



San Luis Obispo Creek Barrier Remediation

Project Need

Modifications were made in 2006 to an existing sheet pile weir designed to prevent seawater intrusion near the mouth of San Luis Obispo Creek in Central Coast California. These modifications were intended to benefit passage of Central CA Coast steelhead, federally listed as Threatened. However, this work blocked passage for another anadromous species Pacific lamprey. Pacific lamprey historically occurred from Alaska to northern Baja California but their range has contracted for over a century due to human infrastructure which blocks passage between ocean and freshwater habitat.

When surveyed in 2004, San Luis Obispo Creek was the southern extent of lamprey distribution, but had a stable population. However, subsequent surveys by fisheries biologists in 2011 determined that Pacific lamprey had been extirpated from the entire drainage. After examining possible reasons, the team of Western Fishes, USFWS, City of San Luis Obispo and CDFW biologists deduced that Marre weir at the bottom of the drainage created a total barrier to lamprey migration. The associated Denil fish ladder also needed updating as they are older fish passage solutions that require frequent cleaning and maintenance.

Passage Solution

In 2013, the Central California Lamprey Working Group designed and installed an economical solution made from repurposed materials. This was a curved piece of metal placed over the weir that cost less than \$315. In 2017, adult Pacific lamprey were documented building redds in SLO mainstem and tributaries, indicating that the population had recolonized without the need of human facilitated reintroduction.

Long-term management Implications

The SLO monitoring effort demonstrated that Pacific lamprey recolonization can occur in watersheds in which they've been extirpated for generations, and can occur without active re-introduction upon barrier remediation.

California Fish Passage Forum

Reconciliation of Passage Needs For Multiple Aquatic Species

Project Title: San Luis Obispo Creek Passage for Lamprey and Steelhead

Passage Issue: Sheet pile weir w/ 2 Denil fish ladders

Project Lead: Western Fishes, City of SLO, CDFW, US Fish & Wildlife Service

Partners: Central California Lamprey Working Group, California Conservation Corps' Watershed Stewards Program • California Department of Fish & Wildlife • California Polytechnic State University (Cal Poly) • City of San Luis Obispo • Pacific Lamprey Conservation Initiative • San Luis Obispo Land Conservancy • United Water District • US Fish & Wildlife Service • US Forest Service • Western Fishes • San Miguelito Mutual Water Company

Project funding provided by: USFWS

Groups Conducting Monitoring: Western Fishes, City of SLO, CDFW, USFWS

Barrier Removal Completion Date: September, 2013, (lamprey)

Project Location: Latitude: 35.187568, Longitude: -120.725771

PAD ID: 700056

Species Benefitted: Pacific lamprey (CA state Species of Special Concern)

Timeline

- 2004 – Survey by Goodman (USFWS) and Reid (Western Fishes); lamprey presence documented.
- 2006 – Marre Weir modified to provide steelhead passage.
- 2011 – Goodman and Reid surveyed the drainage and lampreys were absent. The first meeting of the Central Coast Lamprey Working Group identified the passage issue at Marre Weir.
- 2011- Ongoing annual monitoring of the population to track distribution, growth, reproductive timing, relative abundance, and more. Annual working group meetings.
- 2013 - First lamprey passage modification installed (metal ramp)
- 2017 – Lamprey naturally recolonized the drainage.
- 2019 - Installation of a second phase structure on the other end of the weir (tube design), with lamprey video monitoring system.
- 2019 - Funding secured for improved fish passage design for steelhead through the site.
- 2020 – Named to National Fish Habitat Partnership 2020 Waters to Watch List.

Further Reading

- Reid, S.B. and D.H. Goodman (2020) Natural Recolonization by Pacific Lampreys in a Southern California Coastal Drainage: Implications for Their Biology and Conservation. North American Journal of Fisheries Management.
- US Fish & Wildlife Service Pacific Southwest Region Boots in the Water Project Profile. Clearing the Way for Pacific lamprey return to their southern range.
https://www.fws.gov/cno/newsroom/featured/2018/lamprey_of_san_luis_obispo_creek/
- National Fish Habitat Partnership (2020) Listing of Waters to Watch – Project Profile
<http://www.fishhabitat.org/waters-to-watch/detail/san-luis-obispo-creek-california>
- San Luis Obispo Tribune article (Joe Johnston) on lamprey recolonization in SLO Creek. <https://www.sanluisobispo.com/news/local/environment/article225234550.html>
- Creeklands Project Description: Lower San Luis Obispo Creek Fish Passage (Marre Weir)
<https://creeklands.org/projects/lower-san-luis-obispo-creek-fish-passage/>

