FY 22 Channel Catfish Management on the San Juan River

Steve Davenport, Tracy Diver, and Nate Caswell
U.S. Fish and Wildlife Service
New Mexico Fish and Wildlife Conservation Office
3800 Commons N.E.
Albuquerque, New Mexico 87109
stephen_davenport@fws.gov

Overview

The establishment of nonnative fishes in the San Juan River has been identified as a detriment to the recovery of the endangered Colorado Pikeminnow (*Ptychocheilus lucius*) and Razorback Sucker (*Xyrauchen* texanus) (USFWS 2002a; USFWS 2002b). Reducing impacts of nonnative fishes has been recognized as a management action in the San Juan River Basin Recovery Implementation Program's Long Range Plan (SJRBRIP 2015). Removal efforts for nonnative Common Carp (*Cyprinus carpio*) have been effective, with river-wide declines in adult densities (Franssen et al. 2014). However, estimates of river-wide removal rates (2011-2015) for nonnative Channel Catfish, suggest that while current efforts have reduced their size structure, they are insufficient to collapse this population in the San Juan River (Pennock et al. 2018). Yet, mechanical nonnative removal efforts remain one of the few tools managers have to suppress nonnative populations to aid the recovery of endangered fishes (Tyus and Saunders 2000; Pennock et al. 2018). Thus, improving removal efficiency is paramount for increasing the impact of this conservation action to benefit native fishes.

The impacts of nonnative fish on endangered fishes are difficult to quantify; however, a recent diet study conducted between Shiprock, NM and Mexican Hat, UT provided estimates for annual consumption rates of Channel Catfish on native fishes (Hedden et al. 2020). Razorback Sucker were not found in Channel Catfish diets, which is likely due to the rarity of juvenile Razorback Sucker individuals in the system. However, annual consumption of age-0 Colorado Pikeminnow was estimated at a rate of 10-34 individuals/rkm/year (Hedden et al. 2020). Even with these relatively low occurrences of Colorado Pikeminnow found in Channel Catfish stomachs, that consumption rate translated to 1,520-5,168 juvenile Colorado Pikeminnow per year. Due to the relative rarity of age-1 Colorado Pikeminnow present in the system annually, the large adult Channel Catfish population may contribute to low survival of this age class (Clark et al. 2018). Given average annual exploitation rates of the Channel Catfish population (Pennock et al. 2018), nonnative removal likely reduces the numbers of Colorado Pikeminnow consumed on average by 158 (range = 0 – 461; *SJRIP Program Office unpublished data*).

Larger Channel Catfish in the San Juan River consume fish prey more frequently and they can consume larger individuals (Hedden et al. 2020). Although previous nonnative removal efforts were likely insufficient to collapse the Channel Catfish population, it has reduced the frequency of larger individuals in the river (Pennock et al. 2018), and likely reduced predation on juvenile Colorado Pikeminnow. In an attempt to increase the efficiency of nonnative removal efforts, a reevaluation of nonnative removal began in 2020. Previous data suggested that removal efficiency is negatively impacted by water turbidity, which is usually caused by unpredictable and localized rain events during warmer times of the year. Thus, in 2020 removal efforts were focused during winter months, a period when water clarity would likely be more conducive for efficient mechanical removal efforts.

We were able to increase efficiency during 2020 winter removal by targeting Channel Catfish when flows were low and high water clarity was high. Removal sampling was limited to three passes in 2020, which was substantially lower effort compared to recent years (e.g., 2011-

2015; Pennock et al. 2018). Whereas it is difficult to directly compare these estimates as they were conducted over different spatial scales, exploitation rates were comparable and well within the 95% confidence intervals presented by Pennock et al. (2018; Figure 1). Moreover, trip- and size-specific removal rates were generally linear with increasing numbers of passes (Figure 2). After three removal passes, nearly 25% of fish >400 mm TL were estimated to be removed. Removal efforts for 2021 are currently underway, and a fourth removal trip was added to assess changes to exploitation rates with a slight increase in effort. While these results are unknown, we propose conducting a third year of sampling to determine the effects of sampling season, turbidity, and number of removal trips on exploitation of Channel Catfish.

While it is encouraging to observe total exploitation rates over 20% for the larger size classes with only three removal passes over 42 river miles, the data suggest that the exploitation rates would have continued to rise with more removal passes. Movement of Channel Catfish in the San Juan has shown to negatively impact exploitation rates, however we think that fish likely demonstrate restricted movements during the winter, and by focusing removal under more optimal sampling conditions the data indicate we have increased our exploitation efficacy of with less effort.

Objectives

1.) Conduct a marking pass to tag fish in order to quantify annual exploitation rates and population estimates of adult Channel Catfish.
2.) Mechanically remove adult Channel Catfish during fall and early winter to maximize sampling efficacy.

