COLORADO RIVER RECOVERY PROGRAM
FY 2015 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 167

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

II. Bureau of Reclamation Agreement Number(s): R14AP00007 (UDWR)
R13PG40020 (USFWS)

III. Principal Investigator(s):

Christian Smith / Tildon Jones
U. S. Fish and Wildlife Service
Colorado River Fish Project
1380 S. 2350 W.
Vernal, UT 84078
(435) 789-4078 ext 21
christian_t_smith@fws.gov

Matthew J. Breen / Robert C. Schelly
Utah Division of Wildlife Resources
Northeast Regional Office
318 North Vernal Avenue
Vernal, Utah 84078
435-781-9453; Fax: 435-789-8343
mattbreen@utah.gov

Jennifer Logan
Colorado Parks and Wildlife
0088 Wildlife Way
Glenwood Springs, CO 81601
(970) 947-2923
jenn.logan@state.co.us

IV. Abstract:

U.S. Fish and Wildlife Service, Utah Division of Wildlife Resources, and Colorado Parks and Wildlife worked collaboratively to remove an emerging population of smallmouth bass from the White River. This population was first detected in 2011, and mechanical removal began in 2012. In 2015, a total of 1,019 smallmouth bass were removed between Taylor Draw Dam and the Enron boat ramp. Overall catch rates were lower than the previous three years, and in general exhibited a similar trend of decreasing bass densities moving downstream. However, catch rates for adult smallmouth bass increased in all but the most upstream reach (river mile [RM] 104.3-102.6), where higher bass densities and catch rates have been observed since 2012. In the Colorado portion of the White River, two size classes of smallmouth bass predominated, mainly representing adult bass from successful 2012 and 2013 cohorts. In the Utah portion of the White River, the increase in adult bass densities is more prominent than upstream areas. However, smallmouth bass catch rates decreased significantly below Evacuation Creek (RM 61.5), likely due to habitat changes from higher sediment loads following the 20,000 acre Wolfden fire in July 2012.

V. Study Schedule: 2012 – ongoing

VI. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN
III. Reduce negative impacts of nonnative fishes and sportfish management activities.
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.
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 2015 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1: Smallmouth bass removal from Taylor Draw Dam to the Colorado/Utah border

U.S. Fish and Wildlife Service (Vernal CRFP) and Colorado Parks and Wildlife worked collaboratively to remove smallmouth bass from this reach between 27 April and 16 July 2015 (Table 1). The majority of effort was expended in the 11 miles immediately below Taylor Draw Dam, as previous data suggested this was the area of highest bass densities and spawning adult bass (Breen et al. 2012; Webber et al. 2013, Webber et al 2014). Moderately high, yet sustained spring flows resulted in a lack of access caused by low clearance at the Highway 64 bridge for a portion of the project. Reduced clearance at the bridge, as well as limited landowner consent, restricted raft electrofishing capabilities in the upper 3.5 miles when sampling occurred in late May and June. This resulted in 10 sampling passes between river miles (RM) 104.3-102.6, five passes from RM 102.6-93.4, and five passes from RM 93.4-87.5. In total, 866 smallmouth bass were removed, consisting of 449 adults (≥ 200 mm TL), 332 sub-adults (100-199 mm TL), and 85 fish < 100 mm TL (likely age-1). Of the 449 adults captured, 29 were large enough to be considered piscivores (≥ 325 mm TL) posing a competitive threat to Colorado pikeminnow and a predatory threat to smaller native fishes.

The overall catch rate for smallmouth bass in the Colorado portion of the White River was 9.1 fish/hour. We compared 2015 catch rates to bass removal passes conducted from 2012 through 2014 (Figure 1). The combined catch rate for smallmouth bass was lower than previous years, as was the overall number of bass captured. However, adult smallmouth bass catch rates from Taylor Draw Dam to the BLM takeout (RM 87.5) were more consistent in 2015 than in 2014, the effect of higher adult catch rates from RM 102.6-87.5 and higher catch rates for all size classes below Douglas Creek (RM 97.1) in 2015 (Webber et al. 2014, Figure 4). This increase in adult catch rates was likely caused by recruitment and range expansion of the strong 2012 cohort (Webber et al. 2013). Catch rates by pass were variable, and reflected the fact that passes were conducted over different reaches of river due to restricted access at higher flows. The size structure of

bass caught in 2015 revealed three size classes that correspond to fish spawned in 2012, 2013, and 2014 (Webber et al. 2013; Webber et al. 2014, Figures 2 and 4).

