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Oregon State Rank Assessment for Southern Torrent Salamander (Rhyacotriton variegatus)

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Natural Heritage Ranking Form - Oregon State Rank

Oregon Ranking Form **Southern torrent salamander (Rhyacotriton variegatus)** **Oregon Biodiversity Information Center**

SPECIES ASSESSED

Scientific Name ***Rhyacotriton variegatus*** **ELCODE** AAAAJ01020

Common Name **Southern torrent salamander** **Element ID** 6284

Species Concept Reference Citation

Good, D. A., and D. B. Wake. 1992. Geographic variation and speciation in the torrent salamanders of the genus Rhyacotriton (Caudata: Rhyacotritonidae). University of California Publications in Zoology 126:i-xii, 1-91.

CONSERVATION STATUS RANK

Assigned Rank **S3?**

Rank Assignment Author	Eleanor Gaines	**Rank Review Date**	11/09/2022
Rank Factors Author	Eleanor Gaines	**Rank Factors Date**	11/09/2022
Calculated Rank	S3?	**Rank Change Date**	11/09/2022
Rank Methodology Used	Rank calculation - Biotics v2		

Assigned Rank Reasons

This species has a small range in western Oregon. It still occurs throughout its historical range and is common in places, but logging, road construction, and associated sedimentation and increased water temperatures have led to isolated populations, some localized extirpations and reductions in abundance. Threats from logging are likely decreasing, but the species faces new threats from climate change and marijuana cultivation. Furthermore, it has narrow habitat requirements and with low reproductive rates and dispersal abilities it is slow to colonize new areas. Information on population size and trends is limited. Timber harvest negatively affects Rhyacotriton salamanders more than it does other amphibians (Bury and Corn 1988, Corn and Bury 1989). In the Coast Range of western Oregon total salamander abundance, including Rhyacotriton spp., and amphibian species richness were found to be sensitive to forest practices in riparian areas. Riparian buffer strip widths currently required by state forest practices regulations may not be sufficient to ensure that amphibian communities in managed stands remain as diverse as in unlogged forests (Vesely & McComb 2002). However, USFWS (2000) concluded that current regulatory practices do not constitute a threat.

RANGE/DISTRIBUTION

Range Extent

Rating 20,000-200,000 square km (about 8000-80,000 square miles)

Estimate 37893 **Unit Used for Estimate**

Comments The southern torrent salamander occurs in the Coast Range of southern Oregon north as far as the Little Nestucca River and the Grande Ronde Valley in Polk, Tillamook, and Yamhill counties, Oregon, where the range abuts that of R. kezeri (Emel et al. 2019, Halstead et al. 2020, iNaturalist 2022, ORBIC 2022). It also occurs along the West Slope of the Cascades as far north as the Middle Fork of the Willamette River east of Eugene (Wagner 2001, ORBIC 2022). It is known from Benton, Coos, Curry, Douglas, Josephine, Lane, Lincoln, Polk, Tillamook, and Yamhill Counties in Oregon. It is patchily distributed in headwaters and low order tributaries (Welsh and Lind 1996).

Area of Occupancy

Grid Cell Size 4 km² Grid Cells

Rating (as Number of 4 km2 Grid Cells) F = 126-500

Comments Known records for this species intersect with 238 4 km² grid cells in Oregon (ORBIC 2022)

ABUNDANCE AND CONDITION

Number of Occurrences

Rating 81 - 300

Comments

There are over 200 known observation records in the state that would distill to approximately 85 element occurrences. Approximately 25% of these observations are post-2000 (ORBIC 2022).

Population Size

Rating Unknown

Good Viability/Ecological Integrity

Number of Occurrences with Good Viability/Ecological Integrity

Rating Some to many (13-125)

Comments

Management for Northern Spotted Owls (Strix occidentalis caurinus) likely benefits southern torrent salamanders to some extent (USFWS 2000). Habitat in the northern end of the species range is more fragmented than that to the south (Emel et al. 2019).

THREATS

Threat Category Code	Threat Category	Calculated Impact	Scope	Severity	Timing	Comments
7.2.4	Abstraction of surface water (unknown use)	CD = Medium - low	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Serious - moderate	High: Continuing	
9.3.2	Soil erosion, sedimentation	BD = High - low	Large - restricted	Serious - moderate	Moderate: In the short-term future, or now suspended but could return in short term	
4	Transportation & service corridors	D = Low	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Moderate: Likely to moderately degrade/reduce affected occurrences or habitat, or reduce population 11-30%	Moderate: In the short-term future, or now suspended but could return in short term	
4.1	Roads & railroads	D = Low	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Moderate: Likely to moderately degrade/reduce affected occurrences or habitat, or reduce population 11-30%	Moderate: In the short-term future, or now suspended but could return in short term	
5	Biological resource use	BC = High - medium	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious - moderate	High: Continuing	
5.3	Logging & wood harvesting	BC = High - medium	Large: Affects most (31-70%) of the total population or occurrences or extent	Serious - moderate	High: Continuing	
7	Natural system modifications	CD = Medium - low	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Serious - moderate	High: Continuing	
7.2	Dams & water management/use	CD = Medium - low	Restricted: Affects some (11-30%) of the total population or occurrences or extent	Serious - moderate	High: Continuing	
9	Pollution	BD = High - low	Large - restricted	Serious - moderate	Moderate: In the short-term future, or now suspended but could return in short term	
9.3	Agricultural & forestry effluents	BD = High - low	Large - restricted	Serious - moderate	Moderate: In the short-term future, or now suspended but could return in short term	

