreation areas		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Golf courses create habitat for badgers and their prey, but both (particularly prey species) are actively discouraged from using the golf courses. Number of new golf courses to be built is unknown. If golf course is developed from native prairie, this activity should be considered a habitat threat; if golf course is developed from previous non-habitat then threat is likely neutral
2	Agriculture & aquaculture	CD	Medium - Low	Large - Restricted (11-70%)	Moderate (11-30%)	High (Continuing)	
2.1	Annual & perennial non-timber crops	CD	Medium - Low	Large - Restricted (11-70%)	Moderate (11-30%)	High (Continuing)	cultivated fields are not available habitat for badgers. They will use the edges of the fields and likely fallow fields, but not those regularly planted.
2.3	Livestock farming & ranching		Not a Threat	Restricted (11-30%)	Neutral or Potential Benefit	High (Continuing)	pasture lands may be suitable badger habitat provided rancher is favourable to badger presence. Badgers generally suffer more persecution on prairies than they do in British Columbia or Ontario. Number of badgers killed by landowners in AB, SK & MB is unknown.
3	Energy production & mining	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	
3.1	Oil & gas drilling	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	numerous oil and gas developments, especially in western part of the population. Severity of threat is uncertain. Potential impacts include: Effects of seismic testing on a fossorial animal; added road network (threat 4.1); unknown impacts on prey populations; well sites themselves are likely a negligible threat beyond potential damage in the event of spill or leakage.
3.2	Mining & quarrying		Negligible	Negligible (<1%)	Serious (31-70%)	High (Continuing)	

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
4	Transportation & service corridors	B	High	Pervasive - Large (31-100%)	Serious (31-70%)	High (Continuing)	
4.1	Roads & railroads	B	High	Pervasive - Large (31-100%)	Serious (31-70%)	High (Continuing)	Roadkill rates in AB, SK & MB are unknown. More opportunities for badgers to avoid roads on prairies than BC and possibly ON, but most badgers likely have a road within their homerange.
4.2	Utility & service lines		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	Utility corridors (hydro, pipeline, etc.) represent habitat for badger and their prey, especially in forested areas. Can also provide movement corridors for badgers and prey to access other habitat patches
5	Biological resource use	BC	High - Medium	Pervasive - Large (31-100%)	Serious - Moderate (11-70%)	High (Continuing)	
5.1	Hunting & collecting terrestrial animals	BC	High - Medium	Pervasive - Large (31-100%)	Serious - Moderate (11-70%)	High (Continuing)	Total harvest of badgers in AB, SK and MB is unknown. Population level impact of combined trapping, killing in defence of property (SK, MB) or hunting on private land (AB) is unknown. Based on recorded pelt returns, minimum mean annual harvest from all three provinces, 1999-2000 to 1009-2010 is 734 (SD = 331); total minimum harvest 1999-2010 is 8075 individuals. Significant amount of mortality from hunting on private land is anticipated but total numbers are unknown. Additional mortality occurs from secondary poisoning which affects badgers consuming prey killed with rodenticides, particularly anticoagulents. Amount of rodent poisoning is unknown, likely widespread. Threat likely episodic and greatest during high ground squirrel / pocket gopher outbreaks.
5.3	Logging & wood harvesting		Not a Threat	Large - Restricted (11-70%)	Neutral or Potential Benefit	High (Continuing)	Logging, and associated road construction, generally creates habitat for badger and prey. But see Threat 4.1 - Roadkill rates are lower on logging roads, but badgers are killed by vehicles on all roads.
6	Human intrusions & disturbance	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	
6.1	Recreational activities		Negligible	Large - Small (1-70%)	Negligible (<1%)	High (Continuing)	recreational use of badger habitat is unknwon, possibly widespread, but impact on badgers is considered negligible
6.2	War, civil unrest & military exercises	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	Military training may imapct badger individuals, their prey and/or their habitat - extent unknown. Major DND sites include CFB Wainwright (583 sq km), CFB Shilo (400 sq km); CFB Suffield (2690 sq km)
7	Natural system modifications	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
7.1	Fire & fire suppression	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
7.2	Dams & water management/use		Negligible	Negligible (<1%)	Extreme (71-100%)	High (Continuing)	total amount of badger habitat inundated by water impoundment within this population range is unknown (example reservoirs: Oldman, Diefenbaker)
8	Invasive & other problematic species & genes	D	Low	Large - Small (1-70%)	Slight (1-10%)	High (Continuing)	
8.1	Invasive non-native/alien species	D	Low	Large - Small (1-70%)	Slight (1-10%)	High (Continuing)	invasive plants may reduce forage opportunities and degrade habitat for badger prey species. Invasive weeds are widespread, but the extent of their impact in this regard is poorly known.
11	Climate change & severe weather		Unknown	Unknown	Unknown	Unknown	

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
11.1	Habitat shifting & alteration		Unknown	Unknown	Unknown	Unknown	climate change impacts are uncertain. Increased drought in south could reduce prey populations, although badgers occur throughout the arid US southwest. Northern range limit may move north.

Table B-5. Threats calculator results for the *jacksoni* subspecies.