Task 2: Two smallmouth bass removal passes from the Colorado/Utah border to Enron boat launch

Utah Division of Wildlife Resources completed two electrofishing passes (RM 71.6–24.0; 64.9 hours of combined effort) from 11 May to 11 June 2015 (Table 1). We selected this time frame to maximize the removal of spawning adult bass based on preferred temperatures and real-time upstream field observations by Vernal CRFP. One complete pass was conducted from 11-14 May 2015, at which time we determined that spawning temperatures were not yet ideal because only a small percentage of bass were in spawning condition. More specifically, extended peak flows from a second pulse of snowmelt in 2015 provided higher flows and cooler temperatures after removal efforts were initiated. In addition, during this first pass we observed substantially higher bass densities in the two most upstream removal sections (RM 71.6–61.5) of our overall study reach compared to downstream sections. Therefore, we conducted a day trip to remove bass in the first two sections on 20 May 2015. At this time, the bass spawn was still not at its height, thus we waited to conduct another day trip in the same two sections, along with half of the third section (RM 71.6–59.0), on 4 June 2015. During our second day trip we determined that it was indeed the best time to use our remaining effort and we electrofished six sections beginning at Bonanza Bridge (RM 59.0–31.5) from 10-11 June 2015. We did not remove bass in the farthest downstream sections (RM 31.5–24.0) as this effort was shifted upstream previously.

During this effort, 153 smallmouth bass were removed (mean ± SE = 180.7 ± 3.8 mm TL; range = 76–394 mm TL; Figure 5). Catch consisted of 111 sub-adults (≤ 199 mm TL), 40 adults (200–324 mm TL), and two bass in the piscivore size class (≥ 325 mm TL; Figures 4 and 5). Overall catch-per-unit-effort (CPUE) was 2.35 fish/hour, approximately half of the 2014 catch rate (Webber et al. 2014). Adult bass were dissected for sex determination and gamete expression. Forty of the 42 adult bass (200–294 mm TL) were reproductively mature (27 females, 13 males); 18.5% of adult female bass and 15.4% of adult males were ripe at the time of collection. During 2014 sampling efforts, only one ripe bass was collected (Webber et al. 2014), thus demonstrating the effectiveness of our sampling strategy to target spawning bass when most appropriate to achieve our main goal. Combining all removal efforts, 1.6 bass/mile were removed on average, representing more than a two-fold decrease over 2014 (Webber et al. 2014; Figure 6). Separating our data by pass (Table 1), we removed 75 bass on pass one (CPUE = 2.24 fish/hour), 23 bass on pass two (CPUE = 3.42 fish/hour), 28 bass on pass three (CPUE = 3.49 fish/hour), and 27 bass on pass four (CPUE = 1.62 fish/hour). However, only passes two and three are comparable based on our sampling scheme described above, but those two passes clearly demonstrate that depletion was not observed. Similar to 2014 sampling efforts, when 19.1% of our total catch consisted of adult bass (Webber et al. 2014), we continue to see an increase in the number of adults (27.5% in 2015). This provides further evidence of smallmouth bass population stabilization in the lower White River, with an increasing number of bass from the strong

2012 and 2013 cohorts shifting into the adult category (Figure 5). With the exception of bass < 75 mm TL (i.e., limited recruitment in 2014; Webber et al. 2014), population structure is well represented by all size classes (Figure 5).

Catch-per-unit-effort of smallmouth bass in this sampling reach has varied considerably during the first four years of this project. Not only has overall CPUE shifted substantially from year to year, but dramatic changes in bass distribution along an upstream to downstream gradient are evident. More specifically, 2012 represents CPUE influenced by distance to an upstream source population (Breen et al. 2012; Figure 6a), 2013 CPUE reflects population expansion from excellent recruitment in 2012 (Webber et al. 2013; Figure 6b), and the 2014 and 2015 CPUE gradient is most likely influenced by environmental factors (sediment deposition from Evacuation Creek described below) (Webber et al. 2014; Figure 6c).

