SAN JUAN RIVER BASIN RECOVERY IMPLEMENTATION PROGRAM (PROGRAM)
BIOLOGY COMMITTEE
19-20 FEBRUARY 2020 MEETING SUMMARY

BIOLOGY COMMITTEE (BC) MEMBERS:	**REPRESENTING:**
Matthew Zeigler	State of New Mexico, Chair
Jacob Mazzone	Jicarilla Apache Nation
Brian Westfall	Bureau of Indian Affairs
Stephen Davenport	U.S. Fish and Wildlife Service, Region 2
Mark McKinstry	U.S. Bureau of Reclamation (Reclamation)
Benjamin Schleicher	U.S. Fish and Wildlife Service, Region 6
Vincent Lamarra	Navajo Nation
Harry Crockett	State of Colorado
Tom Wesche	Water Development Interests
William Miller	Southern Ute Tribe
Absent	Bureau of Land Management
Absent	Conservation Interests

COORDINATION COMMITTEE (CC) MEMBERS:	
Ryan Christianson	U.S. Bureau of Reclamation
Jojo La (on the phone)	State of Colorado
Colleen Cunningham	State of New Mexico
Christina Noftsker, CC Alternate	State of New Mexico

PEER REVIEWER:	
Mel Warren Jr.	U.S. Forest Service

PROGRAM OFFICE (PO):	
Melissa Mata, Program Coordinator	U.S. Fish & Wildlife Service, Region 2
Scott Durst, Science Coordinator	U.S. Fish & Wildlife Service, Region 2
Eliza Gilbert, Biologist	U.S. Fish & Wildlife Service, Region 2

OTHER INTERESTED PARTIES:	
Dan Lamarra, BC Alternate	Navajo Nation
Nathan Franssen	U.S. Fish and Wildlife Service, Region 2
Carrie Padgett, BC Alternate	Water Development Interests
Steven Platania	American Southwest Ichthyological Researchers
Michael Farrington	American Southwest Ichthyological Researchers
Andrea Urioste	American Southwest Ichthyological Researchers
Brian Hines	Utah Department of Wildlife Resources (UDWR)
Katie Creighton	Utah Department of Wildlife Resources
Susan Behery	U.S. Bureau of Reclamation

Dex Lewis	U.S. Bureau of Reclamation
Bobby Duran, BC Alternate	U.S. Fish and Wildlife Service Region 2
Weston Furr	U.S. Fish and Wildlife Service Region 2
Daniel Kaus	U.S. Fish and Wildlife Service Region 2
Adam Barkalow, BC Alternate	New Mexico Department of Game and Fish
Jill Wick, BC Alternate	New Mexico Department of Game and Fish
Tracy Diver (on the phone)	New Mexico Department of Game and Fish
Steve Mussmann	U.S. Fish and Wildlife Service Region 2
Jerrod Bowman	Navajo Nation Department of Fish and Wildlife (NNDFW)
Anthony Begay	Navajo Nation Department of Fish and Wildlife
T. Kim Yazzie	Navajo Nation Department of Fish and Wildlife
Melissa Trammel (on the phone)	National Park Service (NPS)
Jeff Arnold	National Park Service (NPS)
Jamie Shockey	City of Farmington
Aaron Chavez	San Juan Water Commission
Jim Dumont	Senator Heinrich's Office
Emily DeArmon	University of New Mexico (MSB)
Matthew Bogard	Kansas State University
Isabel Evelyn	Kansas State University
Keith Gido	Kansas State University
Casey Pennock (on the phone)	Kansas State University
Derek Fryer	Western Area Power Administration (WAPA)

Wednesday 19 February 2020

Introductions and changes to agenda
No changes to the agenda were requested.

Approve draft summary from 3-4 December BC meeting; review Action Item list
Comments were received from New Mexico and Colorado. Changes were editorial or clarification of statements to sections regarding Colorado Pikeminnow stocking and broodstock genetics. Miller motioned to approve the summary, Mazzone seconded, and the motion was approved.

The PO posted December BC meeting summary on website.

Ute Mountain Ute Tribe nomination of Colin Larrick as BC representative (vote required)
The BC voted unanimously for Larrick. The PO will update the roster to reflect the cahnge and post it to the website.

