

COLORADO RIVER RECOVERY PROGRAM  
FY 2014 ANNUAL PROJECT REPORT

RECOVERY PROGRAM  
PROJECT NUMBER: 161b

I. Project Title: Population abundance and dynamics of introduced northern pike, Yampa River, Colorado

II. Bureau of Reclamation Agreement Number(s): R11AP40060

Project/Grant Period: Start date (Mo/Day/Yr): 8 August 2011  
End date: (Mo/Day/Yr): 30 Sept. 2016  
Reporting period end date: 30 Sept. 2014  
Is this the final report? Yes \_\_\_\_\_ No X

III. Principal Investigator(s):  
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IV. Abstract: Research to better understand abundance and population dynamics of northern pike in the Upper Colorado River Basin is needed for managers to proceed with effective control strategies. Our basic approach was to conduct comprehensive abundance and survival rate estimates at appropriate geographic scales, which when coupled with movement data, should allow for a more comprehensive understanding of abundance dynamics of pike populations in the Yampa River. This understanding will allow managers to assess the role of the buffer removal area in the vicinity of Hayden, Colorado, on pike populations in downstream critical habitat and will also aid assessment of immigration from sources upstream of there, and explore more effective means to achieve recovery of native fishes. Influence of important environmental factors on northern pike abundance dynamics, such as stream flow levels and subsequent reproductive effort, allowed inferences about trajectories of pike populations under different levels of removal effort and possible sources of northern pike emigrating from upstream to downstream. This information should increase the ability of managers to understand effectiveness of removal programs and formulate a comprehensive control strategy that will effectively reduce populations of northern pike and enhance prospects for recovery of native fish populations.

V. Study Schedule: Initial Year 2011  
Final year 2015

VI. Relationship to RIPRAP: Green River Action Plan: Yampa and Little Snake Rivers  
III.A.1. Implement Yampa Basin aquatic wildlife management plan to develop nonnative fish control programs in reaches of the Yampa River

occupied by endangered fishes. Each control activity will be evaluated for effectiveness and then continued as needed.

Green River Action Plan: Mainstem

III. Reduce negative impacts of nonnative fishes and sportfish management activities (Nonnative and sportfish management)

III.A.2.c Evaluate the effectiveness (e.g., nonnative and native fish response) and develop and implement an integrated, viable active control program.

VII. Accomplishment of FY 2014 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Data acquisition, clean-up, and compilation were completed. The final set of records were organized into 7 years of sampling (2004–2010), 4 sampling passes per year (1 marking, 3 removal), and 3 capture regions (Hayden to Craig, RM 171.0–134.2; South Beach-Little Yampa Canyon-Juniper, RM 134.2–91.0; Maybell-Sunbeam, RM 88.7–60.6). Data from Lily Park was too sparse to be included. Lily Park records and data from up- and downstream reaches (upstream of Hayden, reservoirs, Yampa Canyon) will be incorporated into a separate movement description/discussion.

The input dataset consisted of 8,929 records of unique northern pike handled in the above regions and years (5,266 in Hayden to Craig, 2,783 in South Beach-Little Yampa Canyon-Juniper, and 880 in Maybell-Sunbeam). Of the 8,929 unique northern pike, 7,877 were encountered once (tagged and never seen again), 1,015 were encountered twice, and 37 were encountered three times. Most were removed upon subsequent encounter, unless they were recaptured during another marking pass. Mean length of northern pike in the dataset was 465 mm (484 mm in Hayden to Craig, 411 mm in South Beach-Little Yampa Canyon-Juniper, and 519 mm in Maybell-Sunbeam).

Robust design was employed in Program MARK, which makes use of both closed population modeling to estimate capture/recapture probabilities ( $p,c$ ) and open population modeling to estimate survival ( $S$ ) and temporary emigration ( $\gamma$ ). The Huggins' closed captures data type was chosen in order to include an individual covariate (northern pike length). Estimates of population abundance,  $N$ , are derived rather than estimated directly. There were too few between-year movements among regions to employ a multi-state (transition) analysis, but movements among regions will be described and discussed separately. We developed models that allowed all parameters to vary by region, year, and/or pass (both additively and as interactions), as well as simpler designs. We investigated several scenarios of temporary emigration ( $\gamma$ ): Markovian, random, and no movement. We allowed recapture probabilities ( $c$ ) to equal and differ from initial capture probabilities ( $p$ ).

We will likely present our findings at the upcoming non-native fish workshop, December 2014. A draft final report was prepared, approved by the Program Directors Office and sent out for peer review. We have received two of three peer reviews and one additional Biology Committee member review at this writing, and we will finalize the report for Program and BC approval after we receive the third peer review.

VIII. Additional noteworthy observations:

Results in the draft final report have been presented on no less than six occasions at Program-sponsored and professional meetings including:

- One Program-sponsored annual Researchers meetings
- Two non-native fish Workshops
- Colorado-Wyoming Chapter of the American Fisheries Society 2014
- Western Division of the American Fisheries Society 2014
- Desert Fishes Council Meeting 2014

These well-received presentations have informed other scientists and managers about nonnative fish issues in the upper Colorado River basin and resulted in exchanges of information useful to this research project. Such presentations also inform others about the extent of Program activities in general, and specifically about progress in control of nonnative fishes and progress towards recovery of endangered fishes.

IX. Recommendations: Complete report and implement recommendations.

X. Project Status: On track and ongoing.

XI. FY 2014 Budget Status

- A. Funds Provided: \$130,000 (total for three years 2011-2013, none in 2014)
- B. Funds Expended: \$130,000 (total for three years 2011-2013, none in 2014)
- C. Difference: \$0
- D. Percent of the FY 2014 work completed, and projected costs to complete: Funds have been exhausted and the project is not yet completed. Nearly 50% of the budget was consumed by data checking and organization, and long delays were realized waiting for additional data to materialize.
- E. Recovery Program funds spent for publication charges: 0

XII. Status of Data Submission (Where applicable): NA

XIII. Signed: Koreen Zelasko and Kevin R. Bestgen 12 November 2014  
Principal Investigator Date