

**RECOVERY PROGRAM
FY 2018-2019 SCOPE OF WORK for:**

Recovery Program Project Number: 98b

Upper Yampa River northern pike management and monitoring

Reclamation Agreement number: R15PG00083
Reclamation Agreement term: 10/01/2014-09/30/2019

Note: Recovery Program FY18-19 scopes of work are drafted in May 2017. They often are revised before final Program approval and may subsequently be revised again in response to changing Program needs. Program participants also recognize the need and allow for some flexibility in scopes of work to accommodate new information (especially in nonnative fish management projects) and changing hydrological conditions.

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Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other [explain]

- I. Title of Proposal: Upper Yampa River northern pike management and monitoring
- II. Relationship to RIPRAP:
Yampa River Action Plan
 - III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management)
 - III.B.1. Prevent nonnative fish introduction; reduce invasion and recruitment
 - III.B.1.b. Address escapement of northern pike from upstream reservoir sources.
 - III.B.1.c.(1) Implement remedial measures to reduce pike reproduction in Yampa River.
 - III.B.1.e. Other emerging nonnative species
 - III.B.2. Control nonnative fishes via mechanical removal
 - III.B.2.c. Identify and evaluate gear types and methods to control nonnative fishes.
 - III.B.2.d. Remove northern pike from Yampa River designated critical habitat.
 - III.B.2.d.(1) Remove northern pike and smallmouth bass above Craig, CO.
 - III.B.2.e. Remove smallmouth bass
- III. Study Background/Rationale and Hypotheses:
Northern pike (*Esox lucius*) is an exotic, predatory species that has become established in the Yampa River. Northern pike escaped from Elkhead Reservoir (a reservoir on Elkhead Creek, which is a tributary to the Yampa River near Craig, CO) where they were stocked to provide

sportfishing. Since escapement, they have established large, reproducing populations in the upper Yampa River (Nesler 1995, Zelasko et al. 2014). The large populations likely provide a source for continual movement of northern pike into the lower Yampa River and further downstream into the Green River where they occur in critical habitat for four endangered fishes — Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). Approximately 130 miles of the Yampa River below Craig, Colorado is designated critical habitat for these species. Northern pike pose a significant predatory risk to these endangered fish, especially juveniles and small adults of Colorado pikeminnow and razorback sucker. Additionally, northern pike represent a predatory risk to other native species in the basin (e.g., bluehead sucker *Catostomus discobolus*, flannelmouth sucker *Catostomus latipinnis*, and roundtail chub *G. robusta*) that have been considered for listing under the Endangered Species Act in the past (Martinez 1995; Nesler 1995). Northern pike and smallmouth bass have been identified as significant threats to the endangered fishes by a majority of upper basin researchers in surveys conducted during the late 1980s (Hawkins and Nesler 1991), as well as through bioenergetics modeling (Johnson et al. 2008).

IV. Study Goals, Objectives, End Product(s):

Goal: Improve survival of endangered fish in the Yampa and Green rivers.

Objective: Reduce abundance of northern pike, smallmouth bass, and white sucker in the study reach.

End products: Annual report due November 2018; presentation at Nonnative-Fish Workshop

Revisions from previous SOW: This SOW retains FWS contributions to assist CPW with backwater netting for northern pike in the Yampa River (Task 2) that were provided the last 2 years.

V. Study Area: Upper Yampa River (upstream and through Craig, CO); river miles 171.5-134.5

VI. Study Methods/Approach:

Temporarily reducing riverine smallmouth bass and northern pike populations appears viable under certain environmental conditions but both species can easily reverse these reductions in population abundance and return to pre-removal abundances under favorable environmental conditions (Breton et al. 2014; Zelasko et al. 2015). Therefore, mechanical removal efforts will attempt to reach eradication of nonnative fish populations in the river. However, recent synthesis reports investigating effectiveness of in-river removal efforts for northern pike and smallmouth bass determined that reducing in-river populations of these two species would not be successful unless in-river reproduction and reservoir escapement were controlled (Breton et al. 2014; Zelasko et al. 2015). Therefore, mechanical removal efforts will continue to temporarily suppress riverine populations, and will focus on reducing in-river reproduction when feasible. Simultaneously, Program partners will work on other means to reduce in-river reproduction and reservoir escapement in order to make mechanical removal more effective and to attempt to reach complete eradication of riverine populations.

