



FINAL SUMMARY
BIOLOGY COMMITTEE MEETING
20-22 February 2018
Holiday Inn Hotel & Suites
Animas/Lightner Room
Durango, CO

Attendees

Biology Committee Members

Bill Miller – Southern Ute Indian Tribe
Jacob Mazzone – Jicarilla Apache Nation
Brian Westfall – Bureau of Indian Affairs
Jason Davis – U.S. Fish and Wildlife Service (Region 2)
Mark McKinstry – U.S. Bureau of Reclamation
Benjamin Schleicher – U.S. Fish and Wildlife Service (Region 6)
Vincent Lamarra – Navajo Nation
Harry Crockett – State of Colorado
Mike Ruhl – State of New Mexico
Tom Wesche – Water Development Interests
Dave Gori – Conservation Interests
Craig Townsend – Bureau of Land Management

Peer Reviewers

John Pitlick – University of Colorado
Steve Ross – University of New Mexico
Brian Bledsoe – University of Georgia
Wayne Hubert – Hubert Fisheries Consulting

Program Management

Sharon Whitmore, U.S. Fish and Wildlife Service (Region 2)
Melissa Mata, U.S. Fish and Wildlife Service (Region 2)
Scott Durst, U.S. Fish and Wildlife Service (Region 2)
Nate Franssen, U.S. Fish and Wildlife Service (Region 2)
Eliza Gilbert, U.S. Fish and Wildlife Service (Region 2)

Other Interested Parties

Steve Platania – American Southwest Ichthyological Researchers, L.L.C.
Stephanie Clark Barkalow – American Southwest Ichthyological Researchers, L.L.C.
Martinique Chavez – American Southwest Ichthyological Researchers, L.L.C.
Michael Farrington – American Southwest Ichthyological Researchers, L.L.C.
Henry Day – Arizona Public Service (APS)
Keith Gido – Kansas State University
Sky Hedden – Kansas State University
Casey Pennock – Kansas State University
Ben Zimmerman – Southern Ute Indian Tribe
Brian Hines – Utah Department of Wildlife Resources
Katie Creighton – Utah Department of Wildlife Resources
Alex Birchfield – Office of Surface Mining Reclamation and Enforcement (OSMRE)
Susan Behery – U.S. Bureau of Reclamation

Tracy Diver – U.S. Fish and Wildlife Service (Region 2)
Weston Furr – U.S. Fish and Wildlife Service (Region 2)
Bobby Duran – U.S. Fish and Wildlife Service (Region 2)
Matthew Zeigler – State of New Mexico
Carrie Padgett – Water Development Interests
Dan Lamarra – Navajo Nation
Jerrod Bowman – Navajo Nation Department of Fish and Wildlife
Kim Yazzie – Navajo Nation Department of Fish and Wildlife
Scott Clark – University of New Mexico

Tuesday 20 February 2018

Introductions and changes to agenda

- A change was requested to move the Habitat presentation to the end of the day.
- Durst made an announcement for Kevin McAbee that the Colorado Pikeminnow population viability analysis (PVA) will be finalized by March 5th. McAbee is requesting the Program Office (PO) and Biology Committee (BC) provide a review and comment by mid-April. Comment period will be open for 45 days.
- Durst will email the PVA once completed to the BC for review.

Approve draft summary from 28-29 November 2017 BC meeting; review Action Item list

- Wesche requested an incomplete thought be removed from the notes on page 5 of draft notes. Wesche motioned to approve the November Meeting summary; McKinstry seconded by updating notes on page 5 and Steve Ross literature reference on the draft notes.

Review Action Items Table

- Action item 15 Colorado and New Mexico have come to agreement on draft and it is ready to send to other signatories for their review
- Action item 16 the PO has contacted Kevin Buhl, who is also doing the Bureau of Indian Affairs selenium study
- Action items 17-19 are ongoing actions
- Action item 20 New Mexico Fish and Wildlife Conservation Office is working on long-term plan
- Action item 22 PO was requested to contact BIA to get permission by May meeting
- Action item 23 revised Scope of Work (SOW) was sent out and presentation on habitat monitoring
- Action item 24 this was discussed at meeting and part of recruitment bottleneck workshop
- Action item 25 will be incorporated into Long Range Plan
- Action item 27 was discussed with the Coordination Committee (CC) and PO met with New Mexico Interstate Stream Commission to obtain full National Fish Wildlife Fund contribution
- Action item 31 is on hold this year due to water availability
- Action item 35 the date was changed to May
- Action item 36 McKinstry and Gilbert have contacted two fish passage experts and organized them to come for field trip in March. This will not require a SOW.
- Action item 37 not going to happen has planned due to flow condition for FY18

2017 Project Reports/Presentations/Updates

2017 hydrology and 2018 operations – Behery

- 2017 was a perturbation year (21 storm events in fall of 2016).

