FY2020 – Demographic Monitoring of Colorado Pikeminnow and Razorback Sucker

Principal Investigators:

Ben Schleicher and Dale Ryden
U. S. Fish and Wildlife Service
Colorado River Fishery Project
445 West Gunnison Ave, Suite 140
Grand Junction, Colorado 81501
(970) 628-7205
benjamin_schleicher@fws.gov
dale_ryden@fws.gov

and

Bobby Duran
U.S. Fish and Wildlife Service
New Mexico Fish and Wildlife Conservation Office
3800 Commons N.E.
Albuquerque, New Mexico 87109
Bobby_Duran@fws.gov

and

Brian Hines
Utah Department of Wildlife Resources
Moab Field Station
1165 S. Hwy 191- Suite 4, Moab, Utah 84532
Bhines@utah.gov

This SOW proposes a second year of a three-year effort to generate age-specific demographic parameters for Colorado Pikeminnow and Razorback Sucker in the San Juan River. This proposal is aimed at satisfying several data and recovery needs of the San Juan River Basin Recovery Implementation Program (SJRIP): 1) age-specific capture and survival probabilities of endangered fishes, 2) age-specific abundance estimates of endangered fishes, 3) effects of limited handling on the endangered fishes, and 4) development of a new post-2023 endangered fish monitoring program. Specifically, the proposed work will focus strictly on the two endangered fishes but with increased effort in order to track demographic parameters of both endangered fishes. Similar to the Upper Colorado River Endangered Fish Recovery Program, we propose this demographic-based sampling occur in a 3-year on, 2-year off fashion in order to allow periods of limited handling stress to the recovering populations. Conducting this work in 2020 would represent the second year of the 3-year "on" cycle. Annual sub-adult/adult monitoring could occur during the "off" cycle to maintain long-term monitoring dataset established during previous sampling.

Following the Recruitment Bottleneck Workshop on 22 February 2018, the SJRIP decided to limit the capture of Colorado Pikeminnow and Razorback Sucker during summer sampling in order to minimize the apparent detrimental effects of the capture event on juvenile Colorado Pikeminnow survival (Clark et al. 2018). At this point the mechanisms contributing to these capture effects are unknown, but stress-related factors such as electrofishing, handling, tagging, live well housing, and other environmental conditions could be negatively affecting survival. Thus, the SJRIP would likely be unable to evaluate the effects of reduced handling of juvenile Colorado Pikeminnow in the summer without conducting this proposed work.

The negative effect of capture on juvenile Colorado Pikeminnow was documented via analysis of annual survival (Clark et al. 2018). Thus, continued use of the same parameter to measure the response of changing management appears most appropriate (i.e., not capturing juvenile Colorado Pikeminnow during summertime sampling). Clark et al. (2018) reported relatively high capture probabilities for juvenile Colorado Pikeminnow based on the entirety of the SJRIP's sampling efforts (annual mean range: 0.31-0.42). However, single-pass Fall Monitoring capture probabilities of juvenile Colorado Pikeminnow are typically lower (annual mean range: 0.0173-0.0483 from 2011-2015; SJRIP 2017), limiting recaptures needed for precise annual survival estimates. In an effort to increase capture probability for reliable annual survival estimates, we propose conducting three passes in this Demographic Monitoring SOW of four rafts each from Shiprock, NM to Sand Island, Utah in fall 2020 (RM 147.9-77.7). Only endangered fish would be captured during this Demographic Monitoring effort and additional care would be carried out to minimize fish stress (e.g., salting live wells and using aerators). We propose conducting Demographic Monitoring for three of five years (on 2019-2021, off 2022-2023). Three years of Demographic Monitoring will allow for annual, age-specific survival estimates and capture probabilities for both endangered species (and in the future, estimates of wild-spawned versus hatchery-reared fish). Additionally, multiple in-year passes over three years allows for the use of Pollock's robust design (Kendall et al. 1997) and estimation of age and species-specific annual abundance. The Demographic Monitoring proposal increases sampling effort during the fall; however, because temperatures are cooler in fall compared to summer (when catch rates of endangered fishes were previously highest), physiological stress and mortality should be reduced.

