I. Project Title: Smallmouth bass control in the White River

II. Bureau of Reclamation Agreement Number(s): #R12AP40032; R12PG40027

III. Principal Investigator(s):

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IV. Abstract: Control of nonnative fish in the upper Colorado River basin is essential to the recovery of endangered fishes. Smallmouth bass (*Micropterus dolomieu*) have been documented in the White River for over three decades, yet proliferation of this population has not occurred as in other systems. However, recent findings suggest that abundance of this problematic species is increasing, with evidence of successful recruitment. We conducted an initial investigation focusing on smallmouth bass removal in the White River as a precautionary measure to preclude potential population expansion in order to protect the robust native fish community. We determined that smallmouth bass densities are greatest in Colorado portions of the White River, including a large adult spawning population that is successfully reproducing (i.e., source population), and have proposed additional research and control measures to aid in future management of this population.

V. Study Schedule: FY 2012-2013

VI. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
III.A. Reduce negative interactions between nonnative and endangered fishes.

III.A.2. Identify and implement viable active control measures.

GREEN RIVER ACTION PLAN: WHITE RIVER

III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
III.A. Reduce negative interactions between nonnative and endangered fishes.
III.B.2. Preclude new nonnative species introductions, translocations or invasions to preserve native species dominance within critical habitat.

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

Task 1. Two smallmouth bass removal passes from Taylor Draw Dam to the Colorado/Utah border; June–July 2012

The spring runoff on the White River was very limited and short-lived in 2012. We had planned on conducting work for this project during June and July; however, due to lack of sufficient water to use rafts, we conducted passes in May and early June. Although we did not conduct two full passes of raft electrofishing removal as outlined in the scope of work, we used adaptive management during this project in order to remove the greatest number of smallmouth bass with our allotted effort. After conducting the first pass, we realized the vast majority of smallmouth bass were concentrated in the upper section of the study area (i.e., just below Taylor Draw Dam), and effort expended in this area would result in higher catch rates than effort exerted on lower reaches. Thus, we completed one full pass from Kenney Reservoir to the CO/UT state line (RM 72.1), and allocated the effort that would have been spent on a second pass, plus four additional days, to the upper sections of the study area (RM 103.4-93.6 and 93.6-87.6). It should also be noted that Colorado Parks and Wildlife provided crews to assist with 3 days of additional removal in the upper sections of the study area.

We removed 2,592 smallmouth bass from the White River between 9 April and 7 June 2012. Of these, 274 were removed during 3 passes of a Colorado pikeminnow population estimate (Project 128 which occurred from 9 April-4 May, passes for project 167 occurred from 14 May-7 June). We report smallmouth bass removed in Project 128 because that project is a Colorado pikeminnow population estimate in which nonnative fish removal is not reported. Of all bass removed (Projects 128 and 167 combined), catch comprised of 1,445 adults (≥ 200 mm TL) and 1,147 juveniles (< 200 mm TL; Figure 1). Smaller size classes (i.e., < 100 mm TL) were not captured in the earlier passes for Project 128, which is not surprising given that we did not see any spawning activity until mid-May, and so smallmouth bass < 100 mm TL might not have been present in the system when we sampled. We collected otoliths from 11 adult bass (295-440 mm TL) in order to have these samples analyzed if funding became available for microchemistry analysis aimed at identifying the origin of this relatively new population. Other nonnative fish captures of interest included a gizzard shad (TL=430mm) caught near Rangely during project 167, and a northern pike (TL=458mm) caught above Enron (RM

24) during a Project 128 pass.

We determined that smallmouth bass densities are highest in the uppermost section (i.e., RM 103.6-93.6) and taper off to relatively low densities after approximately 20 miles downstream of Taylor Draw Dam (Figure 2). Our data show that catch rates for the uppermost 10-mile reach is almost double the catch rate for the next 6 mile reach, and is 6 times that of the reach encompassing the next 12 miles (Figure 2). We did not see any evidence of depletion in any of the reaches we sampled more than once (Figure 3). We also concluded that spawning adult bass were more concentrated in the uppermost sections and gradually decreased until they were not detected below RM 75.5 (Figure 4).

