

## SPECIES ACCOUNT

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### Species Data

Common Name:	<b>Great Basin Gopher Snake</b>
Scientific Name:	<i>Pituophis catenifer deserticola</i>
Species Code:	R-PICA
BC Status:	Blue
Identified Wildlife Status:	Volume I
COSEWIC Status:	Threatened

### Project Data

Project Name:	Central Okanagan Terrestrial Ecosystem & Wildlife Habitat Mapping Project
Project Type:	Terrestrial Ecosystem Mapping
Area:	Central Okanagan
Ecoprovince:	Southern Interior
Ecoregions:	Thompson-Okanagan Plateau
Ecosections:	Northern Okanagan Basin (NOB)
BGC Units:	IDFxh1, PPxh1
Map Scale:	1:20 000

### Distribution

#### ***Provincial Range***

Gopher Snakes occur in a patchy distribution throughout the hot, dry southern interior including the South Thompson, Okanagan, Lower Nicola, Lower Similkameen, Kettle, and Coldstream Valleys, and the Fraser Valley from Lillooet to Churn Creek (Gregory and Campbell 1984, Sarell *et al.* 1997a, Hobbs and Sarell 2001). They appear to be most abundant in the southern Okanagan (Shewchuk and Waye 1995). They inhabit the PAR, SOB, SOH, OKR, NOB, NOH, THB ecosections (BC Environment 1999) and the FRB ecosection (Hobbs and Sarell 2001). They appear to be absent from the STU and ETU ecosections (Nelson and Gregory 1992, Shewchuk and Waye 1995). The bulk of their habitat lies in the Ponderosa Pine and Bunch Grass Biogeoclimatic Zones and may be found at low elevations in the Interior Douglas-fir Zone (Orchard 1984, Nelson and Gregory 1992, Shewchuk and Waye 1995).

#### ***Elevation Range***

Gopher Snakes usually inhabit valley bottoms and grassland slopes, sometimes extending above 800m asl.

#### ***Distribution in the Project Area***

Gopher Snakes are known from just south of Westbank, Ellison Prov. Park, Okanagan Mtn. Prov. Park (Orchard in Erickson and Torrence 1989), and Knox Mountain (K. Iverson pers. comm.).

## Ecology and Habitat Requirements

Gopher Snakes inhabit the hot, arid valleys of south-central British Columbia (Hobbs and Sarell 2001). Most of their range consists of grasslands or open ponderosa pine forests. Riparian, wetland, and rocky habitats are also used within these areas. Densely forested, high elevations are typically avoided throughout their range (Nussbaum *et al.* 1983).

Gopher Snakes are active from spring through fall. Most of the time is spent underground in rodent burrows. Above ground activities consist of periodic travelling, mating, and seeking new rodent burrows. Underground, Gopher Snakes forage, digest, and thermoregulate. Mating occurs in spring and egg deposition occurs in late summer. Eggs are laid in burrows in warm-aspect, deep-soiled slopes. Adult females probably breed every three years.

Hibernacula are sought as the temperatures become cooler in fall. Two types of hibernacula are used: semi-permanent dens in rock outcroppings; and short-lived dens in deep burrows. There is a moderately strong fidelity to den sites.

In British Columbia, remaining habitats occupied by Gopher Snakes are quickly being lost to agriculture and residential developments. Snakes in agricultural areas are prone to tilling, mowing, baling and traffic mortalities. Snakes in residential areas are prone to predation by pets, persecution, and traffic mortality. Traffic mortality is probably the largest cause of death, due to increasing roads and traffic volumes. Populations are especially prone to human impacts due to their limited range and communal denning. In addition, the non-venomous Gopher Snake is at risk of persecution due to its resemblance to the venomous Western Rattlesnake.

### **General Living – Spring and Fall**

#### Security/Thermal Habitat

Snakes usually enter hibernation in mid- to late-October (although active individuals have been seen in early November) in the South Okanagan. Dates may be earlier in cooler parts of their range. Males tend to enter hibernation earlier while females and young maximize their active period. Emergence from hibernation and dispersal happens relatively quickly in late March or April (Sarell 1993, Shewchuk and Wayne 1995).