Methods

Study Area

We propose sampling in our current study area from Four Corners Bridge (River Mile 119) to Sand Island, Utah (River Mile 76.5). We will use two raft-mounted electrofishing units along adjacent shorelines, and we will sample 12-15 river miles per day. We propose conducting four removal trips to evaluate rates of removals with an additional trip for an additional year. Given the logistical challenges of winter sampling we have faced in FY20 and FY21 (extreme cold, river ice, short day length, etc.), we are will target the fall and early winter months (October-December). This will also allow comparison to the late wintertime period of previous work. We will make every effort to target optimal sampling conditions when river discharge is below 1,000 CFS turbidity is low (> 250mm Secchi disk) to maximize sampling efficacy. However, previous work has shown that turbidity spikes are often unavoidable.

Tagging Protocol

Channel Catfish ≥300 mm TL captured during the marking pass will be fitted with an individual numerical T-bar anchor tag and released back to the river. Tag ID and TL will be

recorded for every fish. Tagging of Channel Catfish will allow us to generate exploitation rates during the sampling period as well as generate Lincoln-Peterson population estimates.

All Channel Catfish ≥300 mm TL captured on the subsequent removal trips after the marking pass will be removed from the river. All fish will be measured (TL) and examined for a tag before being removed from the river. As the main focus of this project is removing large predatory adult Channel Catfish, due to the timing of the trips and the geomorphic reach, we do not expect to see large numbers of juvenile Channel Catfish during these sampling trips, however if juvenile Channel Catfish or any other nonnative fish is observed, they will be collected and removed from the river.

Rare Fishes Captures

Due to the demographic monitoring of Colorado Pikeminnow and Razorback Sucker already taking place in the fall on the San Juan River, rare fishes will not be collected during nonnative removal efforts.

Deliverables

Results will be presented to the SJRIP Biology Committee during the annual meeting. A draft report will be submitted to the Program Office by 31 March 2022 and a final report will be completed by 1 June 2022. All data will be submitted to the Program Office by 31 December 2022.

Budget Justification

The increase in budget compared to the previous year is based on an increase in travel costs. Travel costs were previously based on renting a single house; however, under current restrictions, travel costs include individual per diem estimates for travel location (i.e., Bluff, UT).

Literature Cited

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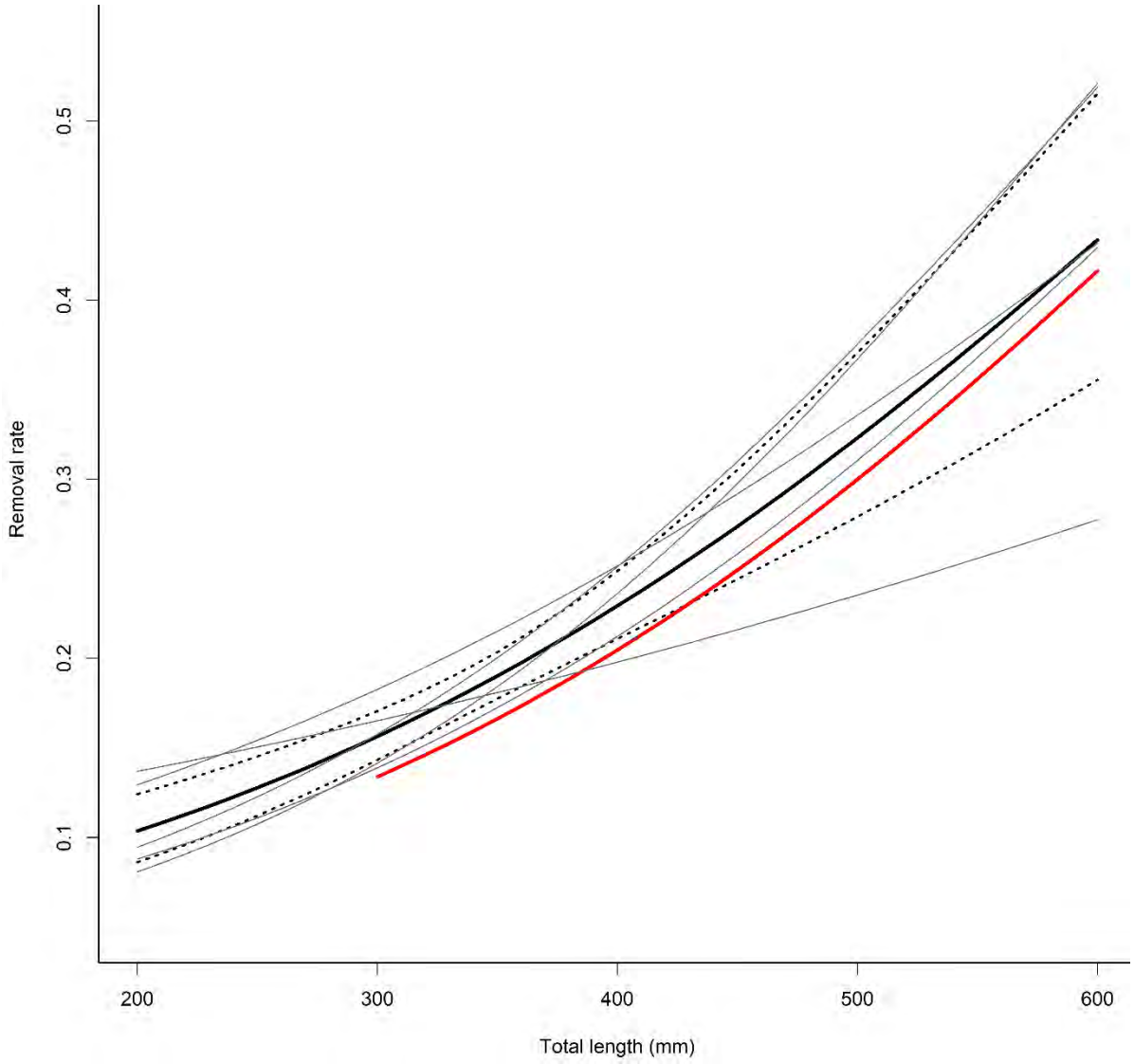

