

Northwestern salamander

Ambystoma gracile

Class: Amphibia
Order: Caudata

Review Status: Peer-reviewed

Version Date: 23 April 2018

Conservation Status

NatureServe:

Agency:

G Rank: G5

ADF&G: Species of Greatest Conservation Need

IUCN: Least Concern

Audubon AK:

S Rank: S3

USFWS:

BLM:

Final Rank		
Conservation category: IV. Orange		
unknown status and high biological vulnerability and action need		
<u>Category</u>	<u>Range</u>	<u>Score</u>
Status	-20 to 20	0
Biological	-50 to 50	8
Action	-40 to 40	40
Higher numerical scores denote greater concern		

Status - variables measure the trend in a taxon's population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing).

Score

Population Trend in Alaska (-10 to 10)

0

Unknown.

Distribution Trend in Alaska (-10 to 10)

0

Unknown.

Status Total: 0

Biological - variables measure aspects of a taxon's distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable).

Score

Population Size in Alaska (-10 to 10)

6

Unknown, but suspected small. This species is rarely detected during amphibian surveys and few occurrences have been reported (e.g. Waters 1992; Anderson 2004; Ream 2016).

Range Size in Alaska (-10 to 10)

4

Restricted to Southeast Alaska. Little is known about its distribution in Alaska. It has been collected on Mary Island and Chichagof Island (MacDonald 2010), and has been reported as far north as Glacier Bay (Anderson 2004; MacDonald 2010). Additional surveys are required to determine range limits and verify its presence on the Stikine River (Waters 1992; Ream 2016). Estimated range size is 9,442 sq. km, based on range map from ACCS (2017a; note that range map does not include record from Glacier Bay).

<i>Population Concentration in Alaska (-10 to 10)</i>	-2
Does not concentrate, but there may be fewer than 250 sites given the scarcity of occurrence records in the state. We tentatively rank this question as $0.5 * B + 0.5 * C$ until more information is available.	
<i>Reproductive Potential in Alaska</i>	
<u>Age of First Reproduction (-5 to 5)</u>	-3
Females typically attain sexual maturity at 2-3 years (Snyder 1956; Eagleson 1976).	
<u>Number of Young (-5 to 5)</u>	1
Adult females lay more than 100 eggs annually (Knudsen 1960; Lindsey 1966); neotenic females are also capable of breeding but lay fewer eggs (Snyder 1956; Knudsen 1960). Although studies are limited, they suggest that survival rates to larvae or juvenile life stages are less than 10% (Shoop 1974; Petranka 1984; Petranka and Sih 1986). To account for these very low survival rates, we rank this question as C- 3-9 offspring/year.	
<i>Ecological Specialization in Alaska</i>	
<u>Dietary (-5 to 5)</u>	1
Little information available. Feeds on terrestrial and aquatic invertebrates including dipteran larvae, small crustaceans, and mollusks (Neish 1970; Licht 1975a). Because invertebrates are ephemeral and potentially unpredictable food sources, we rank this question as B- Moderately adaptable.	
<u>Habitat (-5 to 5)</u>	1
Requires freshwater to complete its life cycle. Eggs are deposited in lakes and ponds (MacDonald 2010). Larvae are aquatic, while adults live underground or in moist habitats near freshwater (Hoffman et al. 2003; Anderson 2004; MacDonald 2010). Outside Alaska, habitat types include moist meadows, wetlands, and forests from sea level to >1,900 meters (Snyder 1956; Hoffman et al. 2003).	
Biological Total:	8

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs).

Score

<i>Management Plans and Regulations in Alaska (-10 to 10)</i>	10
Not managed or protected in the state of Alaska. A permit is required to collect specimens for scientific or educational purposes (ADF&G 2004).	
<i>Knowledge of Distribution and Habitat in Alaska (-10 to 10)</i>	10
Little is known about this species' distribution and habitat associations in Alaska. Few occurrences have been documented (ARCTOS 2016; Ream 2016). Amphibian surveys have been conducted on the mainland and islands of Southeast Alaska including Juneau, Glacier Bay, the Stikine River, and Prince of Wales and Admiralty Islands (Waters 1992; Carstensen et al. 2003; Anderson 2004; Pyare 2007; Gotthardt et al. 2015; Ream 2016), but only a few detected Northwestern Salamanders (Waters 1992; Anderson 2004).	
<i>Knowledge of Population Trends in Alaska (-10 to 10)</i>	10
Not currently monitored.	
<i>Knowledge of Factors Limiting Populations in Alaska (-10 to 10)</i>	10
Very little is known about the ecology of this species in Alaska. Potential threats include pathogens,	

climate-related habitat loss e.g. wetland drying, and introduced species (MacDonald 2010). Several studies outside of Alaska have shown that predation by introduced trout can severely depress amphibian populations (e.g. Funk and Dunlap 1999; Welsh et al. 2006; Larson et al. 2017).

Action Total: 40

Supplemental Information - variables do not receive numerical scores. Instead, they are used to sort taxa to answer specific biological or management questions.