The main channel of the Yampa River between Highway 40 Bridge upstream of Hayden, Colorado and the Highway 13 Bridge in Craig, CO will be electrofished using hard-bottom electrofishing boats and rafts, with effort concentrated in habitats of higher pike density, such as sloughs and flooded backwaters. When possible, gill nets will be set to optimize removal efforts in backwaters where pike densities are high and boat electrofishing efficiency is limited by factors such as depth, conductivity, or vegetation. The entire river reach will be electrofished four times between March and July. Special effort will be made to conduct 3-4 electrofishing passes as early as possible to take advantage of high catch rates for northern pike during their spawn. The remaining passes will be conducted as late as water will allow to attempt to disrupt smallmouth bass spawning activity known to occur in this reach. The effort for three passes will be used at the PI's discretion to target the disruption of spawning for northern pike and smallmouth bass. Effort, total length (TL), weight (grams), and abundance of northern pike will be recorded at each backwater to determine where northern pike are encountered and the highest pike densities are observed within and between years. All northern pike, smallmouth bass, and white sucker captured will be euthanized and disposed of in the Craig, Colorado landfill.

Any endangered fish captured will be identified to species, checked for tags, and TL and weight will be recorded along with GPS coordinates. If an endangered fish is untagged, a PIT tag will be inserted and recorded. Given that flannelmouth sucker, bluehead sucker, and roundtail chub captures are extremely rare in this stretch, any encounters with these fish will be handled with the same protocol as endangered fish. All capture and length data on northern pike, smallmouth bass, and other species collected during the sampling effort in the Yampa River will be added to the Recovery Program database. A brief summary report will be produced after sampling is completed and distributed through the Recovery Program's annual reporting process. In addition, results will be presented at the annual nonnative fish workshop.

VII. Task Description and Schedule:

1. April - July: Electrofish and gill net the Yampa River between Hayden and Craig, CO.
2. April: Gill net large sloughs/backwaters with CPW to block pike spawning habitats
3. October: Consolidate data and provide to CPW and to the Recovery Program database.
4. November- January: Prepare annual reports. Attend nonnative fish workshop and annual researchers meeting.

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:

USFWS personnel costs are based on FY2017 GS and WG tables, with current benefit rates included for each position. Future rates were determined assuming a 2% inflation and cost of living increase. Vehicle and travel costs are based on current GSA rates, again assuming a 2% rate of inflation in future years.