Task 2. Two smallmouth bass removal passes from the Colorado/Utah border to Enron; June–July 2012 and 2013

As mentioned in task 1, the White River spring hydrograph provided limited opportunity to complete project objectives, thus we altered our study plan in order to maximize our removal efforts. Most notably, low flow conditions, in combination with limited access points, dictated our ability to complete two full passes in our designated reach (RM 72.1–24.0). Specifically, the only permitted entry point in Colorado for accessing the start point at the Colorado/Utah state line was located at RM 75.5. We determined that under the extremely low-flow scenario, it was not feasible to float (conditions did not allow the use of motors in this section) from this access point to the start point and electrofish from RM 72.1–66.5 (next possible put in) in the allotted time frame outlined in our scope of work. Therefore, we conducted two cataraft electrofishing passes from RM 66.5–24.0 from 20–31 May 2012. In addition, we completed one additional removal pass in this reach in conjunction with a Three Species sampling trip from 2–5 June 2012. Overall, given the smallmouth bass density gradient we observed (Figure 2), we are confident that this was a sound adjustment that likely did not significantly affect our results. The distinct pattern observed for reach-wide smallmouth bass catch rates (Figure 2) suggests that catch rates would be similar within the 5.6 river miles that was not surveyed as was observed below RM 75.5.

Smallmouth bass CPUE was minimal throughout the entire removal reach, only exceeding one fish/hour in the first two upstream sub-reaches (1.67 and 1.31 fish/hr respectively; Figure 2). Catch rates reflect much lower densities of smallmouth bass present in Utah portions of the study reach relative to densities observed near the Taylor Draw Dam (Figure 3). Similar to Colorado reaches, we did not observe any evidence of depletion during the three removal passes (Figure 3), with increased or stable catch rates for several sub-reaches (Figure 5). Despite low smallmouth bass abundance in Utah (43 bass total), we observed increased removal efficiency during passes two (17 bass) and three (14 bass). Fish capture was more effective upon the descending limb of the hydrograph when fewer habitats were available to sample and water clarity improved significantly.

Juvenile size classes (< 200 mm TL) dominated total catch of smallmouth bass in Utah

portions of the study reach. In fact, only five smallmouth bass exceeding 200 mm TL were captured in this reach (Figure 6) and a much different size structure was observed (N = 43; Mean ± SE = 165.8 ± 3.6; Range = 129–232 mm TL). Unlike the abundance of large adult bass in close proximity to Taylor Draw Dam (Figure 4), reproductive capabilities of smallmouth bass in lower reaches of the White River appear to be quite limited. However, it is important to note that suitable and similar habitat conditions exist in many downstream reaches, thus posing the potential threat of additional spawning congregations if substantial population expansion were to occur from high density areas upstream. Thus, it is fundamentally important that we better understand how smallmouth bass population expansion is occurring in this system and determine ways to prevent it.

An additional nonnative capture of interest during our efforts was a ripe male gizzard shad (TL = 435 mm) collected near RM 46 on 29 May 2012. We removed otoliths from this individual in the event that microchemistry analyses are pursued in the future.

Task 3. Data entry, analysis, and reporting

Recovery Program annual progress report (November 2012)

VIII. Recommendations:

- Our results suggest that high densities of smallmouth bass in the uppermost reaches near Taylor Draw Dam may serve as a source population to the rest of the White River and potentially the Green River if significant expansion were to occur. To evaluate population expansion, we propose PIT-tagging smallmouth bass throughout the study reach and using the newly constructed PIT tag antenna below Bonanza Bridge to monitor smallmouth bass movement in the White River. This information will further guide management decisions regarding the allocation of smallmouth bass control efforts in the White River. We would tag all smallmouth bass captured during the three passes of the Colorado pikeminnow population estimate (Project 128) in spring 2013 (in 2012 those three passes resulted in 274 smallmouth bass removed). From this we would attempt to generate a population estimate with subsequent captures; however, we do not want to advocate future mark-recapture population estimates during removal efforts. This approach would minimize the amount of smallmouth bass released back into the river compared to tagging bass later in the season when spawning would occur and removal efforts would be most effective.

- We recommend increasing removal effort in the upper sections of the White River and decreasing effort in the lower sections. This effort should be adjusted as more information is gathered about the status of the smallmouth bass population.

- We recommend incorporating additional stop points in the upper sections of the White River to better identify hotspots of smallmouth bass densities.

