

SPECIES ACCOUNT

Species Data

Common Name:	Western Toad
Scientific Name:	<i>Anaxyrus boreas</i> (formerly <i>Bufo boreas</i>)
Species Code:	A-ANBO
BC Status:	Blue-listed
COSEWIC / SARA Status:	Special Concern



Project Data

Project Name:	Mid-Shuswap Sensitive Ecosystems Inventory
Project Type:	Terrestrial Ecosystem Mapping
Ecoprovince:	Southern Interior
Ecoregions:	Thompson-Okanagan Plateau
Ecosections:	Northern Okanagan Highland (NOH), Shuswap Highland (SHH)
BGC Units:	IDFmw1, ICHmw2
Map Scale:	1:20 000

Distribution

Provincial Range

The Western Toad is widely distributed, occurring throughout most of BC. However, they are patchily distributed, and are subjected to numerous threats. Although toads have a large range in BC and can appear locally abundant at some sites, populations have declined in some areas, including in parks and pristine areas, often at alarming rates (BC Conservation Data Centre 2011a). Declines have occurred in the U.S. and in the southwest portions of BC. Pathogens such as chytrid fungus, *Aeromonas* bacteria, *Saprolegnia* fungus, and trematode infections are serious threats (Wind and Dupuis 2002), and may be responsible for some deformities and disease seen in toad populations. Other threats to the species include climate change, increased levels of ultraviolet radiation, roadkill, and loss and degradation of habitat.

According to Wind and Dupuis (2002), severe and rapid toad population declines in the U.S. in recent decades demonstrate the vulnerability of this widespread and otherwise common species, and with the cause of declines largely unknown, and with some of our B.C. populations exposed to similar stresses, there is an elevated concern for this species in areas where it has become less common. If trends continue, our interior and northern populations may serve as the stronghold of the species (Wind and Dupuis 2002).

Elevation Range

Sea level to alpine.

Distribution in the Project Area

Most of the observations in the area are from near Sugar Lake just north of the study area, but there is one known record within the SEI study area, west of Cherryville (H. Davis pers. com.).

Ecology and Habitat Requirements

Western Toads are generally active from early spring until late fall, and hibernate through the winter in most areas of the province, but in low-elevation coastal areas in southern BC, toads may be active at some periods in winter (BC Conservation Data Centre 2011b). Typically, adults emerge from hibernation and travel to breeding ponds in spring, eggs and tadpoles develop in summer, and metamorphosis occurs in late summer/early fall. However, the breeding period varies with local conditions; it may begin in January at low elevations but not until late spring or summer in the high mountains, as the winter snowpack begins to melt (NatureServe 2011). Gyug (2000) found toad breeding to coincide with the time when average daily minimum temperatures rose above freezing and maximum daily temperatures rose above 10°C. The daily activity of toads varies by region and elevation as well: at low elevations, they are nocturnal in summer and diurnal in early spring, but at higher elevations they may be active both day and night (BC Conservation Data Centre 2011b).

Females deposit an average of about 12,000 eggs per clutch, which may hatch in a few days in warm temperatures, or may take up to about 12 days to hatch in cold conditions (NatureServe 2011). Adult females lay eggs at depths of 5 cm to 2 m (but depths over 1 m are rare) in the same location within sites each year. [SARA registry profile]

Larval metamorphosis takes one to three months, depending on temperature, and always occurs before the next winter (NatureServe 2011). Like other amphibians, toads exhibit high site fidelity to natal breeding ponds (BC Conservation Data Centre 2011b).

Breeding occurs in various waterbodies, including ponds, shallow margins of lakes and reservoirs, and slow-moving rivers and streams. They range into various upland habitats, sometimes moving up to a few kilometers through uplands (NatureServe 2011). Although commonly found within 2 km of breeding sites, occasional long distance excursions of up to 7.2 km have been noted for this species (Davis 2000, in Wind and Dupuis 2002).

For shelter in terrestrial habitats, Western Toads dig their own burrow in loose soil or use those of small mammals, or seclude themselves under logs or rocks (NatureServe 2011).

The diet of tadpoles is comprised of filamentous algae and organic detritus, but they will also scavenge carrion (Wind and Dupuis 2002). Metamorphosed individuals feed on various small terrestrial invertebrates (NatureServe 2011); the adult toads wait for their prey on the surface of the ground or in burrows (Wind and Dupuis 2002).

