



United States Department of the Interior

NATIONAL PARK SERVICE

Water Resources Division
1201 Oak Ridge Drive, Suite 250
Fort Collins, CO 80525

Preliminary Response to Technical Assistance Request

To: Mark Miller, Chief of Natural Resources, Arches National Park (ARCH), Utah
From: (Carl) Nicolas Medley, Aquatic Ecologist/Fisheries Biologist, Aquatic Systems Branch, WRD-NRPC-WASO-NPS, Fort Collins, Colorado
Re: Technical Assistance Request 1096: "Mitigate threats to native amphibian populations from exotic bullfrogs in Salt Wash and Courthouse Wash, Arches National Park
Date: May 29, 2013

TAR Problem Statement

Arches National Park submitted a NRSS Technical Assistance Request (TAR #1096) on 11/22/2011. The Problem Statement reads: "Exotic bullfrog populations have become established in Salt Wash and Courthouse Wash -- two high-value riparian-aquatic systems in Arches National Park. Bullfrog populations appear to be increasing in size and spatial extent, and thus have increasing potential to adversely impact populations of native amphibians including uncommon leopard frogs. We have an urgent need for a wildlife ecologist with appropriate expertise to assess the current situation and provide recommendations for plausible / practical actions that may be taken to control bullfrogs or otherwise mitigate risks to native amphibian populations." (Carl) Nic Medley, Aquatic Ecologist for NRSS Fisheries Program, is assisting the park; carl_medley@nps.gov; (970) 225-3587.

Presence of non-native fish also threatens native amphibian populations

While the increasing bullfrog population is almost certainly having a serious negative impact on native amphibian populations and must be controlled, historic fish surveys have also confirmed the presence of non-native fish in permanent reaches and spring sources within Salt Wash and Courthouse Wash including fathead minnow, red shiner, and plains killifish (see Table 1). In one of these studies (Conner and Kepner, 1983), non-native carp and yellow bullhead were also found near the confluence of the Colorado River in both drainages. An observation in the Summer of 2010 of "catfish" (Medley and Wullschleger, NPS Fisheries Program, Fort Collins) in the ponded habitat near the Wolfe Ranch suggests that yellow bullhead may now have invaded some permanently wetted habitats within the park. The presence of non-native fish that may prey on native tadpoles (red shiner, yellow bullhead) is also likely to pose another significant risk to native frogs. In order to establish the potential threat that non-native fish pose and to develop a management plan that will comprehensively address multiple threats to native species, an updated fish survey is needed.

Need for a long-term bullfrog and non-native fish control program

The presence of bullfrogs and predatory, non-native fish, and their association with permanent water sources used by native frogs, indicates that removal and eradication of bullfrogs and non-native fish is necessary to lessen and/or remove the threats to native frogs, tadpoles, other amphibians and other native aquatic species (Ostracoda, aquatic macroinvertebrates?). Establishment of both bullfrogs and non-native fish likely occurred from source populations in the Colorado River. Fish were either directly introduced in perennially wetted habitats or moved upstream when stream-flow in the wash was connected to the

Colorado River during spring runoff or rainstorm events. Bullfrogs dispersed upstream by moving overland between permanent water bodies as post larval juveniles and adults. While both animal types require permanent water, the ability of bullfrogs to spend time out of water and to disperse overland requires that different, but complimentary and overlapping management approaches will be needed to address both threats to native amphibians. However, since the source populations of bullfrogs and non-native fish in the Colorado River cannot be fully controlled, it will never be possible to fully remove the threat to native amphibians. While initial control efforts may significantly reduce bullfrog and non-native fish populations, subsequent long-term (seasonal/annual?) control efforts will always be required to keep bullfrog and non-native fish populations in check.

Possible long-term strategies to remove/control bullfrogs and non-native fish include;

Bullfrogs;

- Remove egg masses in spring
- Electrofish/seine net/hoop net/dip net bullfrog tadpoles in the Fall after metamorphosis of native frogs when the extent of wetted habitat is minimal, and in early Spring prior to breeding.
- “Headlight” (with headlamp or light attached to gun barrel) and gig, or shoot juvenile and adult bullfrogs on the stream bank, at night, throughout year, using either a high powered pellet gun, or a bolt-action .22-caliber rim-fire rifle and dust-shot or sound-suppressed bullets (Aguila brand).
- Electrofish adult frogs and large tadpoles in spring during cool weather, prior to breeding

Non-native fish;

- Selective removal of non-native fish by electrofishing, seining netting, hoop netting, and minnow traps throughout the year, but focusing effort in the Fall and early Spring prior to fish spawning.