Species or Ecosystem Scientific Name American Badger *jacksoni* subspecies, *Taxidea taxus jacksoni*

Date: 23/12/2011

Assessor(s): Danielle Ethier, Josh Sayers, Ian Adams

Overall Threat Impact Calculation Help:

		Level 1 Threat Impact Counts	
Threat Impact		**high range**	**low range**
A	Very High	0	0
B	High	1	1
C	Medium	1	1
D	Low	4	4
Calculated Overall Threat Impact:		High	High

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
1	Residential & commercial development	D	Low	Small (1-10%)	Moderate (11-30%)	High (Continuing)	
1.1	Housing & urban areas	D	Low	Small (1-10%)	Moderate (11-30%)	High (Continuing)	The extent of new housing development within the AO is unknown, though there is likely to be continued development in most areas. See comments for Threat 2.1
1.2	Commercial & industrial areas	D	Low	Small (1-10%)	Moderate (11-30%)	High (Continuing)	
1.3	Tourism & recreation areas	D	Low	Small (1-10%)	Slight (1-10%)	High (Continuing)	Golf courses create habitat for badgers and their prey, but both (particularly prey species) are actively discouraged from using the golf courses. Number of new golf courses to be built is unknown. If golf course is developed from undeveloped habitat, this activity should be considered a habitat threat; if golf course is developed from previous non-habitat (e.g. within previous urban development) then threat is likely neutral.
2	Agriculture & aquaculture	C	Medium	Large (31-70%)	Moderate (11-30%)	High (Continuing)	
2.1	Annual & perennial non-timber crops	C	Medium	Large (31-70%)	Moderate (11-30%)	High (Continuing)	Cultivated fields are not available habitat for badgers. They will use the edges of the fields and likely fallow fields, but not those regularly planted for most crops. Reforestation and reclamation of agricultural lands would seem to reduce overal habitat for badgers. Clearing of land for future development or crops might provide habitat for several years before the area becomes unavailable for badgers. Shifts in crops or land use likely have complex and perhaps contradictory affects on badgers and/or their prey.

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
2.2	Wood & pulp plantations		Negligible	Negligible (<1%)	Moderate (11-30%)	High (Continuing)	If tree plantation is planted on otherwise suitable habitat, that habitat will likely be lost or degraded until plantation is harvested. Amount of land affected is unknown, likely very small. See comments for Threat 2.1
2.3	Livestock farming & ranching		Not a Threat	Small (1-10%)	Neutral or Potential Benefit	High (Continuing)	pasture lands are usually suitable badger habitat provided landowner is favourable to badger presence.
3	Energy production & mining		Negligible	Negligible (<1%)	Moderate (11-30%)	High (Continuing)	
3.1	Oil & gas drilling		Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	
3.2	Mining & quarrying		Negligible	Negligible (<1%)	Moderate (11-30%)	High (Continuing)	Primarily aggregate quarries - few sites identified within badger AO. Where they do occur, habitat is lost until site reclamation
3.3	Renewable energy		Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	
4	Transportation & service corridors	B	High	Pervasive (71-100%)	Serious (31-70%)	High (Continuing)	
4.1	Roads & railroads	B	High	Pervasive (71-100%)	Serious (31-70%)	High (Continuing)	Number of roads throughout AO is very high; traffic volume likely to increase.
4.2	Utility & service lines		Not a Threat	Negligible (<1%)	Neutral or Potential Benefit	High (Continuing)	
5	Biological resource use	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	
5.1	Hunting & collecting terrestrial animals	D	Low	Small (1-10%)	Moderate - Slight (1-30%)	High (Continuing)	Badgers rarely caught in traps set for other species; killing by landowners is expected to be low. Secondary poisoning affects badgers consuming prey poisoned with rodenticides, particularly anticoagulents. Amount of rodent poisoning activity is unknown, likely low primarily targeting rats and mice in areas badgers are unlikely to encounter prey. Threat is likely episodic and greatest during high rodent outbreaks. Use of rodenticides strongly regulated under provincial legislation
5.3	Logging & wood harvesting		Not a Threat	Small (1-10%)	Neutral or Potential Benefit	High (Continuing)	Removal of tree canopy likely beneficial to badgers. See comments for Threat 2.1
6	Human intrusions & disturbance		Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	
6.1	Recreational activities		Negligible	Negligible (<1%)	Negligible (<1%)	High (Continuing)	most badger occurrences are on private land with little recreational activity. Off-road vehicle use has ability to disrupt badger activity and/or degrade habitat conditions for prey. Extent is likely low.
7	Natural system modifications		Negligible	Small (1-10%)	Negligible (<1%)	High (Continuing)	
7.1	Fire & fire suppression		Negligible	Small (1-10%)	Negligible (<1%)	High (Continuing)	
7.2	Dams & water management/use		Negligible	Negligible (<1%)	Slight (1-10%)	High (Continuing)	

Threat		Impact (calculated)		Scope (next 10 Yrs)	Severity (10 Yrs or 3 Gen.)	Timing	Comments
8	Invasive & other problematic species & genes	D	Low	Restricted - Small (1-30%)	Slight (1-10%)	High (Continuing)	
8.1	Invasive non-native/alien species	D	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	Invasive weeds are widespread, but the extent of their impact in this regard is poorly known.
8.2	Problematic native species	D	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	Coyotes may compete with badgers for prey and may depredate badgers. Coyote population may be increasing.
9.3	Agricultural & forestry effluents		Negligible	Negligible (<1%)	Moderate (11-30%)	High (Continuing)	Secondary poisoning effects; badgers consuming prey poisoned with rodenticides, particularly anticoagulents. Amount of rodent poisoning activity is unknown, likely low primarily targeting rats and mice in areas badgers are unlikely to encounter prey. Threat is likely episodic and greatest during high rodent outbreaks. Use of rodenticides strongly regulated under provincial legislation
11	Climate change & severe weather	D	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	
11.1	Habitat shifting & alteration	D	Low	Restricted (11-30%)	Slight (1-10%)	High (Continuing)	The affects of shifts in habitat on badgers are variable and poorly understood.