

COLORADO RIVER RECOVERY PROGRAM
FY 2013 ANNUAL PROJECT REPORT

RECOVERY PROGRAM
PROJECT NUMBER: 123a

I. Project Title: Nonnative Fish Control in the Echo Park to Split Mountain Reach of the Green River, Utah

II. Bureau of Reclamation Agreement Number(s):
USFWS Vernal: R11PG40024
UDWR Moab: R09AP0871

III. Principal Investigator(s):
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IV. Abstract:
Utah Division of Wildlife Resources and U.S. Fish and Wildlife Service performed six electrofishing passes each in summer 2013 in the Echo Park to Split Mountain Reach of the Green River, Utah. During these passes, crews were able to remove 5,913 smallmouth bass, most of which (96%) were fish spawned in 2012 or 2013. The overall catch rate for sub-adult and adult fish combined was 21 fish per hour, the highest since 2004 when the project began. This year's efforts are suitable for comparison to 2008, because both years followed a large cohort of age-1 fish present from successful spawning. More age-1 fish were captured this year than 2008. Fish captured in 2013 have also reached greater lengths than the 2007 cohort had by the end of their second growing season.

V. Study Schedule: 2004-ongoing

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: MAINSTEM

- III. Reduce impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.A. Reduce negative impacts to endangered fishes from sportfish management activities.

III.A.4. Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify required levels of control. Each control activity will be evaluated for effectiveness, and then continued as needed.

VII. Accomplishment of FY 2013 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Tasks 1 & 2. Smallmouth bass removal-Echo Park to Split Mtn.

All tasks were completed in 2013 with 12 passes conducted between the two field stations. During the twelve passes, 5,913 smallmouth bass were removed, including 250 adults, 5,380 sub-adults, and 283 young-of-year (Table 1). Out of 250 adult bass captured, 49 were labeled as piscivores (>325mm): fish representing a competitive threat to Colorado pikeminnow based on bioenergetics. These groups were classified by length at the beginning of the sampling, where adults were greater than 200mm, sub-adults were 100-199mm, and young-of-year were less than 100mm once they were observed after pass 10. The group length thresholds were adjusted by pass based on growth in the sub-adult category, and adult and sub-adult sizes were relatively discrete in length frequency histograms (Figs. 1a-b). By the end of sampling fish between 100-236mm were classified as sub-adults. The purpose of classifying fish in this way was to track a cohort of bass spawned in 2012, which made up the majority of fish captured in 2013. It is possible these size criteria may include a small number of fish spawned in 2011, which was a poor year for bass recruitment. Fish spawned in 2011 hatched later and likely would be small enough to be confused with the quickly growing 2012 year class. In either case, the numbers would not be drastically different if the size breaks were slightly altered.

The catch rate for adult and sub-adult bass combined over the entire season was 21.1 fish per hour (Fig. 2). This is the highest catch rate observed since this project began in 2004, when smallmouth bass first proliferated in this reach of river. Catch rates for each pass varied throughout the sampling period, but were generally high (Fig. 3). Towards the end of the season water conditions were exceptionally clear, with visibilities of greater than 1 meter. In response, crews electrofished in deeper water where adult fish of several species were observed, probably in an attempt to seek cover. While this likely reduced young-of-year catch, it increased the catch of larger fish, particularly adults, in passes 11 and 12. Catch rates were influenced primarily by sub-adult captures, and the overall catch rates by pass reflect this. Smallmouth bass were captured at similar rates through all three reaches of the sampling area (Fig. 4), with slightly higher catch rates for all three size classes in Split Mountain.

Eight bass with green Floy tags were captured during the sampling period, and included four fish tagged as sub-adults and four tagged as adults. Two fish were tagged as sub-adults in 2009. The rest were fish tagged in 2011, the last year fish were marked in this reach. Fish tagged as sub-adults grew on average 54mm per year. Bass marked as adults grew an average of 26mm/year. Among the sub-adults, two fish moved downstream between captures, one moved upstream, and one remained in the original capture reach.