Hibernating occurs in two distinct, warm-aspect ecosystems; both provide thermal characteristics that prevent freezing. Bedrock fractures provide long-term denning opportunities for many individuals, including other species of snakes (Sarell 1993, Shewchuk 1996, Hobbs and Sarell 2001). It is assumed that these hibernacula provide the optimum conditions for population survival. Dens in burrows of rodents, bank swallows, and other animals in deep-soiled ecosystems are probably used less, and it is unlikely that a burrow will retain its structure for many years. Dens in deep-soiled ecosystems have been poorly described (Bertram *et al.* 2001) and therefore cannot be confidently predicted. Dens in bedrock have been described in more detail and are easier to predict.

Dens site fidelity is not as high as some other temperate snake species (Shewchuk 1996).

### **General Living – Summer**

#### Food, Security and Thermal Habitat

Gopher Snakes are active and away from the den from April through October. Their main life requisites during the growing season consist of food and security/thermal cover. These habitat

requirements do not always occur in the same ecosystem. Deep-soiled grasslands and open forests provide both food and security/thermal habitats, but periodic foraging forays to areas of very high rodent productivity (e.g. wet meadows) may occur. Snakes must return to areas with warmer thermal characteristics to aid digestion, especially during cool weather.

Gopher Snakes remain in rodent burrows for much of the time, although other security cover may be used, including rock and coarse woody debris, or dense riparian cover. Activity above ground usually happens at night, except in the spring and fall when nights are too cool for the snakes to remain warm at night.

Their diet consists primarily of small- and medium-sized rodents and other small mammals, including cottontail rabbits, but, they will also eat birds, eggs, reptiles, and insects (Gregory and Campbell 1984, Nelson and Gregory 1992, Shewchuk and Waye 1995).

The average summer range of a Gopher Snake is 1.15 ha for males, 1.8 ha for gravid females and 2.4 ha for non-gravid females (Shewchuk and Waye 1995). Densities in Utah ranged from 0.11 to 0.33 snakes/ha and in southwestern Idaho densities ranged from 0.1 to 1.9 snakes/ha (Shewchuk and Waye 1995). It is not known whether these densities are representative of BC populations.

Foraging and thermal values will be rated together, with equal weighting.

## ***Reproducing***

### **Security/Thermal Habitat (Egg-laying)**

Mating occurs in May and egg -laying occurs in late June or early July. Gopher Snakes lay from two to eight eggs that hatch in late August or early September (Shewchuk and Waye 1995). Eggs usually are laid in abandoned rodent burrows that provide adequate warmth and humidity for incubation. Sometimes nests are deposited in talus with small rock fragments. Nests often contain eggs of several females including eggs of other species, such as the Racer (Shewchuk and Waye 1995). The burrows used for egg-laying do not have to be very deep. Gravid females may travel distances of greater than 1 km to locate suitable nesting sites (Shewchuk 1996).

## **Ratings**

There is insufficient knowledge of habitat requirements to use a six-class rating scheme, but sufficient knowledge for a four-class rating scheme (RIC 1999). Proposed habitat uses have been developed by Orchard and Harcombe (1988).

### ***Provincial Benchmark***

Ecosection	Southern Okanagan Basin (SOB)
Biogeoclimatic Zones	BGxh1, PPxh1, IDFxh
Habitats	AB, BS, SS (CL, RO, TA)

**Map Themes**

Life Requisite	Habitat Use	Season	Rating Code	Ecosystem Attributes
General Living	Security/Thermal	Fall to sSpring	STLIFP *	<ul style="list-style-type: none"> <li>Rock outcroppings on hot and warm slopes (deep soiled dens not modelled) Note: RCROR_STLIA ratings used</li> </ul>
General Living	Security, Thermal, Food	Summer	LIS	<ul style="list-style-type: none"> <li>Deep-soiled grasslands and open forests, wet meadows and wetlands, riparian areas, and gullies</li> </ul>
Reproducing	Security/Thermal	Summer	STRE	<ul style="list-style-type: none"> <li>Warm-aspect slopes with friable soils</li> </ul>

