Hitch (*Lavinia exilicauda*)

Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2011
Revised, January 2018
Web Version, 8/29/2018

Photo: R. Reyes. Public domain. Available: https://commons.wikimedia.org/wiki/File:Lavinia-exilicauda-21.jpg. (January 2018).

1 Native Range and Status in the United States

Native Range

From Froese and Pauly (2017):

"North America: Sacramento-San Joaquin, Clear Lake, Russian River, and Pajaro-Salinas river drainages in California, USA."

Status in the United States

From NatureServe (2017):

"Range includes the Sacramento and San Joaquin drainages; Clear Lake, Lake County; Russian River; and Pajaro and Salinas rivers drainages, California (Moyle 2002, Page and Burr 2011). This species has been introduced in a few reservoirs within the native range, and it occurs in some waters as a result of transport in water diversion aqueducts (Moyle 2002).. [*sic*]"

From Nico (2018):

“Status: Established in parts of southern California (Swift et al. 1993).”

“McGinnis (1984) stated that this species was apparently introduced into the Russian River of California. Other authors (e.g., Page and Burr 1991) apparently consider it to be native to that drainage.”

From Swift et al. (1993):

“This species was reported from Pyramid Lake in 1984 […], Lake Silverwood in 1988 […], and one was taken in June 1992 at Pyramid Lake […]. It is possibly established or at least a regular immigrant from central California. […] Kimsey and Fisk (1960) reported one collected in Ramer Lake, Imperial County. Hitch were collected in the spring of 1992 from isolated pools of Aliso Canyon, tributary to Santa Clara River in Soledad Canyon […], and thought to have been there for about 40 years (Tom Hale, pers. comm.).

Means of Introductions in the United States

From Swift et al. (1993):

“It is possibly established or at least a regular immigrant from central California. Miller (1952) reported hitch sold as bait in the lower Colorado River, […]”

From Miller (1952):

“The hitch has appeared in bait tanks as follows : Site Six, Lake Havasu, P. A. Douglas, March 2, 1950; Kinder's Camp, Miller and party, April 7, 1950 ; and at the same place, P. A. Douglas, June 21, 1950.”

“This minnow unquestionably was imported from the Central Valley of California. Milt Holt wrote me (March 18, 1951) that he collected bait "north of Modesto" late in 1949 and early in 1950. Vic Spratt, operator of the Site Six camp, told P. A. Douglas that his hitch were being trucked and flown to Site Six from Fresno by C. L. Ballard, Jr., and Mr. Kinkillea. In order to limit the species of bait fishes, and because the biological effect of this species is problematical, its further use for bait is not recommended.”

From Santos et al. (2013):

“Only capable of natural colonization via hydrologic stream connection. Hitch have, however, been widely dispersed outside their native range via water delivery infrastructure, especially the California Aquaduct. The viability of these introduced populations is not known.”

Remarks

From Swift et al. (1993):

"A specimen [of *Orthodon microlepidotus*] from Pyramid Lake taken in June 1992 has intermediate features and apparently is a hybrid with *Lavinia exilicauda* […], a combination first reported by Hopkirk ([1973]), and found to be common in San Luis Reservoir in central California by Moyle and Massingill (1981)."

From Santos et al. (2013):

"Taxonomic Relationships: Hitch are most closely related to the California roach (Lavinia symmetricus) and they interbreed in some areas. (Avise et al. 1975). Hitch can also hybridize with Sacramento blackfish, although the hybrids are apparently sterile (Moyle and Massingill 1981). There are three subspecies, Clear Lake hitch, *L. e. chi*, Monterey hitch, *L. e. harengus* from the Pajaro and Salinas rivers and the type subspecies, the Sacramento hitch, *L. e. exilicauda*. The taxonomy of hitch found in the Russian River is uncertain."

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

From ITIS (2018):

"Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Actinopterygii
Class Teleostei
Superorder Ostariophysi
Order Cypriniformes
Superfamily Cyprinoidea
Family Cyprinidae
Genus *Lavinia*
Species *Lavinia exilicauda* Baird and Girard in Girard, 1854"

From Eschmeyer et al. (2018):

"Current status: Valid as *Lavinia exilicauda* Baird & Girard 1854. Cyprinidae: Leuciscinae."

