	Species:	Index Result:
Scientific Name	*Cryptantha grandiflora*	Moderately Vulnerable
Common Name	Clearwater cryptantha	Confidence: Moderate
Taxonomic Group	Vascular Plant	(based on entered data)
Geographic Area	OR, WA, ID (full range)	Date Assessed: 8/13/2019
		GRank: G3?
Cave/Ground Water Obligate:	No	SRank: S2
Migratory area included in assessment:	No	Assessor: Lindsey Wise

Climate Change Vulnerability Index Values: (greatest score shown when range was selected)

Category	Factor	Score	Comments
Temperature Scope (predicted increase)	A >6.0F	0	
	A 5.5F	0	
	A 5.1F	40	
	A 4.5F	60	
	A 3.9F	0	
	A <3.9F	0	
Hamon AET:PET Moisture Metric Scope	< -0.119	10	
	-0.119	50	
	-0.096	30	
	-0.073	10	
	-0.05	0	
	>-0.028	0	
Sea level rise	B1	N	Species is not coastal.
Natural barriers	B2a	SI	Snake and Columbia Rivers may be barriers.
Anthropogenic barriers	B2b	N	Species range is in a sparsely populated area.
Climate Change mitigation	B3	SI	There is potential for wind or solar development within its range.
Dispersal/Movement	C1	N	Some Cryptantha species have a positive response to fire (Keeley & Fotheringham). Casper (1987) suggested seed dispersal of Cryptantha flava by wind, mammals, or water could potentially carry seeds long distances.
Historical thermal niche	C2ai	N	Most of range is in the >57 deg. F temperature variation range.
Physiological thermal niche	C2aii	N	C. grandiflora currently occupies exposed southern slopes in a region with hot summers.
Historical hydrological niche	C2bi	SI	About 11 to 13 inches historical variation in precipitation within geographic range.
Physiol. hydrological niche	C2bii	N	Not known or expected to be dependent on a seasonal hydrological niche, given its known habitat.
Disturbance dependence	C2c	U	
Ice/snow dependence	C2d	N	
Physical habitat restrictions	C3	Inc	According to Darrach, this species is only found on an atypical Columbia River Basalt that is a gabbro high in metals.
Other spp create habitat	C4a	N	
Dietary Versatility	C4b	U	

Pollinator Versatility	C4c	N	Castro (1983) found a variety of pollinators visited two species of Cryptantha. Likely to be true of C. grandiflora.
Other spp for dispersal	C4d	N	Seeds likely dispersed by several methods (wind, mammals, water).
Pathogen sensitivity	C4e	U	
Competition sensitivity	C4f	Inc	Known Oregon sites are being impacted by invasive annual grasses including Ventenata dubia.
Interspecific Relationship	C4g	U	
Measured genetic variation	C5a	U	
Bottlenecks	C5b	U	
Plant reproductive system	C5c	U	
Phenological response	C6	U	
Documented response	D1	U	
Modeled change	D2	U	
Modeled overlap	D3	U	
Modeled protected areas	D4	U	

Additional Notes:

There is some taxonomic disagreement regarding this species, with many sources synonymizing it with C. intermedia. ORBIC and Flora of Pacific NW consider C. grandiflora a valid species, covering a much smaller geographic area than C. intermedia. This smaller range is what is assessed here.

References:

Darrach, Mark. 2013. Pers. comm. Botanist with USFS and the Burke Herbarium.

Casper, Brenda. 1987. Spatial Patterns of Seed Dispersal and Postdispersal Seed Predation of Cryptantha flava (Boraginaceae). American Journal of Botany Vol. 74, No. 11 (Nov., 1987), pp. 1646-1655.

Keeley, Jon and C.J. Fotheringham. 2000. "Role of Fire in Regeneration from Seed." in Seeds: the Ecology of Regeneration in Plant Communities, 2nd Ed. Edited by M. Fenner.

Casper, Brenda. 1983. The Efficiency of Pollen Transfer and Rates of Embryo Initiation in Cryptantha (Boraginaceae). Oecologia Vol. 59, No. 2/3 (1983), pp. 262-268.

Hitchcock, C. L. and A. Cronquist.2018. Flora of the Pacific Northwest, 2nd Edition. Eds: Giblin, Legler, Zika, and Olmstead. University of Washington Press, Seattle, WA.

Data sources and notes:

Climate and precipitation data from Climate Wizard using the A1B emissions scenario and ensemble average general circulation model: Historical = 1951-2006; Future = mid-century (2050s); Hamon AET:PET moisture metric (Hamon 1961). Species data from ORBIC database. Assessment performed in conjunction with the NatureServe Element Rank Calculator. Other resources consulted: NREL national wind resources, 50m resolution (https://www.nrel.gov/gis/data-wind.html); SILVIS lab Wildland Urban Interface 2010 layer (http://silvis.forest.wisc.edu/data/wui-change/); Oregon Department of Geology and Mineral Industries geologic map (https://www.oregongeology.org/gis/); US mining claims on federal lands (http://mrdata.usgs.gov/mine-claim/); Oregon Protected Areas Database (http://gapanalysis.usgs.gov/padus/data/).

Detailed definitions of criteria and methodology can be found in the documentation at http://www.natureserve.org/conservation-tools/climate-change-vulnerability-index

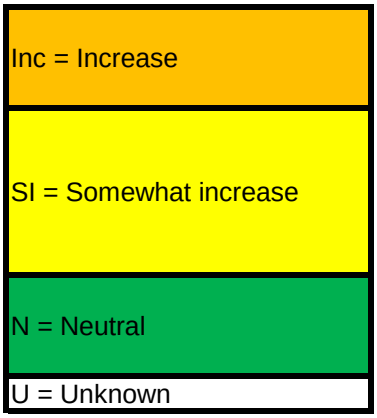
Legend and Definitions:

Affect to Vulnerability:
GI = Greatly increase

Index Scores:

Extremely Vulnerable: Abundance and/or range extent within geographical area assessed extremely likely to substantially decrease or disappear by 2050.

Highly Vulnerable: Abundance and/or range extent within geographical area assessed likely to decrease significantly by 2050.



Moderately Vulnerable: Abundance and/or range extent within geographical area assessed likely to decrease by 2050.

Less Vulnerable: Available evidence does not suggest that abundance and/or range extent within the geographical area assessed will change (increase/decrease) substantially by 2050. Actual range boundaries may change.

Insufficient Evidence: Information entered about a species' vulnerability is inadequate to calculate an Index score.

Citation:

Oregon Biodiversity Information Center. 2019. Climate Change Vulnerability Index assessment for Clearwater cryptantha (Cryptantha grandiflora). Institute for Natural Resources, Portland State University, Portland, OR.