NORTHWESTERN SALAMANDER

TAXONOMY

Scientific name: *Ambystoma gracile* (Baird, 1857 [1859])
Common name: Northwestern salamander
Family: Ambystomatidae

Taxonomic comments:
Titus (1990) concluded that available genetic and morphological information do not support recognition of subspecies; systematics may be complex and warrant further study. Titus and Gaines (1991) studied allozyme variation in coastal metamorphosing and montane nonmetamorphosing populations in Oregon; in both groups of populations, 98-100% of the total genetic variation for each locus was attributable to within-population variation. See Kraus (1988) and Shaffer et al. (1991) for phylogenetic analyses of North American *Ambystoma*; allozyme data indicate that *A. maculatum* is the closest relative of *A. gracile* (Shaffer et al. 1991), a conclusion that is not supported by any morphological data (Kraus 1988).

DESCRIPTION

Basic description: A salamander.

General description:
A large, robust salamander with a broad head, pronounced costal grooves, and pitted areas along the rounded top edge on the tail and on the prominent parotoid glands behind each eye. Skin is smooth, uniformly gray-brown above and lighter below. May have a cream or yellow flecked back. Males become darker than females during breeding season (MacDonald 2003).

Length (cm): 22

Reproduction comments:
Breeding season is variable; begins as early as January in south, extends as late as July in north or at higher elevations. Lays grapefruit-sized masses of 15-200 eggs attached to aquatic vegetation, which hatch in 2-4 weeks. Larval period lasts 1-2 years. Montane populations often paedomorphic (adults retain gills), some obligately so; incidence of paedomorphosis is positively correlated with increasing elevation, stability of the aquatic habitat, lack of fishes, and slower larval growth rates. Metamorphic and paedomorphic individuals may coexist in the same population.

Ecology comments:
May be preyed on by introduced trout, which reduce salamander abundance. Reported to be distasteful to fish, however (MacDonald 2003); predation threat requires study. Terrestrial adults

primarily subterranean, active on the surface usually only during rains and migrations to aquatic breeding sites (MacDonald 2003).

Migration comments:
Nonpaedomorphic populations migrate between breeding and non-breeding habitats; usually migrates on rainy nights.

Food Comments:
Larvae feed on zooplankton as well as many other aquatic invertebrates. Diet of terrestrial adults is not well documented, but they apparently feed on a wide variety of terrestrial invertebrates (Nussbaum et al. 1983).

Phenology comments:
Nonpaedomorphic adults seldom seen except when breeding. Active day and night in deep water where fish absent; strictly nocturnal where fish present (Taylor 1984).

Habitat comments:
Global habitat comments:
Open grassland, woodland, and forest near breeding ponds. Nonpaedomorphic adults are underground most of the year. During the breeding season, they are often found under rocks and logs. Larvae have been reported to be restricted to shallows in lakes with fishes, but adult and larval northwestern salamanders are distasteful to fishes and bullfrogs, sometimes allowing coexistence (Leonard et al. 1993). Eggs are laid in ponds, lakes, and slow-moving streams; usually attached to vegetation in shallows (Blaustein et al. 1995) or deeper water (e.g., 0.5-1.0 m below water surface) (Nussbaum et al. 1983).

State habitat comments:
In Alaska, known breeding sites include muskeg ponds and a freshwater lake (Waters 1992); larvae may require two years to complete metamorphosis, thus requiring a permanent source of water (MacDonald 2003).

STATUS

Global rank: G5 (1996-09-26)
Global rank reasons:
Many stable populations exist throughout the historical range in the Pacific Northwest; not acutely sensitive to modern timber harvest practices; can coexist with introduced fishes and bullfrogs.

State rank: S2? (2004-06-15)
State rank reasons:
The distribution of this species is unknown; currently known occurrences restricted to Southeast Alaska. Only three specimens collected in Alaska. Population status unknown. Current threats include UV-B exposure to larvae and potential loss of old-growth forest habitat as a result of logging.