2019 Project Reports/Presentations

2019 hydrology, possible 2020 operations, and overview of Hydrology Model Technical Workgroup meeting
Using the Program's Flow Recommendation decision tree the 2019 forecast resulted in no release. However, a release was made for channel maintenance purposes. The maintenance release was matched to the Animas River runoff and resulted in meeting the 10,000, 5,000, and 2,500 Flow Recommendation targets (the 8,000 target was missed by a day). Currently, the 2020 forecast would

not result in a peak release. Reclamation conducted a hydrologic modeling workshop to discuss options and scenarios for modeling the effect of future maintenance releases. Current modeling, which assumes the Animas River peak is matched 100% of the time, predicts reservoir elevations would drop, years with a spring peak release would remain the same, years with excess water >6063' would decrease, and the number of years that would result in 2002 like shortage sharing would increase. Climate change modeling for the San Juan River was also discussed and a study plan for scenarios will be sent out.

Reclamation will send a study plan for the climate change scenarios to committee members.

Rare fish stocking summary and update on Razorback Sucker Augmentation Plan
Over 400,000 age-0 Colorado Pikeminnow and ~6,700 Razorback Sucker > 300 mm total length were stocked between San Juan River miles 93 to 196 and Animas River miles 4 to 9. A few of the prey and pellet-trained Colorado Pikeminnow (~600 in each treatment) stocked into McElmo Creek in November have been detected exiting the creek. NNDFW is planning a March electrofishing trip to see if some of those stocked fish are still in the creek. They also conducted an electrofishing trip last November to detect Razorback Sucker from the April stocking of larval fish. That trip did not result in any captures of Razorback Sucker.

Weston will send out the final draft of the Razorback Sucker Augmentation Plan for BC review/comment.

Operation of PNM Fish Passage
The passage was operated as a nonselective passage from March to the end of June. During nonselective operations, passive integrated transponder (PIT) antenna detected ~650 Razorback Sucker passing upstream through the structure and ~20 Colorado Pikeminnow. During selective operations (June-October) ~4,000 fish were captured and 80% were native. These included capture of another 82 Razorback Sucker and 125 Colorado Pikeminnow.

Habitat monitoring
Habitat mapping was conducted at two different river discharges (1,431 and 684 cfs) to assess whether increasing baseflows could result in increased low velocity habitats (i.e., backwaters and embayments). This year's mapping was also after a record spring discharge of ~10,000 cfs at 5 days, which had not been realized since 2008. Between the higher and lower discharge at mapping, wetted area was greater by 2 million m^2 as was the count (122) of islands. However, there was more low velocity habitat at the lower than higher discharge (i.e., a difference of ~78,000 m^2 between mapping flows). The lower discharge at mapping was used to compare the total low velocity habitat across years. In 2019, at the lower discharge there was ~130,000 m^2, which was higher than any other year since 1996.

Larval fish monitoring in long-term sampling reach, downstream of waterfall, and upstream of Shiprock
A total of 300 Colorado Pikeminnow and 722 Razorback Sucker larvae were captured among three study areas (long term study area [river mile 3 to 148], expanded study area [river mile 168 of the San Juan to Boyd Park of the Animas River], and below the waterfall [river mile 0 to -18 and lake mile 36 to 54]). Colorado Pikeminnow larvae to early juvenile were captured from ~ Four Corners downstream to below the waterfall at river mile -13, with spawning predicted to have occurred throughout July. Colorado Pikeminnow estimated catch rates were similar to recent years with June

temperatures and adult estimates predictive of 2019 catch rates. Razorback Sucker larvae to early juvenile were captured in the Animas ~2 miles upstream from the confluence with San Juan and throughout the San Juan River downstream of the waterfall to river mile -13. Spawning was predicted from late March through late July and catch rates continued to be best predicted by May discharges and total number of fish stocked. A wild age-1 measured at 170 mm total length Razorback Sucker (i.e., 2018 cohort) was also captured during larval fish monitoring.

Small-bodied fish monitoring
Sampling occurred from Bloomfield to Mexican Hat. A total of 12 wild age-0 Colorado Pikeminnow were captured and resulted in an estimated catch per unit effort greater than 2017 but not as great as the high observed in 2016. No age-0 Razorback Sucker were captured. The proportion of native fish captured in the last two years was similar to low values observed in 2003, 2004, and 2009. New Mexico Game and Fish (NMDGF) recommended sampling downstream from Mexican Hat to Clay Hills where higher densities of larval Razorback Sucker have been observed. Plots of discharge versus the number of larvae and juvenile collected showed an inverse relationship between discharge and Razorback Sucker captures and a positive relationship with the number of Colorado Pikeminnow.