The following is an outline for the proposed work:

- Three passes (4 rafts each pass) separated by one week
- Each river mile will be a sample unit
- Sampled reach is between Shiprock and Sand Island (RM 147.9-77.7)
- Start mid-September, end early October
- Capture only endangered fishes
- All previous PIT tagging protocols will be in place
    - All captured fish will be checked for a PIT tag
    - All fish lacking a PIT tag and >130mm will be implanted with a new PIT tag
- Analysis will be mark-recapture robust design (same analysis used by Upper Basin)
    - Estimate age-specific capture probability (per pass)
    - Estimate age-specific survival (annual)
    - Estimate age-specific abundance (annual)

Data Analysis

Data collected during the proposed Demographic Monitoring effort in 2020 would complete the second year (of three years) of this monitoring effort. Interim reports will be based on data in-hand at the time of analysis but these results will be provisional until the completion of analyses in a final report following the three years of data collection.

Following data collection in 2020 and 2021, we will use Pollock's robust design (Kendall et al. 1997) implemented in Program MARK (White and Burnham 1999) to estimate demographic parameters of interest. The use of this model is particularly advantageous because it integrates both closed and open population models to estimate several demographic parameters. For example, within year sampling occasions will take place at closely spaced temporal intervals (3 passes over 6 weeks) to estimate *within year age-specific abundance* with closed models. This level of within-year sampling across consecutive years will then allow for the estimation of *between year age-specific survival* using open population models. Additionally, the robust design allows for the estimation of *capture/recapture probability by pass*. A suite of competing models including the effects of variation in factors such as fish size (TL), year, pass-specific capture/recapture probability, temporary emigration, and reach will be evaluated with AIC_C (Burnham and Anderson 1998).

Because 2019 will complete only the first year of this monitoring effort (multiple passes within year), data analysis for the first year will be limited to closed capture models described by Otis et al (1978) implemented in Program MARK (White and Burnham 1999). The 2019 data analysis will evaluate models with constant pass-specific detection probability, varying pass-specific detection probability, and variation in capture and recapture probability to estimate age-specific abundance and detection probability for Colorado Pikeminnow and Razorback Sucker.

Deliverables

A draft report will be submitted to the Program Office by 31 March 2020 and a final report will be completed at the end of the three year study period. All data will be submitted to the Program Office by 31 December 2020.

References

Burnham, K.P., and D.R. Anderson. 1998. Model selection and inference: a practical information-theoretic approach. Springer-Verlag, New York.

Clark, S.R., M.M. Conner, S.L. Durst, and N.R. Franssen. 2018. Age-specific estimates indicate deleterious capture effects and low survival of stocked juvenile Colorado Pikeminnow (*Ptychocheilus lucius*). North American Journal of Fisheries Management. doi/pdf/10.1002/nafm.10214.

Kendall, W.L., J.D. Nichols, and J.E. Hines. 1997. Estimating temporary emigration using capture-recapture data with Pollock's robust design. Ecology 78(2):563-578.

Otis, D.L., K.P. Burnham, G.C. White, and D.R. Anderson. 1978. Statistical inference from capture data on closed animal populations. Wildlife Monographs 62.

San Juan River Basin Recovery Implementation Program (SJRIP). 2017. Population abundance estimates for Colorado Pikeminnow and Razorback Sucker in the San Juan River. San Juan River Basin Recovery Implementation Program, U.S. Fish & Wildlife Service, Albuquerque, NM.

White, G.C., and K.P. Burnham. 1999. Program MARK: survival estimation from populations of marked animals. Bird Study 46 (supplement):120-138.