FY 2018

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
Task 1- 7 passes			
Preparatory Labor/Training/Field Work			
GS-11 Biologist	\$42.37	281	\$11,906
GS-8 Fisheries Tech Maintenance work	\$43.43	199	\$8,643
3 GS-5 Tech/ WG-5 Boat Operator	\$23.16	648	\$15,010
Overtime for GS-5 technicians	\$34.75	147	\$5,108
Subtotal			\$40,667
Travel			
Vernal to Craig round trip, daily river shuttles (2 trucks/trip x 700 mi/truck x \$0.325/mi x 7 trips)			\$3,185
Per diem (\$52.00/person x 4 people/day x 21 days)			\$4,368
Lodging (4 rooms/night x \$93.00/room x 14 nights)			\$5,208
Subtotal			\$12,761
Equipment			
Boat gas (8 gal gas/boat x \$4.00/gal x 2 boats/day x 21 trips)			\$1,344
Boat oil (2 qt. Oil/pass x \$11.00/qt x 2 boats/pass x 7 passes)			\$308
GSA truck (rate/mo x # truck-months + 2 trucks)	\$250	3	\$1,500
Evinrude Etec 30 hp outboard motor (2018 only)			\$4,114
Equipment and maintenance (net replacement and repairs, motor repairs and maintenance, boat repairs and maintenance, electrofishing equipment repairs, electrofishing safety pedal and mat replacement, boots, waders, and gloves for field crew, based on average expenditures for the past five years)			\$6,692
Subtotal			\$13,958
TASK 1 TOTAL			\$67,385
Task 2			
Field Work			
2 GS-5 Tech / WG-5 Boat Operator	\$23.16	320	\$7,413
Subtotal			\$7,413
Travel			
Vernal to Craig round trip, daily backwater shuttles (1 truck/trip x 300 mi/truck x \$0.33/mi x 4 trips)			\$396
Per diem (\$52.00/person x 2 people/day x 20 days)			\$2,080
Lodging (2 rooms/night x \$93.00/room x 16 nights)			\$2,976
Subtotal			\$5,452
Equipment			
Gill net repair and replacement (4 nets @ \$119 each)			\$476
Subtotal			\$476
TASK 2 TOTAL			\$13,341

Tasks 3 and 4- Data Analysis, Annual Report, Project Presentation, Administration

Labor

GS-12 Supervisory Fish Biologist	\$60.84	40	\$2,434
GS-11 Fisheries Biologist	\$42.37	220	\$9,321
GS-9 Admin Assist.	\$41.57	88	\$3,658

Subtotal **\$15,413**

Travel

Per diem (1 person x \$52.00/day x 3 days) Vernal to Grand Junction			\$156
Lodging (1 room/night x \$93.00/room x 2 nights)			\$186
Travel to give presentations at workshops and meetings (1 truck/trip x 288 mi/truck x \$0.33/mi x 1 trip)			\$95

Subtotal **\$437**

TASKS 3 & 4 TOTAL **\$15,850**

SOW TOTAL **\$96,576**

FY 2019

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Preparatory Labor/Training/Field Work			
GS-11 Biologist	\$43.73	281	\$12,288
GS-8 Fisheries Tech Maintenance work	\$44.29	246	\$10,895
3 GS-5 Tech/ WG-5 Boat Operator: FWS Electrofishing	\$23.63	648	\$15,312
Overtime for GS-5 technicians	\$35.45	147	\$5,210
Subtotal			\$43,706
Travel			
Vernal to Craig round trip, daily river shuttles (2 trucks/trip x 700 mi/truck x \$0.34/mi x 7 trips)			\$3,332
Per diem (\$54.00/person x 4 people/day x 21 days)			\$4,536
Lodging (4 rooms/night x \$94.00/room x 14 nights)			\$5,264
Subtotal			\$13,132
Equipment			
Boat gas (8 gal gas/boat x \$4.00/gal x 2 boats/day x 21 trips)			\$1,344
Boat oil (2 qt. Oil/pass x \$11.00/qt x 2 boats/pass x 7 passes)			\$308
GSA truck (rate/mo x # truck-months * 2 trucks)	\$255	4	\$1,530
Equipment and maintenance (net replacement and repairs, motor repairs and maintenance, boat repairs and maintenance, electrofishing equipment repairs, electrofishing safety pedal and mat replacement, boots, waders, and gloves for field crew, based on average expenditures for the past five years)			\$6,692
Subtotal			\$9,874
TASK 1 TOTAL			\$66,712
Task 2			
Field Work			
2 GS-5 Tech / WG-5 Boat Operator	\$23.63	320	\$7,562
Subtotal			\$7,562
Travel			
Vernal to Craig round trip, daily backwater shuttles (1 truck/trip x 300 mi/truck x \$0.34/mi x 4 trips)			\$390
Per diem (\$54.00/person x 2 people/day x 20 days)			\$2,160
Lodging (2 rooms/night x \$94.00/room x 16 nights)			\$3,008
Subtotal			\$5,558
Equipment			
Gill net repair and replacement (4 nets @ \$119 each)			\$476
Subtotal			\$476
TASK 2 TOTAL			\$13,596