Two of the adult fish remained within the reach where they were marked, and one moved upstream.

Smallmouth bass length frequency distributions for 2008 and 2013 are presented in Figure 5. These years are useful for comparison because captures in both years include a large cohort of sub-adult fish spawned in the prior year. Bass successfully spawned in 2007 and 2012 due to low spring runoff and warm water temperatures, while other years during the course of this project did not appear to be conducive to bass spawning. Researchers have been tracking the 2007 cohort over the last six years, and the new cohort of age-1 bass presents an opportunity to track this group of fish in a similar manner. More bass were captured in 12 sampling passes in 2013 than in 16 passes in 2008. Specifically, more age-1 bass were captured in 2013 than in 2008. Also, on average the 2012 cohort consisted of larger fish compared to those from 2007. In 2007 flows reached a higher spring peak and receded more slowly, reaching base flows in mid-July. The spring peak was lower in 2012, with base flows by late June. Smallmouth bass were likely able to spawn earlier in 2012, providing a longer growing season for young-of-year fish. Also, water conditions in 2013 were characterized by lower flows and warmer temperatures than 2008, providing favorable conditions for growth of the age-1 cohort. Although bass spawning and age-0 fish are not consistently found in high numbers in this reach, favorable hydrology and temperatures make this reach suitable for a high level of successful reproduction. Age-1 and age-0 fish were collected in all reaches of this study in both 2012 and 2013, especially in Island Park and Split Mountain. Furthermore, spawning bass aggregations have been observed in side channels and backwaters of Island Park, which provides suitable habitat similar to that found in other reaches with high levels of spawning.

Seven other nonnative fish species were removed during the sampling (Table 2), including black bullhead, black crappie, bluegill, green sunfish, white sucker and their hybrids, northern pike, and walleye. No burbot were captured this year. White sucker captures were much higher this year, as were walleye. The majority of white sucker (85%) were less than 150mm total length, and were captured in the Island Park reach. This year nonnative predatory species were classified as to whether they would likely present a predation threat to native fishes, and also a competitive threat to Colorado pikeminnow. Walleye longer than 375mm and pike greater than 450mm were considered piscivores that could compete with adult pikeminnow. All 24 walleye captured met the piscivore criterion, and 21 of the 22 northern pike were in this category. This compares to 41 individual Colorado pikeminnow captured in the same reach, of which 38 were piscivores. Smallmouth bass were also classified as piscivores if they were greater than 325mm in length. As previously mentioned, out of 250 adult bass captured, 49 were labeled as piscivores. Large northern pike appeared to be distributed throughout the reach, whereas piscivorous bass were more prevalent from Echo Park through Whirlpool Canyon (Figure 6). Walleye were slightly more common in Split Mountain.

VIII. Additional noteworthy observations:

Forty-one individual Colorado pikeminnow were collected during this study, including

one fish found dead near Echo Park. Of the 41 unique pikeminnow, 20 were fish previously tagged in other projects. One tagged pikeminnow was recaptured twice during this field season: once in Split Mountain and then later in Whirlpool Canyon. Data from these captures have been submitted to CSU-LFL for possible use in assisting with pikeminnow population estimates.

Sixty-seven roundtail chub and small, unidentified chub were captured in 2013. These fish were more common in Whirlpool Canyon and decreased moving downstream. One chub was marked in Rainbow Park this year and subsequently recaptured twice in Split Mountain. Two roundtails were recaptured from other projects. One was tagged in 2006 by CSU-LFL, and the other was tagged by FWS in Yampa Canyon during 2009. One bonytail was also recaptured from fish stocked in mid-June 2013 between Red Wash and Ouray. This fish was captured 8 August in Split Mountain, after moving between 26-62 miles upstream.