DISTRIBUTION AND ABUNDANCE

Range:

Global range comments:
Pacific coast of North America from extreme southeastern Alaska south through western Canada and northwestern U.S. to Gualala River, California. Sea level to about 10,200 ft (3110 m) (Stebbins 1985).

State range comments:
Found in coastal forests of extreme southeastern Alaska (Hodge 1976). Has only been collected in two localities: southeast of Ketchikan on Mary Island, and on northwest Chichagof Island near Pelican (MacDonald 2003). A globular egg mass, presumably of this species, was found in Figure Eight Lake, Stikine River (MacDonald 2003). Recently, a single northwestern salamander was reported along the outer coast of Glacier Bay National Park in Graves Harbor (Anderson 2004).

Abundance:

Global abundance comments:
Total adult population size is unknown but surely exceeds 10,000 and possibly exceeds 100,000.

State abundance comments:
Unknown, but suspected rare.

Trends:

Global trend comments:
Unknown.

State trend comments:
Unknown.

PROTECTION

Global protection comments:
Unknown.

State protection comments:
In Alaska, amphibians are managed by the Alaska Department of Fish and Game under statute 16.05.030, in which amphibians are legally included in the definition of “fish”. This statute makes it illegal for anyone to “hold, transport or release” any native amphibians without a valid permit. There is one known occurrence in Glacier Bay National Park.

THREATS

Global threats comments:
Ambient ultraviolet radiation causes increased mortality of eggs (compared to UV-B-shielded eggs) (Blaustein et al. 1995), but natural oviposition sites often may not be subject to damaging levels of UV.

Experimental data indicate that larvae are negatively impacted by the presence of trout (Tyler et al. 1998), yet salamanders and trout coexist in some areas (Leonard et al. 1993). Embryos in eggs masses easily survive several weeks of prolonged exposure to air as may occur with recession of water level in breeding ponds (Marco 2001).

State threat comments:
Ambient ultraviolet radiation causes increased mortality of eggs (compared to UV-B-shielded eggs) (Blaustein et al. 1995), but natural oviposition sites often may not be subject to damaging levels of UV.

There is conflicting data on the affinity of this species for old-growth forest habitat (Grialou et al. 2000, Aubry 2000). Clear-cutting rendered habitat unsuitable in one study. Because of their distasteful qualities, predation by introduced fishes and other predators on adults is not considered a serious problem by some (MacDonald 2003). Salamanders and trout do coexist in some areas (Leonard et al. 1993), however, experimental data indicate that larvae are negatively impacted by the presence of trout (Tyler et al. 1998).

RESEARCH AND INVENTORY NEEDS

Global research needs:
Unknown.

State research needs:
Establish programs to monitor population trends; identify threats and limiting factors.

Global inventory needs:
Unknown.

State inventory needs:
Inventory to precisely determine the species' distribution is needed; population estimates for each area of occurrence are needed to determine status; if possible, establish programs to monitor population trends; identify threats and/or limiting factors.

CONSERVATION AND MANAGEMENT NEEDS

Global conservation and management needs:
See State conservation needs.

State conservation and management needs:
More study is needed on the effects of logging on this species habitat. It increases exposure and degrades habitat because of reduced tree canopy, temperature changes in streams, and can increase siltation. Increased siltation can reduce larval habitat. Needs further study.

Acknowledgements

State Conservation Status, Element Ecology & Life History Author(s): Gotthardt, T.A.
State Conservation Status, Element Ecology & Life History Edition Date: 22Mar2005

Reviewer(s): Stephen MacDonald, University of New Mexico; Blain Anderson, National Park Service, Anchorage, AK.

Life history and Global level information were obtained from the on-line database, NatureServe Explorer (www.natureserve.org/explorer). In many cases, life history and Global information were updated for this species account by Alaska Natural Heritage Program zoologist, Tracey Gotthardt. All Global level modifications will be sent to NatureServe to update the on-line version.

NatureServe Conservation Status Factors Edition Date: 04Feb2002
NatureServe Conservation Status Factors Author: Hammerson, G.
Global Element Ecology & Life History Edition Date: 19Sep1994
Global Element Ecology & Life History Author(s): Hammerson, G.

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