

I. Project Title: *Standardization of Recovery Program Electrofishing Fleet*

II. Principal Investigator(s):

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III. Abstract: Testing of commercially available electrofishers for use in boat/raft mounted applications was finalized and published and provided the basis for selecting a single brand/model of electrofisher for use by the electrofishing fleet of the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) within critical habitat of the upper Colorado River basin (UCRB). Based on standardized electrode configurations of the fleet's electrofishing boats (two anodes, one cathode) and rafts (one anode, two cathodes), and their respective electrical system resistance, it was recommended that the ETS 1-D electrofisher equipped with the 72 amp option sustained power output across the range of water conductivities likely to be encountered (100 to 1,500 $\mu\text{S}/\text{cm}$) in the UCRB while operating at 60 Hz and 20-30% duty cycle.

IV. Study Schedule: Initial year: 2010 Final Year: 2013.

V. Relationship to RIPRAP:

- General Recovery Program Support Action Plan
 - V.A. Measure and document population parameters to determine status and biological response to recovery actions.
 - V.A. 2. Evaluate population estimates.
 - V.C. Develop and enhance scientific techniques required to complete recovery actions.
 - V.D. Establish sampling procedures to minimize adverse impacts to endangered fishes.
 - V.D.2. Implement scientific sampling protocols to minimize mortality for all endangered fish.
- To provide members of the Recovery Program's electrofishing fleet with information about electrofisher performance and control settings to achieve optimum power output to maximize fish capture while minimizing the likelihood of fish injury or mortality.

VI. Accomplishment of FY 2012 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Four electrofishers designed for use in boats: the VVP 15B and the GPP 5.0 (Smith-Root, Inc., Vancouver, Washington), the MBS 1D equipped with a 72 amp, high output current option (ETS Electrofishing, LLC, Verona, Wisconsin), and the MLES Infinity (Midwest Lake Electrofishing Systems, Inc., Polo, Missouri) were evaluated for their use in Recovery Program electrofishing boats and rafts equipped with standardized electrodes. The aluminum boat hull (~5.3-m-long, flat-bottom, john boat) served as the cathode and had two booms, each supporting 23 cm diameter anodic spheres. The booms extended 2.3 m from the bow and positioned the anodes 2 m apart. The whitewater rafts (4.3 m to 4.9 m in length) operated with a single, 23 cm diameter sphere that extended 1.4 m beyond the handrail. The two cathodes (each comprised of three, 0.6 cm diameter stainless steel cables, 1.2-m-long), one dropped along each side of the raft, were about 2 m apart and positioned 5 m aft of the anodic sphere. At 115 $\mu\text{S}/\text{cm}$ (i.e., equal fish and water conductivities), corresponding electrode resistances are 66 Ω for the boat and 162 Ω for the raft.

Output measurements for the four boat-electrofishers were performed at a pulse rate of 60 Hz. This frequency was tested because the setting is commonly available in commercial boat-electrofishers, it is recommended for PDC electrofishing to monitor a variety of nonsalmonid, warmwater fishes (Miranda 2005; Reynolds and Kolz 2012), it may induce taxis of fish toward the anode (Burkhardt and Gutreuter 1995), and its effects may be less harmful to non-target life stages or species of fish than higher frequencies (Holliman et al. 2003; Bohl et al. 2009; Miranda and Kidwell 2010). Duty cycles of 10-50% require the least peak power to immobilize fish Miranda and Dolan (2004), provided the highest margin between the power levels that narcotized versus tetanized fishes and allowed a larger radius of immobilization away from the anode. This range of intermediate duty cycles is considered to be less injurious to warmwater fishes (Dolan and Miranda 2004; Miranda and Dolan 2004), and duty cycles of 20-30% are associated with electrotaxis of fishes (Burnet 1959; Harbera et al. 2010), which tends to facilitate fish capture (Novotny and Priegel 1975; Burkhardt and Gutreuter 1995; Maret et al. 2007).

The Recovery Program began retrofitting its electrofishing fleet (boats and rafts) with ETS 1D-72A boat electrofishers in 2012. The initial results of field use for the ETS 1D-72A boat electrofisher was presented and discussed at the Nonnative Fish Workshop held in Grand Junction, Colorado in December 5-6, 2012. The manuscript summarizing the performance evaluation of the four boat-electrofishers was accepted for publication in the North American Journal of Fisheries Management (Martinez and Kolz 2013).

VII. Recommendations:

Complete the conversion of the Recovery Program's electrofishing fleet (boats and rafts) to the use of ETS 1D-72A boat-electrofishers in 2013. Conduct an electrofishing training course for Recovery Program personnel in 2013. Verify fish response thresholds for standard electrode configurations of Recovery Program electrofishing boats and rafts when operated with the ETS 1D-72A boat-electrofisher. Recommend initial boat-electrofisher controls settings based on fish response thresholds for Recovery Program boats and rafts

VIII. Project Status: Project is on track and ongoing.

IX. FY 2012 Budget Status

- A. Funds Provided: NFWF Section 7 funds up to \$10,000.
- B. Funds Expended: 174 hrs (October 2011 – September 2012) @ \$25 = \$4,350.
- C. Difference: Planned field work with crews did not take place as planned, but still needs to occur in 2013.
- D. Percent of the FY 2012 work completed, and projected costs to complete: N/A
- E. Recovery Program funds spent for publication charges: ~\$930.

X. Status of Data Submission (Where applicable): Not applicable.

XI. Signed: Patrick J. Martinez December 28, 2012

Principal Investigator

Date

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