IX. Recommendations:

- Continue removing smallmouth bass and other predatory species in this reach
- Focus on smallmouth bass spawning period for initiation of passes and target known spawning reaches in lower Whirlpool and Island Park
 - Potentially increase effort to disrupt smallmouth bass spawning in years that environmental conditions support a large year class (such as 2012)
- Adapt sampling strategy to maximize removal of adults and sub-adults, by electrofishing in deeper water during periods of high water clarity

X. Project Status: On track and ongoing

XI. FY 2013 Budget Status

- A. Funds Provided: \$159,077
- B. Funds Expended: \$159,077
- C. Difference: -0-
- D. Percent of the FY 2013 work completed, and projected costs to complete: 100%
- E. Recovery Program funds spent for publication charges: -0-

XII. Status of Data Submission: All data has been submitted for FY2013 with the submission of 2012 field season data. The 2013 field season data will be submitted to the database manager prior to December 2013.

XIII. Signed: *M. Tildon Jones & Julie Howard* 11/13/2013
Principal Investigator Date

Table 1. Total bass caught in Echo-Split reach by pass and size group, 2013. All fish were removed.

Pass	YOY	Sub-adults	Adults	Piscivores	Total
1-UDWR, 14-16 June		227	9	2	236
2-UDWR, 24-26 June		492	34	4	526
3-UDWR, 27-29 June		514	35	5	549
4-UDWR, 8-10 July		361	19	3	380
5-UDWR, 11-13 July		362	20	2	382
6-UDWR, 13-15 July		443	16	4	459
7-FWS, 23-25 July		381	20	5	401
8-FWS, 29-31 July		664	28	7	692
9-FWS, 6-8 August		243	6	2	249
10-FWS, 13-15 Aug.	66	318	15	4	399
11-FWS, 20-22 Aug.	128	676	22	5	826
12-FWS, 27-29 Aug.	89	699	26	6	814
Totals	283	5,380	250	49	5,913

Table 2. Ancillary fish captures in the Echo-Split study reach, 2013. Piscivores are northern pike >450mm and walleye >375mm.

Species	Number Captured	Piscivores
Black bullhead (<i>Ameiurus melas</i>)	3	
Black crappie (<i>Pomoxis nigromaculatus</i>)	1	
Bluegill (<i>Lepomis macrochirus</i>)	9	
Green sunfish (<i>Lepomis cyanellus</i>)	68	
White sucker and hybrids (<i>Catostomus commersonii</i>)	2,155	
Northern pike (<i>Esox lucius</i>)	22	21
Walleye (<i>Sander vitreus</i>)	24	24
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	41	38
Bonytail (<i>Gila elegans</i>)	1	
Roundtail chub (<i>Gila robusta</i>)	43	
<i>Gila spp.</i> (usually TL <200mm)	24	