Budgets

GJFWCO Budget

Task 1: Demographic Monitoring

Personnel/Labor Costs (Federal Salary + Benefits)

Objectives 1-3: Logistics, Electrofishing, Removal of Nonnative Fish

Description	Rate/HR	PEOPLE	DAYS	HRS	OT HRS	SUB TOTAL	OT SUB TOTAL	TOTAL
Principal Biologist (GS-11/7) – 320 hours								$4,307.20
(1 person X 10 days planning & organization)	$53.84	1	10	80		$4,307.20		
San Juan River sampling - fall:								
(1 person X 8 days/trip X 1 trip – camping)	$53.84	1	8	0		$0.00		
(+ 16 extra hours)	$53.84							
	1	16	0		$0.00	Bio. Tech. Crew		
Leader (GS-7/4) - 120 hours								
	$0.00							
San Juan River sampling - fall:								
(1 person X 10 days/trip X 1 trip – camping)	$32.46	1	5	0		$0.00		
(+ 40 hours overtime)	$48.69	1			0		$0.00	
Bio. Tech. Crew Leader (GS-6/3) - 120 hours								$16,646.40
San Juan River sampling - fall:								
(1 person X 10 days/trip X 1 trip – camping)	$27.74	2	5	120		$6,657.60		
(+ 40 hours overtime)	$41.62	2			120		$9,988.80	
Biological Technicians (GS-5/1) – 312 hours @ $23.02/hr								$0.00

San Juan River sampling – fall:						
(2 person X 10 days/trip X 1 trip – camping)	$23.40	0	5	0	$0.00	
(+ 40 hours overtime)	$35.10	0		40		$0.00

PERSONNEL/LABOR TOTAL **$20,953.60**

Permitting; Coordination; Data Input, Analysis, Management & Presentation; Report Writing; Office & Administrative Support (Federal Salary + Benefits)

	Rate/HR	PEOPLE	DAYS	HRS	OT HRS	SUB TOTAL OT	SUB TOTAL	TOTAL
Administrative Officer (GS-9/8) – 360 hours	$42.98	1		360				$15,472.80
Principal Biologist (GS-11/7) – 480 hours	$53.84	1		480				$25,843.20
Project Leader (GS-14/6) – 320 hours	$82.57	1		320				$26,422.40
						PERMITTING, DATA INPUT, E		**$67,738.40**

Travel and Per Diem (Based on Published FY-2017 Federal Per Diem Rates) 1

Hotel Costs	RATE	PEOPLE	NIGHTS	TRIPS		TOTAL
5 nights (in Cortez, CO)	$118.00	4	1	3		$1,416.00
Per Diem (Hotel Rate)						
1 days X 5 people (in Cortez, CO)	$61.00	4	1	3		
	$732.00	Per Diem (Camping Rate)				
10 days X 4 people	$36.00	4	7	3		
	$3,024.00					

TRAVEL/PER DIEM TOTAL **$5,172.00**

Equipment and Supplies 1.015

Vehicle Maintenance & Gasoline (@ $365/month lease = $12.17 per day based on 30 days in an "average" month + $0.42/mile)

TOTAL

Vehicle Mileage	TRUCKS	DAYS	MILEAGE	Mileage Rate		
San Juan fall sampling						
Grand Jct. to Cortez to Hogback to Sand Island to Grand	3	1	525	$0.43		$671.42
VEHICLE LEASE	TRUCKS	DAYS	Lease/day			
San Juan fa Grand Jct. to Cortez to Hogback to Sand Island to Grand	3	8	$12.35			$296.46
Shuttle Service	8		$253.75			$2,030.00
Generator Gasoline	BOATS	DAYS	GAS $/GAL			
San Juan River sampling - fall camping trip 2	4	7	$2.51			$350.99
					Vehicle Maint. & Gasoline	**$3,399.10**

Equipment Maintenance, Repair, & Replacement

Exact use of the money in this section of the budget will vary from year to year depending on what equipment needs to be maintained, repaired, or replaced, but use of these funds for a "typical" field season for one study **COULD** include the following: Raft trailer maintenance