Harvest:	None or Prohibited
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Monotypic species
% Global Range in Alaska:	<10%
% Global Population in Alaska:	<25%
Peripheral:	Yes

References

- Alaska Center for Conservation Science (ACCS). 2017a. Wildlife Data Portal. University of Alaska Anchorage. Available online: <http://aknhp.uaa.alaska.edu/apps/wildlife>
- Alaska Department of Fish and Game (ADFG). 2004. Policy and requirements for fish resource permits. Juneau, AK, USA.
- Anderson, B. C. 2004. An opportunistic amphibian inventory in Alaska's National Parks 2001-2003. Inventory and Monitoring Program, National Park Service, Anchorage, AK, USA.
- ARCTOS. 2016. ARCTOS database: Fish, amphibian, mammal, bird and reptile collections. University of Alaska Museum of the North, Fairbanks, AK, USA. Available online: <http://arctos.database.museum/>
- Carstensen, R., M. Willson, and R. Armstrong. 2003. Habitat use of amphibians in northern Southeast Alaska. Report to the Alaska Department of Fish and Game by Discovery Southeast, Juneau, AK, USA.
- Eagleson, G. W. 1976. A comparison of the life histories and growth patterns of populations of the salamander *Ambystoma gracile* (Baird) from permanent low-altitude and montane lakes. *Canadian Journal of Zoology* 54(12):2098-2111.
- Funk, W. C., and W. W. Dunlap. 1999. Colonization of high-elevation lakes by long-toed salamanders (*Ambystoma macrodactylum*) after the extinction of introduced trout populations. *Canadian Journal of Zoology* 77(11):1759-1767. DOI: 10.1139/z99-160
- Gotthardt, T., J. Reimer, T. Nawrocki, C. Greenstein, and K. Walton. 2015. Prince of Wales Island amphibian surveys 2013 and 2014. Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK, USA. Available online: <https://accs.uaa.alaska.edu/publications/>
- Hoffman, R. L., G. L. Larson, and B. J. Brokes. 2003. Habitat segregation of *Ambystoma gracile* and *Ambystoma macrodactylum* in mountain ponds and lakes, Mount Rainier National Park, Washington, USA. *Journal of Herpetology* 37(1):24-34
- Knudsen, J. W. 1960. The courtship and egg mass of *Ambystoma gracile* and *Ambystoma macrodactylum*. *Copeia* 1960(1):44-46. DOI: 10.2307/1439844
- Larson, G. L., R. L. Hoffman, R. Lofgren, B. Samora, and S. Anderson. 2017. Increased amphibian presence in a montane lake after fish removal, Mount Rainier National Park, Washington. *Northwestern Naturalist* 98(3):228-236. DOI: 10.1898/NWN16-17.1
- Licht, L. E. 1975a. Growth and food of larval *Ambystoma gracile* from a lowland population in southwestern British Columbia. *Canadian Journal of Zoology* 53(11):1716-1722. DOI: 10.1139/z75-207
- Lindsey, C. C. 1966. Temperature-controlled meristic variation in the salamander *Ambystoma gracile*. *Nature* 209:1152-1153.

MacDonald, S. O. 2010. The amphibians and reptiles of Alaska: A field handbook. Version 2.0, May 2010. Alaska Natural Heritage Program, University of Alaska Anchorage, AK, USA.

Neish, I. C. 1970. A comparative analysis of the feeding behaviour of two salamander populations in Marion Lake, B.C. Ph. D. thesis, University of British Columbia, Vancouver, B.C., CAN.

Petranka, J. W. 1984. Incubation, Larval Growth, and Embryonic and Larval Survivorship of Smallmouth Salamanders (*Ambystoma texanum*) in Streams. *Copeia* 1984(4):862-868. DOI: 10.2307/1445329

Petranka, J. W., and A. Sih. 1986. Environmental Instability, Competition, and Density-Dependent Growth and Survivorship of a Stream-Dwelling Salamander. *Ecology* 67(3):729-736. DOI: 10.2307/1937696

Pyare, S. 2007. Amphibian monitoring in Southeast Alaska. Final and annual performance reports for State Wildlife Grant T-1-6-18, submitted to Alaska Department of Fish and Game. University of Alaska Southeast, Juneau, AK, USA.

Ream, J. T. 2016. Local herpetological knowledge in the north. PhD thesis, University of Alaska Fairbanks, AK, USA.

Shoop, C. R. 1974. Yearly Variation in Larval Survival of *Ambystoma maculatum*. *Ecology* 55(2):440-444. DOI: 10.2307/1935233

Snyder, R. C. 1956. Comparative features of the life histories of *Ambystoma gracile* (Baird) from populations at low and high altitudes. *Copeia* 1956(1):41-50.

Waters, N. D. L. 1992. Habitat associations, phenology, and biogeography of amphibians in the Stikine River basin and Southeast Alaska. Report of the 1991 pilot project, U.S. Fish and Wildlife Service, California Cooperative Fishery Research Unit, and Humboldt State University, Arcata, CA, USA.

Welsh, H. H., K. L. Pope, and D. Boiano. 2006. Sub-alpine amphibian distributions related to species palatability to nonnative salmonids in the Klamath mountains of northern California. *Diversity and Distributions* 12(3):298-309.

Alaska Center for Conservation Science
Alaska Natural Heritage Program
University of Alaska Anchorage
Anchorage, AK