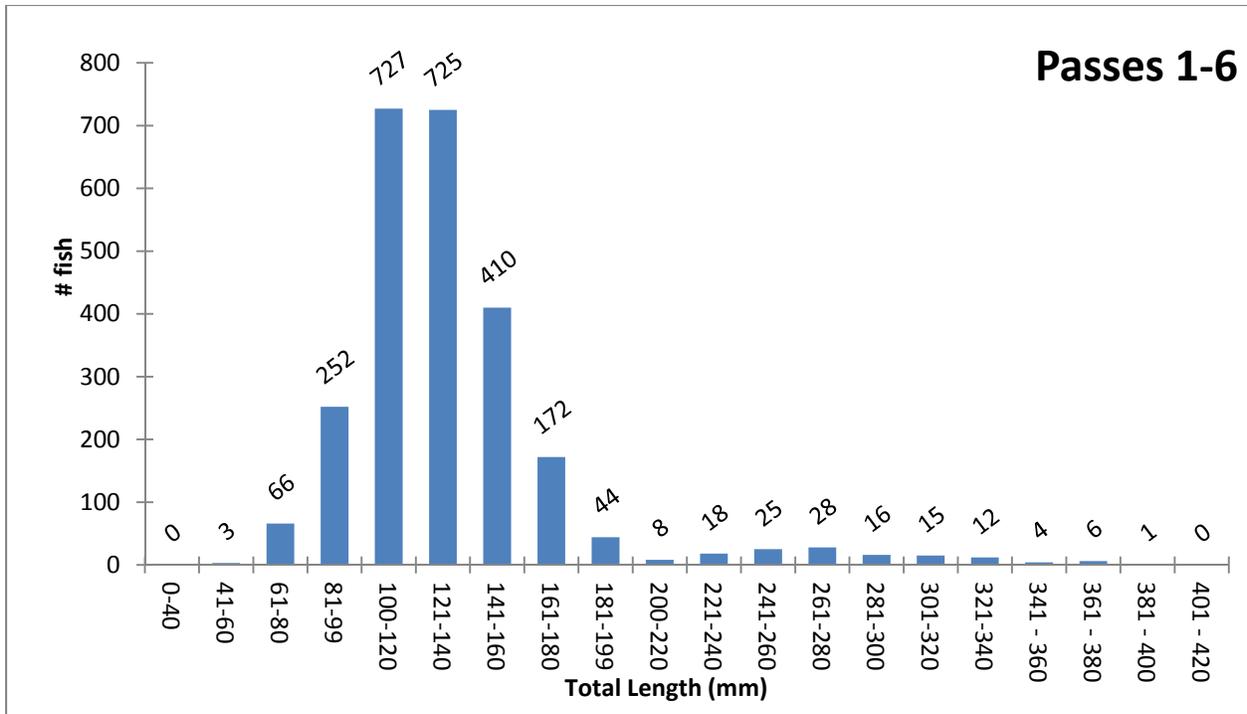


Figure 1a. Length frequency distribution of smallmouth bass captured in Echo-Split reach, passes 1-6, 2013.