Annual trailer maintenance & safety inspection	$788.20	Replace/repair trailer suspension, trailer lights, winch handle/straps/gears, trailer jack stand, wheel bearings	
Replace trailer tires – 2 per year @ $77 each	$154.00		
Signal light pigtail adapters – 2 @ $15 each	$30.00	Generator maintenace	
Spark plugs for generators – 5 at $2.20 each	$11.00	Synthetic oil for generators - 5 quarts at $6.30 each	$31.50
Generator repair/tune-up - 9 hrs @ $70/hr = parts	$703.79		
Sampling gear (needs to be regularly replaced)			
Hip boots – 2 pair at $75/pair	$150.00		
Breathable chest waders - 2 pair @ $120/pair	$240.00		
NRS Type IV life jackets – 2 @ $130 each	$260.00		
Electrical Gloves - 3 pairs @ $75/pair	$225.00		
Dura-Frame electrofishing dip nets – 1 @ $630 each + fr	$630.00		
Raft frame &/or boat hull repair			
Aluminum welding – 7 hours @ $95/hr	$665.00		
Raft repair kits			
Raft glue (urethane/hypalon) – Four 4-oz. cans @ $24.95	$100.00		
NRS raft patch material – 5 feet @ $37/ft	$185.00		
Toluene – 1 qt @ $17.95/qt	$18.00		
Equipment tie-downs - NRS HD-brand tie-down straps, each boat needs:			
Ten 2-ft straps - 10 @ $4.20 each	$42.00		
Five 3-ft straps - 5 @ $4.30 each	$21.50		
Ten 4-ft straps - 10 @ $4.70 each	$47.00		

Five 6-ft straps 5 @ $5.05 each	$25.25
Five 9-ft straps 5 @ $5.70 each	$28.50
Five 12-ft straps 5 @ $6.15 each	$30.75
Raft rigging materials, each boat needs:	
D-style carabiners - 10 @ $8.25 each	$82.50
Mesh rig bag – 1 @ $50 each	$50.00
Yeti 125-quart coolers – 1 @ $500 each	$550.00
5-gallon plastic gasoline jerry cans – 5 @ $40 each	$200.00
20 lb. propane tanks – 1 @ $55 each	$55.00
Eddy Out Aluminum Dry Box (36L x 16H x 16D) - 1 at $3	$375.00
Cans for 1st aid & tool kits, raft repair kits, etc. - 20 @ $1	$380.00
Rafting oars, oar blades, and oar rowing sleeves	
Carlisle 10-foot oar shafts – 2 @ $100 each	$200.00
Carlisle Oars blades – 4 @ $65 each	$260.00
Oar sleeves – 4 @ $18 each	$72.00
Camping Gear	
NRS Canyon Dry Box (kitchen cook kit storage) - 1 at $16	$165.00
NRS campsite counter (18"W X 68" L X 40" H) - 1 at $299	$299.95
Roll-A-Table (32" X 32" table, 27" legs) - 2 at $99.95 each	$199.90
2-man tent (1/person), ~ 1 year life-span - 6 at $99.99 ea	$599.94
Partner Steel 16" 4-burner camp stove - 1 at $359.00	$359.00
River bags	
NRS 3.8 heavy-duty Bill's Bag 110L – 1 @ $160 each	$160.00
NRS Tuff Sacks 25L - 5 @ $ 35 each	$175.00
Pesola brand spring scales	
# 20010 Micro-Line 10 gram – 1 @ $68.75	$68.75
# 20030 Micro-Line 30 gram – 1 $61.60	$61.60
# 20100 Micro-Line 100 gram – 1 @ $61.60	$61.60
# 40300 Medio-Line 300 gram – 1 @ $73.15	$73.15
# 40600 Medio-Line 600 gram – 1 @ $73.15	$73.15
# 42500 Medio-Line 2,500 gram – 1 @ $71.45	$71.45
# 41002 Medio-Line 1,000 gram – 1 @ $73.15	$73.15
# 80005 Macro-Line 5 kg – 1 @ $150.15	$150.15
# 80010 Macro-Line 10 kg – 1 @ $155.65	$155.65
NRS E-160 Self-Bailing Raft - 1 at $6,125.00	$6,125.00
Equipment Maintenance, Repair, & Replacement Subtotal	$15,483.43
Requested funding divided between Tasks 1-3	