Adult Western Toads secrete a mild toxin to deter predators, but are still preyed upon by a variety of species; they are most vulnerable when congregated in shallow margins of ponds during the breeding season (Wind and Dupuis 2002). The eggs are consumed by many aquatic invertebrates, and while the tadpoles are unpalatable to fish, they are eaten by garter snakes, a variety of birds, and large invertebrates, and are particularly vulnerable to terrestrial predators during metamorphosis (Wind and Dupuis 2002). Recently metamorphosed toadlets tend to form dense aggregations on the shores of breeding sites (NatureServe 2011), which may invoke predator saturation, but is also hypothesized to be the result of a deteriorating larval environment, an inability to disperse, or protection from desiccation (Wind and Dupuis 2002).

Because toads are attracted to open areas, they may spend a great deal of time on roads, which increases mortality; the small metamorphs are particularly vulnerable, and easily decimated (Wind and Dupuis 2002). Red-leg disease, fungal agents that attack toad eggs (e.g., *Saprolegnia*), UV radiation, and mass reproductive failure (which they are vulnerable to, especially in areas with small, isolated populations) have all been proposed as potentially contributing to the decline of toads (Wind and Dupuis 2002). Currently, the primary threat to the majority of Western Toads in BC is likely habitat degradation and loss, especially in the Lower Mainland and on Vancouver Island where populations have declined (Wind and Dupuis 2002).

Reproducing

The Western Toad will breed in a wide variety of natural and artificial aquatic habitats, from the shallow margins of lakes to roadside ditches or even road ruts. It does not seem to matter if the sites have tree or shrub canopy cover, coarse woody debris, or emergent vegetation (SARA Registry 2012), although they are known to seek cover in emergent vegetation (Olson 1992, in Wind and Dupuis 2002). It appears that the absence of predators and warm spring water temperatures are desirable (SARA Registry 2012).

Any natural or artificial permanent or semi-permanent waterbody at least 20 cm deep will potentially be used by toads, but habitat associations predicting which will actually be used are unclear (Gyug 2000, Gyug pers.comm.). There appears to be a trade-off between higher water temperatures for faster development, and the risk of drying up before metamorphosis, and Gyug (2000) suggests that smaller ponds may be a population sink: they are attractive due to warmer temperatures in May during breeding, but the larvae may die if they dry up before metamorphosis.

Hibernating

Habitat for hibernating is assumed to be a subset of general living (terrestrial) habitat. Toads utilize a variety of terrestrial habitats for general living in BC, including all forest and woodland types, shrubland/chaparral, savanna, cropland/hedgerow, grassland/herbaceous cover, old fields, and suburban/orchard (BC Conservation Data Centre 2011b). They do not appear to be dependent upon mature or old-growth forest and are frequently found within cut-over areas (Wind and Dupuis 2002). Their use of dense shrubs for thermal and predatory cover may preclude them from dense young forest stands, which are typically characterized by an undeveloped understory (Franklin 1988, in Wind and Dupuis 2002).

Hibernacula are located in areas with loose soils and burrows (BC Conservation Data Centre 2011b). Burrows are often associated with wet areas; those that were deep enough to prevent freezing and moist enough to prevent desiccation were used (Jones and Goettl 1998, in Wind and Dupuis 2002). Toads hibernate up to 1.3 m under ground (Mennel and Slough 1999, in Wind and Dupuis 2002). According to Campbell (1970, in Wind and Dupuis 2002), Western Toads must hibernate in contact with water all winter.

Ratings

This model employs a 4-class rating scheme because there is insufficient knowledge of specific habitat requirements to use a 6-Class scheme yet there is sufficient knowledge to go beyond a 2-class rating scheme. This complies with the recommended rating scheme in the RIC (1999) standards manual.

Provincial Benchmark

Ecosection	unknown
Biogeoclimatic Zones	unknown
Habitats	Permanent or semi-permanent open water and nearby deep, moist hibernating sites

Map Themes

Habitat Use	Life Requisite	Season	Rating Code	Ecosystem Attributes
Reproducing	Security/ Thermal, Food	Growing season	RE	<ul style="list-style-type: none"> permanent or temporary water bodies
Hibernating	Security/ Thermal	Winter	HI	<ul style="list-style-type: none"> deep, moist soils (>1m)