Size, Weight, and Age Range
From Froese and Pauly (2017):

"Max length : 36.0 cm TL male/unsexed; [Page and Burr 1991]; common length : 25.0 cm TL male/unsexed; [Hugg 1996]; max. reported age: 6 years [Altman and Dittmer 1962]"

Environment
From Froese and Pauly (2017):

"Freshwater; demersal."

From NatureServe (2017):

"[…] in water temperatures of 14-18 C (Moyle 1976, 2002)."

Climate/Range
From Froese and Pauly (2017):

"Temperate; 41°N - 36°N"

Distribution Outside the United States
Native
This species is native to the United States.

Introduced
This species has not been reported as introduced outside of the United States.

Means of Introduction Outside the United States
This species has not been reported as introduced outside of the United States.

Short Description
From Froese and Pauly (2017):

"Dorsal soft rays (total): 10-13; Anal soft rays: 11 - 13. Body deep and compressed; caudal peduncle tapering to narrow; caudal fin large; lateral line strongly decurved; head small, compressed, mouth terminal (slightly upturned); dorsal-fin origin behind pelvic-fin origin; scales on lateral line 54-62; dorsal fin with 10-13 rays; anal fin with 11-13 rays; pharyngeal teeth 0,5-4,0 or 0,5-5,0; brown-yellow above, scales on back and silver side darkly outlined (crosshatched pattern on small individuals); fins dusky; and small specimens with black caudal spot [Page and Burr 2011]."

Biology

From Miller (1952):

"The hitch prefers the lower, sandy to muddy, slow-moving stretches of rivers or the quiet pools of creeks, generally in fairly warm water. According to Murphy (1948, p. 101) it appears to require gravel-bottomed streams for successful spawning. It feeds, in large part at least, on fine microscopic organisms (plankton), as shown by the rather numerous gill rakers, the long intestine and the grinding type of pharyngeal teeth."

From Santos et al. (2013):

"Spawning takes place mainly in riffles of streams tributary to lakes, rivers, and sloughs, after flows increase in response to spring rains, although spawning requirements are in need of further documentation. When they are present in ponds and reservoirs with Sacramento blackfish, the two species often hybridize, presumably because they are forced to share spawning areas."

"Spawning is in groups, with much vigorous splashing. A spawning female is closely followed by 1-5 males, who fertilize eggs immediately after their release. Fertilized eggs sink into interstices of the gravel before absorbing water and then swell to about 4 times their initial size. Swelling lodges embryos in the gravel. Hatching takes place in 3-7 days at 15-22°C and larvae take another 3-4 days to become free-swimming. Young-of-year hitch spend the next 2 months shoaling in shallow water or staying close to beds of aquatic plants, especially among emergent tules, before moving out into more open water, at about 50 mm FL."

From NatureServe (2017):

"Abundance has declined in many areas, and the scattered populations are increasingly isolated from one another (Moyle 2002). Some populations in streams flowing into the San Joaquin Valley have apparently gone extinct in recent years (see Moyle 2002)."

Human Uses

From Swift et al. (1993):

"Miller (1952) reported hitch sold as bait in the lower Colorado River, […]"

Diseases

Poelen et al. (2014) lists *Dactylogyrus kritskyi* and *Dactylogyrus microlepidotus* as parasites of *Lavinia exilicauda* (Strona et al. 2013).

No OIE-listed diseases have been documented for this species.

Threat to Humans

From Froese and Pauly (2017):

"Harmless"

3 Impacts of Introductions

From Nico (2018):

"Unknown. Possibly in reference to introduced populations, Moyle ([1976]) stated that the species is largely regarded as a nuisance by fisheries managers."

