



Global Re-introduction Perspectives: 2010

Additional case-studies from around the globe
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IUCN/SSC Re-introduction Specialist Group (RSG)





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Colorado pikeminnow re-introduction and population augmentation in rivers of the Western USA

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Introduction

The Colorado pikeminnow (*Ptychocheilus lucius*) attains sizes well over 1.5 m length and 35 kg weight. This species is a large river fish that migrates long distances for spawning. The Colorado pikeminnow is endemic to the Colorado River basin of the western USA and was listed as endangered in the original US Endangered Species Act of 1973. The IUCN classifies this species as vulnerable to extinction and recent population estimates indicate it remains in need of national protection. The largest population (6,000-8,000) of Colorado pikeminnow occurs in the Green River where reproduction has been repeatedly documented. The upper Colorado River is believed to support reproduction and has a population estimated to be from 600-900 adults and some subadults. The San Juan River, a tributary of the Colorado River discharging into Lake Powell (Glen Canyon Dam), had a small number of individuals (<50) with no or very limited reproduction in the 1990s. A key goal for recovery of the species is to achieve self-sustaining populations in each of these three rivers. The upper Colorado River had hatchery produced Colorado pikeminnows stocked for two years, and the San Juan has had an intensive and long-term stocking program since 2002.

Goals

- Goal 1: Establish Colorado pikeminnow in river reaches no longer producing juvenile fish.
- Goal 2: Accelerate population recovery in the unpopulated reaches upstream of the diversion dams.



Colorado Pikeminnow © US Fish and Wildlife Service

- Goal 3: Evaluate dispersal and retention of stocked juvenile Colorado pikeminnow and determine habitats needed for rearing.
- Goal 4: Add genetic diversity to the existing gene pool and establish a refuge population in suitable river reaches.

Success Indicators

- Indicator 1: Retention of stocked juvenile fish in target river reaches.
- Indicator 2: Document spawning success and recruitment of sub-adults to adults.

Project Summary

The Colorado pikeminnow is a long-lived fish (40+ years) that persists in river reaches that have been isolated by diversions and dams and no longer support the entire life cycle of the species. Augmentation of these small remnant populations with cultured fish was planned as experiments to determine the feasibility of rebuilding populations with hatchery-produced individuals. Two years of stocking juvenile fish (2,000-3,000 annually) was conducted and evaluated in the upper Colorado River basin where a small population was present and reproduction was documented. An aggressive, long-term (eight year) program of population augmentation (300,000 annual stocking objective) was implemented in the San Juan River where few fish were present and no reproduction was detected in field studies. Colorado pikeminnow stocked in the upper Colorado River failed to stay in the targeted river reaches. Most or all stocked fish dispersed downstream out of the study areas, and none were recaptured near stocking locations. Some were recorded in water diversion canals drained after the growing season. High mortality was also suspected for stocked fish, and some may have moved downstream into impounded waters not regarded as suitable habitat. Following these findings, Colorado pikeminnow population augmentation was considered unsuccessful and suspended in the upper Colorado River. Construction of fish passage facilities and screening water diversions were regarded as more effective management practices for rebuilding Colorado pikeminnow populations in the upper Colorado River. Initial evidence for success of these practices has been obtained.

In the San Juan River Colorado pikeminnow were re-introduced using all early life history stages: eggs, larvae, young of the year, and juveniles up to age five. The annual stockings were tracked to determine the extent and rate of dispersion and the fate of stocked fish. Experiences indicated that traditional fish hauling and stocking techniques might contribute to rapid downstream dispersal. Consequently a release strategy was developed to minimize immediate passive downstream dispersal. Cultured fish were acclimated in river water, and moved in live wells by rafts to multiple low-velocity, off-channel habitats for one or more days prior to release. The more intensive and long-term population augmentation in the San Juan River initially found rapid downstream dispersal out of target river reaches that suggested a poor chance of success. However, after several years of intensive stocking, evidence of survival of re-introduced fish began to emerge from field monitoring. Stocked Colorado pikeminnow have been documented to survive multiple years and the number of fish in the river has been steadily

increasing from year to year. Re-introduced juveniles recently began to reach adulthood and some natural reproduction and larvae have been documented. Therefore, population augmentation by intensive stocking is now resulting in some fish completing their life cycle in the river. Thus the population augmentation by stocking is resulting in an increasingly secure population of Colorado pikeminnow in the San Juan River, and being considered an effective strategy for population recovery.



Upper Colorado River, Moab, Utah @ Mark Bain

Major difficulties faced

- Numerous dams and large reservoirs regulate river flows, alter sediment dynamics, change water temperatures, and disrupt habitat formation processes.
- Non-native fishes dominate the rivers and pose serious predation and competition in low velocity habitats that are the key nursery areas for larval and juvenile Colorado pikeminnow.
- Diversion structures and dams fragment the rivers, block migrations, and threaten dispersing young fish.
- Restoration programs must advance recovery of the Colorado pikeminnow and other endangered species and be compatible with intensive water use and further water supply development.
- The key measure of success is establishing secure, self-sustaining populations and many years will be needed to confirm this conclusion.

Major lessons learned

- Re-introduction and population augmentation can be an effective option for fish species recovery.
- Conservation strategies appear to require many years of consistent effort to judge effectiveness.
- Conservation programs should experiment with a broad range of practices and include most or all life stages.
- Monitoring the distribution and fate of re-introduced fish is essential to learn from and assess conservation programs.

Fish

Success of project

Highly Successful	Successful	Partially Successful	Failure
	√		

Reason(s) for success/failure:

- Re-introduction and population augmentation appears to be succeeding in one case and failed in another case.
- Not enough time has passed to fully realize and document the establishment of a secure and self-sustaining population.
- Evidence from monitoring has documented some success criteria but not all.

References

Numerous reports, papers, and newsletters available from the Upper Colorado River Endangered Fish Recovery Program <http://www.coloradoriverrecovery.org/> were used to develop this review.