Figure 1. Estimated size-dependent removal rates for Channel Catfish in the San Juan River adapted from Pennock et al. (2018). The light grey lines are yearly estimates between 2011 and 2015, the solid black line is the estimated mean removal rate among all years (dotted lines are 95% CI). Estimated size-specific Channel Catfish removal efforts in 2020 is denoted by the red line.

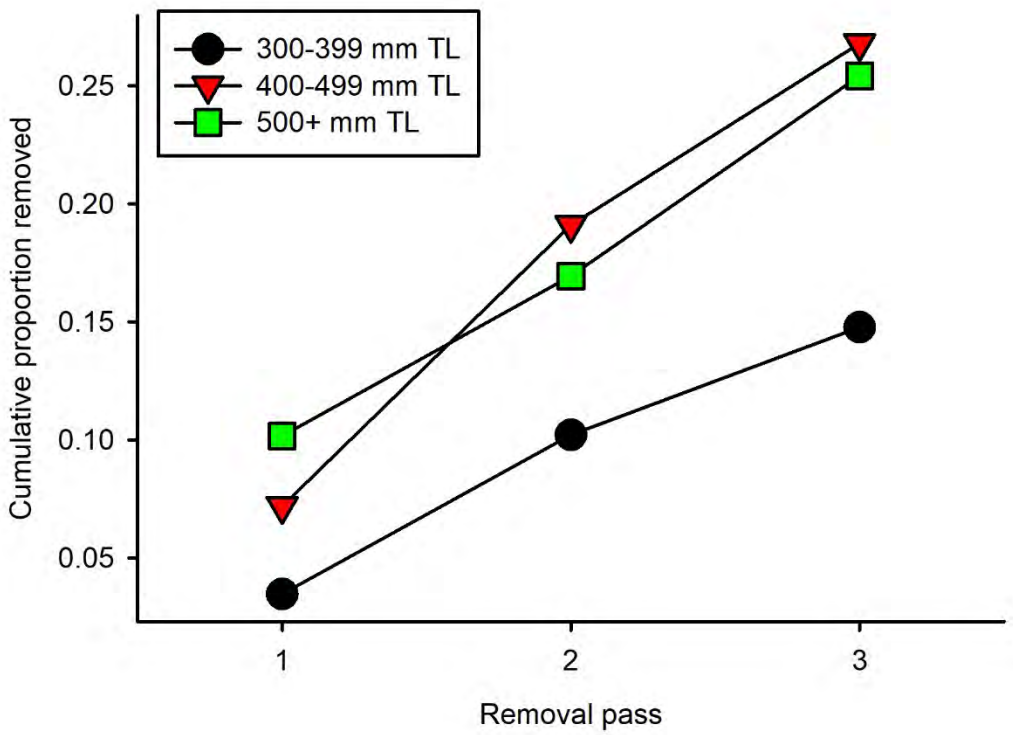

Figure 2. Cumalitive proportion of tagged Channel Catfish in three size-classes removed per pass between Four Corners Bridge, CO and Sand Island, UT in 2020.