4 Global Distribution

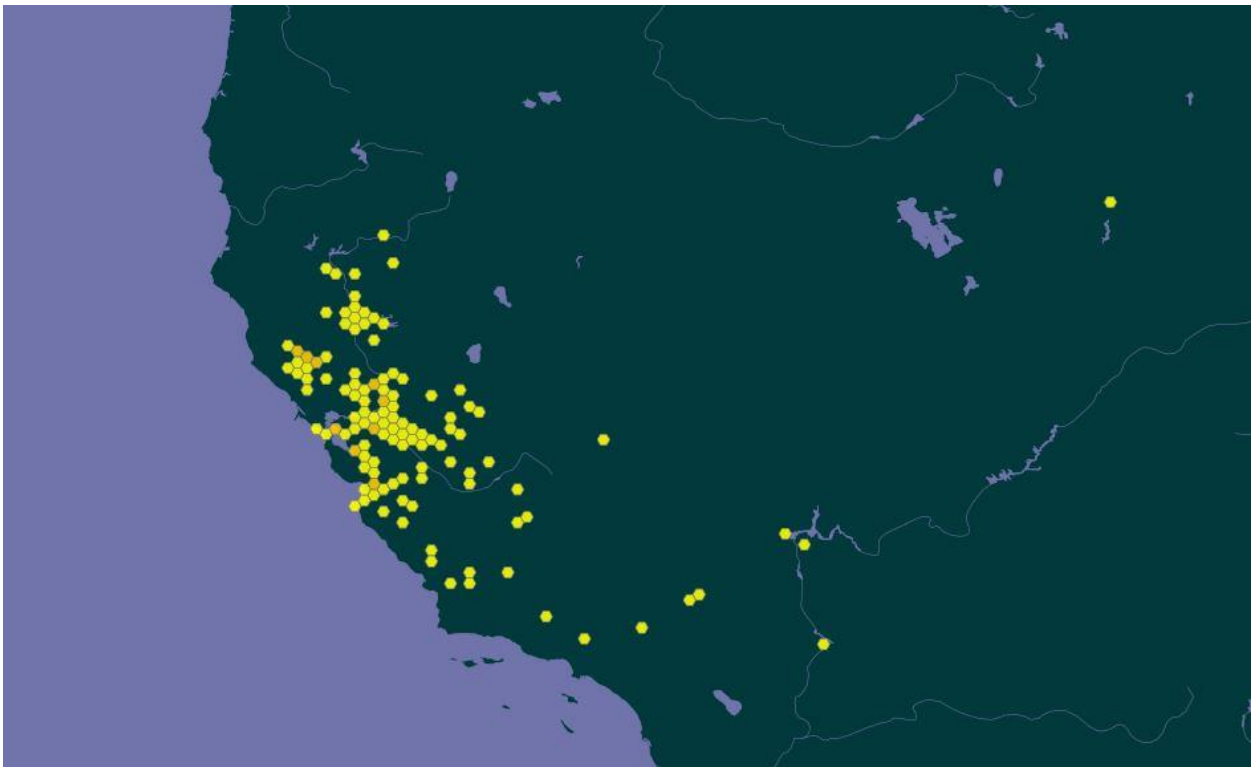

Figure 1. Known global distribution of *Lavinia exilicauda*, reported from the U.S. states of California, Wyoming, and Nevada. Map from GBIF Secretariat (2018). A point in Wyoming and two points in Las Vegas, Nevada were excluded from climate matching analysis because they do not represent established populations.