Wild age-1 Razorback Sucker monitoring
This trip was conducted to assess whether age-0 Razorback Sucker detected in the fall of 2018 survived the winter of 2019. The trip was also conducted to tag age-2, 3, and adult Colorado Pikeminnow. A total of 45 age-1 Razorback Sucker were captured and ranged in size from 100-197 mm total length. The majority of Colorado Pikeminnow were captured from river mile 61 to 16. The total number of Colorado Pikeminnow captured was 274 and tended towards fish between 200-300 mm total length, which could be age-2 or 3 fish from the 2017 or 2016 cohort, respectively. The 2020 spring sampling will target collection of age-1 Razorback Sucker, sampling for U.S. Bureau of Indian Affair's selenium monitoring, and include capture and tagging of all age classes of Colorado Pikeminnow.

Demographic monitoring
This project is conducted to evaluate whether limiting capture of endangered fishes could increase the low apparent survival demonstrated by Clark et al. (2018) [1] and provide age specific abundance estimates. This is the first year of a three-year effort and thus only capture probabilities and abundance can be estimated (i.e., three years are needed to estimate survival). Age specific capture probabilities for Colorado Pikeminnow ranged from ~0.02-0.25. However, the coefficient of variation was ~0.2 or greater, suggesting abundance estimates (~200 age-1, ~750 age-2, ~1000 age-3, and ~140 age-4) were imprecise. The age class specific capture probabilities were greater for Razorback Sucker and the coefficients of variation were <0.2, suggesting the juvenile (~1000) and adult (~2800) estimates were more realistic. Improvements on calculating estimates could include use of submersible antenna and moving trip dates to avoid turbidity.

Quantifying effective number of breeders and evaluating potential reproductive bottlenecks
The 2009-2018 effective number of breeders were estimated from 1,119 and 446 larval Colorado Pikeminnow and Razorback Sucker, respectively. Estimates for Colorado Pikeminnow ranged from a low of 3 (2015) to 50 (2016). This suggest 3-40% of the adult population successfully contributes to annual larval production. Effective number of breeding Razorback Sucker ranged from 71-124 with a

[1] Clark, Scott R., et al. "Age-specific estimates indicate potential deleterious capture effects and low survival of stocked juvenile Colorado pikeminnow." *North American Journal of Fisheries Management* 38.5 (2018): 1059-1074.

mean of 101. When compared to the adult population this suggests ~1-3% of adults are successful in contributing to larval production. For both species the number of contributing parents is a long-tailed histogram, which indicates that some individuals are more successful at contributing to larval production each year. Using a sibling analysis, distances between captures of related larvae was >100 river miles (i.e., depicts drift). Further analysis of the Razorback Sucker data will include tracking the annual contribution of individual adults (i.e., how often does an adult successfully spawn) and comparing that to the adult age structure.

Channel Catfish predation

Gido presented results from Sky Hedden's Channel Catfish (hereafter, catfish) predation study from the last two years of investigation. The study had three objectives: 1) Determine the gut evacuation rate and stomach fullness (daily ration) of catfish, 2) Determine the incidence of native species in diet of catfish, and 3) Estimate the number and biomass of native fish consumed annually by catfish. They estimated temperature-dependent evacuation rates (proportion of food remaining in stomachs over time) of catfish through a laboratory experiment where catfish were fed Fathead Minnow in different temperatures and stomach contents were evaluated over time. Evacuation rates of catfish increased almost exponentially with increased temperature. To assess when catfish were feeding throughout the day, they examined diel stomach fullness of catfish from 4-hour intervals from March through November in 2018. These results demonstrated catfish fed throughout the day and there was no difference in diel stomach fullness, allowing stomach contents of catfish to be collected during daylight hours. To quantify the proportion of different diet items of catfish in the field, a total of 4,649 catfish was sampled via gastric lavage between Shiprock and Mexican Hat in 2018 and 2019. Terrestrial plants comprised the most biomass in the stomachs (53%) while fish only comprised 3% of the biomass in diets. Only two Colorado Pikeminnow (hereafter, CPM) and no Razorback Suckers were found in the stomachs of catfish. The biggest driver of total biomass consumption was river temperature, where higher temperatures correlated with higher stomach fullness. The incidence of fish prey in the diets was then predicted using the size of catfish and daily turbidity, both were positively correlated with the probability of fish prey in the stomachs. Most fish prey were predicted to be consumed by larger catfish in warm, and turbid water conditions.