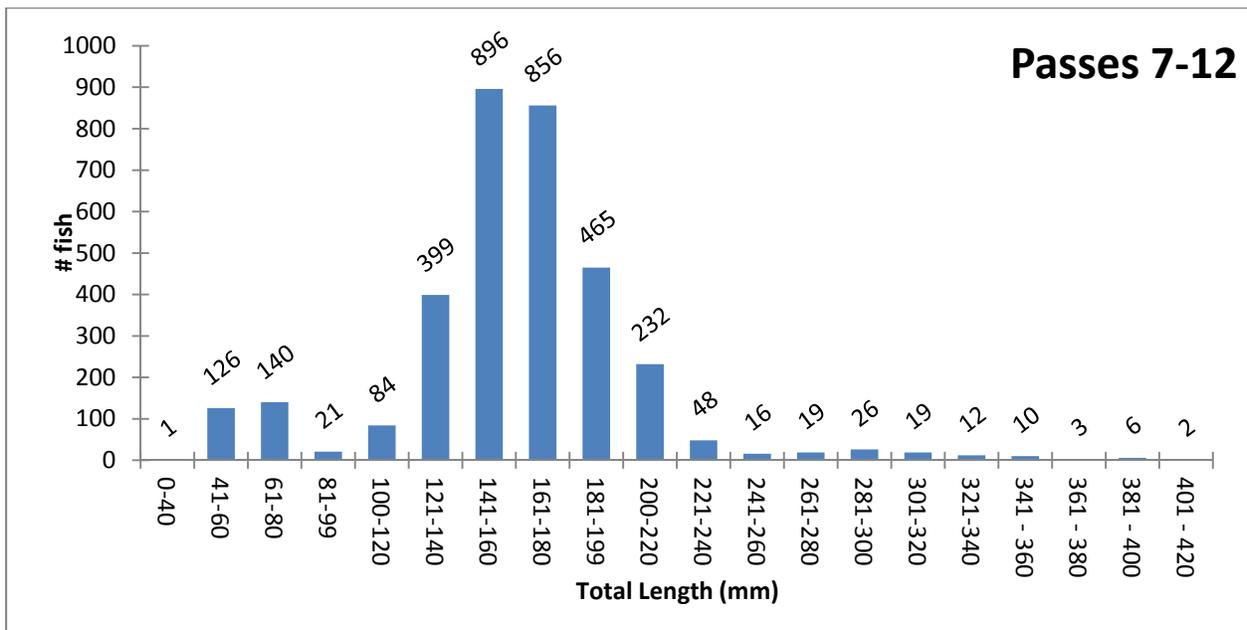


Figure 1b. Length frequency distribution of smallmouth bass captured in Echo-Split reach, passes 7-12, 2013.

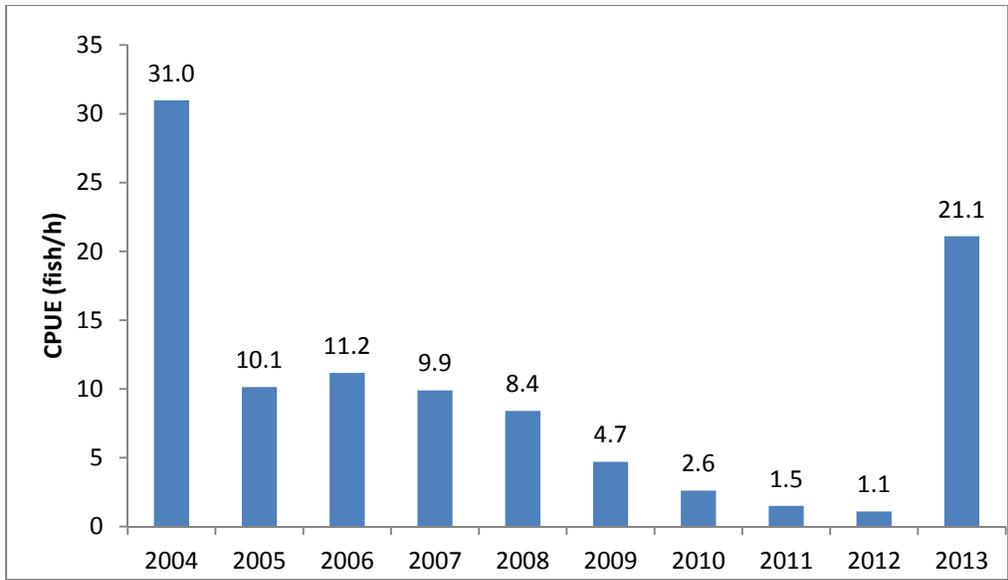


Figure 2. Catch per unit effort (fish/hour) for sub-adult and adult bass combined over all passes, 2004-2013.