River mile 61.5 is the end of a 5-mile sample reach as well as the location of the Evacuation Creek confluence. The Evacuation Creek watershed was devastated by the 20,000 acre Wolfden wildfire in July of 2012, leaving a barren landscape that has since been subject to increased erosion and high sediment loads during severe rainstorms. Following an irregular monsoon season in late summer of 2013, young-of-year surveys revealed significant changes in marginal, low-velocity habitats that were nearly or completely filled in with sediment, ash, and debris (Fiorelli and Breen 2014). Given a clear break in CPUE at RM 61.5 (Figure 6c), we suspect that 2013 sub-adult bass downstream of Evacuation Creek experienced poor survival rates or moved out of the reach to seek more suitable habitat. Furthermore, Fiorelli and Breen (2015) describe a positive relationship between downstream distance from Evacuation Creek and water depth (i.e., sediment depth in low-velocity habitats). Our 2015 results clearly demonstrate that this has had a profound effect on bass distribution in the lower White River. Comparing average CPUE above and below Evacuation Creek, there was more than a four-fold difference in catch rates (4.80 fish/hour vs. 1.05 fish/hour; Figure 6c). Regardless, 2012 and 2013 bass cohorts remain in this sample reach, have achieved greater size, and now present a greater threat in terms of piscivory and reproductive capacity.

Overall observations of smallmouth bass on the White River from Taylor Draw Dam to the Enron Boat Ramp:

When the data are combined between both sampling reaches, fewer bass were captured in 2015 than previous years, with corresponding lower catch rates. The majority of bass captured were adults (n= 491), comprised largely of smaller adult fish (mean ± SE = 244.4 ± 1.9 mm TL) that were likely spawned in 2012. Adult catch rates were highest near Taylor Draw Dam and generally showed a decreasing trend moving in the downstream direction (Figures 4 and 6c), although this trend was not as abrupt in 2015 as in past years. Adult smallmouth bass catch rates were higher in 2015 than 2014 in the lower three reaches of the Colorado portion of the White River and continue to increase in the Utah portion of the White River at a greater rate (i.e., fewer adults were present originally). In Colorado, catch rates for all smallmouth bass were higher from Douglas

Creek to the BLM takeout. However, the highest bass catch rates and densities observed in the White River in 2015 occurred in the most upstream reach (RM 104.3-102.6). Therefore, these data remain consistent with previous observations suggesting that a large population of adults near Rangely, Colorado successfully spawned, and young fish either disperse or are displaced downstream. Observations of reduced bass densities downstream of Evacuation Creek in Utah further suggest that turbidity and/or sediment deposition from flash flood events may help suppress bass numbers. Given the continued decline in overall catch rates and the number of smallmouth bass removed since 2013, we feel that environmental factors and mechanical removal efforts have reduced predatory and competitive threats to native fishes in the White River.

Task 3: Data entry, analysis, and reporting

Recovery Program annual progress report submitted November 2015.

VIII. Additional noteworthy observations:

In addition to Tasks 1 and 2, Colorado State University Larval Fish Lab removed nonnative fish from the White River immediately below the Taylor Draw Dam with an electric seine for their second year on 25 September and 13 October 2015. During these two days they removed 1,890 smallmouth bass, of which 1,878 were classified as juveniles (< 100 mm TL). Smallmouth bass catch rates were higher in 2015 (381 fish/hour) than in 2014 (354 fish/hour). Although the impact of this removal effort on sub-adult and adult bass densities in the White River is unknown, these high catch rates verify successful bass spawning in 2015 and promote the continuation of this sampling method in the future.

A significant increase in the number of flannelmouth x white sucker hybrid captures was observed in the Utah portion of the White River in 2015, while white sucker abundance decreased compared to 2014 (Table 2; Webber et al. 2014). Additionally, crews observed bluehead sucker actively spawning (i.e., numerous ripe adults present) in Utah portions of the White River during sampling efforts, and collected a ripe bluehead x white sucker hybrid from overlapping habitat. This raises concern that the level of white sucker hybridization in the White River is increasing and presenting a direct threat to the genetic integrity of this robust native catostomid community (e.g., Fiorelli and Breen 2014, 2015).

In 2015, crews captured 2 adult razorback sucker (443 & 449mm) and 13 Colorado pikeminnow (398 – 892mm) (Table 2). Of the 13 Colorado pikeminnow captured, 4 were not PIT tagged. In 2014, excessive bonytail captures in Utah portions of the White River following recent stocking events at Bonanza Bridge by Ouray and Wahweap hatcheries prompted crews to ignore this species for the remainder of sampling efforts (Webber et al. 2014). However, bonytail were absent during 2015 sampling efforts, which raises questions regarding bonytail stocking protocol in the White River, along with the potential impacts to roundtail chub from habitat overlap. More specifically, ideal chub habitat is limited in the White River and carrying capacity is likely exceeded with extensive stocking events (i.e., thousands of bonytail ≥ 250 mm TL).

IX. Recommendations:

- We recommend maintaining current levels of smallmouth bass removal effort in the Colorado portion of this study. In Utah, we recommend adding additional ~4 day trips to perform smallmouth bass removal during the spawning period. Although decreasing catch rates have been observed in the White River, continued pressure is important at this juncture.