Tasks 3 and 4- Data Analysis, Annual Report, Project Presentation, Administration

Labor

GS-12 Supervisory Fish Biologist	\$62.05	80	\$4,964
GS-11 Fisheries Biologist	\$43.73	220	\$9,621
GS-9 Admin Assist.	\$42.69	105	\$4,482

Subtotal **\$19,067**

Travel

Per diem (1 person x \$54.00/day x 3 days) Vernal to Grand Junction			\$162
Lodging (1 room/night x \$94.00/room x 2 nights)			\$188
Travel to give presentations at workshops and meetings (1 truck/trip x 288 mi/truck x \$0.34/mi x 1 trip)			\$98

Subtotal **\$448**

TASKS 3 & 4 TOTAL **\$19,515**

SOW TOTAL **\$99,823**

FY 2020

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Preparatory Labor/Training/Field Work			
GS-11 Biologist	\$46.92	281	\$13,185
GS-8 Fisheries Tech Maintenance work	\$46.34	199	\$9,222
3 GS-5 Tech/ WG-5 Boat Operator: FWS Electrofishing	\$24.10	648	\$15,617
Overtime for GS-5 technicians	\$36.15	147	\$5,314
Subtotal			\$43,337
Travel			
Vernal to Craig round trip, daily river shuttles (2 trucks/trip x 700 mi/truck x \$0.34/mi x 7 trips)			\$3,332
Per diem (\$55.00/person x 4 people/day x 21 days)			\$4,620
Lodging (4 rooms/night x \$96.00/room x 14 nights)			\$5,376
Subtotal			\$13,328
Equipment			
Boat gas (8 gal gas/boat x \$4.00/gal x 2 boats/day x 21 trips)			\$1,344
Boat oil (2 qt. Oil/pass x \$11.00/qt x 2 boats/pass x 7 passes)			\$308
GSA truck (rate/mo x # truck-months * 2 trucks)	\$260	3	\$1,560
Equipment and maintenance (net replacement and repairs, motor repairs and maintenance, boat repairs and maintenance, electrofishing equipment repairs, electrofishing safety pedal and mat replacement, boots, waders, and gloves for field crew, based on average expenditures for the past five years)			\$6,692
Subtotal			\$9,904
TASK 1 TOTAL			\$66,569
Task 2			
Field Work			
2 GS-5 Tech / WG-5 Boat Operator	\$24.10	320	\$7,712
Subtotal			\$7,712
Travel			
Vernal to Craig round trip, daily backwater shuttles (1 truck/trip x 300 mi/truck x \$0.34/mi x 4 trips)			\$408
Per diem (\$55.00/person x 2 people/day x 20 days)			\$2,200
Lodging (2 rooms/night x \$96.00/room x 16 nights)			\$3,072
Subtotal			\$5,680
Equipment			
Gill net repair and replacement (4 nets @ \$119 each)			\$476
Subtotal			\$476
TASK 2 TOTAL			\$13,868

Tasks 3 and 4- Data Analysis, Annual Report, Project Presentation, Administration

Labor

GS-12 Supervisory Fish Biologist	\$63.30	40	\$2,532
GS-11 Fisheries Biologist	\$46.92	220	\$10,322
GS-9 Admin Assist.	\$44.42	84	\$3,731

Subtotal **\$16,586**

Travel

Per diem (1 person x \$55.00/day x 3 days) Vernal to Grand Junction			\$165
Lodging (1 room/night x \$96.00/room x 2 nights)			\$192
Travel to give presentations at workshops and meetings (1 truck/trip x 288 mi/truck x \$0.34/mi x 1 trip)			\$98