- Snowpack above Navajo Reservoir peaked at 135% of average in early March of 2017. A very warm March resulted in a significant early loss of snowpack. The spring peak release began with a week at 1,000 cubic feet per second (cfs) to control the rapidly rising pool elevation. The spring peak release started the beginning of May and ended in early July. The release totaled 440,000 acre-feet (af) over the base release.
- The Animas peaked at least six times from March through June, with the largest peak occurring in early June. Peak daily average release was 4,760 cfs. Resulting flows at Four Corners gauge consisted of the following: 80 days > 2,425 cfs, 51 days > 4,850 cfs, 7 days > 7,760 cfs and a max daily average flow 8,310 cfs.
- As mentioned in previous meetings, the release maximum did not reach 5,000 cfs. The USGS gauge at Archuleta has possible encroachment issues causing the stage at the gauge to nearly trigger a flood warning. The National Weather Service (NWS) flood stage warning system required BOR to hold the release below 4,800 cfs so a flood warning would not be issued. BOR asked the NWS to reevaluate the flood stage level and to potentially raise it. However, the NWS will not do it if the San Juan County, New Mexico, Office of Emergency Management does not agree, which they did not agree to. BOR is investigating possible solutions to this issue and will report back to the BC with updates and progress.
- 2018 is not a perturbation year, because there were not enough flashy events in 2017. A question has risen on whether perturbation years should be included in the environmental flow document.
- The Program Office may want to consider maintenance releases and perturbation in the environmental flow document.
- 2018 Operation plan is to have no spring peak release. Releases will be at the minimum required to meet minimum target baseflows. Based on current forecast, end of year storage in 2018 is likely to be below 6050 ft. Then we need to discuss a possible short 2,500 cfs release (for a few hours) to wet new (NMDGF) wetland plants at outlet of Simone Canyon, which would require about 1200 af.
- We also need to discuss maintenance release scenarios: if we are below 6050 then do we not do a maintenance release. However, if we end at 6050 then we would need to come up with ideas for a maintenance release.

Habitat monitoring – D. Lamarra

- Habitat monitoring included a flight over the river taking photos on 9/11-9/12/2017. Flights were delayed due to obligations associated with Hurricane Harvey. The Four Corners gauge was at 531 cfs, which is low compared to previous years.
- Due to low flow mapping, island complexes were not present but did appear to be flowing during high and moderate flow events.
- Backwaters accounted for 0.69% of wetted habitat.
- Even with the low flow at mapping low velocity habitats appeared in similar areas throughout the river from river miles 180-2, and the river gained more low velocity habitats by mile overall.
- Though small in number, secondary channel associated backwaters contribute a significant amount of area to the total low velocity habitat (LVH) amount as well as large embayments.
- Though the river lost multiple large LVH structures much of the 2017 gain appeared in the form of moderately sized low velocity habitat types.
- Two large run-off years back to back effectively cleaned out many river channels which allowed numerous moderate to large, low velocity habitats to persist well into the summer and fall.
- Pitlick suggested comparing bank widths to help determine the impacts of 2016-2017 high flows.
- There was a loss of wetted habitat. An overall reduction in island count was most likely caused by the low flow. Reach 6 is the only section that gained islands, all other reaches lost islands.
- Low velocity habitat is very similar to last year. There were gains and losses along the river for low velocity habitat.

- Even though we lost a good amount of wetted habitat due to low flow, there was a diversity of habitats gained, which is surprising. Given the high proportion of bank and associated backwaters, it is likely that high flow events reset the system.
- Loss of islands may be an artifact of the definition used for an island. An island is only an island when both sides of the channel are flowing, so it is still an island but at a different flow. In addition, if an island does not have vegetation it is not considered an island but just a cobble bar. It is assumed that if an island has vegetation it stays. They do not get washed away. If an island does not have 50% vegetation it is not classified as an island.

Monitoring of secondary channel restoration sites – V. Lamarra

- Dave Gori could not make it the day of the BC Meeting, so Lamarra is filling in. This is third year for the Phase II Channel Restoration Monitoring and the 2017 Results. There are no controls, because every secondary or tertiary channel is different, therefore these channels are called reference channels.
- Pre-, post-runoff and post-monsoon measurements have occurred for three years. The channel never flowed at ≤ 659 cfs and always flowed at >930 cfs. The goal during the study was to have the channel flowing below 659 cfs.
- The San Juan River had flows less than 475 cfs in August and September that resulted in limited or no inflow into the channel. Some of the limited flow at the transducer was partially clogged due to a debris pile. The channel was flowing at 500 cfs (due to restoration efforts) prior to the 2017 spring runoff. Groundwater accual may have kept the channel wet. During low flow periods, outflow temperatures were warmer in the fall and cooler in the summer compared to the inflow temperatures. This indicates there may be some influx of groundwater influencing temperature.
- The two tertiary channels exhibited opposite trends in deposition/erosion over the three years of the study. The wetted channel in T-1 has remained stable but the adjacent cobble bar has exhibited both erosion and deposition over the study period. Two of the three main secondary channel transects have remained neutral (T-2 and T-4) while the lowest most transect (T-6) has had significant erosion and/or substrate removal. The general pattern observed was erosion during spring runoff followed by deposition over the summer monsoons and winter time periods
- A total of 84 Colorado Pikeminnow were captured in the Phase II Channel complex and the Reference Channel over the three year study. Colorado Pikeminnow was captured in all 8 habitat categories mapped and in 11 of 18 sample periods (Main Channel and Reference Channel).
- Using the proportion of habitats sampled and captures by habitat, Colorado Pikeminnow were found in higher numbers in backwaters, embayments and slackwaters and less in runs than expected. These “preferred” habitats were approximately 30-40% of the habitat counts in both the Main Channel and Reference Channel
- Slackwater and riffles are associated with each other and this relates to where fish are being caught. Most are caught in the main channel; however, this could be a gear limitation in our ability to sample runs. Colorado Pikeminnow appears to select slackwaters associated with riffles, which could be for feeding purposes. Runs may simply be an avenue for Colorado Pikeminnow to get to preferred habitats. Determining methods to effectively capture Colorado Pikeminnow in runs may further our understanding of this fish’s habitat use.
- This presentation brings to question if we should go into these secondary and tertiary channels and open them up with some shovels and chainsaws to maintain these habitats in the long run. For example, T6 is flushing out after runoff and slowly gets filled back in especially during the monsoon season.
- Recommendation is the BC would like to see a proposal on how to open up these secondary channels again. This should be a future SOW.

