

**SHINUMO CREEK, SHINUMO INFLOW, AND INVASIVE SPECIES SURVEILLANCE  
MONITORING  
September 3 – 12, 2019  
TRIP REPORT**



Photo: A large speckled dace (*Rhinichthys osculus*) measuring 130 mm total length captured and released in Shinumo Creek, September 2019. NPS Photos by Brian Healy.

**Report Prepared for the Upper Colorado Region, Bureau of Reclamation, Interagency  
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## INTRODUCTION

Juvenile humpback chub (*Gila cypha*) were translocated from the Little Colorado River to Shinumo Creek between 2009 and 2013 to provide a rearing opportunity for juveniles and potentially develop a second spawning population in Grand Canyon (Table 1). Humpback chub translocations are a conservation measure included in multiple Biological Opinions on the Bureau of Reclamation's operations of the Glen Canyon Dam, including the Long Term Experimental and Management Plan (LTEMP, U.S. Department of Interior 2016). The translocation project is funded by the Bureau of Reclamation and the National Park Service, and involves assistance and coordination with the U.S. Fish and Wildlife Service and the U.S. Geological Survey- Grand Canyon Monitoring and Research Center. In addition to the contributions of many volunteers, the Grand Canyon Conservancy has also provided valuable assistance to the program through Direct Aid Grants and a grant from the Arthur L. & Elaine V. Johnson Foundation, which have primarily been used to fund research technicians (Table 2).

This report describes monitoring observations made during September 6-11, 2019, for the purpose of characterizing the current distribution of fishes within Shinumo Creek, assessing habitat conditions following the Galahad Fire and flood of 2014, and determining the presence of translocated humpback chub in the Shinumo Creek Inflow of the Colorado River. Translocations were ceased following an ash-laden 2014 flood, which extirpated most fishes, removed bank vegetation, and deposited fine sediment throughout the channel, causing aggradation (Healy et al. 2014). Following snorkeling observations in June, 2019, which revealed the presence of invasive rainbow trout (*Oncorhynchus mykiss*) in the lower reaches of Shinumo Creek, it was determined that electrofishing surveys would assist managers in prescribing future native fish restoration, and inform future humpback chub translocations.

In addition, invasive species surveillance monitoring, prescribed in the Comprehensive Fisheries Management Plan for Grand Canyon National Park and Glen Canyon National Recreation Area (CFMP; U.S. Department of Interior 2013), which was conducted during the runout from Shinumo Creek, is described. The monitoring protocol and long-term objectives for the project are described in the CFMP, and the LTEMP (U.S. Department of Interior 2016).

### Trip Objectives

1. Assess the fish community and status of Shinumo Creek post-fire/flood via electrofishing, and surber sampling for aquatic invertebrates.
2. Sample the mainstem area between Bass and Shinumo rapids using hoop nets.
3. Remove non-native fish if encountered, and put fish to "beneficial use" when practicable and safe (consistent with CFMP and NHPA Section 106 obligations).
4. Inform the development of alternatives for the upcoming non-native fish EA being managed by IMR staff.
5. Re-install temperature logger and take a streamflow measurement near the gauge.
6. Conduct aquatic invasive surveillance monitoring at Kanab Creek, and Granite Park Slough (time permitting).
7. Provide outreach to interested parties along the river.

## METHODS

### Logistics and Personnel

A summary of logistics and the itinerary are provided in Table 3. On September 3rd, Ceiba Adventures rafts launched from Lees Ferry, and on September 5th, trip participants hiked to Phantom Ranch to join the contracted motorized raft crew, including a 37-foot s-rig and a snout (Table 2). Camp was established at Inscription later that afternoon. Hoop-netting was initiated beginning the afternoon of September 6<sup>th</sup>, by setting and checking twenty baited nets each day, through the morning of September 9<sup>th</sup>, when we moved downriver toward Kanab Creek. Hoop nets were first set in the lower section, nearest Shinumo Rapid, followed by the middle section, and the upper section just below Bass Rapid at Inscription Camp.

Also beginning on September 6th, a 5-person crew initiated electrofishing in the furthest downstream reaches (1 and 2), and sampled aquatic macroinvertebrates at three established sites between reach 1/2 and 4 in Shinumo Creek. The first electrofishing site (site #4) was established at the boundary of reach 1 and 2, and following the completion of macroinvertebrate sampling and electrofishing at site #4, the crew proceeded downstream to the waterfall to sample sites 1-3. The rest of the electrofishing sites were selected and sampled sequentially in an upstream direction. Electrofishing sites were chosen to repeat sampling conducted in September, 2017, to the extent possible, however 2017 site descriptions were unclear in the NPS fisheries database. A site description is included in Table 4. The crew also replaced a continuous temperature recorder near the gauge site, approximately 200 meters upstream of the Shinumo Creek waterfall.