**Ratings Assumptions**

<b>General Living, Fall through Spring – Security/Thermal (RCROR_STLIA ratings used)</b>	
Site Series	<ul style="list-style-type: none"> <li>Rocky terrain rated up to High.</li> </ul>
Structural Stage	<ul style="list-style-type: none"> <li>No effect but high tree density rated down.</li> </ul>
Shrub Density	<ul style="list-style-type: none"> <li>No effect.</li> </ul>
Range Condition	<ul style="list-style-type: none"> <li>Effect unknown.</li> </ul>
Aspect	<ul style="list-style-type: none"> <li>Warm aspects preferred.</li> </ul>
Slope	<ul style="list-style-type: none"> <li>Steep and Moderate rated up to High.</li> </ul>
Soil Texture	<ul style="list-style-type: none"> <li>No effect.</li> </ul>
Soil Depth	<ul style="list-style-type: none"> <li>No effect.</li> </ul>
<b>General Living, Summer – Security, Thermal, Food</b>	
Site Series	<ul style="list-style-type: none"> <li>Map units that can support high fossorial rodent populations (e.g. grassland units) rated High.</li> <li>Shrub/Grassland rated High.</li> <li>PP/IDFxh1: DF, DP, DS, DW, PB, PF, SP rated up to High.</li> <li>Floodplains rated up to High.</li> <li>Gully and riparian units rated up to High.</li> </ul>
Structural Stage	<ul style="list-style-type: none"> <li>No effect.</li> </ul>
Shrub Density	<ul style="list-style-type: none"> <li>No effect.</li> </ul>
Range Condition	<ul style="list-style-type: none"> <li>Effect unknown.</li> </ul>
Aspect	<ul style="list-style-type: none"> <li>Cool aspects (e.g., N, NW, NE, E) rated lower than warm aspects (e.g. SE, S, SW, W).</li> </ul>
Slope	<ul style="list-style-type: none"> <li>Steep slopes rated down one class.</li> </ul>
Soil Texture	<ul style="list-style-type: none"> <li>Coarse-textured soils rated up to Moderate for warm slopes.</li> </ul>
Soil Depth	<ul style="list-style-type: none"> <li>Deep to shallow soil (0.2-4m) rated up to High.</li> <li>Very shallow soils (0 – 0.2m) rated up to Moderate (fewer rodent burrows available).</li> </ul>

<b>Reproducing – Security/Thermal</b>	
Site Series	<ul style="list-style-type: none"> <li>• Shrub/Grassland rated High.</li> <li>• Dry, moisture shedding sites rated up to High.</li> <li>• Wet sites (subhygric to hydric) rated Nil.</li> </ul>
Structural Stage	<ul style="list-style-type: none"> <li>• No effect.</li> </ul>
Shrub Density	<ul style="list-style-type: none"> <li>• Dense rated down.</li> </ul>
Range Condition	<ul style="list-style-type: none"> <li>• Effect unknown.</li> </ul>
Aspect	<ul style="list-style-type: none"> <li>• Cool aspects rated up to Low.</li> <li>• Warm aspects rated up to High.</li> </ul>
Slope	<ul style="list-style-type: none"> <li>• Gentle slopes to flat areas rated lower than moderate slopes.</li> </ul>
Soil Texture	<ul style="list-style-type: none"> <li>• Coarse-textured soils (e.g. glaciofluvial) rated up to Moderate.</li> <li>• Lacustrine rated up to Moderate.</li> <li>• Sandy soils rated up to High.</li> </ul>
Soil Depth	<ul style="list-style-type: none"> <li>• Deep soil (1-4m) rated up to High.</li> <li>• Shallow soils rated up to Low.</li> <li>• Very shallow soils rated Nil.</li> </ul>

## Map Interpretation

Three layers of habitat use will be depicted. All are critical for the survival of Gopher Snakes. Denning and basking habitats (security/thermal for general living, fall through spring,) occur on rugged, rocky slopes. All year, security/thermal habitats from the rattlesnake model will be used to depict this habitat (Gopher Snakes and rattlesnakes often den together). Deep-soiled grasslands and open forests, as well as meadows and wetlands are used for foraging (general living, summer, security/thermal/food) and the former are sometimes used for denning. Egg laying sites (reproducing, security/thermal) are on warm, loose-soiled slopes.

Fall through spring, security/thermal habitat will display the highest-value ratings, as these habitats are often discreet within a complex of other habitats. Summer foraging habitats and nesting habitats also will be displayed as highest-value as these habitats can be fine corridors within a complex of habitats.

## Management Recommendations

Management of Low, Moderate and High potential denning (Security/Thermal) habitats should include a no-development zone, unless an inventory has demonstrated that the depicted habitat(s) are not used. Recreational corridors should avoid these areas to minimize human-snake conflicts, including mortality from mountain bikes and vehicles. Summer foraging areas should be carefully assessed to see whether any development is appropriate, and if so, what mitigation measures are required. Although corridors to allow snake movement from winter security/thermal habitats to summer foraging habitats have not been mapped, they should be interpreted and applied to project planning. Roads should not intersect any of these areas unless appropriate mitigation measures are employed to avoid mortalities.

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# Great Basin Gopher Snake Suitability Map