Other potential uses for these same funds include replacing hand tools (ratchet and sockets, screw drivers, vise grips, pliers, Allen wrenches, crescent wrenches, hammer, etc.), WD-40, bailing wire, duct tape, electrical supplies (12 and 14 gage wire for the boats, junction boxes, extra male & female plugs, wire nuts, fuses, Ohm meter, electrical tape), batteries (C, AA and AAA), lanterns, lantern mantles, small "pony" propane bottles for lanterns, Gott 5-gallon water jugs, shovels, 5-gallon buckets, cargo nets, fix chips or cracks in vehicle windshields, bulbs, lenses, and wiring to fix trailer lights and pigtails, new electrofishing spheres, wire rope for replacing stainless steel electrofishing cathodes, camping kitchen gear (anodized dutch ovens X 2, plates, cups, bowls silverware, pots, pans, griddle), data books, pre-printed Rite-In-The-Rain data sheets, pencils, repair/replace river maps, etc.

Requested 2017 Equipment Costs for Task 1	**$6,546.75**

USFWS-GJFWCO Total	**$103,809.85**
USFWS R6 Admin Overhead (3.00%)	**$3,114.30**
USFWS Region 6 Total	**$106,924.15**

NMFWCO Budget

FY 2020

Pop. estimate - 3 trips, two passes per trip, Hogback Diversion to Sand Island, UT. NMFWCO supplying 5 people per trip

Labor Cost - Field Work (3 trips x 8 days/trip)

Position	Grade/Step	Hourly Rate	Fringe	Salary w/benefits	Hours/Day	Total Days	Sub-Total
Supervisory Fish Biologist	GS 12/7	$43.09	29.51%	$59.48	9	24	$12,847.68
Fish Biologist	GS 11/7	$35.95	25.57%	$47.75	9	24	$10,314.00
Fish Biologist	GS 9/7	$29.71	26.46%	$39.92	9	24	$8,622.72
Remote Biologist	GS 9/2	$25.59	25.16%	$33.74	9	24	$7,287.84
Biological Tech	GS 5/1	$16.34	7.11%	$17.55	9	24	$3,790.80
Overtime Hours (weekend work)							
Fish Biologist	GS 9/7	$40.91	26.46%	$51.73	9	6	$2,793.42
Remote Biologist	GS 9/1	$37.14	25.16%	$46.48	9	6	$2,509.92
Biological Tech	GS 5/1	$24.51	7.11%	$26.25	9	6	$1,417.50
Administrative, Reporting, Planning							
Fish Biologist	GS 9/7	$29.71	26.46%	$39.92	9	30	$10,778.40
Remote Biologist	GS 9/2	$25.59	25.16%	$33.74	9	15	$4,554.90
Supervisory Fish Biologist	GS 12/7	$43.09	29.51%	$59.48	9	5	$2,676.60
Adminstrative Officer	GS 9/9	$31.36	26.18%	$42.22	9	2	$759.96

Total Labor

$68,353.74

FY20 3% increase

$2,050.61

Total FY20 Labor

$70,404.35

Travel and Per Diem	Days	Rate		
Hotel Costs	12	$94.00		$1,128.00
Per Diem (Travel Day)	30	$41.25		$1,237.50
Per Diem (Full Day)	90	$29.00		$2,610.00
			Total Travel/Per Diem	**$4,975.50**

Equipment	Miles/Qty	Total Miles	Rate	
Shuttle Costs x 3 trips	9		$200.00	$1,800.00 3 trucks
Vehicle Fuel 3 trucks X 3 trips - ABQ to Sand Island, UT 574 mi RT	574	5,166	$0.58	$2,996.28
Generator Fuel 40 gallons/trip x 3 trips	120		$2.85	$342.00
Maintenance, repair, replace (i.e. life jackets, waders, generator repair, dip nets, etc.)				$3,000.00

Equipment Total **$8,138.28**

Sub-total for 3 trip pop est. - NMFWCO	**$83,518.13**
USFWS Administrative Overhead (3%)	**$1,913.92**
Total for 3 trip pop est. - NMFWCO	**$85,432.05**