5 Distribution Within the United States

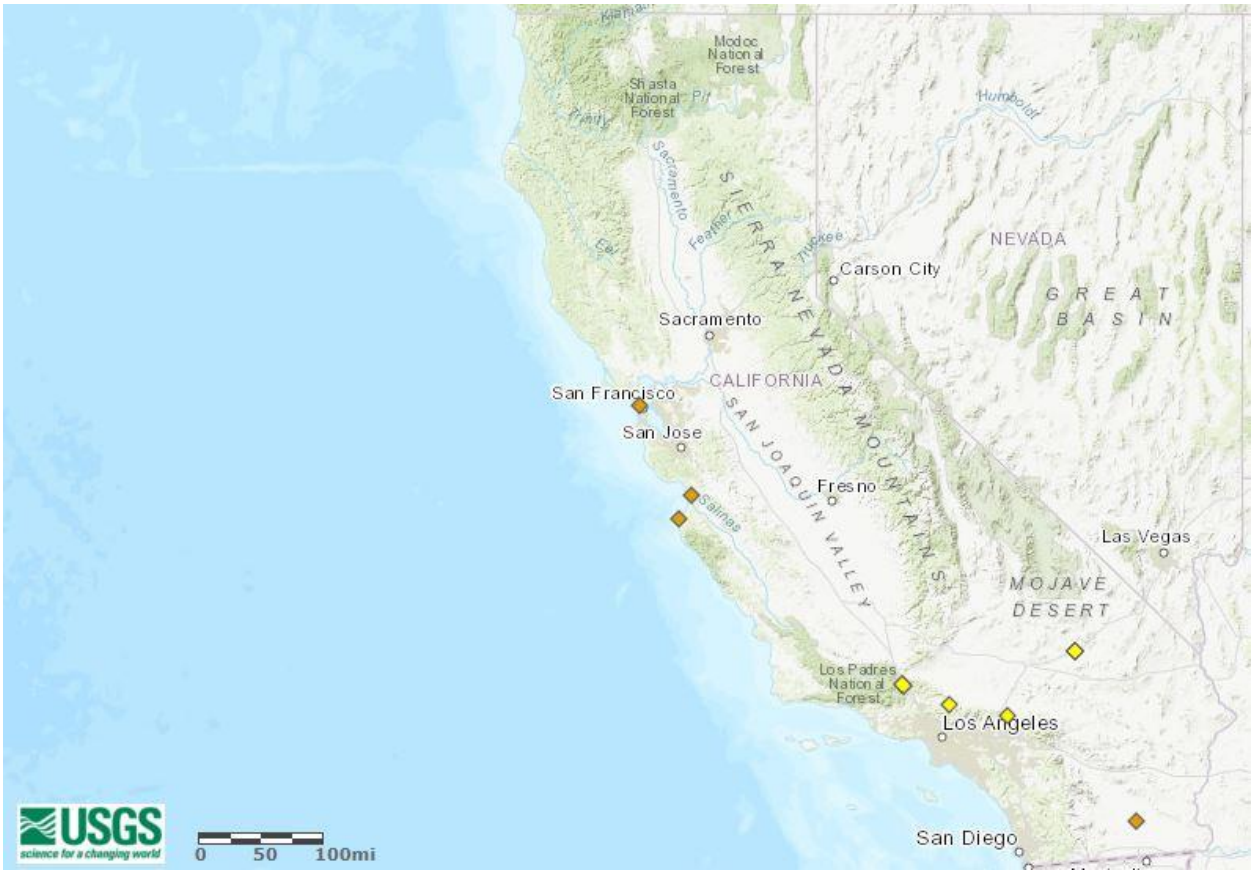

Figure 2. Known distribution of *Lavinia exilicauda* in the United States (California) as reported by Nico (2018). Yellow diamonds represent established populations; orange diamonds represent populations of failed or unknown status.

6 Climate Matching

Summary of Climate Matching Analysis

The Climate 6 score (Sanders et al. 2014; 16 climate variables; Euclidean distance) for the contiguous U.S. was 0.226, which is a high climate match. *L. exilicauda* had a high climate match in California, which is its native range. Other States with a high climate match included Arizona, Colorado, Idaho, New Mexico, Nevada, Oregon, Texas, Utah, Washington, and Wyoming. States with a medium climate match were Kansas, Montana, Nebraska, and Oklahoma. Midwest, Southern, and Atlantic States had a low climate match.