They then modeled the predicted consumption of fish prey by the entire catfish population in 2018 and 2019 using water temperature, turbidity, the observed incidence of different prey types in the diets and the current size structure and abundance of catfish between Shiprock and Mexican Hat (mean estimate of 42,000 catfish >300 mm TL). The model predicted the mean biomass of CPM being consumed would be 535g/RM or 43 individuals/RM (at 12 g per individual CPM) in 2018 and 252g/RM or 19 individuals/RM in 2019. The difference in predicted consumption between years was only driven by differences in river temperature and turbidity, the number and size structure of catfish in the model remained constant. The most abundant fish prey in terms of total biomass consumed was other catfish, followed by Bluehead Sucker, Speckled Dace, and Flannelmouth Sucker. CPM were the 8th highest predicted fish prey based on biomass.

It was noted that the study could not discern live from dead prey, therefore the model estimates could be biased high if fish prey were already dead before they were consumed. Gido did suggest that fish kills have been observed in flash-floods with high turbidity, but other predation studies have documented increased predation rates of Ictalurids in turbidity experiments. Moreover, evacuation rates were estimated from fish prey and could also bias estimates high if fish evacuate plant material slower than fish prey. Nonetheless, given the large numbers of catfish in the system, even relatively

small rates of prey consumption could have significant impacts to CPM, but we should keep these caveats in mind when discussing the model predictions.

It was noted that extrapolating the consumption of two CPM by catfish to these relatively large numbers of individuals consumed may seem unrealistic. However, Gido noted that based on the number of catfish in the river (~40,000) and the number of warm days they are consuming fish (e.g., ~100), their sample size of ~4,000 stomachs is only a small portion of the total number of stomachs that could have been sampled (i.e., 40,000 catfish x 100 days = 4,000,000 stomach-days; so 4,000 stomachs/4,000,000 is only 0.1%). In these terms, the observed consumption of 2 CPM scales up very quickly to the predicted rates.

Gido was going to email the catfish model to the BC in an Excel file to allow people to investigate the model at their leisure.

Implications of Channel Catfish predation on age-1 Colorado Pikeminnow
Franssen presented the Program Office's extrapolation of Hedden's catfish diet model and attempted to place the predicted annual consumption of age-1 CPM by catfish into context. The PO's objective was to answer the following question: What is the predicted annual mortality of age-1 CPM contributable to catfish predation?

The PO obtained the Excel diet model and ran several scenarios through it to investigate the potential range of mortality rates of CPM that catfish could affect through predation. Specifically, they investigated effects of environmental variation, catfish abundances, and catfish size structure on predicted consumption of CPM. To set up the different scenarios they first obtained temperature and turbidity data from 2017, 2018, and 2019 and constructed all possible combinations of these variables to assess effects of environmental variation on consumption rates of CPM. Second, they assessed the potential effects of nonnative fish removal on consumption by varying the size structure of catfish in the model. They developed two scenarios by using the size structure of catfish from 1991-1995 as a "no removal" size structure while the size structure from 2013-2017 served as the "removal" size structure. Modeled predictions as well as observational data have demonstrated nonnative removal efforts over the last couple decades have decreased the biomass of larger, older individuals. Third, they varied the abundance of catfish in the model by using the lower (~34,000) and upper (~52,000) 95% confidence intervals from the 2018 catfish population estimates between Shiprock and Mexican Hat. Therefore, a total of 36 scenarios was run through the model and the biomass and number of age-1 CPM consumed annually was recorded for each scenario.

Results of the modeling exercise demonstrated that environmental variation and abundances of catfish had relatively small effects on predicted consumption of CPM compared to the effects of nonnative fish removal (i.e., the different size structures of catfish had the largest effects). Overall, the mean predicted numbers of age-1 CPM annually consumed ranged between 1,000-1,500 for an exploited catfish population and 2,250-3,400 individuals for an un-exploited catfish population. McKinstry noted that these consumption estimates were substantially lower compared to the estimates Gido just presented. Franssen was unsure why the estimates were so different (he later determined that the differences arose because Gido used an average age-1 CPM size of 12g while he used an average size of 24g, effectively reducing Gido's estimates by half). Franssen also clarified that the model is based on biomass consumed rather than individuals, which therefore leaves the conversion from biomass to "individuals consumed" somewhat up to interpretation. Therefore, both

models predicted similar estimates of biomass of CPM consumed, and only varied by the modeled size of individuals consumed.