Subtotal **\$455**

TASKS 3 & 4 TOTAL **\$17,041**

SOW TOTAL **\$97,477**

FY 2021

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Preparatory Labor/Training/Field Work			
GS-11 Biologist	\$47.86	281	\$13,449
GS-8 Fisheries Tech Maintenance work	\$47.26	199	\$9,405
3 GS-5 Tech/ WG-5 Boat Operator: FWS Electrofishing	\$24.58	648	\$15,928
Overtime for GS-5 technicians	\$36.87	147	\$5,420
Subtotal			\$44,201
Travel			
Vernal to Craig round trip, daily river shuttles (2 trucks/trip x 700 mi/truck x \$0.35/mi x 7 trips)			\$3,430
Per diem (\$57.00/person x 4 people/day x 21 days)			\$4,788
Lodging (4 rooms/night x \$97.00/room x 14 nights)			\$5,432
Subtotal			\$13,650
Equipment			
Boat gas (8 gal gas/boat x \$4.00/gal x 2 boats/day x 21 trips)			\$1,344
Boat oil (2 qt. Oil/pass x \$11.00/qt x 2 boats/pass x 7 passes)			\$308
GSA truck (rate/mo x # truck-months * 2 trucks)	\$265	3	\$1,590
Equipment and maintenance (net replacement and repairs, motor repairs and maintenance, boat repairs and maintenance, electrofishing equipment repairs, electrofishing safety pedal and mat replacement, boots, waders, and gloves for field crew, based on average expenditures for the past five years)			\$6,692
Subtotal			\$9,934
TASK 1 TOTAL			\$67,785
Task 2			
Field Work			
2 GS-5 Tech / WG-5 Boat Operator	\$24.58	320	\$7,866
Subtotal			\$7,866
Travel			
Vernal to Craig round trip, daily backwater shuttles (1 truck/trip x 300 mi/truck x \$0.35/mi x 4 trips)			\$420
Per diem (\$57.00/person x 2 people/day x 20 days)			\$2,280
Lodging (2 rooms/night x \$97.00/room x 16 nights)			\$3,104
Subtotal			\$5,804
Equipment			
Gill net repair and replacement (4 nets @ \$119 each)			\$476
Subtotal			\$476
TASK 2 TOTAL			\$14,146

Tasks 3 and 4- Data Analysis, Annual Report, Project Presentation, Administration

Labor

GS-12 Supervisory Fish Biologist	\$66.37	40	\$2,655
GS-11 Fisheries Biologist	\$47.86	220	\$10,529
GS-9 Admin Assist.	\$45.61	84	\$3,831

Subtotal **\$17,015**

Travel

Per diem (1 person x \$57.00/day x 3 days) Vernal to Grand Junction			\$171
Lodging (1 room/night x \$97.00/room x 2 nights)			\$194
Travel to give presentations at workshops and meetings (1 truck/trip x 288 mi/truck x \$0.35/mi x 1 trip)			\$101

Subtotal **\$466**

TASKS 3 & 4 TOTAL **\$17,481**

SOW TOTAL **\$99,412**

FY 2022

Deliverables: Annual report in November. Data submitted to database manager.