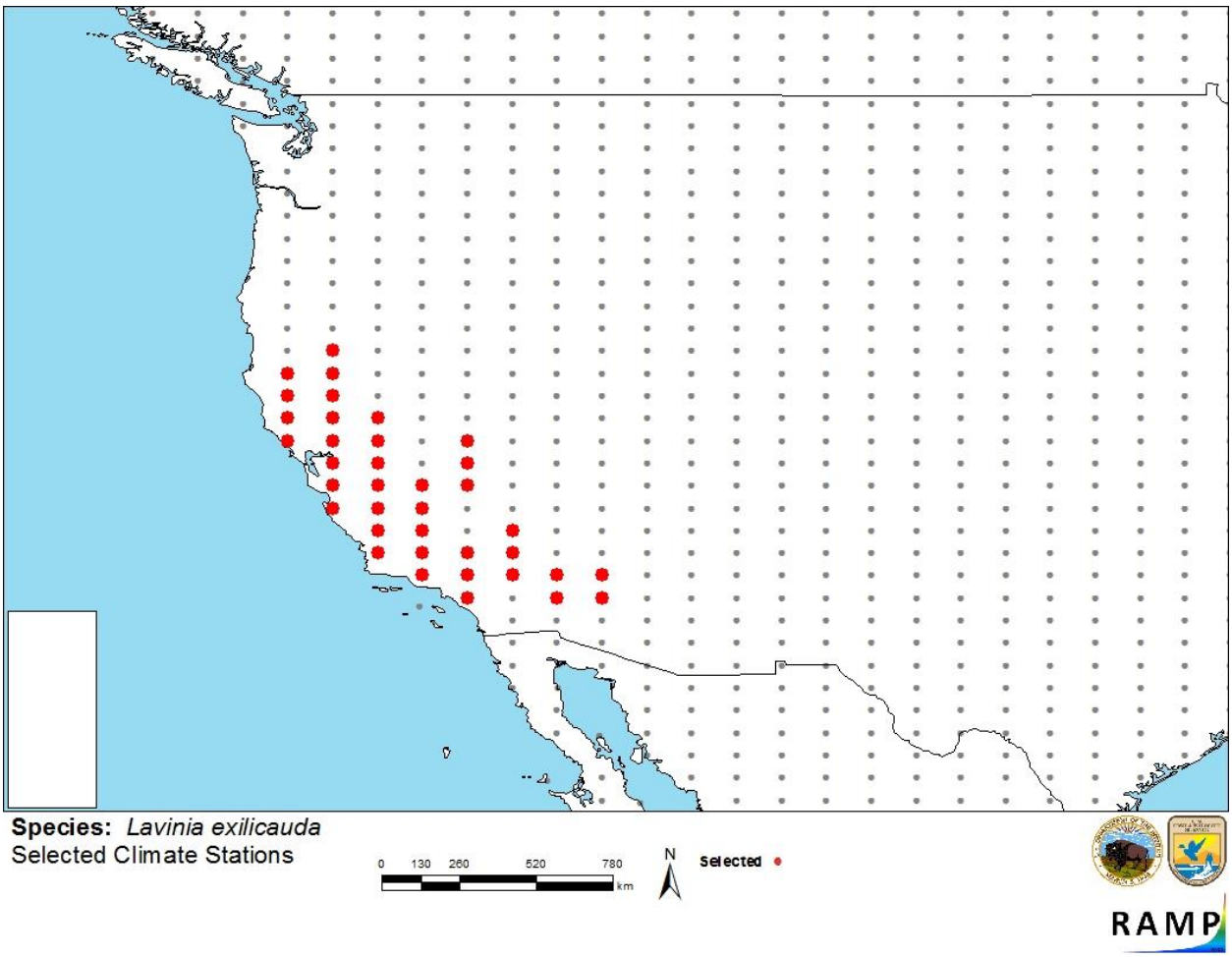

Figure 3. RAMP (Sanders et al. 2014) source map showing weather stations selected as source locations (red; California) and non-source locations (gray) for *Lavinia exilicauda* climate matching. Source locations from Nico (2018) and GBIF Secretariat (2018).