In order to estimate potential annual mortality rates of age-1 CPM attributable to catfish predation predicted by the model, the likely numbers of age-1 CPM available in the spring of each year before catfish can start predation on the population were investigated. Some "back of the envelope" estimates placed the range between 750 to 4,000 age-1 CPM in the spring. To calculate the annual mortality due to catfish predation, the predicted numbers of individuals consumed by catfish were then divided by a range of 4,000 to 20,000 age-1 CPM in the system. These results demonstrated that the annual mortality due to catfish was estimated between 25 to 40% if 4,000 age-1 CPM were available in an exploited catfish population but increased to 55-85% in an un-exploited catfish population. However, these predicted mortality rates dropped precipitously to <20% for both an exploited and an un-exploited catfish population when the age-1 CPM availability increased to 20,000. Franssen noted that if the numbers of age-1 CPM in the system were higher, the threat of catfish predation would be lessened.

Wesche noted that in one table Gido presented showed that catfish were also eating large numbers of young catfish. What would we predict would happen to those smaller size classes if we reduce the larger size classes of catfish? Can we use this model to help tease out that effect? Franssen noted that this predation model is probably not the best way to look at that question but the catfish population model that Pennock et al. published in 2018 might be used. We could use that model to 'tweak' survival rates and see the impact. However, that model does not include abundances of age-0 catfish, which are the size class likely being consumed by other catfish. Therefore, it may be hard to assess that question with our current models. Nonetheless, we already see an effect of nonnative removal on the size structure of catfish by the increased biomass of younger individuals in the river, a common response of fish populations to exploitation. So, stopping removal would likely reduce the numbers of smaller individuals in the system, but also result in more, larger catfish as well.

Miller asked if Franssen had extrapolated the predicted numbers of all fish consumed to the entire 100 river miles in the model to see if these numbers seemed reasonable. Franssen had not made that calculation but agreed that would help refine the model.

Miller also asked if we continue to keep the size structure of catfish at its current state, will this lead to long-term survival and does this lead to a recovered CPM population. How long do we have to keep removing catfish? Based on the population model of Miller and Lamarra, they modeled catfish removal for 20 years but when they stopped removal the catfish population returned to its former state. Franssen noted this is a good point but we really don't know. If we assume a recovered CPM population has a higher reproductive output than we can artificially create through stocking, then we may not have to remove catfish in the future, or at least at a reduced rate. We really won't know this until we see more natural reproduction and recruitment of CPM in the river. We currently have a large age-3 year class in the river that may be from the 2016 wild spawn New Mexico Department of Game and Fish (NMDGF) documented in their fall sampling. The survival of these fish appears to be higher than observed previously, which potentially suggests wild spawned fish may have higher survival than our stocked fish.

Duran also noted that 2016 was the year in which we had relatively high catfish exploitation rates, which may have aided the survival of these fish. It was also suggested that during high water years the Program may want to exploit the catfish population to reduce consumption of CPM.

Duran then gave an update on the two nonnative removal trips NMFWCO conducted this spring. Duran stated there were a lot of catfish and the water was fairly clear. They conducted one tagging trip and one removal trip between Four Corners bridge and Sand Island, discharge was <1000 cfs and Secchi depths were relatively deep. Overall exploitation rates were substantially higher for only one trip (17-19%), which are usually only accomplished during an entire season of nonnative removal. However, they are conducting removal over a smaller section of river compared to previous years.

A BC member asked what a 20% exploitation rate does to the catfish population. Franssen thought it would result in about a 60% reduction in total biomass based on the Pennock et al. model, however, we would need to subtract the sections not being exploited to make it comparable (i.e. upstream of Four Corners bridge and downstream of San Island). Duran noted that their current efforts are design to just reduce the size structure of catfish and not crash the population.

Miller asked if the problem with small numbers of young CPM could stem from a lack of habitat. A lot of historical habitat is now under Lake Powell. High flows do seem to clear the mouths of secondary channels creating backwaters that CPM can use in high flow years.

Franssen asked why side canyons are infrequently sampled by NMDGF in small-bodied monitoring compared to the larval sampling crews. Matt Zeigler responded that at that time of the year in the fall, there are not a lot of lateral canyons that are wetted. They must be more frequent in earlier times of the year before monsoons start. Franssen stated that it seems like the availability of zero-velocity habitats are probably temporally variable and young CPM probably continually move to different habitats in the river.