## RESULTS AND OBSERVATIONS

### *Colorado River Fish Sampling*

Captures of all fish sampled in hoop-netting in the Shinumo Creek inflow reach (including below the waterfall in Shinumo Creek) are displayed in Table 5. A larger number of humpback chub were captured, compared to the June trip (20 vs. 3), and individuals captured included a representation of cohorts translocated to Shinumo Creek in 2009 (2 individuals), 2010 (2), and 2013 (1). Humpback chub were primarily larger individuals (Figure 1). An additional recaptured humpback chub was translocated to Havasu Creek in 2012. Catches of invasive rainbow trout were relatively low (2), as were native bluehead sucker (*Catostomus discobolus*) – a preliminary review of data sheets suggested that zero were captured. Rainbow trout were humanely euthanized.

### *Shinumo Creek Electrofishing*

Electrofishing was conducted in Shinumo Creek from the waterfall ~200 m from the mouth of the creek through reach 5 to determine fish distribution and catch rates. As noted in June, 2018 (Healy and Koller 2019), rainbow trout had reinvaded Shinumo Creek in its entirety, which was confirmed by electrofishing. However, trout captures were low in the downstream reaches, relative to electrofishing catch rates in upstream sites, and compared to numbers observed during snorkeling surveys in June. Rainbow trout seem to be represented in at least two age-classes

(Figure 2). Water temperature during the afternoon in reach one was 29.5°C, and only 24.5°C during the afternoon in reach 5, which suggests that warm temperatures may be limiting trout downstream, as upper lethal limits may exist between 22 - 26°C (reviewed in Ebersole et al. 2001). Speckled dace (*Rhinichthys osculus*) were numerous in all stations, including some large individuals (e.g., 130 mm total length).

#### *Macroinvertebrate monitoring*

Three macroinvertebrate samples were taken during electrofishing in Shinumo Creek. The samples were collected prior to electrofishing in the site (see Table 4), to avoid stimulating drift or dislodging invertebrates from the substrate. Corydalids, a potentially important food item for humpback chub (Spurgeon et al. 2015), were evident in each sample, as were representatives of Ephemeroptera, Plecoptera, and Trichoptera orders. Numerous samples have been taken since 2014, however no samples have been lab-processed, as of yet. Nevertheless, abundant and diverse invertebrate communities appear to be present in Shinumo Creek, relative to the period immediately following the fire and flood impacts (B. Healy, personal observation). Sufficient samples appear to be available to adequately describe temporal changes in the macroinvertebrate community and make pre- and post- fire/flood comparisons of the food base for future humpback chub translocations.

#### *Rainbow trout diets*

Due to heat, and lacking cool water to keep fish cool for human consumption, it was logistically infeasible to preserve invasive rainbow trout captured using electrofishing for later human consumption. In an effort to gather as much data as possible from rainbow trout that were humanely euthanized, stomach contents of all but three individuals was recorded ( $N=114$  stomachs examined). Sixty-six percent of individuals' stomachs contained 1-6 dobsonfly larvae ("hellgrammites"; Megaloptera:Corydalidae), which is a large, long-lived insect that had not been observed in post-fire/flood Shinumo Creek in large numbers until this sampling event (B. Healy, personal observation). These larvae were readily observed, weakly swimming or drifting in the water column. While speckled dace were abundant, only two (1.7%) rainbow trout stomachs contained fish. Other items found were pebbles, cicadas, grasshoppers, ladybugs, algae, and other small macroinvertebrates.

#### *Invasive Species Surveillance*

At Kanab Creek, seining revealed the presence of young-of-year (YOY) of three invasive species, including plains killifish (*Fundulus zebrinus*), fathead minnow (*Pimephales promelas*), and green sunfish (*Lepomis cyanellus*; Table 5). An additional YOY sunfish (*Lepomis sp.*) was captured, but a positive identification could not be made in the field. Three native fishes, bluehead sucker, flannelmouth sucker, and speckled dace, were also captured (Table 5). Given their distribution in the creek, and young age, it is likely all species were successfully spawning in Kanab Creek. The collection of sunfish was not unexpected, as historically, a small number of individual sunfish had been seen in the area (Healy 2018).

At the Granite Park slough (river mile 209, river left), no native fishes were sampled, and fathead minnow and plains killifish were the only species captured. In addition, a live adult Quagga mussel was observed by a GCC technician. The slough did not appear to be connected to the Colorado River by surface flow, and was quite stagnant.