Other Considerations:

- Conduct suppression activities from upstream to downstream and focusing on areas close to permanent water
- If an opportunity arose to chemically treat (rotenone) each wash to remove all fish and bullfrog tadpoles in the entire drainage, a fish barrier would need to be constructed to prevent the upstream movement of fish from the Colorado River. Native fish could be (re?)introduced into permanently wetted habitats. While this approach may permanently remove non-native fish, it cannot permanently remove bullfrogs which will reinvade overland.

Initial Recommendation

- Conduct fish survey at previously surveyed sites, to document current bullfrog tadpole and fish distribution and relative abundance. Once this information is obtained it may be used to develop a general aquatic resources management plan and a plan for the removal/control/eradication of bullfrogs and non-native fish.

Proposed Fish/bullfrog Survey, Fall 2013:

In order to better understand the potential impact that non-native fish and bullfrogs may have on native amphibians and other native fish, a presence/absence/relative abundance fish and bullfrog survey is proposed to be conducted in Salt and Courthouse Wash, in September/October, 2013. It is proposed that this survey be conducted in cooperation with staff of the Utah DWR. Sites to be surveyed will be consistent with those previously sampled. Fish and tadpoles will be sampled in a predetermined length of habitat, using a combination of electrofishing, seine netting, hoop netting and minnow traps, as the habitat requires. Fish will be counted, identified to species and their total length measured. Bullfrog tadpoles will be counted. All non-native fish and bullfrog tadpoles will be euthanized.

Proposed sampling sites:

Salt Wash:

1. Salt Wash, 100 yards upstream from confluence with Colorado River
2. Salt Spring
3. Salt Wash at road crossing to Delicate Arch parking lot
4. Salt Wash 100 feet below confluence with Freshwater Canyon
5. Freshwater Canyon
6. Salt Wash, 1 mile above confluence with Freshwater Canyon

Courthouse Wash (sampled only if permanent water confirmed to be present):

1. Courthouse wash at pool at gaging station
2. Courthouse Wash ~3 km above gaging station
3. Courthouse Wash, ~500m below park road
4. Courthouse Wash, ~4.5km above park road
5. Courthouse Wash, ~6km above park road

Table 1. Summary of historic fish survey data collected from Salt Wash and Courthouse Wash, Arches National Park

Study	Site	Location	Year	Speckled Dace	Flannemouth sucker	Bluehead sucker	Fathead minnow	Plains Killifish	Red shiner	Yellow bullhead	Carp	Largemouth Bass	Order Upstream from Colorado River
Salt Wash													
Conner	C1	100 yd upstr Colorado	1983	15	47	10	22	9	65	3	7		1
Webb	W10	300 ft upstr Colorado	1988				Present	Present	Present				1
Selby	S1	Lower SW	1979	Present	Present		Present	Present					2
Selby	S2	Salt Spring	1979	Present									3
Conner	C2	Salt Spring	1983				21	15					3
Webb	W9	Salt Spring	1988	Present									3
Webb	W8	SW 300 ft upstr from Salt Sprng	1988					Present					4
Webb	W4	Wall spring August 13	1988					Present					5
Webb	W5	Wall spring August 14	1988					Present					5
Webb	W3	Upsstr Wall Spring South	1988					Present					6
Webb	W2	Upsstr Wall Spring North	1988					Present	Present				7
Conner	C3	SW below Wolfe	1983										8
Conner	C4	SW Road to DA	1983		2		98	8	1				9
Selby	S3	SW at Wolfe Cabin	1979				Present	Present					10
Webb	W1	500 ft upstr above DA footbridge	1988					Present	Present				11
Conner	C5	SW 100ft below conf FW Canyon	1983				234	10					12
Selby	S4	FW Canyon	1979				Present						13
Conner	C6	SW 1 mile above conf FW Canyon	1983				422	132					14
Courthouse Wash													
Conner	C7	Pool at Gaging Station	1983		3			12	38	19		2	1
				Native Fish			Non-native Fish						

Selby: Selby and Holden. 1979. Survey of Fish, Invertebrates and algae in Salt Wash, Arches National Park. BioWest Inc, Logan Utah .

Conner: Conner and Kepner. 1983. Arches and Canyonlands National Park Aquatic Study.

Webb: Webb. 1988. Chemical and biotic survey of Salt Wash, Arches National Park, August 13-15, 1988.