Ratings Assumptions

Reproducing (RE) – Security/Thermal, Food	
Site Series	<ul style="list-style-type: none"> Most wetlands, pond and lake margins, reservoirs, and slow-moving streams or backchannels rated up to High. Wetlands that are likely to dry up prior to metamorphosis ('x' modifier and/or meadows), rated up to Low. Riparian units potentially containing springs or seeps rated up to Moderate.
Hibernating (HI) –Security/Thermal	
Site Series	<ul style="list-style-type: none"> Units with soils deep enough to prevent freezing (1m), and moist enough to prevent desiccation.
Structural Stage	<ul style="list-style-type: none"> Shrubby understory may be preferred – coniferous forest structural stages with dense canopy cover rated down: structural stage 4 up to Moderate.
Aspect	<ul style="list-style-type: none"> No effect.
Slope	<ul style="list-style-type: none"> No effect.
Drainage	<ul style="list-style-type: none"> 'Moist' units only.
Soil depth	<ul style="list-style-type: none"> Shallow soils rated up to Moderate; Very shallow soil rated Nil.
Soil texture	<ul style="list-style-type: none"> Coarse soils likely unsuitable for burrows, and too well drained – rated up to Low for upland areas.

Map Interpretation

Breeding ponds and hibernation sites form the two layers of habitat uses depicted on the map, as general living terrestrial habitats are highly varied. The aquatic reproducing habitat is the focus of the map. Suitable hibernating habitats *within 2 km of polygons containing suitable aquatic habitats* are also depicted.

The model uses the highest-value method to display all suitable aquatic and hibernating habitats, even if the suitable habitat only forms a component of an ecosystem complex. This is due to the small aquatic habitats that are preferentially used, and the microsite requirements of a hibernation site.

Road construction should be avoided near wetlands at all cost. The practice of adult Western Toads congregating in large numbers in and near wetlands prior to breeding, and of the toadlets remaining in large aggregations after metamorphosis, represents a very high potential for massive roadkill events if roads are nearby. Roads and other hazardous developments should avoid creating barriers between the aquatic habitat and suitable upland habitats. Connectivity between aquatic habitats must also be considered, to maintain genetic flow between populations.

Literature Cited

- B.C. Conservation Data Centre. 2011a. Species Conservation Status Report: *Anaxyrus boreas*. B.C. Ministry of Environment. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jul 27, 2011).
- B.C. Conservation Data Centre. 2011b. Species Summary: *Anaxyrus boreas*. B.C. Ministry of Environment. Available: <http://a100.gov.bc.ca/pub/eswp/> (accessed Jul 27, 2011).
- Campbell, J.B. 1970. Life history of *Bufo boreas boreas* on the Colorado Front Range. PhD. Dissertation. University of Colorado, Boulder, CO.
- Davis, T.M. 2000. Ecology of the Western Toad (*Bufo boreas*) in forested areas on Vancouver Island. Final Report. Forest Renewal B.C. Ministry of Forests, Victoria, B.C.
- Franklin, J.F. 1988. Structural and functional diversity in temperate forests. In Biodiversity. Edited by E.O. Wilson. National Academy Press, Washington, D.C. Pp. 166-175.
- Gyug, L. 2000. Timber harvesting effects on riparian wildlife and vegetation in the Okanagan Highlands of British Columbia. Wildlife Bulletin No. B-97. Ministry of Environment, Lands and Parks. Victoria, B.C.
- Jones, M.S. and J.P. Goettl. 1998. Henderson/Urad boreal toad studies. In Boreal toad research progress report 1995-1997. Colorado Division of Wildlife, Fort Collins, CO.
- Mennel, R.L. and B.G. Slough. 1998. Amphibian and biodiversity inventories of ecoregions in Northwestern British Columbia. Habita Conservation Trust Fund Project TF28056. Ministry of Environment, Lands and Parks. Whitehorse, YT.
- NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: July 27, 2011).
- RIC (Resources Inventory Committee; now Resources Information Services Committee). 1999. British Columbia wildlife habitat rating standards, Version 2.0. Ministry of Environment, Lands and Parks, Resource Inventory Branch. Victoria, BC.
- SARA Registry. 2011. Species at Risk Public Registry - Species profiles: Western Toad. <http://www.sararegistry.gc.ca/species> (accessed Jul 27, 2011).
- Wind, E. and L. Dupuis. 2002. COSEWIC status report on the western toad *Bufo boreas* in Canada, in COSEWIC assessment and status report on the western toad *Bufo boreas* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Personal Communications

- Davis, Helen. 2011. Artemis Wildlife Consulting. Armstrong, BC.
- Gyug, Les. 2011. Okanagan Wildlife Consulting. West Kelowna, BC.

Western Toad Suitability: Mid-Shuswap