2017 Rare fish stocking summary – Furr

- 101,237 Colorado Pikeminnow were soft released at PNM Sluiceway (RM 166.6), ranging in size from 45-50 mm TL. These fish were held for 24 hours prior to release.
- 99,499 Colorado Pikeminnow were hard released at Verde del Rio Park (RM 196), ranging in size from 45-65 mm TL
- Stocking will continue in the same fashion with a potential of batch marking with calcein or other methods.
- A total of 4,315 Razorback Suckers were stocked from two NAPI ponds and 1,891 from Southwestern Native ARRC into the San Juan and Animas rivers in 2017.

Larval fish monitoring – Farrington

- River-wide catch for 2017 larval fish survey consisted of 172 Age-0 and 233 Age 1+ Colorado Pikeminnow and 360 Age-0 and zero Age 1+ Razorback Sucker. Colorado Pikeminnow Age-0 (mesolarvae to juveniles) were captured as high up as 1.5 miles downstream of APS at River Mile 162.5. This is the highest location for larval Colorado Pikeminnow captures. Prior to 2017, the highest location ASIR documented of Colorado Pikeminnow larvae was in drift-net samples taken from Hogback diversion canal in 2016.
- Monitoring from 2011-2017 included 15 permanent sites located in lateral washes or canyons between RM 124.8 and 3.3. Habitat types are restricted to backwater, isolated pool or “site dry”. Steer Gulch (RM 8.1) and Slickhorn (RM 17.7) are backwaters available throughout the year. Stability is important for larval fish. Habitats with month to month and year to year stability are highly productive.
- From 2011-2017, the 15 permanent monitoring sites yielded 41.7% of all Razorback Sucker larvae collected and 54.6% of all Razorback Sucker larvae came from lateral canyons and washes, including 97.2% in 2017. It is variable, but some years these backwaters have been the only place that Razorback Sucker larvae have been found.
- Spawning by Colorado Pikeminnow has been documented in 10 of the last 15 years and eight of the last nine. Back-calculated spawning dates suggest spawning occurred over a nearly five week period in 2017 which is the longest spawning period observed during this study.
- For the second consecutive year larval Colorado Pikeminnow were documented between Shiprock and Farmington New Mexico. Larval Colorado Pikeminnow was documented nearly 5 miles (RM 162.5) farther upstream in 2017 than any previous survey year and below the waterfall.
- Razorback Sucker larvae have been collected for 20 consecutive years. Back-calculated spawning dates indicate spawning occurred over a nearly 16 week period in 2017 with the majority of spawning occurring in April.

Small-bodied monitoring – Zeigler

- During small-bodied monitoring a total of 43 Colorado Pikeminnow were captured including five wild YOY (\bar{x} =47mm TL (42-54mm)) and 38 Age-1 fish. Four adult Razorback Suckers were captured and averaged 404 mm TL.
- Sampling in geomorphic reaches 6-3 yielded 2,688 fish of which 58% were native fishes.
- In summary, 2017 was the second consecutive year capturing wild age-0 Colorado Pikeminnow. Densities of common native fishes decreased while nonnative Red Shiner and Western Mosquitofish densities increased; however, there was an overall decline in the proportion of nonnative fishes collected
- Flannelmouth and Bluehead Suckers in 2017 were the lowest observed during this study.
- Tagging fish by using 9mm tags has disadvantages due to its small read range. It was suggested that these fish could later be tagged with 12 mm tags. However, having two tags in one individual could cause the tags to be undetectable. It may be best if we just tag at 12mm versus 9mm.

- NMDGF would like to get a recommendation from the PO on the smallest size of fish can be tagged. However, there was discussion amongst the BC that 120mm fish can be tagged.
- The PO will be conducting a tagging experiment in the fall to determine the best size for PIT tagging.