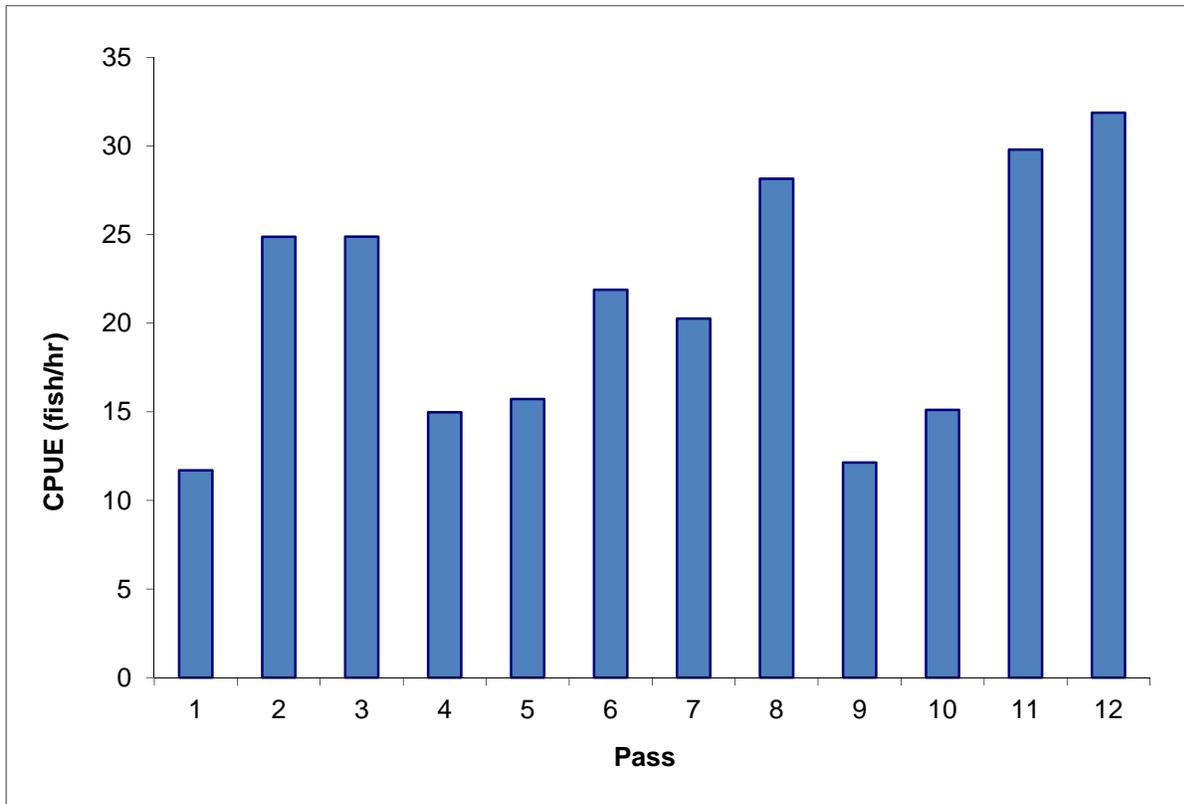


Figure 3. Catch rates for adult and sub-adult bass for each pass, 2013.

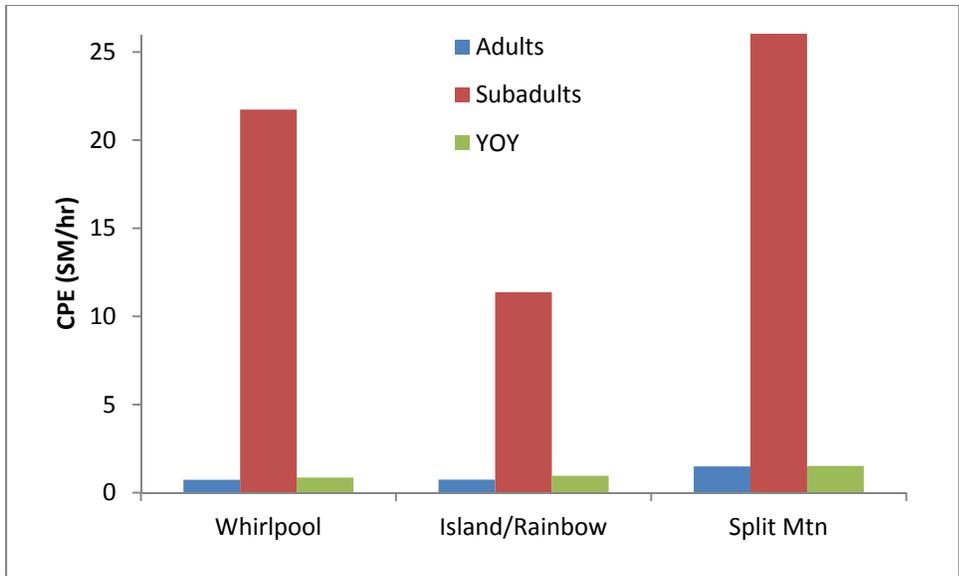


Figure 4. Distribution of smallmouth bass size classes by reach, 2013.