- We recommend the Recovery Program pursue funding for microchemistry analysis on smallmouth bass otoliths from the White River, to potentially determine origin of this population. Knowledge of the origin of this smallmouth bass population will aid in management actions in the White River and elsewhere.

IX. Project Status:

Project direction changes have been recommended based on initial findings. Otherwise, the project should be considered "on track and ongoing".

X. FY 2012 Budget Status

A. Funds Provided: $33,785
B. Funds Expended: $33,785
C. Difference: 0
D. Percent of the FY 2012 work completed, and projected costs to complete: 100%
E. Recovery Program funds spent for publication charges: $0

XI. Status of Data Submission (Where applicable):

We will submit all data to the database manager by December 2012.

XII. Signed:

Matthew J. Breen	October 30, 2012
Principal Investigator	Date
Aaron Webber	October 30, 2012
Principal Investigator	Date

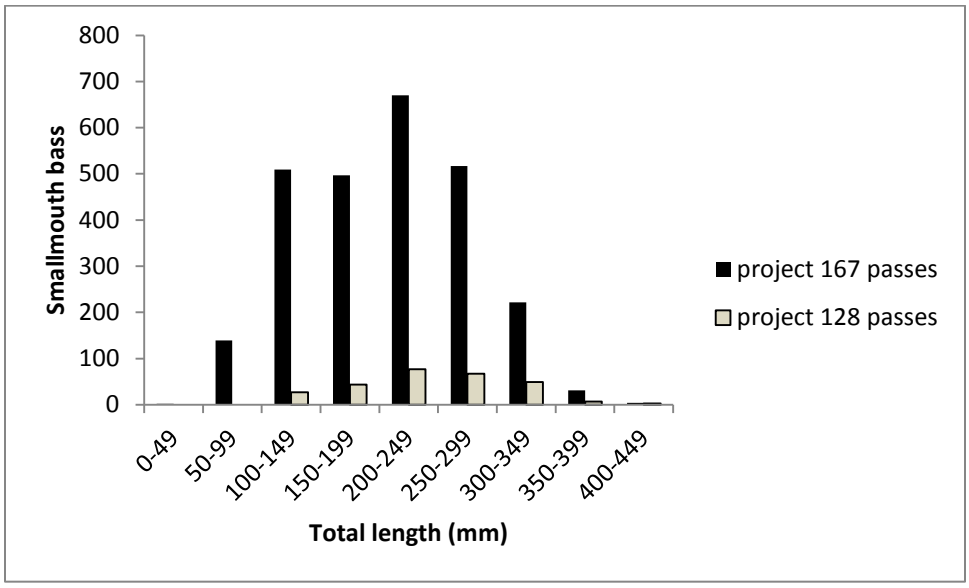

Figure 1. Length-frequency distribution of smallmouth bass removed from the White River in 2012 from passes conducted for Project 128 (9 April-4 May; RM 103.4-24) and project 167 (14 May-7 June; RM 103.4-72.1; Colorado portions only).