Budget

Task Activity	Rate \$/h	Hours	Cost
Task 1			
Preparatory Labor/Training/Field Work			
GS-11 Biologist	\$48.81	281	\$13,716
GS-8 Fisheries Tech Maintenance work	\$48.21	199	\$9,594
3 GS-5 Tech/ WG-5 Boat Operator: FWS Electrofishing	\$25.07	648	\$16,245
Overtime for GS-5 technicians	\$37.61	147	\$5,528
Subtotal			\$45,083
Travel			
Vernal to Craig round trip, daily river shuttles (2 trucks/trip x 700 mi/truck x \$0.36/mi x 7 trips)			\$3,528
Per diem (\$58.00/person x 4 people/day x 21 days)			\$4,872
Lodging (4 rooms/night x \$99.00/room x 14 nights)			\$5,544
Subtotal			\$13,944
Equipment			
Boat gas (8 gal gas/boat x \$4.00/gal x 2 boats/day x 21 trips)			\$1,344
Boat oil (2 qt. Oil/pass x \$11.00/qt x 2 boats/pass x 7 passes)			\$308
GSA truck (rate/mo x # truck-months * 2 trucks)	\$271	3	\$1,626
Equipment and maintenance (net replacement and repairs, motor repairs and maintenance, boat repairs and maintenance, electrofishing equipment repairs, electrofishing safety pedal and mat replacement, boots, waders, and gloves for field crew, based on average expenditures for the past five years)			\$6,692
Subtotal			\$9,970
TASK 1 TOTAL			\$68,997
Task 2			
Field Work			
2 GS-5 Tech / WG-5 Boat Operator	\$25.07	320	\$8,022
Subtotal			\$8,022
Travel			
Vernal to Craig round trip, daily backwater shuttles (1 truck/trip x 300 mi/truck x \$0.36/mi x 4 trips)			\$432
Per diem (\$58.00/person x 2 people/day x 20 days)			\$2,320
Lodging (2 rooms/night x \$99.00/room x 16 nights)			\$3,168
Subtotal			\$5,920
Equipment			
Gill net repair and replacement (4 nets @ \$119 each)			\$476
Subtotal			\$476
TASK 2 TOTAL			\$14,418

Tasks 3 and 4- Data Analysis, Annual Report, Project Presentation, Administration			
Labor			
GS-12 Supervisory Fish Biologist	\$67.70	40	\$2,708
GS-11 Fisheries Biologist	\$48.81	220	\$10,738
GS-9 Admin Assist.	\$46.53	84	\$3,909
Subtotal			\$17,355
Travel			
Per diem (1 person x \$58.00/day x 3 days) Vernal to Grand Junction			\$174
Lodging (1 room/night x \$99.00/room x 2 nights)			\$198
Travel to give presentations at workshops and meetings (1 truck/trip x 288 mi/truck x \$0.36/mi x 1 trip)			\$104
Subtotal			\$476
TASKS 3 & 4 TOTAL			\$17,830
SOW TOTAL			\$101,245

IX. Budget Summary:

Total budget to USFWS Vernal by fiscal year:

FY2018: \$96,576

FY2019: \$99,823

FY2020: \$97,477

FY2021: \$99,412

FY2022: \$101,245

X. Reviewers: Recovery Program Director's Office – May 2017; Biology Committee – July 2017

XI. References:

Breton, A. R, D. L. Winkelman, J. A. Hawkins, and K. R. Bestgen. 2014. Population trends of smallmouth bass in the upper Colorado River basin with an evaluation of removal effects. Final report to the Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado. Larval Fish Laboratory Contribution 169.

Hawkins, J. A., and T. P. Nesler. 1991. Nonnative fishes in the upper Colorado River basin: an issue paper. Final Report. Colorado State University Larval Fish Laboratory and Colorado Division of Wildlife, Fort Collins.

Johnson, B.M., P.J. Martinez, J.A. Hawkins, and K.R. Bestgen. 2008. Ranking predatory threats by nonnative fishes in the Yampa River, Colorado, via bioenergetics modeling. North American Journal of Fisheries Management 28: 1941-1953.

Martinez, P. J. 1995. Coldwater Reservoir Ecology. Colorado Division of Wildlife, Federal Aid in Fish and Wildlife Restoration Project F-242R-2, Job Final Report, Fort Collins.

Zelasko, K. A., K. R. Bestgen, J. A. Hawkins, G. C. White. 2015. Abundance and population dynamics of invasive northern pike *Esox lucius*, Yampa River, Colorado, 2004–2010. Final Report to the Upper Colorado River Endangered Fish Recovery Program, Project 161b, Denver. Larval Fish Laboratory Contribution 185.