Photos



Adult lamprey building a nest (redd) in San Luis Obispo Creek in Central California (SLO Tribune article). Credit. D. Baldwin (California Department of Fish and Wildlife)



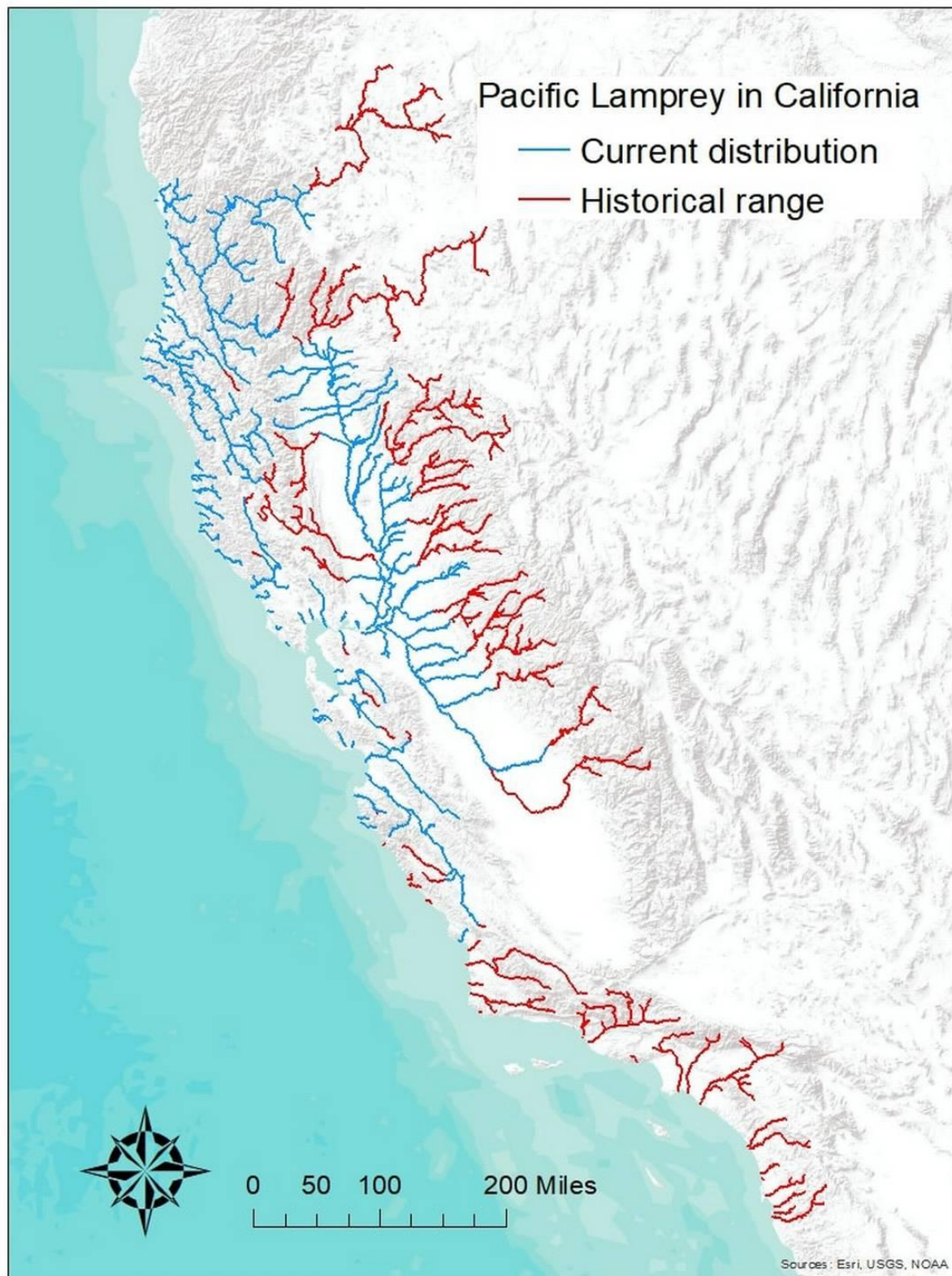
Damon Goodman, US FWS biologist, studies where lamprey in small gravel of San Luis Obispo Creek. (SLO Tribune article). Photo credit. D. Baldwin (CDFW).



Lamp Ramp installed near the mouth of San Luis Obispo Creek in 2013. Photo courtesy of City of San Luis Obispo.

Current and Historic Range

While lampreys historically occupied streams from Baja to Alaska, their range has contracted over the past century, but they are generally present at this time in all larger coastal south to San Luis Obispo. Recent sightings have occurred in rivers further south, and reproduction was recently confirmed in the Santa Margarita River in San Diego County.



