Green Sunfish Rapid Response Treatment

November 2-6, and November 12-13, 2015

Brief Treatment Summary

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Background

In July 2015, an unusually large number of nonnative green sunfish (GSF) were discovered in a large backwater in the Lees Ferry Reach (AGFD unpublished data). Agency biologists agreed that elimination of this invasive species from the backwater sloughs was necessary and urgent due to the risk of negative interactions with native fish, particularly the humpback chub. Two subsequent removal trips in August 2015 using electrofishing, seining and trapping failed to deplete the population despite removing over 3000 fish (Table 1). Agency biologists conferred and agreed that these methods were not likely to successfully eradicate this species from the area. While additional methods of removal and control were considered, an immediate need to contain the GSF was recognized. On Oct 7, 2015 biologists from NPS and AGFD constructed and installed a large block net at the downstream end of the main slough to minimize escapement of GSF until a more complete removal can be effected. Potential methods to eradicate GSF from Glen Canyon include mechanical approaches like electrofishing, netting, or concussive methods and chemical treatments such as piscicides. Of the methods evaluated to remove these fish, chemical treatments provided the greatest likelihood of success (Ward 2015). NPS and AGFD, with assistance from GCMRC and BOR began working towards a chemical treatment solution; however, the treatment could not be completed and determined to be fully successful before a fall 2015 HFE could be implemented in November due to the planning and State and Federal regulatory compliance that was necessary before initiating any chemical treatment. An HFE would have overtopped the slough and resulted in unacceptable downstream dispersal of the GSF. Thus, the HFE Technical Team recommended, and the Leadership Team approved, that no experimental HFE would be conducted this year. However, eradication of the GSF was still determined to be necessary and urgent; thus, NPS and AGFD completed the planning and compliance necessary to conduct a rotenone treatment . Two treatments were planned for November, about 10 days apart.

Treatment summary

The first treatment was conducted from November 2 to 6, 2015. Personnel from AGFD, NPS, FWS, GCMRC, BOR and Western participated in planning and implementation. Prior to the treatment, an impermeable barrier was installed to minimize water exchange from the slough to the river. Additional efforts to remove fish from the slough were made using electrofishing. A total of 785 GSF were removed, and frozen for future beneficial use except for some held back for use in bioassay tests. Totals of 42 carp, 134 rainbow trout, and 2 flannelmouth sucker were removed and released into the mainstem river. Some rainbow trout were held back for use as sentinel fish but died before the treatment, and were frozen to be provided as food for the Zuni Eagle Aviary. Tests (bioassays) done on Nov 3rd determined that a concentration of 1.5 ppm was needed to treat the sloughs. BOR and Western agreed to provide steady flows of 9,000 cfs for 3 days to facilitate the treatment. Rotenone was applied on Nov 4th beginning at about 11 am and fish were observed on the surface in about 30-45 min. Detoxification began the next morning and continued through the afternoon. Live trout were placed in cages in the sloughs to ensure that detoxification was successful. The project was considered complete and successful by 4 pm Friday, Nov 6th, when trout remained alive in the cages for 24 hours.

Dead fish were collected throughout the treatment and detoxification periods, counted, and kept for research (Table 1). A total of 1980 GSF were collected from both sloughs, primarily from the upper slough. The count of GSF compared with previous removal efforts will allow an estimate of the efficiency of our mechanical removals, and the accuracy of population estimates, thus serving a beneficial scientific use. The GSF were frozen in case a future beneficial use can be determined. A total of 239 carp were collected. Carp were scanned for PIT tags, and recaptured fish were processed to

remove otoliths, scales and a portion of the dorsal spine to be used to calculate the fishes' age. This information combined with previous capture information will allow analysis of growth, movement, and habitat occupied (sloughs, v. mainstem). The remainder of the carp were disposed of, having reached an advanced state of decay. Trout (192) were also scanned for PIT tags so that growth and movement could be evaluated. Since the trout were the most susceptible to rotenone and died first, and tend to decompose faster than the other species, the trout had to be discarded as no further beneficial use was possible. Discarded fish were taken to a landfill.

A second treatment was planned on November 14, to address fish that may have hatched after the first treatment. However, water temperatures in the sloughs declined more rapidly than expected. Air temperature, which largely drives water temperature, was about 10 degrees below normal for this time of year, and, the sloughs are positioned so that they do not receive any sunlight during the day, driving water temperatures down below the point that GSF could spawn, before the first treatment. The second treatment was not necessary because all of the GSF in the slough were killed during the first treatment or left prior to treatment because the mainstem was warmer than the slough. Sampling just prior to the planned second treatment found no live GSF larvae or adults in the sloughs. Reducing the number of treatments was in keeping with using the minimum chemical necessary, and reducing incidental death of invertebrates and non-target fish.

Despite our best efforts, we did not achieve full containment of the slough with the block net before the treatment. We believe that some of the GSF did leave the slough. A few have been captured outside the slough in the Lees Ferry Reach. Nonetheless, all of the participants believe that this was a worthwhile and important treatment to have done, as about 2000 GSF were removed during the treatment, mostly from the upper slough. The upper slough is isolated now but is likely to connect to the lower slough when daily fluctuations increase in December, which would have allowed further escape. If the sloughs are significantly reinvaded by GSF or other warmwater non-native fish before a more permanent solution can be implemented, additional treatments may be considered. A permanent solution is being considered and may include alteration of the sloughs to make the habitat unsuitable or inaccessible to future invasion.

Table 1. Preliminary counts of fish removed from the upper and lower sloughs, RM -12, Colorado River below Glen Canyon Dam, during pre-and post-treatment collections. (Compiled from AGFD trip reports, on site fish collections, and as reported by David Ward, USGS)

	Main Slough	**Upper Slough**
Pre-Treatment removal and salvage fish totals		
Green Sunfish	1855	2638
Carp	42	0
Rainbow trout	134	0
Flannelmouth sucker	2	0
Bluegill sunfish	0	0
Channel catfish	0	0
Post Treatment fish totals		
Green Sunfish	195	1785
Carp	131	108
Rainbow trout	192	0
Flannelmouth sucker	3	0
Bluegill sunfish	1	0
Channel catfish	1	0