Adult monitoring – Schleicher

- During adult monitoring 190 Age-1+ Colorado Pikeminnow were captured and the oldest year class captured was 2006. However, it should be noted that through the years of adult monitoring year class 2006 keeps popping up in our captures. It may be interesting to look up that year class and determine if there is anything special with the 2006 year class.
- Colorado Pikeminnow CPUE increased for the first time since 2014.
- In addition, 340 Age-1+ Razorback Sucker (303 individuals in the river for at least one over-winter period) were collected and the oldest year class captured was 2000. Razorback Suckers from year classes 1999 and 2000 appear to have retained in the river.
- At least one endangered fish was captured in 88% of the 2017 samples.
- Six Razorback Suckers were collected in the Animas River, all of which were previously stocked in the Animas River.
- 2017 marked the second consecutive year that Colorado Pikeminnow were collected upstream of the San Juan River and Animas River confluence and the first time an adult captured was not tagged.
- Additionally, 24 Razorback Sucker collected upstream of the Animas confluence, 22 had never been contacted before. The two other fish were capture previously at PNM fish weir and during adult monitoring in 2016.
- Amongst all the native fishes, Colorado Pikeminnow has the worst Fulton's condition factor. Maybe Colorado Pikeminnow have allometric growth and not cubic.
- In addition, Razorback Sucker weight-at-lengths when compared between basins (Upper Colorado and San Juan basin fish), are almost identical. However, Colorado Pikeminnow is statistically different between basins. We do not know at this time if such a difference is biologically important.

Wednesday 21 February 2018

Researcher of the Year award – Whitmore

- The Program Office presented the Researcher of the Year award to both Scott Durst and Nathan Franssen

Floating PIT tag antenna update – Stout

- Ben Stout was unable to attend; therefore Mark McKinstry provided Stout's presentation.
- The Bureau of Reclamation (Mark McKinstry), working with Utah State University (Peter MacKinnon and Ben Stout) and using funding provided by Reclamation's Science and Technology Office developed a floating PIT tag antenna in an attempt to float over fish and detect them. This project was initiated in 2010 and has been several years in development, with Ben Stout being hired as the graduate student to test the full system and see if it works.
- The goal of this project is to determine if we can tell the difference between live fish and dead/shed tags. Approximately 50,000 Colorado Pikeminnow and 150,000 Razorback sucker have been tagged and stocked into the San Juan River Basin.
- The first step of the project was to model or describe the movement of live fish and dead tags in order to distinguish them effectively. Known live tags are determined by matching detections with the floating antennas to electrofishing data and stationary antenna data for the year. Known dead tags are tags that have been seeded in the river (just dropped in the water and not implanted in fish) to simulate dead/shed tags.

- A ten mile section of river was seeded with 5,000 tags (known dead tags) and 273 rkm were sampled using three rafts with floating antennae from July to October in 2016 and 2017.
- For 2016 and 2017, 900 unique tags were detected and 1,405 movements were detected. Nonseeded tags (potential live fish) resulted in 3,958 unique tag detections with 847 unique tags detected and 1,190 detections of movement. Confirmed live fish were determined by being caught by electrofishing or other sampling methods or detected by a stationary antenna: 302 confirmed live fish and 370 live movement detections were developed from the floating antenna data.
- Using a statistical sampling technique called “random forest” a model was developed to predict the probably of a tags status (dead or live). Variables to classify tags as either live or dead included total distance moved, direction of movement (up or downstream), and flows (cfs).
- The model predicted that 72% of seeded tags were actually “dead” tags and on average the tags moved 4.05 km downstream from where tags were placed.
- The model also predicted live tags/fish with a 92% correct classification and life fish were equally likely to move upstream or downstream.
- Overall, the modeling exercise is a conservative prediction which provides an 8% increase to the total confirmed captures with pit tags.
- There is very little overlap between the use of electrofishing and floating antennae in tag detections. This could possibly mean that electrofishing and floating antennae boats could be detecting different fish/tags.
- Using the floating antennas works if you use them in an iterative manner, i.e, several trips per year and several years in a row, since the detections and movements build off of each other and you get better data and better predictability with more detections.

Colorado Pikeminnow survival, Razorback Sucker movement, and Razorback Sucker post-stocking survival analysis – Clark

- *Colorado Pikeminnow survival*
- An analysis was conducted to evaluate age-specific survival and potential capture effects of Colorado Pikeminnow stocked during 2002-2015. The impetus for this analysis was to empirically evaluate the anecdotal evidence that stocked Colorado Pikeminnow are rarely captured two or three years post-stocking. This may provide insight into specific age classes contributing to the apparent low survival of Colorado Pikeminnow.
- To evaluate age-specific survival and potential capture effects among the different age classes, the analysis was focused on two time intervals. The first time interval estimates survival over the first year post-tagging (an individual’s first encounter) and requires the fish be captured in hand (PIT tag implantation). The second time interval estimates survival during the second year following the tagging encounter; however, this time period does not require capture. Survival estimates are retrospectively assigned to time periods an individual was not encountered if that individual is recaptured in later time periods. This provided the ability to test for capture-related effects by comparing fish that were or were not captured and handled during this second time interval.
- First time interval mean apparent survival: Age 1: 0.19; Age 2: 0.16; Age 3+: 0.08. Little variation was observed among years within age groups and the low apparent survival of age3+ fish was surprising given the general relationship between age and survival. This indirectly suggests potential size-related capture effects.
- Second time interval mean apparent survival: Age 1-2: 0.37; Age 2-3: 0.22; Age 3+: 0.50. Age3+ fish rebound but it appears that potential capture effects linger for age 2 fish.
- Only known age 2 fish could be directly evaluated for potential capture effects. The analysis revealed that apparent survival of Colorado Pikeminnow handled at age 2 was approximately 50% lower compared to fish that were not captured and handled.