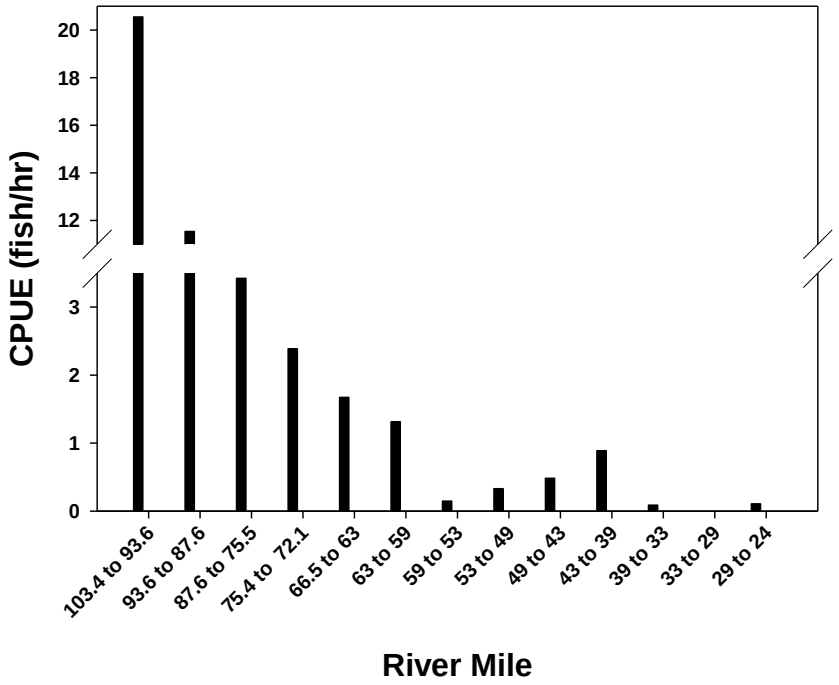

Figure 2. Smallmouth bass catch-per-unit-effort (CPUE) in the White River, 2012 from Taylor Draw Dam to Enron (all passes from project 167 combined). The Colorado/Utah state line is located at RM 72.1; removal did not take place from RM 72.1-66.5.

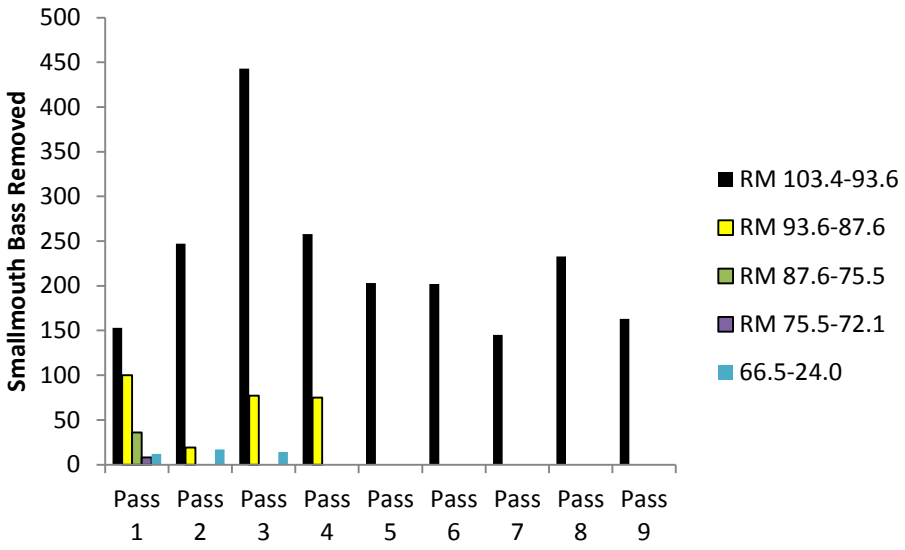

Figure 3. Smallmouth bass removed by pass in five sections of the White River from Taylor Draw Dam to Enron (project 167 data only). The Colorado/Utah state line is located at RM 72.1; removal did not take place from RM 72.1-66.5.

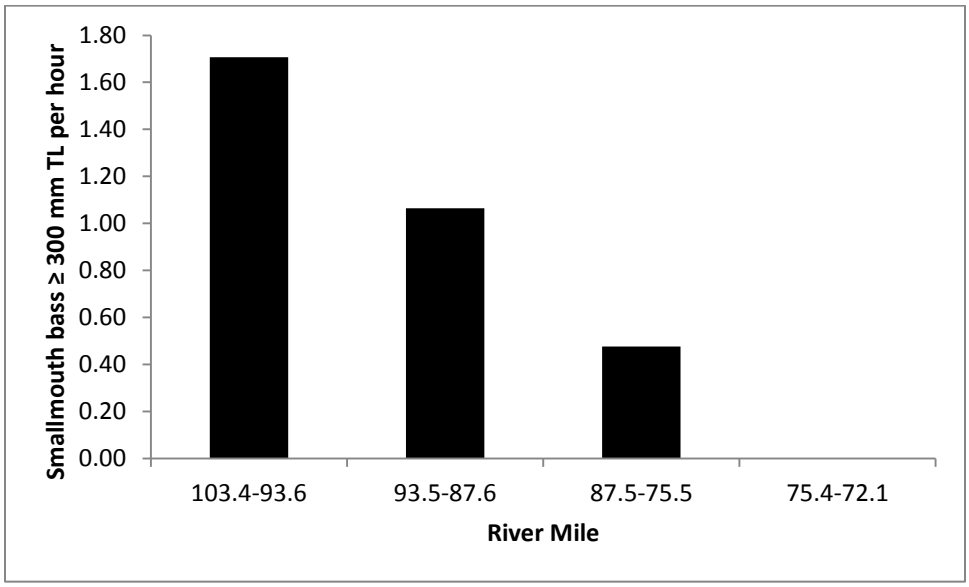

Figure 4. Smallmouth bass ≥ 300 mm TL captured per hour in four sections of the White River, Colorado 2012. Data from Project 128 is not included.