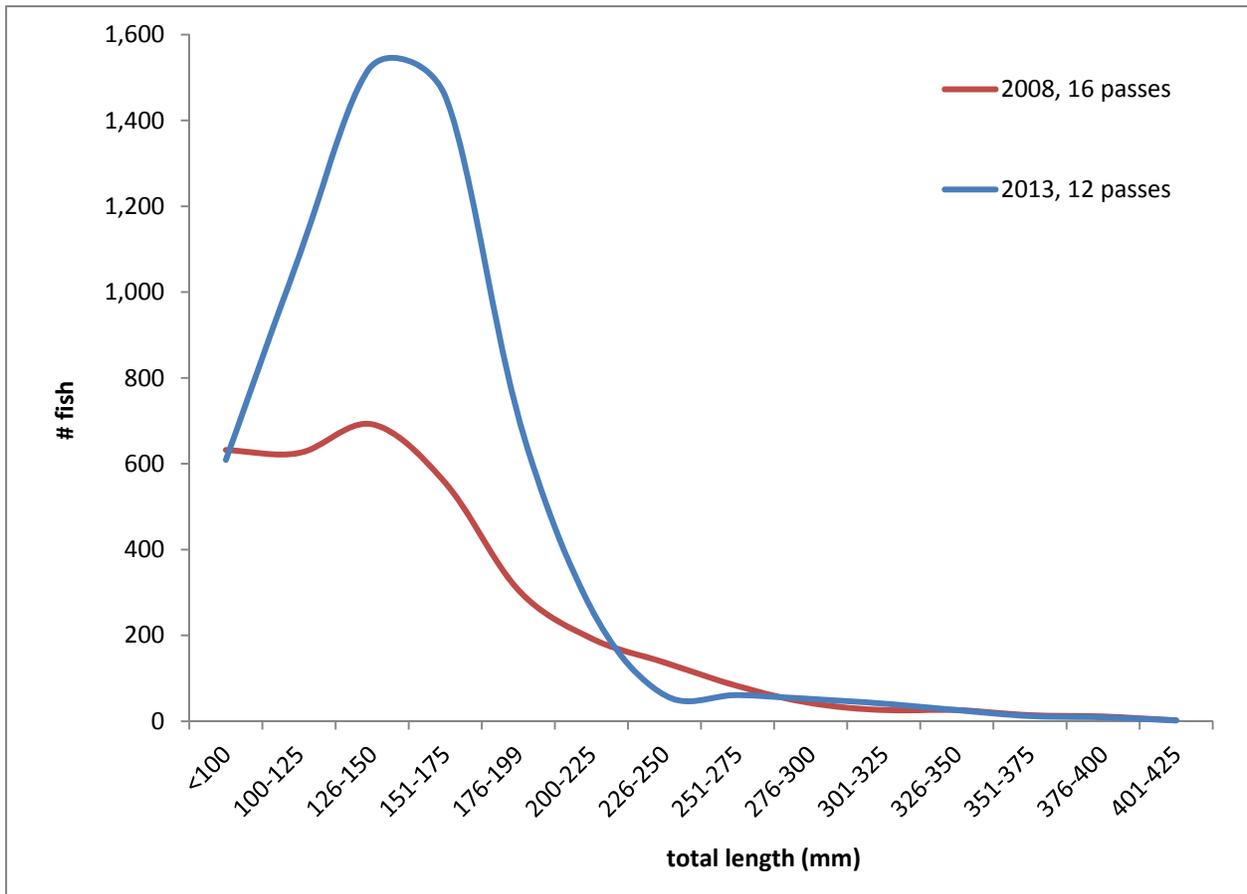


Figure 5. Length frequency distribution of smallmouth bass, 2008 and 2013.