- There was a strong effect of first encounter size (TL) on survival. Furthermore, differential survival estimates among age groups indicates a relationship between survival and size.
- Mean age-specific survival estimates: Age 1:0.19, Age 2:0.25, Age 3:0.22, Age 4: 0.54.
- Detection probabilities were relatively high (0.28-0.48) compared to the upper basin where detection probabilities are generally less than 0.10 for adults. However, a direct comparison of detection probabilities cannot be made since the upper basin statistic is for adults. The San Juan detection probability means a large proportion of fish in the system are captured and handled. The difference between detection probabilities may be due to the relative size and depth of the rivers between those in the Upper Basin and the San Juan River and the disparity in sampling effort.
- Mean age-specific detection probabilities: Age 1:0.31, Age 2:0.37, Age 3:0.42, Age 4: 0.42.
- Once a fish gets to age-4 apparent survival is much higher but reaching that age appears to be a challenge.
- There are relatively few encounters of Colorado Pikeminnow at the waterfall antenna. They may not be moving downstream, are not detected because many are not PIT tagged as compared to Razorback Sucker, or they may be dying there if they are not able to survive in the lake.
- Data from the Yampa indicated age 3 fish were the most mobile of all the fish. The apparent behavior was that they need to find some area to develop a home range, for example adults develop a home range and compete for that. If a fish goes over the waterfall they cannot return to the upper San Juan River.
- *Stocking and post-stocking river movements of Razorback Sucker*
- A mixed model framework (AIC approach) was used to evaluate post-stocking and subsequent annual and seasonal movements of Razorback Sucker.
- Stocking location and density were the variables included in the highest supported model predicting downstream stocking movement distance.
- Discharge was not a variable identified as a predictor of fish movement. One reason may be that fish are stocked in the fall and discharge is not highly variable at that time and these fish are stocked at 300 mm.
- There was consistent downstream stocking movement (95% of all individuals were recaptured downstream of their stocking location) which may be due to orientation behavior or swimming performance or endurance
- Despite the regular downstream stocking movement, movement distances tended to decrease concomitantly with downstream stocking locations. This has resulted in an accumulation of individuals in a reach from Shiprock to PNM.
- Contrary to previous studies in other sub-basins, Razorback Sucker in the San Juan River did not display consistent movements associated with reproductive behaviors using in-hand capture data.
- Analysis of annual movement indicated the majority of Razorback Sucker (73%) tends to move less than 10 km between successive encounters based on in-hand capture data. As the time between captures ranged from 186 to 582 days, it was assumed such a range would have been adequate to reveal seasonal movement patterns if they were apparent.
- The probability of upstream annual movement was best predicted by total length and river kilometer. Smaller individuals and those further downstream were more likely to invest in upstream movements. Similarly, river kilometer was the best predictor of upstream annual movement distance.
- Similar to the probability of downstream movement, annual downstream movement probability was best predicted by total length. Total length and residual weight were the best predictors of downstream movement distance. Larger and better conditioned fish tended to disperse further on an annual basis.
- Relationships between potential handling effects and survival and detection have not been analyzed from these data but it could be done.

- Razorback Suckers are not getting passed through PNM fish passage structure; however, we have data to indicate that Razorback Sucker return year after year (2014-2017). Remote detections by antennas at the weir and fish passage peaked during March-May, suggesting movements related to spawning. Although if they did get passed upstream we do not know if that would be to spawn and return downstream or to stay in that habitat.
- In-hand captures of individuals before and after remote detections at the weir indicate they are returning to previously occupied areas. This has likely contributed to the lack of observed annual or seasonal movement.
- How would this analysis be changed if the 1,200 known detections from below the waterfall were incorporated? Similar to PNM there are detections that corroborate a spring movement connection.
- There were 140 detections at the waterfall in one hour of monitoring in August 2017.
- *Experimental Razorback Sucker post-stocking survival analysis*
- The first analysis evaluated the effects of stocking location (Animas River, Bloomfield, Montezuma Creek, and PNM weir) and hatchery source (NAPI, Ouray) on post-stocking survival and detection probabilities
- There were survival and location effects. Survival estimates were lower at Animas and Bloomfield compared to PNM and Montezuma Creek although confidence intervals overlapped.
- There was a strong effect of stocking size (TL) on survival for individuals stocked at all locations
- Increased survival from Ouray fish was detected on a consistent basis. These fish tend to be larger than those stocked from NAPI.
- There was no effect of stocking location or hatchery source on detection probability. Again detection probabilities were higher in the San Juan River for this species than those observed in the Upper Colorado River Basin.
- The second analysis evaluated the effects of stocking release method (hard vs. soft release) on survival estimates, detection probabilities, and post-stocking movement.
- No differences in apparent survival or detection probabilities were detected between soft v. hard released fish. This may be a result of small sample sizes (number of individuals recaptured) and additional recaptures may help to identify any relationships. Stocking fewer fish at more locations may ameliorate downstream dispersion
- Although not statistically distinguishable, smaller stocked Razorback Sucker tended to move further following stocking
- The third analysis evaluated the effect of flow-conditioning on recapture (return) rates and dispersal distances of recaptured Razorback Sucker. Only one year of recapture data is available, thus precluding the ability to use traditional methods (i.e. Program MARK) to evaluate survival and detection probabilities.
- Razorback sucker were conditioned to flow (n=513) or static conditions (i.e., no flow; n=530) for six weeks and were subsequently stocked on 2 November 2016 at PNM.
- Subsequent recaptures indicated that flow conditioned fish had a higher return rate than static conditioned fish, 5.3% and 1.9%, respectively.
- Mean size (TL) did not differ between recaptured flow-conditioned and static conditioned fish; however, static conditioned fish had a higher condition factor.
- Median movement distance and movement rate were lower for flow conditioned fish compared to static conditioned fish.