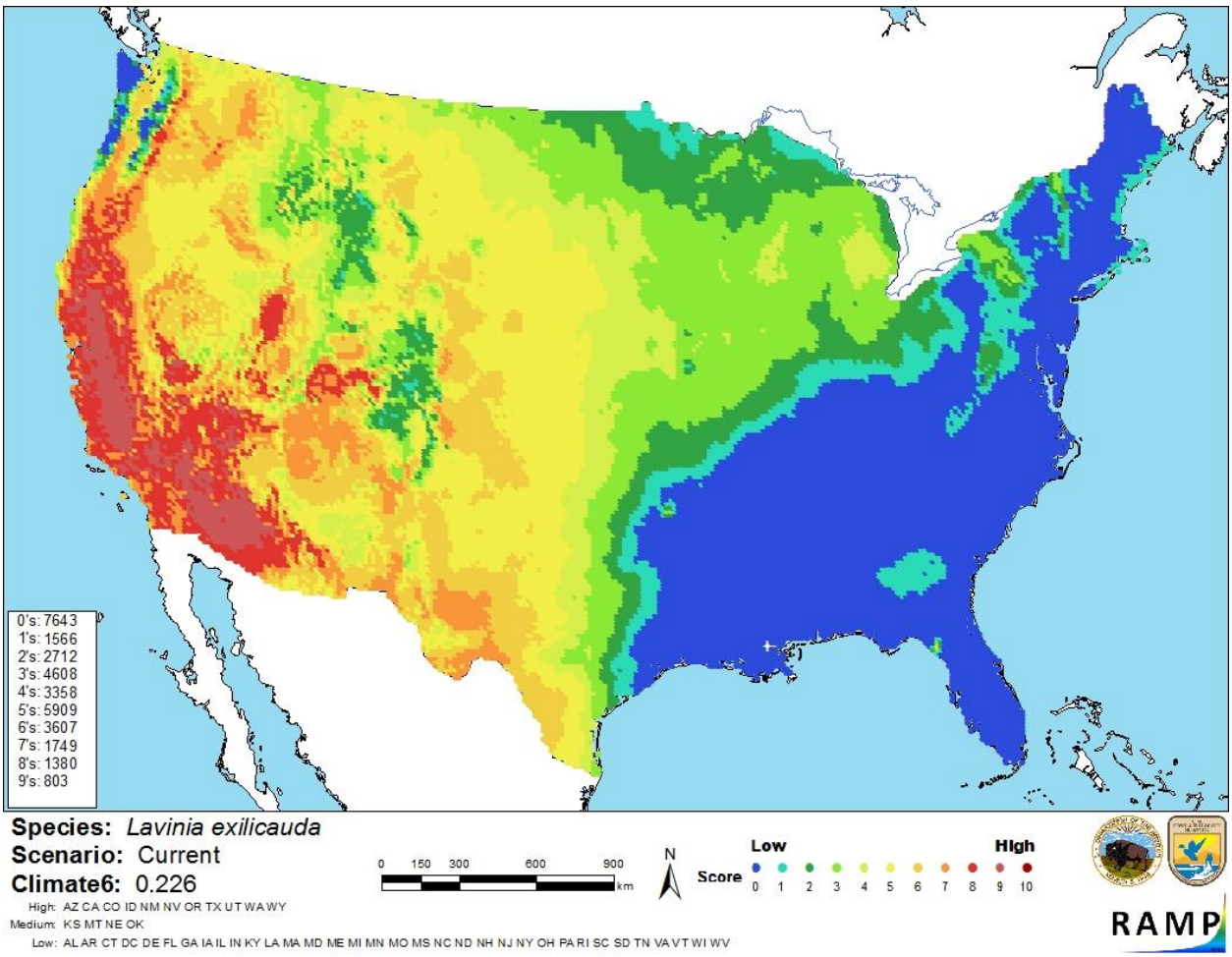

Figure 4. Map of RAMP (Sanders et al. 2014) climate matches for *Lavinia exilicauda* in the contiguous United States based on source locations reported by Nico (2018) and GBIF Secretariat (2018). 0= Lowest match, 10= Highest match.

The "High", "Medium", and "Low" climate match categories are based on the following table:

Climate 6: Proportion of (Sum of Climate Scores 6-10) / (Sum of total Climate Scores)	Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

7 Certainty of Assessment

There is adequate information available on the biology of *Lavinia exilicauda*. Its native range and the extent to which this species had expanded outside of its native range are not clear, although establishment has been confirmed in at least some places. Further information is necessary to determine to range of this species and if it has had any negative impacts where introduced. Certainty of this assessment is low.

8 Risk Assessment

Summary of Risk to the Contiguous United States

Lavinia exilicauda is a cyprinid fish species native to California. It has been introduced to drainages near its native range through construction of aqueducts. It is unknown if it has any negative impacts in its introduced range. *L. exilocauda* has a high climate match with the contiguous United States, with the areas of highest match near its native range. Further information on the introduced range of this species and impacts of these introductions is needed to assess the risk this species poses with certainty. Overall risk assessment category is uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 3): None Documented**
- **Climate Match (Sec. 6): High**
- **Certainty of Assessment (Sec. 7): Low**
- **Overall Risk Assessment Category: Uncertain**

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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