- Despite relatively low white sucker densities, a significant increase in white sucker hybrid captures occurred from 2014 to 2015. This warrants an increased focus toward white sucker and white sucker hybrid removal in the White River in the future.

- The lack of bonytail captures in the White River in 2015 warrants better coordination between hatchery managers, stocking coordinators, and field crews in order to incorporate the ecology of the native fish community in the White River. Continuing without this coordination and knowledge will likely bring continued bonytail and investment losses, as well as potential negative impacts to established, wild-spawned roundtail chub populations, which currently have few refuges range-wide.

X. Project Status: On track and ongoing

XI. FY 2015 Budget Status
- A. Funds Provided: $47,044
- B. Funds Expended: $47,044
- C. Difference: $0
- D. Percent of the FY 2015 work completed: 100%
- E. Recovery Program funds spent for publication charges: $0

XII. Status of Data Submission:

We will submit all data to the database manager by December 2015.

XIII. Signed: *Chris Smith & Matthew J. Breen* November 27, 2015
Principal Investigators Date

References:

Breen, M.J., J.A. Skorupski Jr., A. Webber, and T. Jones. 2012. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Fiorelli, M.D. and M.J. Breen. 2015. Conservation activities for three species in northeastern Utah, 2014. 2014 Statewide Three Species Monitoring Summary, Publication No. 15-27. Utah Division of Wildlife Resources, Salt Lake City, Utah

Fiorelli, M.D. and M.J. Breen. 2014. Conservation activities for three species in northeastern Utah, 2013. 2013 Statewide Three Species Monitoring Summary, Publication No. 14-19. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Webber, A., M.T. Jones, M.J. Breen, and R.C. Schelly. 2014. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Webber, A., M.J. Breen, and J.A. Skorupski Jr. 2013. Smallmouth bass control in the White River. Annual Report to the Upper Colorado River Endangered Fish Recovery Program. Denver, CO.

Table 1. Sub-adult (includes all bass < 200 mm) and adult smallmouth bass caught for each pass. River miles (RMI) and dates sampled are also indicated for each pass.

Pass/Date	RM	Sub-adults	Adults	Total
1-CPW, 27 April	93.4-87.5	6	25	31
2-FWS, 28 April	104.3-97.1	8	12	20
3-CPW, 28 April	93.4-87.5	12	16	28
4-CPW, 29 April	93.4-87.5	10	19	29
5-FWS, 11 May	104.3-97.1	0	8	8
6-FWS, 14 May	97.1-93.4	12	23	35
7-CPW, 19 May	104.3-97.1	15	72	87
8-FWS, 19 May	97.1-93.4	12	13	25
9-CPW, 20 May	93.4-87.5	8	19	27
10-FWS, 22 May	104.3-102.6	4	7	11
11-FWS, 1-2 June	104.3-93.4	10	31	41
12-CPW, 9 June	104.3-101	19	35	54
13-FWS, 16 June	101-97.1	15	16	31
14-CPW, 17 June	104.3-101	14	19	33
15-CPW, 18 June	104.3-101	16	27	43
16-FWS, 19 June	97.1-93.4	9	3	12
17-FWS, 29-30 June	104.3-94.8	87	36	123
18-CPW, 15-16 July	104.3-93.4	160	68	228
1-UDWR, 11-14 May	71.6-24.0	59	16	75
2-UDWR, , 20 May	71.6-61.5	12	11	23
3-UDWR, 4 June	71.6-59.0	18	10	28
4-UDWR, 10-11 June	59.0-31.5	22	5	27
Totals		**528**	**491**	**1019**

Table 2. Ancillary captures from the White River, 2015.

Species	Total Captured	Length Range (mm)
Colorado pikeminnow	13	398 - 892
Razorback sucker	2	443-449
*Roundtail chub	99	169-416
Flannelmouth x WS hybrid	125	236 - 491
Green sunfish	118	19 - 184
White sucker	40	310 - 448
Bluehead x WS hybrid	19	252 - 356
Black crappie	17	75 - 191
Brown trout	1	215