Update on Lake Powell-San Juan River Razorback Sucker study – Pennock

- Efforts for this study have included detection of PIT tagged fishes (2015-2017), capture and translocation of endangered fishes (2015-2017), telemetry tracking of translocated fish (2017) and sampling fish community downstream of waterfall (2017)

- 780 Razorback Sucker and 9 Colorado Pikeminnow, plus 813 unique tags were detected in 153 days of antennae readings.
- Based on a 4 sampling pass on approximately 70 river miles using a closed mark-recapture model in Program MARK, there is an estimate of 2296-4073 (95% Confidence Interval) for Razorback Sucker population size. Razorback Sucker detections obtained from a single PIT antenna deployed below the waterfall, which have varied through the years with 498 (2015), 472 (2016) and 780 (2017).
- In 2016, 167 Razorback Sucker were moved upstream above the waterfall, 102 of those fish moved back below the waterfall and 17 were recaptured upstream. In 2017, 152 Razorback Sucker were transferred upstream above the waterfall, 50 of those fish move back below the waterfall, and 4 were recaptured upstream.
- Small-bodied sampling below the waterfall indicated that there is high seasonal turnover in fish community.

Determining effective number of Razorback Sucker and Colorado Pikeminnow breeders in the San Juan River – Diver

- There are two objectives for this project: 1) Quantify the effective number of breeders (N_b) for Razorback Sucker and Colorado Pikeminnow and 2) estimate what proportions of adults are reproducing annually?
 - Additional calculations were made and include: estimates of the number of spawning adults, the number of offspring produced by each parent, the number of parental pairs, and the distribution of larvae and full-siblings across the landscape; full sibling reconstruction plotted across the landscape allow the opportunity to visualize the extent of larval drift.
- Microsatellite genotyping was used for this study. Twenty-five loci were used for Colorado Pikeminnow and 19 loci were used for Razorback Sucker. The program COLONY was used to estimate N_b using the sib-ship assignment method.
- For Colorado Pikeminnow, annual N_b estimates were highly variable among years with the annual proportion of spawning adults ranging from ~3-40%.
- In 2016, the contribution of offspring by parent was relatively even (i.e., the number of offspring produced by parent were relatively similar); whereas, in 2014 offspring contribution by parents was more variable. Although the number of parents that contributed offspring in 2014 and 2016 were relatively similar, the variance in reproductive success observed in 2014 resulted in a lower N_b estimate relative to 2016.
- Full-sibling relationships plotted across the San Juan River, suggest extensive larval drift occurs with evidence of some parental pairs spawning relatively high in the system.
- The N_b for Razorback Sucker (65-109 individuals) was much larger than that for Colorado Pikeminnow. The estimated proportion of adults varied among years with an approximate 3-40% annual contribution for Colorado Pikeminnow. Annual contribution for Razorback Sucker was consistent among years at ~2%.
- Similar to Colorado Pikeminnow there is extensive downstream drift but contribution to offspring by parent was similar among years.
- For Razorback Sucker could the low proportion of adults contributing to offspring be the result of selenium? That is why BIA is conducting their study. Selenium could reduce the viability of the eggs, hatch success level, and reduce survivorship of larvae.
- Reduced fecundity would not show this pattern as the pattern is a result of cohort survivorship rather than reduced adult fecundity. The analysis suggests only a few Razorback Sucker adults are contributing to offspring and this could be worrisome.
- The genetic data cannot be used to determine the number of males spawning with the number of females.

- The Program has not had many projects related to early life history. Flannelmouth Sucker annually returns to McElmo Creek and maybe suckers are similar to salmon and can be imprinted to a natal origin. It would mean stocking larvae rather than adults.
- Sampling the other common suckers may provide context for the Razorback Sucker N_b , although a population estimate is not available for those species so no proportion could be derived.
- Based on the Razorback Sucker movement data the Program knows there is seasonal movement of fish indicating an effort to move upstream of PNM. There is somewhat similar evidence for fish trying to pass the waterfall. An easy way to provide passage at PNM is to open the passage during the time when these fish would be moving. It is a cheap solution and could be monitored using PIT tag antenna.
- The N_b for Razorback Sucker only includes the spawning of fish in the mainstem river and not that from below the waterfall. Sampling only includes the portion of the San Juan River ASIR samples annually.
- Putting more fish into the system may not result in more successful spawning if there is a lack of habitat, inaccessibility to appropriate habitat, impacts from contaminants or other factors.