## Problems Encountered and Suggestions for Future Trips

- Ethanol ran low for preservation of macroinvertebrate samples. A liter would probably be sufficient on future trips if monitoring continued.
- Macroinvertebrate sampling since 2014 appears adequate to document temporal changes and recovery of the community. Consider discontinuing additional sampling and secure an agreement or funds (if necessary) for a lab to process the samples. Prior samples have been provided to USGS-Grand Canyon Monitoring and Research Center.

Table 1. Number and size of humpback chub released into Shinumo Creek, Grand Canyon, between 2009 and 2013.

Year	Mean total length (mm)	Mean weight (g)	Number Released
2009	127.9	18.7	302
2010	121.1	15.3	300
2011	88.9	5.4	300
2013	123.3	14.8	200

Table 2. Trip participants and affiliation, September, 2019.

Name	Affiliation
Jorge Visser	Ceiba, boat operator
Nate Alvord	Ceiba, boat operator
Bryce Mosher	Ceiba, assistant
Brian Healy	GRCA, Fisheries Program Manager
Taryn Schreiner	Grand Canyon Conservancy technician
Susan Wood	Grand Canyon Conservancy technician
Jenna Norris	Volunteer
Rebecca Koller	GRCA, Fisheries Lead Technician
Melissa Steller	GRCA, Vegetation Technician
Jenna Keaton	Volunteer – Utah State University Research Assistant
Dan Shein	Volunteer

Table 3. Itinerary for the monitoring trip.

Day	Date	Activity
1	9/3/19	Launch
2	9/4/19	Run-in, Ceiba staff only
3	9/5/19	Pickup fisheries crew at Phantom, motor to Inscription camp (RM 108)
4	9/6/19	Set hoop nets, Shinumo Inflow/Colorado; electrofishing sampling in Shinumo Creek
5	9/7/19	Check hoop nets, Shinumo Inflow/Colorado; electrofishing sampling in Shinumo Creek, Set hoop nets, macroinvertebrate sampling, re-install temp. logger
6	9/8/19	Check hoop nets, Shinumo Inflow/Colorado; electrofishing sampling in Shinumo Creek, macroinvertebrate sampling
7	9/9/19	Check hoop nets, proceed downstream, camp, RM 136
8	9/10/19	Invasive fish surveillance – Kanab Creek, camp RM 177
9	9/11/19	Invasive fish surveillance – Granite Park Slough, RM 209. Camp RM 215
10	9/12/19	Take-out, Diamond Creek

Table 4. Electrofishing and macroinvertebrate site descriptions.

Site Number	Reach	Electro-fishing site length (m)	Sample type	Description
1	1	31.7	Electrofishing	Above waterfall
2	1	44.6	Electrofishing	Ended at plunge pool above gauge site
3	1	33	Electrofishing	below "Emily's pool" around bend
4	2	48	Electrofishing/ macroinvertebrates	reach 1/2 boundary
5	2	38	Electrofishing	red/flat large rock at old trail crossing
6	2	45.7	Electrofishing/ macroinvertebrates	downstream of split channel
7	2	29.9	Electrofishing	1/4 mile downstream of reach 2/3 boundary in cottonwoods
8	3	41	Electrofishing	At reach 2/3 boundary
9	3	43	Electrofishing	At "Scary Rock" near high trail junction
10	3	39	Electrofishing	Across trail and just downstream of Bass Camp dwellings
11	3	39.2	Electrofishing	Just below reach 3/4 boundary
12	4	52	Electrofishing/ macroinvertebrates	ended in former translocation pool tail-out
13	5	53	Electrofishing	Reach 4/5 boundary
14	5	31.5	Electrofishing	Approx. mid-day between sites 13/15
15	5	57.9	Electrofishing	Began at first trail crossing

Table 5. Captures of fishes by species, during hoop-netting in the Shinumo Inflow reach of the Colorado River from below Bass Rapid to above Shinumo Rapid, in Shinumo Creek and Kanab Creek, and in the Granite Park Slough, September, 2019 (preliminary data).

Species	Colorado River/Shinumo Inflow and lower Shinumo Creek (below waterfall) captures	Shinumo Creek	Kanab Creek seining	Granite Park Slough seining
<b>Native fishes</b>				
Bluehead Sucker <i>Catostomus discobolus</i>	0	0	1	0
Flannelmouth Sucker <i>Catostomus latipinnis</i>	271	0	39	0
Humpback Chub <i>Gila cypha</i>	20	0	0	0
Speckled Dace <i>Rhinichthys osculus</i>	5	2,853	21	0
<b>Invasive fishes or organisms</b>				
Green Sunfish <i>Lepomis cyanellus</i>	0	0	1	0
<i>Lepomis sp.</i> (young-of-year)	0	0	1	0
Rainbow Trout <i>Oncorhynchus mykiss</i>	2	117	0	0
Plains killifish <i>Fundulus zebrinus</i>	0	0	2	31
Fathead minnow <i>Pimephales promelas</i>	0	0	331	39
Mosquitofish <i>Gambusia affinis</i>	0	0	0	0
Common carp <i>Cyprinus carpio</i>	0	0	0	0
Quagga mussel	0	0	0	1