*** Roundtail chub were not collected in the Colorado portion of this project**

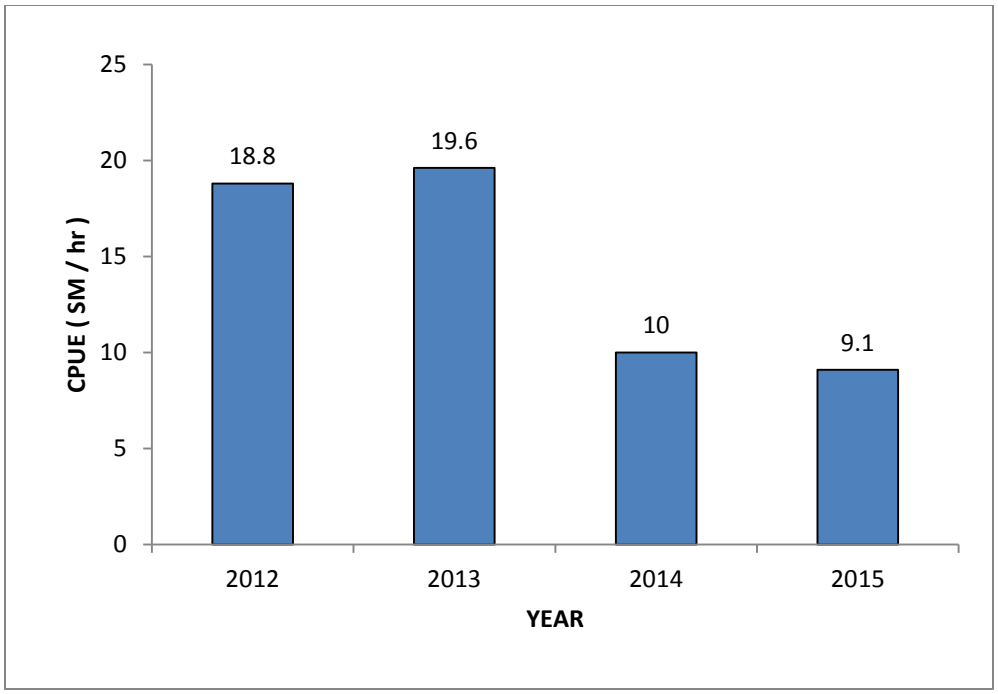

Figure 1. Catch rate for all smallmouth bass captured during nonnative fish passes in the White-River in Colorado (RMI 104.3-87.5), 2012-2015.

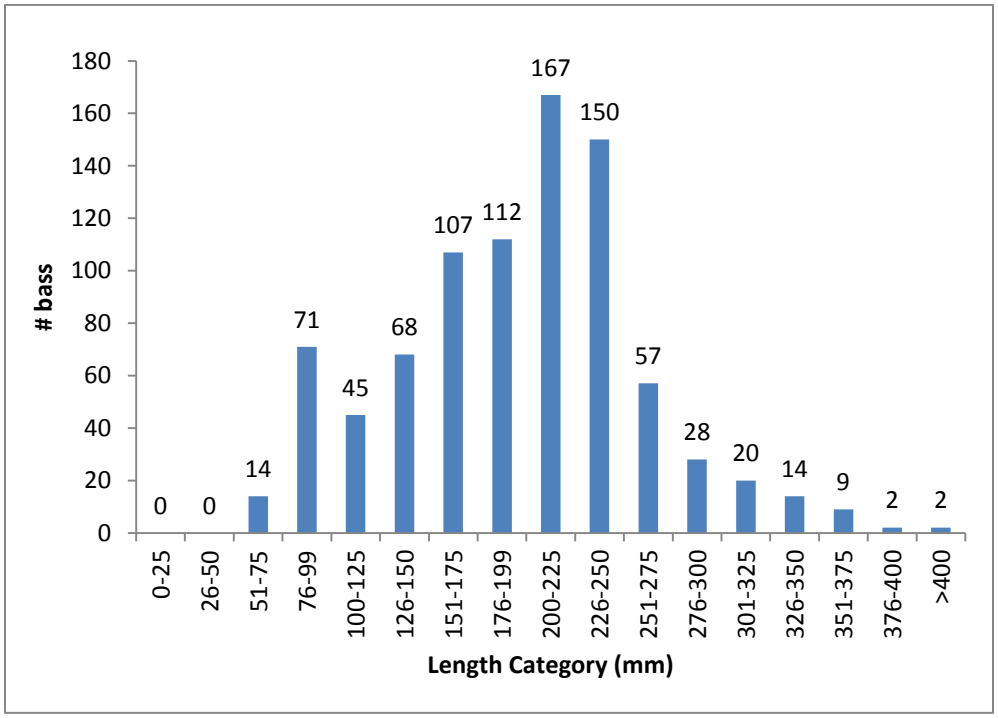

Figure 2. Length frequency of smallmouth bass removed from the White River in Colorado, 2015.