Long-term analysis of low velocity and secondary channel data – Franssen and Lamarra

- Durst, Franssen and Lamarra collaborated and developed a conceptual model to assess habitat (in particular backwaters) and flow relationships. This approach could help identify any recruitment bottleneck.
- All backwater types and secondary channels responded positively to high spring flows defined as flows $>5,000$ and $\geq 8,000$ cfs.
- Backwater area and frequency of flowing secondary channels increases with high spring flows. However, our analysis does not tell us what factors create backwaters.
- Secondary channel backwaters show no temporal trend. All others decrease in area or frequency of flow. The system has lost backwater area and flowing secondary channels likely linked to limited high flows in the last 13 years.
- Only secondary channel backwaters and secondary channels (presence/absence) respond to flows-at-mapping. Elevating base flows will not increase total backwater area since gains/losses of in-channel backwater habitat will occur; however, elevated base flow would increase secondary channel backwater area and frequency of flowing secondary channels.
- Persistence of backwaters is a very important component. Most believe that not all backwaters are equal.

Update on results of calcein marking experiment, implications for Colorado Pikeminnow stocking and summary of PIT tag antenna data – Durst

- *Calcein marking experiment*
- The purpose for the calcein marking experiment is to distinguish between hatchery and wild produced age-1 Colorado Pikeminnow. Because the mark dilutes with fish growth and in sunlight, mark retention was evaluated through time.
- Response tested: accurate identification of marked and unmarked fish.
- Blinds readers, read fish four times over a 10 month period. Readers had 100% accuracy in the first two readings. The third reading, six months later when fish had doubled in size, resulted in an accuracy of ~95%. At the fourth reading, fish had tripled in size and there was an 85-95% accuracy of detecting a mark.
- Fish kept in outdoor ponds for 10 months, dropped down to 0% detection, except for one reader who was able to read with 20% accuracy.
- Both scales and otoliths were collected to see if mark was retained but both had issues. However, fin rays appear to have some promise.

- Twenty Colorado Pikeminnows were captured during Phase II monitoring two weeks after the 200,000 calcein marked fish were stocked. Of these 20 fish, 19 were field-identified as calcein marked and 1 was unmarked. The unmarked fish and one of the marked fish were preserved in formalin and returned to the lab but the formalin degraded the mark preventing any further analysis.
- There is a field based SOW from NMDGF and NMFWCO for this fiscal year (FY18) to assess the calcein mark.
- Take home message, there is >90% detection of calcein mark in the lab and up to a 20% accuracy reading in the field. However, fin rays may be an option for detection of the calcein mark and will be further evaluated.
- What should be the stocking strategy for 2018? Plans for future stocking and marking may include the following options: 1) stock 400,000 unmarked age-0 fish in 2018, 2) do not stock in years with a high spring release and anticipated spawning, 3) stock 400,000 tagged age-0 fish in years without a high spring release and no anticipated spawning
- PO will put together a white paper summarizing stocking options for 2018 that will be voted on by the BC members on a conference call on March 15.
- *Is PNM a barrier for Razorback Sucker*
- Majority of Razorback Sucker movement is occurring March, April and May. These fish presumably want to move upstream. Razorback Sucker are making it into the PNM fish passage but are not being captured. The PO is proposing to the BC that we allow Razorback Sucker access to spawning habitat upstream of PNM by seasonally opening the passage in the spring March, April and May. In addition, the fish passage will be monitored with PIT antenna and pressure sensors.
- The PNM fish passage SOW will need to be updated for any changes of operation due to opening of fish passage.
- PO will provide an updated presentation on PNM fish passage for the May BC meeting.
- McKinstry motioned and seconded by Mazzone to open up the fish passage, from March through May with additional monitoring and installation of pit tag antennae and pressure sensors. Motion unanimously passed.

Update on Morgan Lake nonnative fish escapement control structure – Day

- Morgan Lake is the cooling lake is used for the Four Corners Power Plant. There has been some speculation that nonnative fish are escaping from Morgan Lake into Chaco Wash to the San Juan River
- Reasonable Prudent Measure 3 from the Section 7 compliance for the Four Corners Power Plan and Navajo Mine Energy Project included a conservation measure that the proponent will install and operate a device designed to prevent the transfer of non-native fish species from Morgan Lake to the San Juan River. The work was completed in December 2017, construction cost the proponent \$830,000. The screen appears to be working and still needs to be evaluated over time.
- Action item: Recommend that APS come back to present this information to the Coordination Committee after one year of operation.

Additional data integration priorities and potential 2019 scopes of work

- Both the Program and data integration has come a long way within the last five year. Ross suggests that maybe the PO should organize what we know in hydrology, pit tag information, recruitment and habitat. Possibly a short summarization of what we know would be helpful.
- Last year the peer reviewers provided a synthesis of what we do not know.
- It may be worthwhile to review synthesis reports from the past and possible conduct a new synthesis report.
- The PO should focus on providing a synthesis report or presentation for the Annual Meeting.

Direction to PIs on annual reports – Durst

- PO requested PIs shorten annual reports

Trip to Washington D.C. – Miller

- Miller will be attending the Washington D.C. trip to answer any biological questions regarding the two species. Approximately 15 individuals will be going to Washington D.C. on March 19. Legislation will be going to the Senate on Feb. 28 for funding of the programs. If legislation is approved, funding would be extended to 2023. It may get approved prior, but that is unknown if that would happen.