Farrington noted that the highest densities of larval endangered fish are usually in reach 1 and reach 2, but small-bodied monitoring usually catches most individuals in reach 3. Zeigler stated that they have not sampled the canyon reach for a few years though.

At some point the Program was stocking larger CPM, but the return rate on those fish was lower than what could be produced from just stocking 400,000 age-0 individuals. However, Durst stated that we never really conducted that experiment because we never stocked as many age-1 fish as we could have if we didn't also stock age-0 individuals.

Barkalow also mentioned that we should not overlook the other potential indirect effects of catfish removal on the other native fishes on which they prey, which do provide a prey base for CPM.

The PO will describe the details discussed today on implications of catfish predation on age-1 Colorado Pikeminnow in the meeting summary.

The PO will provide written documentation of reports on the diet study.

Thursday 20 February 2020

Stocking age-0 versus age-1+ Colorado pikeminnow

To evaluate whether the Program could increase the population of adult Colorado Pikeminnow faster by stocking 12,000 PIT age-1 fish instead of 400,000 age-0 fish, the estimated number of age-3 fish resulting from age-0 stockings was compared to estimates of what could be achieved from stocking

12,000 age-1 fish (given the survival estimates from prior age-1 stockings). The result was ambiguous as the confidence intervals around the age-3 estimates from age-1 stockings were large. However, the pros (reduction of catfish predation, ability to identify wild fish because all stocked fish would have PIT tags, ability to evaluate hatchery enrichment, etc.) may outweigh the cons (if the Program could increase age-0 returns that would be a better return on investment, evaluation of the change in management could take 3-5 years, reduced Razorback Sucker production, risks lower accumulation of adult Colorado Pikeminnow, etc.). In the short term a mean age-1 overwinter survival of ~0.10 would indicate accumulation of adults would be on par with age-0 stocking. The BC recommended conversion of Colorado Pikeminnow from age-0 to age-1 fish for a three to five-year period.

Miller reflected that the recommendation to the CC will need to include the rationale for change in production. PO would follow-up with Southwest ARRC to determine how changing production of Colorado Pikeminnow would affect Razorback Sucker production.

Colorado Pikeminnow adaptive management stocking plan

The Colorado Pikeminnow adaptive management stocking plan is providing an adaptive management framework to meet the primary desired condition of self-sustaining population sufficient for delisting criteria. The plan outlines a given conservation action, how that would be evaluated, and then a process for re-evaluation of the stocking strategy. The quantitative response the Program hopes to achieve is abundance of wild age-7 or older with an average population size of 800 for more than seven years. The performance metrics included: 1) adults (age 7+) population growth rate $\geq$ 1.0 over a 7 year period, 2) density of wild age-0 Colorado Pikeminnow averages 0.6 fish/10 m^2 or greater in Reaches 1-4 over a 7 year period and 3) abundance of wild age-7+ Colorado Pikeminnow averages greater than 5 fish/river mile over a 7-year period. Thus far it is recommended to follow Alternative 4, which is to produce 400,000 Colorado Pikeminnow only when April 1st Navajo Dam releases project meeting the 21 days at 5,000 cfs flow recommendation or April 1st Animas River Basin snow water equivalent of 22 or greater criteria is not met. The second decision point on stocking produced fish is dependent on whether the density of wild age-0 Colorado Pikeminnow is greater than 0.6 fish/10m^2 in Reaches 2-4. If this metric is met, then the Program does not stock produced fish. Implementation of such an adaptive management strategy would depend on whether the Program shifts to age-1 stocking as was discussed earlier in the meeting.

Given the preceding discussion and recommendation by the BC to stock age-1 CPM it was noted that stocking age-1 fish is currently an alternative within the stocking plan. It was discussed and agreed upon by the group that the adaptive management stocking plan should be amended to include this as the recommended alternative and be resubmitted to the group for final review.

General discussion of 2019 results and progress towards recovery

<u>Replacement of variable frequency drives (VFDs) at Hogback</u>
Mata emailed the BC a scope of work (SOW) for the replacement of the VFDs at Hogback and described that an appropriate method for payment has been identified. Mata asked if the BC would recommend the SOW to the CC.

The BC recommended the VFD SOW to the CC to seek their funding approval.
The PO will send out the approval request to the CC as soon as possible.