FY 2020 Draft Budget

San Juan River Endangered Fish Demographic Monitoring

Utah Division of Wildlife Resources

Submitted by Katie Creighton and Brian Hines

katherinecreighton@utah.gov, bhines@utah.gov

435.259.3780, 435.259.3782

FY 2020 Costs for UDWR- Moab

San Juan River Endangered Fish Demographic Monitoring

Task 1. Endanagerd Fish Monitoring: Shiprock to Sand Island (4 people X 8 days X 2 trips)

Labor: salary + benefits + applicable overtime (personnel services)

	Rate	Hours	Cost
Project Leader	$36.22	20	$724
Biologist	$33.29	280	$9,323
Technician	$17.08	280	$4,782
		subtotal	**$14,829**

Food and Transport (current expense)

	Rate	Quantity	Cost
Truck Rental (2 trucks)	$199.37	4	$797
Mileage Costs (2 trucks X 350 miles X 2 trips)	$0.40	1500	$600
In-state per diem (during trip)	$43.00	32	$1,376
Out-of-State per diem (before trip)	$46.00	4	$184
Hotel (before trip)	$105.00	4	$420
Shuttle (2 trucks X 2 trips)	$150.00	4	$600
		subtotal	**$3,977**

Equipment (current expense)

	Rate	Quantity	Cost
Camping gear repair/replacement:			$500
Sampling gear repair/replacement:			$1,000
Boating gear repair/replacement:			$1,000
Fuel for generators (50 gallons/pass)	$4.00	100	$400
		subtotal	**$2,900**

Total Expenses	**$21,707**
Administrative Overhead (16% on all personnel services)	**$2,373**
FY 2020 Total	**$24,080**

Response to comments

19a	SOW-19a-Demographic monitoring of Colorado Pikeminnow and Razorback Sucker	Schleicher and Ryden, GJFWCO; Duran, NMWCO; Hines UDWR

Harry Crockett, Colorado DNR, BC member

How can the technical aspects of this SOW be improved?

No recommendations; as the continuation of a 3-year demographic study, methods seemingly need to be kept the same. Assume detailed analysis will come at the end of the three years; in this SOW description of analysis is cursory at best

The SOW has been adjusted to include additional details on data analysis.

What is this SOW's contribution to recovery?

Improved estimates of demographic parameters; possibly assessment of handling effects. Contributes more to ability to assess recovery, rather than effecting recovery directly.

Vince Lamarra, Navajo Nation, BC member

How can the technical aspects of this SOW be improved?

I like the concept of trying to get a quantitative estimate of the population size of the AGE 1 + CPM. Mainstream electrofishing, with 4 boats seems inadequate and may end up with the same results as adult monitoring, (low capture rates of AGE-2 to AGE-7 CPM). Will medium sized secondary channels be sampled? In that reach of the river (RM 147 to 68), there are almost continuous channel breaks. Also, I doubt that you will capture RBS's that are AGE-1 and AGE-2 using this gear type. How does this study fill in the age structure gaps of this species over the captures in the Adult Monitoring Program?

All main channel and any secondary channels that can be sampled with an electrofishing raft will be sampled. Summer 2018 and Spring 2019 sampling indicates that raft electrofishing of shoreline habitats captures AGE 1 Razorback Sucker.

What is this SOW's contribution to recovery?

Important information on CPM population structure (quantifying the rate of recruitment of 50mm stocked fish).

Jacob Mazzone, Jicarilla Apache Nation, BC member

How can the technical aspects of this SOW be improved?

No comment.

What is this SOW's contribution to recovery?

The estimates proposed to be generated by the scope of work are of interest to recovery, especially capture probability and survival estimates. If it is determined that survival estimates remain low, capture inducted myopathy and/or mortality is high, this work could lead to shifts in sampling regime to benefit fish health and therefore aid in their recovery. Data on survival, capture probability, and abundance also help refine and improve data integration and modeling efforts of other Program projects.

Mark McKinstry, BOR, BC member

How can the technical aspects of this SOW be improved?

I think this approach is relatively simple and seems sufficient for the data that is required. I would caution that "trip" becomes the metric, and that what we really want is a bunch of CPM and RBS captured. I realize this is difficult, but trips should not be launched if you think flows are going to be > 800-100 cfs and it is going to be raining. If that is the case the trips should be cancelled and rescheduled. I realize this is difficult with this many people and planning the effort, but the criticism from some members has been that if a contractor was doing it that they would be held to those conditions.