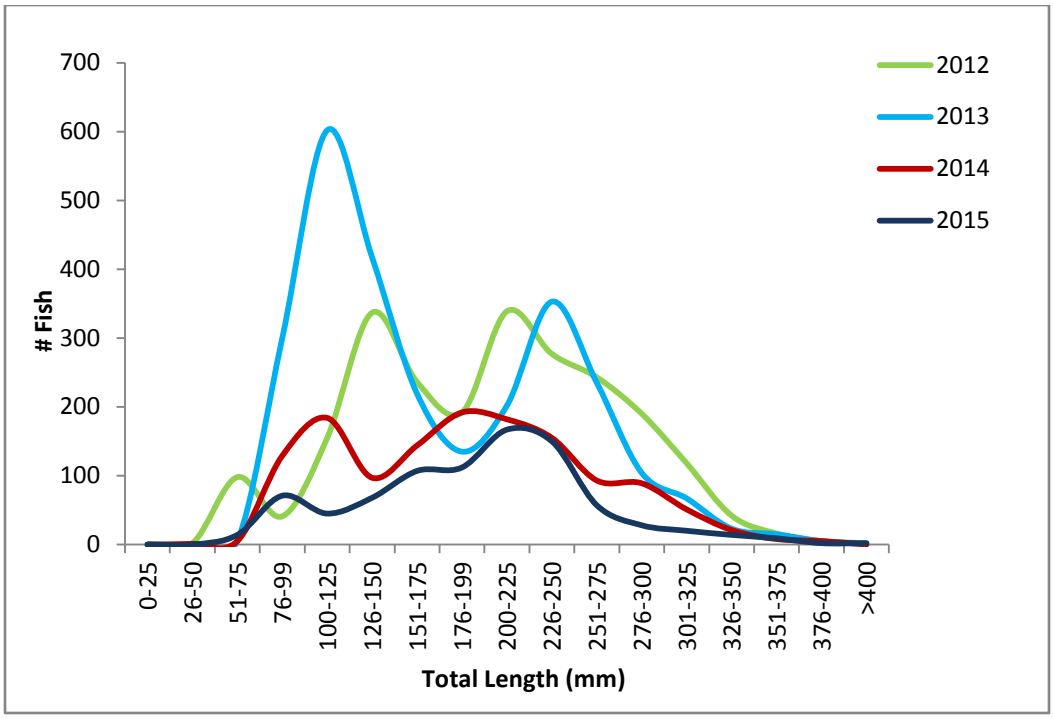

Figure 3. Length frequency of smallmouth bass removed from the White River in Colorado, 2012-2015.

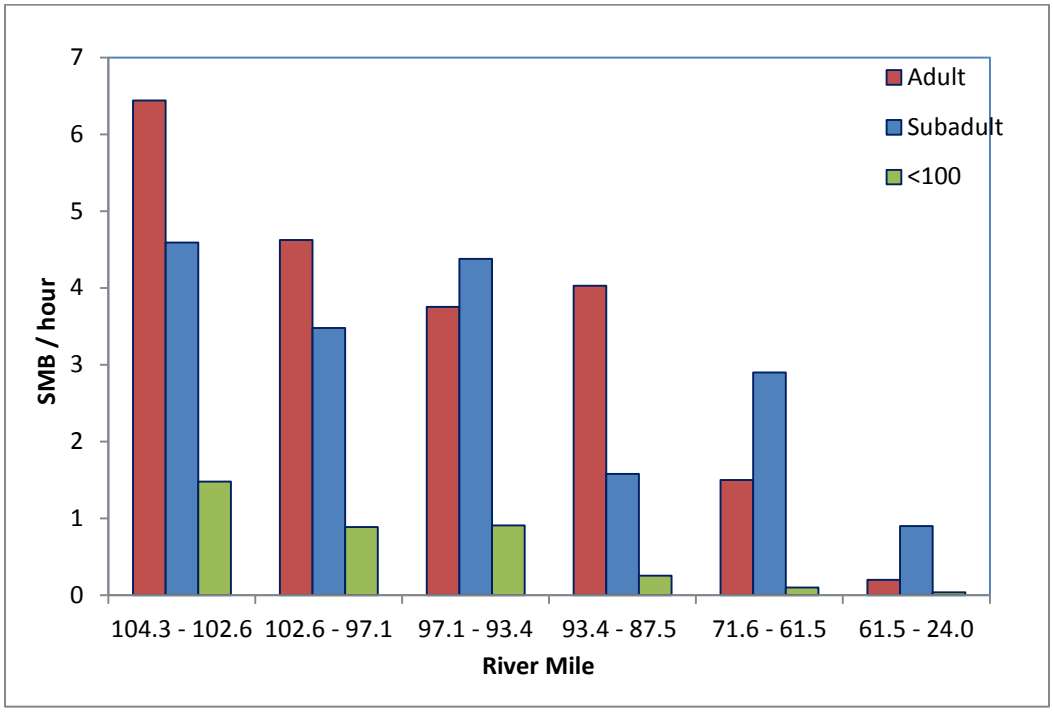

Figure 4. Catch rates for different size classes of smallmouth bass in the White River, CO and UT by river reach, 2015. The Evacuation Creek confluence is located at river mile 61.5.