FY 2022 - Tentative budget with no trip changes from FY21						PAGE 1	
Nonnative fish removal - 5 trips, Four Corners Bridge, UT. to Sand Island, UT. NMFWCO supplying 5 people per trip							
Labor Cost - Field Work (4 trips x 5 days/trip)							
Position	**Grade/Step**	**Salary w/benefits**	**Hours/Day**	**Total Days**		**Sub-Total**	
Fish Biologist	GS 11/8	$53.53	8	25		$10,706.00	
Fish Biologist	GS 9/10	$48.22	8	25		$9,644.00	
Remote Biologist	GS 9/4	$40.60	8	25		$0.00	$8,120.00
Biological Tech	GS 5/1	$18.69	8	25		$3,738.00	
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5 days. 53 hours per trip							
Overtime Hours (weekend or >9	**Grade/Step**	**Salary w/benefits**	**Hours/Day**	**Total Days**			
Fish Biologist	GS 11/8	$53.53	3	25		$4,014.75	
Fish Biologist	GS 9/10	$65.30	3	25		$4,897.50	
Remote Biologist	GS 9/4	$54.75	3	25		$4,106.25	
Biological Tech	GS 5/1	$27.36	3	25		$2,052.00	
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Administrative, Reporting, Planning							
Fish Biologist	GS 9/10	$48.22	8	35		$13,501.60	
Remote Biologist	GS 9/4	$40.60	8	35		$0.00	$11,368.00
Supervisory Fish Biologist	GS 13/4	$74.78	8	5		$2,991.20	
Adminstrative Officer	GS 9/9	$47.35	8	5		$1,894.00	
Biological Tech	GS 5/1	$18.69	8	25		$3,738.00	
Biological Tech	GS 5/1	$18.69	8	25		$3,738.00	
					Total Labor	**$70,811.30**	
Travel and Per Diem	**Days**	**People**	**Rate**				
Lodging Costs	20	5	$96.00			$9,600.00	
Per Diem (Travel Day)	10	5	$41.25			$2,062.50	
Per Diem (Full Day)	25	5	$55.00			$6,875.00	
Concur Fee	5	5	$14.50			$362.50	
				Total Travel/Per Diem		**$18,900.00**	

FY 2022 - Tentative budget with	**no trip changes from FY21**						PAGE 2
Nonnative fish removal - 5 trips, Four Corners Bridge, UT. to Sand Island, UT. NMFWCO supplying 5 people per trip							
Equipment	**Miles/Qty**	**Total Miles**	**Rate**				
Floy Tags	2000		$0.70				$1,400.00
Vehicle Fuel							
1 trucks X 5 trips - ABQ to Sand Island, UT 574 mi RT		2870	$ 0.56				$1,607.20
1 truck X 5 trips- Farming. To San	574/216	1,080	$0.56				$604.80
Generator Fuel	150		$2.85				$427.50
30 gallons/trip x 4 trips							
Maintenance, repair, replace							$3,000.00
(i.e. life jackets, waders, generator repair, dip nets, etc.)							
					Equipment Total		**$7,039.50**
Remote Biologist Savings	$19,488.00			**Total for 5 trips NNR. - NMF**			**$96,750.80**
				Overhead 3%			$2,902.52
				Grand Total			$99,653.32

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How can the technical aspects of this SOW be improved?

McKinstry (BOR): Be flexible for trips and only do trips when conditions are good.

What is this SOW's contribution to recovery?

McKinstry (BOR): Contribution toward recovery is ambiguous. The findings of 2 CPM in over 3200 CCF is really interesting in that it still leads to removal of CCF!! I'm just amazed that 2 fish in 3200 stomachs gets to a decision to remove CCF. What if we had only caught 1, or 0?? Would we still be doing this? What if we had seen twice as many CPM, i.e., 4? If we saw 4 CPM in stomachs, using the same modeling exercise we would likely be doing the same amount of removal as before, ie., $600,000/yr. Removal rates are still not that high according to figures. The question is: Will removing 25%-40% of CCF that are 400mm to 600mm going to have a significant impact on the population? I think many people doubt that it will. Maybe put this project on back burner until we have the workshop?

RESPONSE TO TECHNICAL REVIEW.

How can the technical aspects of this SOW be improved?
McKinstry (BOR): Be flexible for trips and only do trips when conditions are good.

NMFWCO – In an ideal situation, we would adhere to this operating procedure. However, this is easier said than done when dealing with mobilizing five people (or six for COVID purposes) for a week at a time, 5 hotel rooms (not camping in cold weather), and limited ability to pull rafts off the river if conditions are not ideal. This benchmark would be much easier to meet with a dedicated crew based in the Farmington area as McKinstry commented on SOW 38.

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NMFWCO – These are valid points/questions, and based on recent conversations within the BC, they have never been definitively answered. Previous work has shown that the channel catfish in discrete reaches of the San Juan River can be significantly reduced. However, this office cannot definitively say whether this particular SOW, with a relatively small amount of effort, will generate a significant benefit for Razorback Sucker or Colorado Pikeminnow. If the BC determines that this SOW should not be funded for FY22, and this or any future SOWs should be based on the outcome of the upcoming Channel Catfish workshop/symposium, this office would support that.