Sampling during high flow and high turbidity conditions will likely preclude the capture of large numbers of CPM and RBS. However, point estimates of population abundance, capture probability, and survival can still be obtained during these conditions. The caveat for estimating these parameters during poor sampling conditions is that the estimated bounds of uncertainty will likely be large. Additionally, capturing and tagging large numbers of CPM and RBS during good sampling conditions will provide a greater contribution to other SJRIP activities (i.e. detecting movement using PIT tag antennas). Given this benefit, river conditions will be monitored prior to launching for trips. Schedule changes will be considered if river conditions merit a change in float dates.

What is this SOW's contribution to recovery?

Providing reliable numbers of the endangered fish would lead to better management actions and provide us with better information on numbers of fish in the river.

Bill Miller, Southern Ute Indian Tribe, BC member

How can the technical aspects of this SOW be improved?

No comments

What is this SOW's contribution to recovery?

Provides survival and abundance data for the two endangered species that will assist in guiding management actions for those species and assessment of progress toward recovery.

David Mueller, BLM, BC member

How can the technical aspects of this SOW be improved?

It seems that conducting three passes may offset the lower capture probabilities in the fall but it may increase the probability of recapture in a short amount of time that additional care to limit stress may not offset. An assessment of the utility of the additional passes and the amount of recaptures should be done to inform future sampling efforts.

The study design and data collected will allow us to evaluate these hypotheses and determine appropriate sampling efforts in the future.

What is this SOW's contribution to recovery?

Provides information on the status of native fishes specifically age class survival and abundance that will provide measures of success for management actions

Ben Schleicher, USFWS R6, BC member

How can the technical aspects of this SOW be improved?

What is this SOW's contribution to recovery?

Tom Wesche, Water Development Interests, BC member

How can the technical aspects of this SOW be improved?

As I'm not involved in the Upper Basin Program, additional description of the methods to be applied and the logic behind the application of the recommended approach would be helpful. Also, either we need to expand this effort to the entire extent of critical habitat for the endangered species in the San Juan River or the process that will be followed to expand the results obtained to the entirety of critical habitat needs to be thoroughly described.

The SOW has been adjusted to include additional details on data analysis. Expanded effort is not possible on this project due to logistical constraints. However, in previous sampling within critical habitat the majority of rare fish captures have occurred within the current project area.

What is this SOW's contribution to recovery?

I view this project as one of high priority as we attempt to measure the progress we've made to achieving recovery and for planning for the post-2023 period. We need to know where we're at before we can plan for the future and modify our management actions as needed.

Brian Westfall, BIA, BC member

How can the technical aspects of this SOW be improved?

What is this SOW's contribution to recovery?

Monitoring is important to indicate the status of the species and I support this scope of work

Matt Zeigler, NMDGF, BC member

How can the technical aspects of this SOW be improved?

This SOW has been presented to the BC for review several times. However, the SOW still lacks any significant information on methods, in particular the use of the mark-recapture robust design to estimate capture probabilities, survival, and abundance. This information is needed so that a complete technical review can be completed.

The SOW has been adjusted to include additional details on data analysis.

Additionally:

What concentration of salt will be used in the live wells? How will consistency be maintained? How will any effect be measured?

Salt will be applied to live wells at a concentration of 0.5% (5 g/l. This is a common concentration used during hauling of live fish. Live wells will be dumped and salt solutions replaced for each sample mile. This idea was simply a way to help reduce stress of fish from handling. It will be hard to tease apart the effect of salting the live wells. Other options to reduce stress such as aerators in live wells will also be used.

What are the “previous PIT tagging protocols” that will be in place?

All fish will be checked for a PIT tag and all untagged fish >130mm will be implanted with a new PIT tag. These details will be included in the revised SOW.

Will an update or report be provided after every year? Will a final report be provided after the three years?

Yes, annual and final reports will be provided. Additional details on project reporting have been included in the revised SOW.