11	Climate change & severe weather	B = High	Pervasive: Affects all or most (71-100%) of the total population or occurrences or extent	Serious: Likely to seriously degrade/reduce affected occurrences or habitat, or reduce population 31-70%	High: Continuing

Calculated Overall Threat Impact AB = Very high - high

Assigned Overall Threat Impact AB = Very high - high

Overall Threat Impact Comments

The southern torrent salamander is extremely sensitive to temperature increases and increased siltation that can be caused by timber harvest, road construction and maintenance (Welsh and Oliver 1998, Ashton et al. 2006, Bury 2008, Welsh and Hodgson 2008, Bury 2015, Welsh et al. 2019). Timber harvest is associated with increased sedimentation, habitat fragmentation, and water temperature, and leads to reduced relative abundance of this species (Ashton et al. 2006, Bury 2008, Emel et al. 2019, Welsh et al. 2019). Clear cutting can lead to water temperatures that are above the lethal limits for this species (Bury 2008). Forest fertilizers can be lethal to this species (Marco et al. 2001). Roads, including those associated with timber harvest, increase siltation and present an impassable barrier, limiting dispersal, fragmenting populations and increasing genetic isolation (Wagner 2001, Emel et al. 2019). They can also negatively impact the species by increasing sedimentation. However, the species can persist in some areas after timber harvest, and management for the Northern Spotted Owl (Strix occidentalis caurina) and Marbled Murrelet (Brachyramphus marmoratus) likely benefits this species (Diller and Wallace 1996, USFWS 2000). Because of limited dispersal abilities and long generation times, populations are vulnerable to fragmentation and genetic isolation; roads and non-forest habitat are impassable (Diller and Wallace 1996, Emel et al. 2019). Drought, flow modification, and water diversion associated with climate change or marijuana cultivation can render sites unsuitable (Bauer et al. 2015, Bury 2015). Water diversion for marijuana cultivation reduces habitat, alters headwater stream flow, and exacerbates effects of climate change (Bauer et al. 2015). Increased temperatures associated with climate change are likely to result in a decrease in the amount of suitable habitat and a reduced range for this species (Bury 2015).

TRENDS

Short-Term Trend

Rating G = Relatively Stable (<=10% change)

Comments

Short term population trends have not been documented but are assumed to be fairly stable. The trend of habitat loss is lessening across much of the range with a reduction in clearcutting and with some increased awareness and protection of headwater habitats (USFWS 2000). In 2007, Olson and Weaver reported the species was not rare in western Oregon headwater stream reaches. However, this species is extremely sensitive to hydrologic changes associated with climate change (Bury 2015).

Long-Term Trend

Rating F = Decline of 10-30%

Comments

Still present throughout historical range in Oregon, but localized extirpations and reductions in abundance are evident, due to past forest management activities (USFWS 2000, Stebbins 2003). Habitat has declined but to an unknown degree.

OTHER FACTORS

Intrinsic Vulnerability Rating Highly vulnerable

Comments

This species has a very low maximum thermal tolerance (Bury 2008, Bury 2015), low fecundity, long generation time (Tait and Diller 2006), and limited dispersal ability (Diller and Wallace 1996, Emel et al. 2019). It has the lowest desiccation tolerance of any North American salamander (Ray 1958).

Environmental Specificity Rating Very narrow to narrow.

Comments

Southern torrent salamanders require cool, highly oxygenated, high gradient forested headwater streams, seeps, and springs (Diller and Wallace 1996, Welsh and Hodgson 2008).

ADDITIONAL SPECIES INFORMATION

Oregon Habitat Comments

Cold clear springs, seeps, headwater streams and waterfall splash zones within humid, coniferous forests. Typically occur in older forests, but young, managed forests may be occupied as long as the required microhabitats are present. Primary habitats = Sitka spruce, Douglas fir, and alder-hardwood forest types. Most closely associated with riparian vegetation.