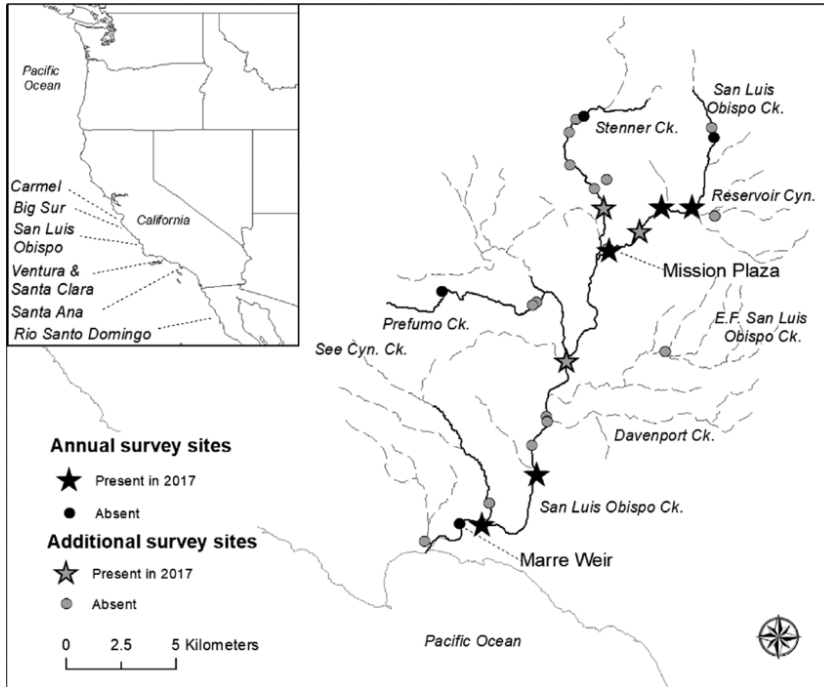
How well did the fish passage project achieve its goal?

Monitoring Scope

The Pacific Lamprey Conservation Initiative and Central Coast Working Group will monitor Pacific lamprey in San Luis Obispo Creek with continued field surveys and the video monitoring system installed at the weir in 2019. City of San Luis Obispo biologists will monitor adult lamprey return numbers and redd locations in San Luis Obispo Creek mainstem and tributaries. The City of San Luis Obispo and California Polytechnic State University will study the ecological niche that lamprey fill in the stream system, including their potential to reduce pathogens in the creek.

Monitoring Observations: Methods, Results and Conclusions (Reid and Goodman, 2020)

Eight sites were selected in San Luis Obispo Creek mainstem and tributaries to survey for Pacific lamprey ammocoetes (larvae). Sites were selected to provide broad coverage of the entire drainage and availability of suitable perennial rearing habitat. Presence surveys were performed by electrofishing under conditions producing >90% probability of detection of ammocoetes. Survey methods followed Reid and Goodman (2015).



Results

TABLE 1. Results of the annual monitoring surveys for Pacific Lampreys in the San Luis Obispo drainage and observations of adult spawning activity, 2011–2019.

Results	2011 May	2012 Mar	2013 Aug	2014 Jul	2015 Nov	2016 Oct	2017 Oct	2018 Jul	2019 Nov
Sites surveyed (<i>n</i>)	6	14	13	14	13	12	15	10	10
Ammocoetes present							Yes	Yes	Yes
Sites with ammocoetes	0	0	0	0	0	0	8	5	5
Adults observed							Yes ^a	Yes ^a	Yes ^a

^aIn Mar–Apr.

From Reid and Goodman (2020).

Summary and Conclusions

- Pacific lamprey ammocoetes (larvae stage) were not observed in the annual surveys until October 2017. They were considered extirpated from the basin from 2011 to 2016 based on 72 individual site surveys over six years in the SLO mainstem and tributaries.
- Presence of ammocoetes was documented starting in October 2017 at up to half of the sites tested in mainstem and tributaries.
- Adult lampreys were first documented in March 2017, and each following year. This indicates that ammocoete pheromones are not required for recolonization, and that natural recolonization can occur quite rapidly once migration barriers are removed.
- Redds were documented in Stenner Creek in 2019 demonstrating real-time reproduction. Monitoring groups included Central California Lamprey Working Group (City of San Luis Obispo and CDFW), California Conservation Corps, City of San Luis Obispo (Freddy Otte and co-workers), U.S. Fish & Wildlife Service.
- This study demonstrates that P. lamprey can recolonize waterways in which they have been extirpated for generations, without active re-introduction.
- Conservation efforts should focus on removing barriers to passage between ocean and freshwater reproduction sites, and providing sufficient stream flow.
- Pacific lamprey exhibit dynamic distribution patterns, particularly at the southern end of their range.