What is this SOW’s contribution to recovery?

This SOW will provide needed information on age-specific and population level survival and abundance for both endangered species. Information collected from this SOW will be beneficial for determining stocking rates, recruitment rates, and survival. This study should provide the most robust assessment of the current status of both species in the San Juan that the program has ever completed.

Brian Bledsoe, Peer Reviewer

How can the technical aspects of this SOW be improved?

Not my expertise.

What is this SOW’s contribution to recovery?

Wayne Hubert, Peer Reviewer

How can the technical aspects of this SOW be improved?

The Clark et al. (2018) is a very powerful paper that is changing the approach to monitoring of Colorado pikeminnow and razorback sucker in the San Juan River. More emphasis should be placed on summarizing the findings from Clark et al. (2018) and how it has provided knowledge leading to this new monitoring protocol.

While sampling protocols are described in relatively sufficient detail, the methods for computation of age-specific capture probability, survival, and abundance are not described. How will Pollock’s robust design be used to estimate these parameters? What are the specific computations for estimation of each parameter? Will the computations be made by the team of Schleicher, Ryden, Duran and Hines or a consultant outside of the team?

Additional details on data analysis have been included in the revised SOW

The handling protocols to reduce stress of captured fish include, but are not limited to, salting of live wells. The SOW would benefit from a thorough description of all protocols aimed at reducing stress on captured fish and inclusion of references that support the application of each protocol.

Salt will be applied to live wells at a concentration of 0.5% (5 g/l) for every sample mile. This concentration is within the range of recommended values found in the literature.

A couple of minor modification to consider:

Line 70. It appears that the correct word is entirety not “entirely.”

Correction made

Line 82. The statement should be more specific. Change to “for the use of Pollack’s robust design.”

Correction made

What is this SOW’s contribution to recovery?

The intention of the new demographic monitoring protocol is to reduce stress and enhance survival of the target species. The benefits of this innovative monitoring protocol of this are yet to be determined. However, it is intuitive that any effort to reduce stress on individual fish will benefit the populations as a whole.

Steve Ross, Peer Reviewer

How can the technical aspects of this SOW be improved?

A minor correction:
Line 70, entirety, not entirely

Correction made

Overall, the design seems appropriate for determining the survivorship of the listed fishes.

What is this SOW’s contribution to recovery?

This SOW should provide survivorship data that would assess whether the reduced handling of listed fishes in the summer results in less mortality of young age classes.

Mel Warren, Peer Reviewer

How can the technical aspects of this SOW be improved?

Are your age-specific estimates really length-at-age estimates or do you know how old a fish is if it's pit tagged?

For the RBS these are age-specific estimates as all stocked fish are either 1) hatchery origin fish that are PIT tagged and known age or 2) Age 1 wild fish with age determined due to distinct length modes. For the CPM the age-specific estimates are determined from length-at-age data presented in "Movement and Growth of Juvenile Colorado Pikeminnows in the San Juan River, Colorado, New Mexico, and Utah" (Durst and Franssen 2014).

Tell the reader your methods to estimate all the listed parameters.

The SOW has been revised to include additional details on data analysis.

What is this SOW's contribution to recovery?

If age-specific demographics (i.e., capture probability, survival, and abundance) can be reliably estimated, the SOW will be of value in evaluating how well or poorly the endangered species are doing in the river and this can be evaluated for year-classes.

Program Office

How can the technical aspects of this SOW be improved?

It may be useful to suggest community sub-adult/adult monitoring occur in the off years of demographic estimations, if an argument can be made as to how community monitoring can be used to better SJRIP management.

SOW has been revised to reflect this suggestion.

What is this SOW's contribution to recovery?

This proposal was initially offered as a three-year project to estimate age-specific demographic parameters for endangered fish in the San Juan River. Conducting this work in FY2020 represents the second year of this effort. This effort is the only means to evaluate the change in Colorado Pikeminnow annual survival following the reduced handling and capture of juvenile fish during summer sampling efforts. Because this sampling effort will inform monitoring efforts as the SJRIP reaches 2023 and beyond, completing the proposal as intended should be a high priority.