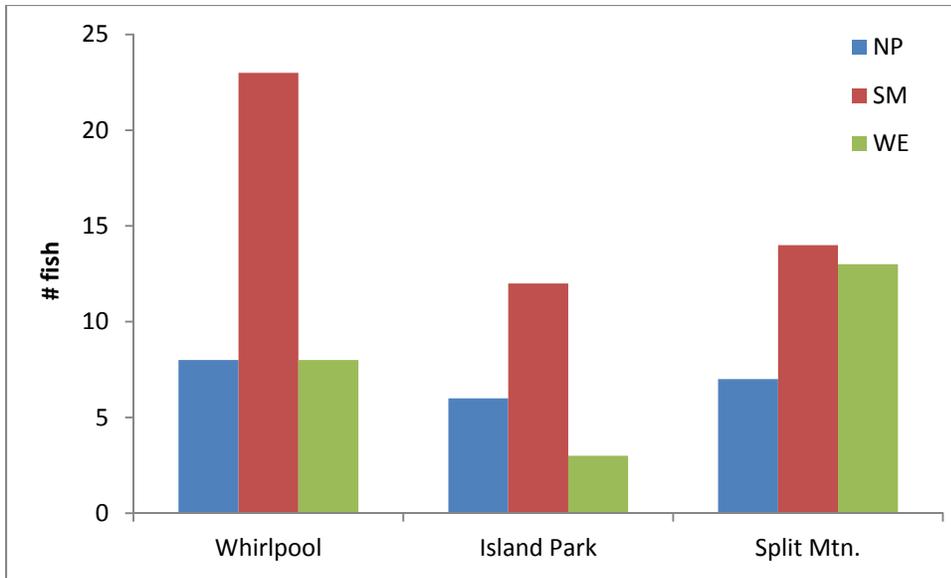


Figure 6. Distribution of piscivore-sized nonnative fishes, 2013.

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R11PG40043 or R13PG40020

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 123a

Project Title: Nonnative Fish Control in the Echo Park to Split Mountain Reach of the Green River, Utah

Principal Investigator:

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U.S. Fish & Wildlife Service

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Project/Grant Period:

Start date (Mo/Day/Yr): 09/16/2011 or 10/01/2012

End date: (Mo/Day/Yr): 09/30/2016 or 09/30/2017

Reporting period end date (Mo/Day/Yr): 09/30/2013

Is this the final report? Yes _____ No X

Performance: USFWS was responsible for tasks 1 and 3. Task 1 was the completion of six electrofishing passes to remove smallmouth bass from this reach. All six passes were completed between 23 July and 29 August 2013. The entire study reach was sampled and bass successfully removed. Task 3 is data analysis and reporting. With the submission of this report on November 15, 2013, that task has been accomplished. There are no outstanding tasks or work to be completed in this fiscal year.

ANNUAL PERFORMANCE PROGRESS REPORT (PPR)

BUREAU OF RECLAMATION AGREEMENT NUMBER: R09AP0871

UPPER COLORADO RIVER RECOVERY PROGRAM PROJECT NUMBER: 123a

Project Title: Nonnative Fish Control in the Echo Park to Split Mountain Reach of the Green River, Utah

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Project/Grant Period: Start date: 11/21/2008
End date: 04/30/2015
Reporting period end date: 09/30/2013
Is this the final report? Yes _____ No X

Performance: Six removal passes were successfully completed (6/14-6/16/13, 6/24-6/26/13, 6/27-6/29/13, 7/8-7/10/13, 7/11-7/13/13, 7/13-7/15/13) on the Green River from Echo Park (RM 344.5) to Split Mountain (RM 319.5). A total of 2532 smallmouth bass were removed with total lengths ranging from 12mm to 387mm. Of the 2534 bass captured, 323 were YOY (<100mm), 2076 were juveniles (>100 and <199mm), and 133 were adults (>199mm). The average total length caught was 133±42 mm. A total of 1427 white sucker were removed with total lengths ranging from 51-410mm. The average total length caught was 133±44mm. These data were reported to the PI in September of 2013. These data were analyzed and reported within the annual report for project #123a by November of 2013. Task 2 and 3 were completed.