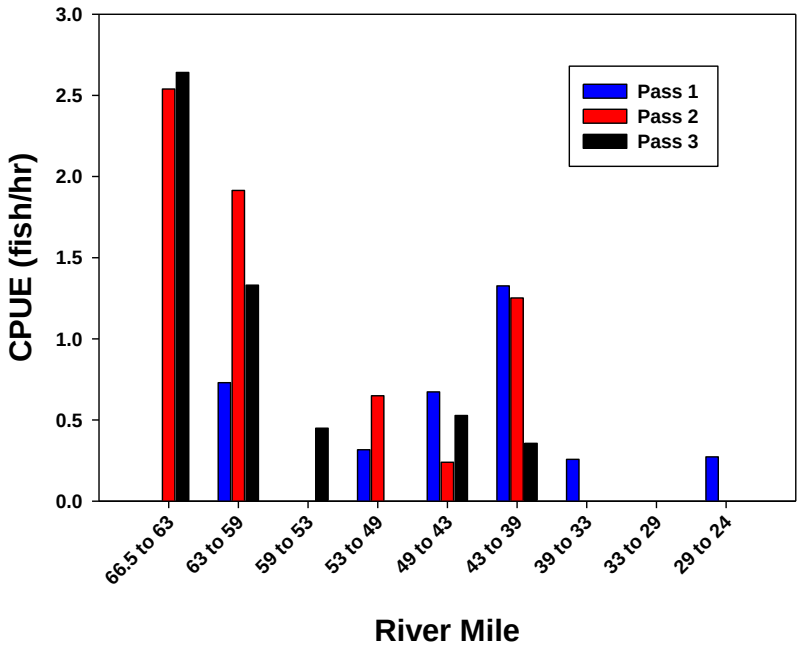

Figure 5. Catch-per-unit-effort (CPUE) of smallmouth bass collected during three passes of cataraft electrofishing in the White River from Cowboy Canyon (RM 66.5) to the Enron Takeout (RM 24.0).

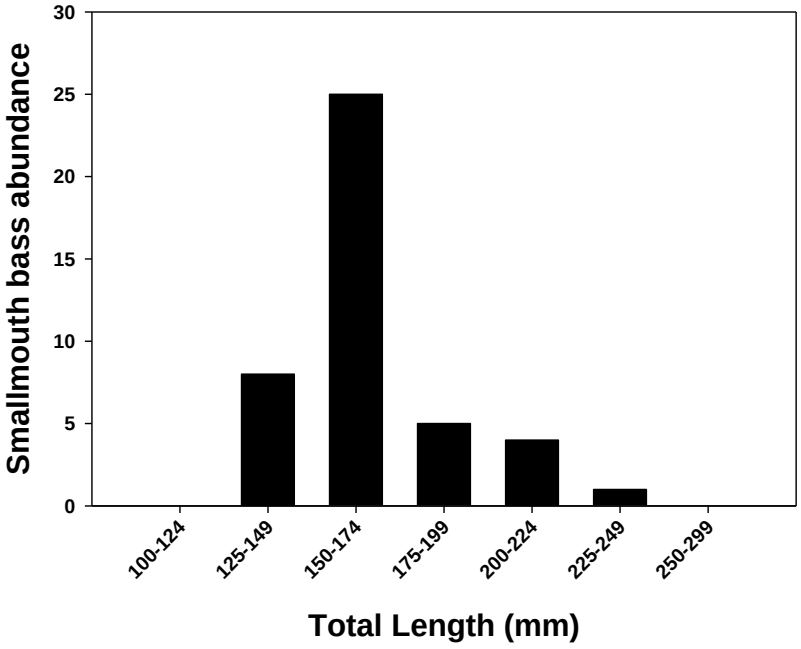

Figure 6. Length-frequency distribution of smallmouth bass collected during three electrofishing passes in the White River from Cowboy Canyon (RM 66.5) to the Enron Takeout (RM 24.0).