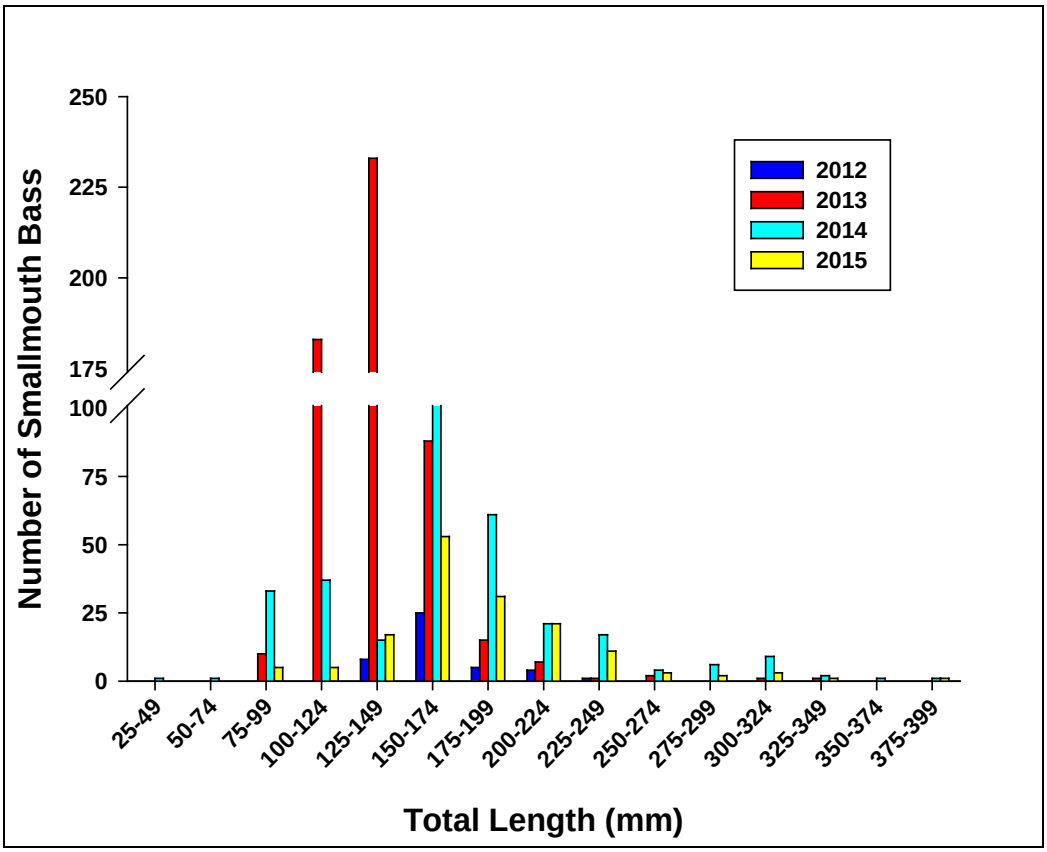

Figure 5. Length-frequency distribution of smallmouth bass collected in the Utah portion of the White River. Three passes of cataraft electrofishing were conducted from RM 66.5–24 in 2012, one pass was conducted from RM 75.8–24.0 in 2013, two passes were conducted from RM 71.6-24.0 in 2014, and four passes (two full passes broken up) were conducted from RM 71.6-24.0 in 2015.