CPM Broodstock enhancement at Southwest Aquatic Recovery and Resource Center (Southwest ARRC)

The BC supported the idea of developing a SOW to enhance the Colorado Pikeminnow broodstock at Southwest ARRC. It was expressed that this needs to be a concerted effort between the Upper Colorado Program and San Juan Program. Currently, UDWR is leading this effort given the locality of collections. There is no SOW in place to aid UDWR, but many partners expressed interest in assisting with collections. The development of this SOW will be a commitment for several years to achieve adequate broodstock numbers with genetic diversity.

Currently, there is a planned effort in March with help provided by American Southwest Ichthyological Researchers. This effort is being funded outside of a Program SOW.

Mata will coordinate with the Upper Colorado Program to ensure efforts are in concert and provide sufficient guidance for UDWR (and others if needed) for submission of FY21 SOW.

Channel Catfish Removal Efforts.

At this point, there is no recommendation to change Channel Catfish removal efforts and to continue with the same effort from FY20.

U.S. Fish and Wildlife Service New Mexico Fish and Wildlife Conservation Office will submit a SOW for Channel Catfish removal similar to FY20.

Phase III Monitoring SOW

There is a need to develop a SOW for Phase III monitoring. Although, the previous SOW for Phase III for capital funds does describe some details of monitoring, a more focused SOW is likely needed. Gilbert will coordinate with all parties identified in the original SOW for operation, maintenance, and monitoring for Phase III for FY21.

The PO will assist with the development of a Phase III Monitoring SOW for FY21.

Maintenance release recommendation

Based on recent discussion on maintenance release recommendations, it might be worth considering a SOW on sediment movement from flow releases from Navajo to the Animas River. This could include measuring cross sections annually. We need to gather empirical data because this is something that cannot be modeled. Is there a way to develop a trigger prior to the release to determine if a maintenance release is needed? Sedimentation work is needed for the Program to evaluate or identify a trigger for a maintenance release.

Nb and genetic diversity SOW

Nb work should continue in FY21 given what we have seen in the past years. For two reasons, continuing to sample Flannelmouth Sucker should also continue to occur. First, it is useful to compare effective breeder numbers between the two species. Secondly, some larvae identified as Razorback Sucker indicated introgression of Flannelmouth Sucker genetics and it may be important for the SJRIP to assess whether hybridization could be a factor limiting recovery.

Potential small-bodied modifications for FY2020

NMDGF is proposing an amendment for the small-bodied monitoring SOW for FY20. Currently, the FY20 SOW proposed to sample from RM 180.6 (Animas River confluence) downstream to RM 52.7 (Mexican Hat, UT). However, due to lack of wild age-0 endangered fish captures in upstream Reaches 5 and 6 (RM 131–181) and increased captures of wild age-0 endangered fishes in downstream reaches in recent years (2016–2019) a shift in small-bodied sampling effort to include Reaches 1 and 2 seems appropriate. It was stated that this would be a no-cost option but would result in not sampling Reach 6. The BC recommended that NMDGF provide an amended SOW for FY20 for review and comment and if recommended by BC to proceed with CC approval.

NMDGF will submit a modification for FY20 small-bodied monitoring SOW and provide a rationale for the shift in effort.

Post-2023 capital projects update

During the November CC meeting regarding post-2023 planning the CC requested the PO provide a additional comments from the BC on the proposed 15-year plan for capital projects. The 15-year plan was derived from the BC recommendations during previous post-2023 planning exercise and given Reclamation projection of cost per capital project. Reclamation did not provide comments because they helped develop the 15-year plan. Mata received confirmation from all BC members either through comments, a statement of support of the recommendation, or that no comments would be forthcoming. The purpose of the additional request for comments was to help determine if the recommendations were reasonable or whether there were areas of efficiency to reduce cost. Most comments were in support of the recommendation but those that stood related to development and implementation of habitat restoration and fish screens/passage. It was suggested that given past performance for design and implementation these schedules in the recommendation were optimistic and it would be more practical to plan for three for each category. Overall, BC members thought the 15-year plan for capital projects was reasonable.

Schedule upcoming meetings

The next meetings are planned for 12-14 May 2020 in Durango, CO. These are the BC meeting on the 12th, the Annual Meeting on the 13th, and CC on the 14th.