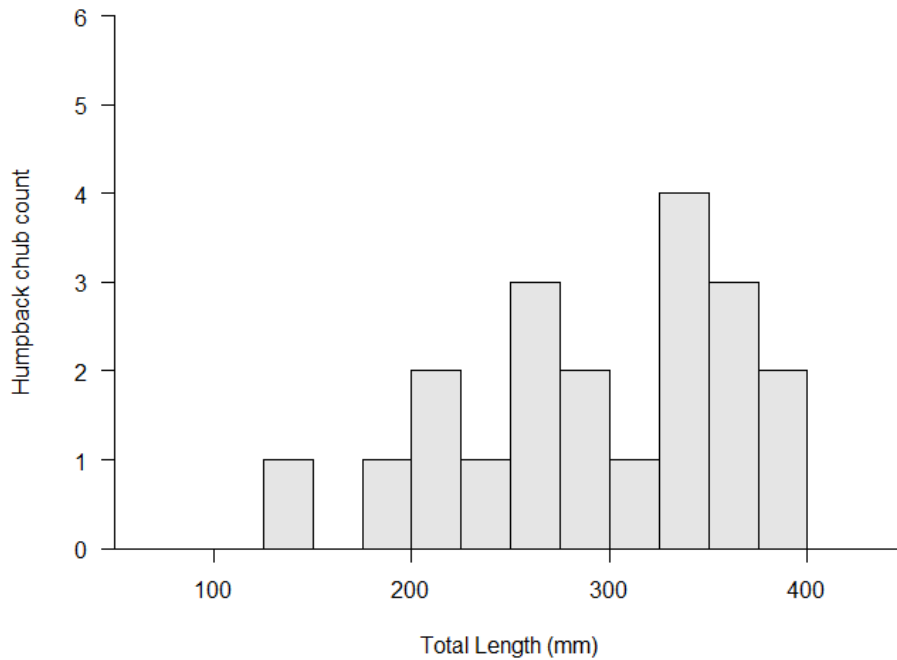


Figure 1. Size structure of humpback chub captured in the Shinumo Creek inflow reach of the Colorado River (N=20).

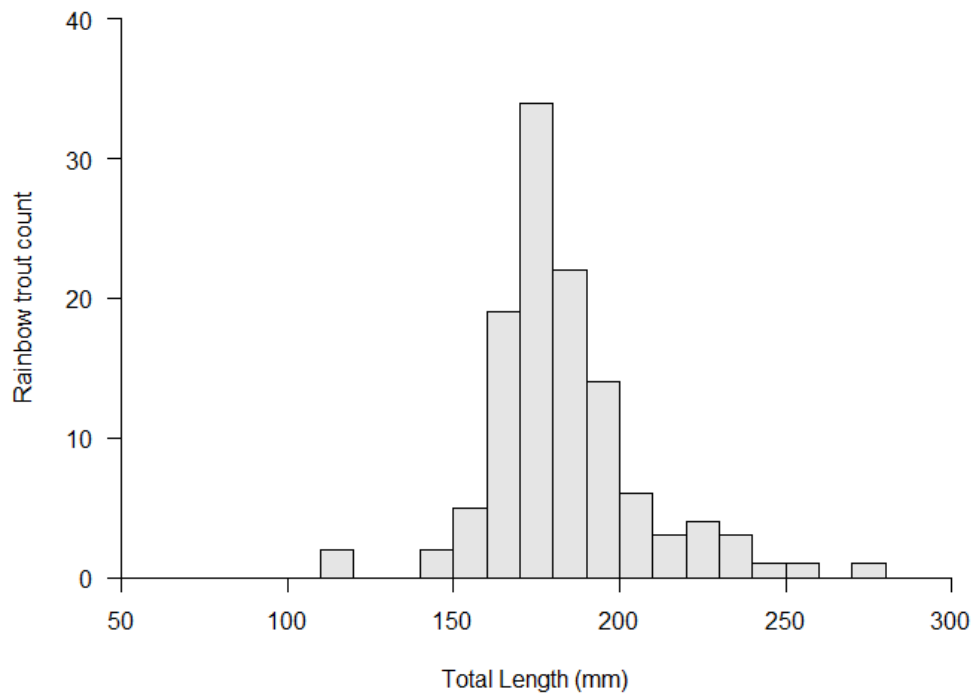


Figure 2. Size structure of rainbow trout captured and removed from Shinumo Creek via electrofishing ( $N=117$ ).

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