RANKING REFERENCES

Short Citation Author	Year	Full Citation
Ashton et al.	2006	Ashton, D.T., Marks, S.B. and Welsh Jr, H.H., 2006. Evidence of continued effects from timber harvesting on lotic amphibians in redwood forests of northwestern California. Forest Ecology and Management, 221(1-3), pp.183-193.
Bauer et al. 2015	2015	Bauer, S., Olson, J., Cockrill, A., Van Hattem, M., Miller, L., Tauzer, M. and Leppig, G., 2015. Impacts of surface water diversions for marijuana cultivation on aquatic habitat in four northwestern California watersheds. PloS one, 10(3), p.e0120016.
Bury	2008	Bury, R. Bruce. 2008. Low thermal tolerances of stream amphibians in the Pacific Northwest: implications for riparian and forest management. Applied Herpetology. 5(1):63-74.
Bury	2015	Bury, G.W., 2015. An integrated approach to gauge the effects of global climate change on headwater stream ecosystems. An abstract of the dissertation of Gwendolynn W. Bury for the degree of Doctor of Philosophy in Zoology presented on August 28, 2015. Available at https://ir.library.oregonstate.edu/downloads/6969z529h
Bury and Corn	1988	Bury, R. B., and P. S. Corn. 1988a. Responses of aquatic and streamside amphibians to timber harvest: a review. Pages 165-181 in Raedaeke, K., editor. Streamside management: riparian wildlife and forestry interactions. Univ. Washington.
Corn and Bury	1989	Corn, P. S., and R. B. Bury. 1989. Logging in western Oregon: responses of headwater habitats and stream amphibians. Forest Ecology and Management 29:39-57.
Diller and Wallace	1996	Diller, L. V., and R. L. Wallace. 1996. Distribution and habitat of Rhyacotriton variegatus in managed, young growth forests in north coastal California. Journal of Herpetology 30:184-191.
Emel	2019	Emel, Sarah L.; Olson, Deanna H.; Knowles, L. Lacey; Storfer, Andrew. 2019. Comparative landscape genetics of two endemic torrent salamander species, Rhyacotriton kezeri and R. variegatus: implications for forest management and species conservation. Conservation Genetics. 20(4):801-815.
Halstead	2020	Halstead, Brian J.; Goldberg, Caren S.; Douglas, Robert B.; Kleeman, Patrick M.; Ulrich, David W. 2020. Occurrence of a suite of stream-obligate amphibians in timberlands of Mendocino County, California, examined using environmental DNA. Northwestern Naturalist. 101(3):194-209.
Marco	2001	Marco, A; Cash, D; Belden, KL; Blaustein, AR. 2001. Sensitivity to urea fertilization in three amphibian species. Arch. Environ. Contam. Toxicol. 40:406-409.
Stebbins	2003	Stebbins, Robert C. 2003. A Peterson field guide to western reptiles and amphibians. Houghton Mifflin Harcourt.
USFWS	2000	U.S. Fish and Wildlife Service (USFWS). 6 June 2000. 12-month finding for a petition to list the southern torrent salamander in California as endangered or threatened. Federal Register 65(109):35951-35956.
Vesely, D.G. and W.C. McComb.	2002	Vesely, D.G. and W.C. McComb. 2002. Salamander abundance and amphibian species richness in riparian buffer strips in the Oregon Coast Range. Forest Science. 48: 291 - 297.
Wagner	2001	Wagner, Ronald Steven. 2001. Phylogeography, evolution, and conservation in forest-associated Pacific Northwest salamanders. PhD Dissertation. Oregon State University, Corvallis, Oregon. Oregon State University.
Welsh & Hodgson	2008	Welsh Jr, H.H. and Hodgson, G.R., 2008. Amphibians as metrics of critical biological thresholds in forested headwater streams of the Pacific Northwest, USA. Freshwater biology, 53(7), pp.1470-1488. Available at https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1365-2427.2008.01963.x.
Welsh and Ollivier	1998	Welsh, H. H., Jr., and L. M. Ollivier. 1998. Stream amphibians as indicators of ecosystem stress: a case study from California's redwoods. Ecological Applications 8:1118-1132.
Welsh et al.	1996	Welsh, H. H., Jr., and A. J. Lind. 1996. Habitat correlates of the southern torrent salamander, Rhyacotriton variegatus (Caudata: Rhyacotritonidae), in northwestern California. Journal of Herpetology 30:385-398.

RESOURCES

Oregon Biodiversity Information Center, Institute for Natural Resources
Portland State University, Mail Stop: INR, PO Box 751, Portland, OR 97207-0751 Phone: 503-725-9950

Additional ORBIC species ranking forms posted at
https://inr.oregonstate.edu/orbic/rare-species/ranking-documentation

Information on Natural Heritage ranking methodology is available at
http://www.natureserve.org/biodiversity-science/publications/natureserve-conservation-status-assessments-methodology-assigning

The Conservation Rank Calculator is developed and maintained by NatureServe and is available from
http://www.natureserve.org/conservation-tools/conservation-rank-calculator

ASSESSMENT CITATION

Eleanor Gaines. 2022. Oregon state rank assessment for Southern torrent salamander (Rhyacotriton variegatus). Oregon Biodiversity Information Center. Institute for Natural Resources, Portland State University, Portland, OR.