BIOLOGY COMMITTEE ACTION ITEM LOG (Updated March 25, 2020)						
Item No.*	Action Item	Meeting/Origination	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
1	Provide RBS/CPM stocking/capture/recapture data		PIs to PO	Before Jan. 1		
2	Provide Preliminary Draft Report Presentations		PI	At Feb. meeting		
3	Review LRP		BC	At fall meeting		
4	Review Peer Review Comments from the February and May meetings		BC	At fall meeting		
5	Provide Draft Reports		PIs to PO	By end of March		
6	Scopes of Work		PIs to PO	By end of March		
7	Provide Final Reports		PIs to PO	By end of June		
8	Annual Data Delivery		PIs to PO	By June 30		
9	T&E Species Data		BC to PO	By Dec. 31		
10	Compile T&E data and Program progress into summary to address overall Program recovery goals/objectives for presentation		PO/BC	At May meeting		
11	Distribute consolidated data and list of annual data collected and available in the Program's database		PO to BC	By Jan. 31		
12	Recapture analysis on PIT tagged fish		Durst	By March		

BIOLOGY COMMITTEE ACTION ITEM LOG (Updated March 25, 2020)						
Item No.*	Action Item	Meeting/Origination	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
13	Coordinate CPM stocking closely with BOR to avoid negative impact due to high flows/releases		PIs	Annually		
14	Revise RBS Augmentation Goals (based on the outcome of experimental stocking and analysis by Franssen and Durst). What is the appropriate numbers of fish to stock?	5/10/10	NMFWCO/PO	05/2011 – provide update and extend as needed	Ongoing	
15	Pursue effects study on Hg/Colorado Pikeminnow with other groups/programs	1/14/10	PO lead		Ongoing	
16	Include benchmarks for recovery in LRP (amended to also included in Pathways document and monitoring protocols)	12/5/14	Mata	01/5/2015	Ongoing	
17	Status updates for the LRP	12/2/15	PIs to Mata	02/23/2016	Ongoing	
18	Make Program peer-reviewed publications available to Program participants	11/29/16	PO (Mata)	02/21/2017	Ongoing	
19	Disposition of Razorback <300 mm TL	02/21/17	NMFWCO	05/16/2017	Ongoing	11/28/2017 TBD 2019
20	Draft a plan for Colorado Pikeminnow stockings	02/21/17	PO, NMFWCO, and NMDGF	02/21/2017	Ongoing	
21	Coordinate aerial flights for base flow imaging	11/28/17	BC (Lamarra)/PO (Franssen)	Fall	Ongoing	
22	Post BC December meeting notes	02/19/2020	PO	05/14/2020		
23	Update and poste roster with new BC member	02/19/2020	PO	05/14/2020		

BIOLOGY COMMITTEE ACTION ITEM LOG (Updated March 25, 2020)						
Item No.*	Action Item	Meeting/Origination	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
24	Reclamation will distribute climate change scenario study plan	02/19/2020	PIs and PO	ASAP		
25	Weston will provide BC the final RBS augmentation plan	02/019/2020	PO	05/14/2020		
26	Rank entrainment risks for diversions included in the Diversion Study	02/019/2020	PO	Ongoing		
27	Develop a monitoring SOW for Phase III	02/019/2020	PO	3/31/2019		
28	Coordinate with Upper Colorado Program on enhancing CPM broodstock	02/019/2020	PO	05/14/2020		
29	Develop a SOW for collection of Colorado Pikeminnow broodstock	02/019/2020	Utah Department of Natural Resources	05/14/2020		
30	Email catfish model with excel file to BC	02/019/2020	Gido (KSU)	05/14/2020		
31	Recommendation of change in production of CPM from age-0 to age-1.	02/019/2020	PO	05/14/2020		
32	Request approval for Replacement of VFDs at Hogback from CC	02/019/2020	PO	05/14/2020		
33	Amend small-bodied monitoring SOW	02/019/2020	NMDGF	05/14/2020		
34	Post BC July meeting notes	12/3/2019	PO			12/13/2019
35	Post Roster with updated BC alternates	12/3/2019	PO	Prior to Feb meeting		12/13/2019
36	Determine how much FY 2019 funds are remaining	12/3/2019	PIs and PO	Prior to Feb		12/13/2019

BIOLOGY COMMITTEE ACTION ITEM LOG (Updated March 25, 2020)						
Item No.*	Action Item	Meeting/Origination	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
37	Present and evaluate age-1+ survival, how many would need to be stocked to exceed age-0 stocking results, and cost/benefit analysis from decision to stock age-0 fish	12/3/2019	PO	Feb meeting		FEB 2020

*Items were re-numbered after changes were made
Yellow highlight indicates annual action items
Green highlight indicates new action item
Red highlight indicates completed action items