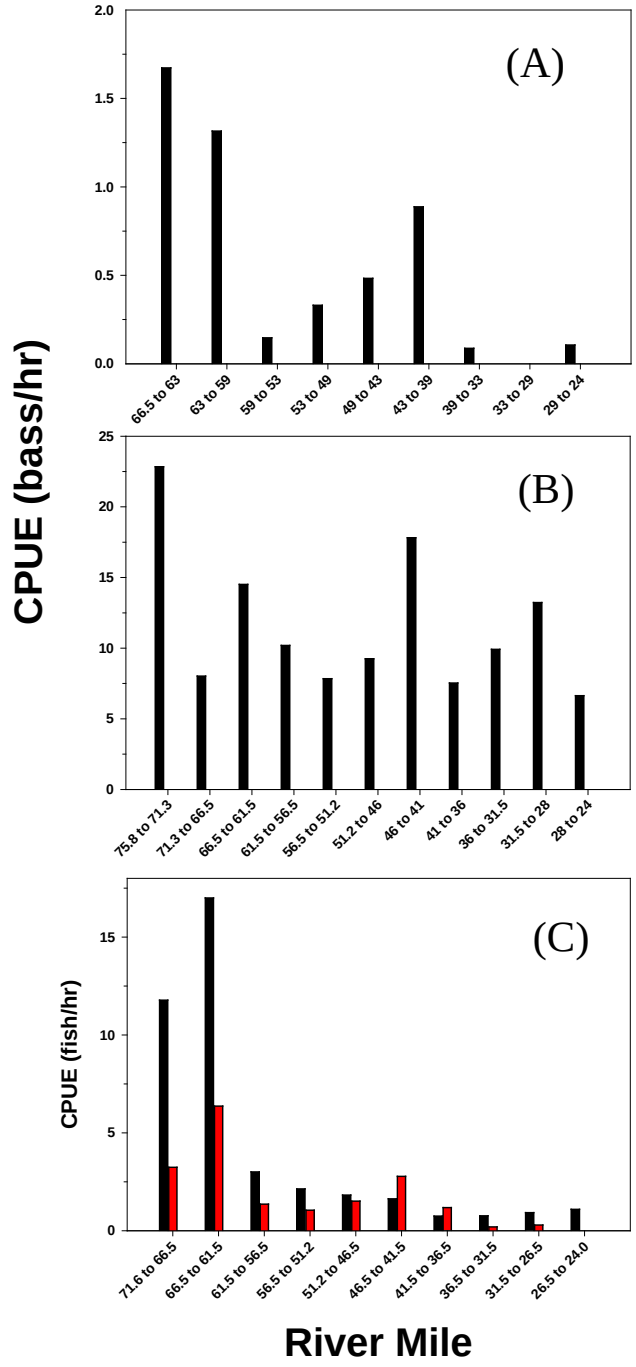

Figure 6. Catch-per-unit-effort (CPUE) of smallmouth bass collected during cataraft electrofishing in the White River from (A) three passes conducted in 2012 from RM 66.5–24, (B) one pass conducted in 2013 from RM 75.8–24, and (C) two passes conducted in 2014 from RM 71.6–24 (black bars) and four passes (two passes broken up) conducted in 2015 from RM 71.6–24 (red bars). Note the difference in the Y-axis scale when comparing panels.

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: #R14AP00007

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 167

Project Title: Smallmouth bass control in the White River

Principal Investigator:

Matthew J. Breen / Robert C. Schelly
Utah Division of Wildlife Resources
Northeast Regional Office
318 North Vernal Ave.
Vernal, Utah 84078
Phone: 435-781-9453; Fax: 435-789-8343
E-mail: mattbreen@utah.gov

Project/Grant Period: Start date (Mo/Day/Yr): 5/1/2014
End date: (Mo/Day/Yr): 9/30/2018
Reporting period end date (Mo/Day/Yr): 9/30/2014
Is this the final report? Yes _____ No __X___

Performance:

Tasks 2–3 were accomplished as outlined in the scope of work for this project. We completed two passes of cataraft electrofishing from RM 71.6–24.0 and determined that bass densities in the lower White River have decreased from initial range expansion of the strong 2012 cohort. However, a greater abundance of adult bass will continue to pose a challenge. We removed a total of 153 smallmouth bass, 27% of which were adults. Annual reporting is complete under task 3 and nonnative data will be submitted to Recovery Program personnel by January 2016.
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ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: # R13PG40020

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 167

Project Title: Smallmouth bass control in the White River

Principal Investigator:

Chris Smith / Tildon Jones
U.S. Fish & Wildlife Service
1380 S 2350 W
Vernal, Utah 84078
Phone: 435-789-0351
E-mail: Christian_t_smith@fws.gov

Project/Grant Period: Start date: 10/01/2013
End date: 09/30/2015
Reporting period end date (Mo/Day/Yr): 9/30/2015
Is this the final report? Yes _X___ No _____

Performance: USFWS completed tasks 1 and 3 under this scope of work. We conducted eight days of electrofishing in order to remove smallmouth bass from the White River downstream of Taylor Draw Dam (task 1). This report fulfills task 3, data analysis and reporting.