Update from PIs on 2018 field activities and logistical concerns

- Adult monitoring will occur river-wide this year and for Colorado Pikeminnow will only include sampling age 1 and adult fish. Otherwise the Grand Junction Office will continue to sample all fish species. During adult monitoring Channel Catfish that are marked will be returned to the river and unmarked fish will be removed.
- Other than previous mentioned concerns regarding what the appropriate smallest size was to PIT tag Colorado Pikeminnow no other updates or logistical concerns were brought to the BC's attention.

Update on January CC conference call and 2018 AWP – Whitmore

- The main objective of the January CC conference call was to make a decision in regard to the nonnative fish SOW. CC members received an overview of the nonnative workshop and recommendation from the BC. Then we discussed that there were several cost savings which would allow all new projects to be funded and added to the FY 2018 annual work plan. Therefore, the PO sent out final versions of these SOWs via email to the CC for a vote. The CC voted to fund all four new projects:
 - 1) Quantifying population-level reproductive success (effective number of breeders N_b) for the endangered fishes of the San Juan River with emphasis on evaluating the genetic diversity of reestablished adult Colorado Pikeminnow
 - 2) Endangered larval fish monitoring downstream of the San Juan River waterfall
 - 3) Sub-adult and adult large-bodied river-wide fish community sampling
 - 4) Nonnative species and rare fish monitoring in the lower San Juan River
- The PO will provide guidance on whether SOW's should be prioritized for FY19.
- Action item: Add prioritization of capital projects to May agenda so that Bureau of Reclamation can start planning for funding of these projects.

Update on Phase 3 habitat restoration project – Gori

- At the last meeting and through written responses the suggestions was to provide more information on the biological purpose of the project and how this may address recruitment bottlenecks for Razorback Sucker. TNC developed a standalone SOW to provide the biological basis for the conceptual design. These incorporated the five written comments coupled with comments received during the Nov. BC meeting. Many individuals helped in writing the SOW. The revised conceptual design, new SOW, and response to comments were sent out on Feb. 5.
- TNC worked with the PO in particular with Gilbert to address the BC's request for a biological justification for the restoration project. There was overall support for this project from the BC. Wesche voiced concern over water rights since this project will create off-channel habitat that will be holding water back. The evaporation should be considered. Ross suggested to referencing Minkley et al as previously stated during the last BC meeting (Nov. 2017).

- Wesche brought forward concerns with regards to this project and how depletions (evapotranspiration) may impact any water rights. Gori agreed to include additional explanation into the SOW to address Wesche's comments.
- A motion was made by Mazzone and seconded by McKinstry to move this project forward with the stipulation that the water rights issue is addressed and was approved unanimously.

Update on status of 2018 and 2019 budgets – McKinstry

- CPI 2.2% for FY2019
- BOR is operating under a continuing resolution. Many principal investigators (PIs) are waiting to receive funds for their respective projects. This also includes the PO which is calling weekly with regards to their funds.
- BOR has not awarded a single grant this year to any of our Program partners.

Update on plans for 2018 work in San Juan River arm of Lake Powell – Schleicher and Hines

- There will be 10 weeks on the river with UDWR and GJFWS.

Update on revised flow document – Franssen

- Comments have been received. The PO is in the process of incorporating those comments. BC recommends that the flow document be moved forward to the CC and we are looking for a vote to send out to the CC.
- Currently, the flow document does not account for maintenance releases.
- It is important to finalize our current flow document.
- The BC agreed to move this document forward for CC approval.

Update on Shiprock secondary channel restoration work – Keller-Bliesner

- In 2015, The San Juan River Dineh Water Users were awarded a salinity reduction grant from BOR. The grant partially funded the conversion of open ditches to pipelines. The riparian habitat along the ditches required replacement based on the grant mitigation. BOR approved restoration of an abandoned secondary channel near Shiprock Bridge as the mitigation project. This secondary channel was included in the Fruitland biological assessment and environmental assessment, which has undergone full NEPA and ESA compliance.

Update of BIA funded Razorback Sucker selenium effects study – Westfall

- As part of a consultation BIA agreed to conduct a Razorback Sucker selenium effects study. The study is being conducted by Kevin Buhl at the U.S. Geological Survey at the Yankton Field Research Station.
- The study's goal is to determine if environmental levels of dietary and water borne selenium in the San Juan River affect the survival, growth and reproduction of adult Razorback Sucker, egg viability and larvae survival, development and growth. The second part of the study is to link adverse biological effects with selenium concentrations in the tissues, diet and water.
- The project was slightly delayed due to the facility and equipment needing to be built for the study. Razorback Sucker arrived in Yankton on February 1, 2018.
- The presentation gave an overview of the experimental design and equipment used.
- The PO has been asked to communicate with BIA with regards to releasing the Selenium Study design to the BC.

Recap decision points and assigned action items

- Set up conference call for March 15, 2018 to discuss Colorado Pikeminnow stocking and any other outstanding BC business.

- Durst will send out a white paper on stocking of Colorado Pikeminnow
- Add an item to the March 15, 2018 agenda to discuss NMDGF 1200 cfs release from Navajo Dam to support a restoration project along Simone Canyon.

Upcoming meetings – PO

SJRIP Annual Meeting 22-23 May 2018, Fort Lewis College, Durango, CO

Researchers Meeting 15-16 January 2019, Moab, UT (UDWR host)

BIOLOGY COMMITTEE ACTION ITEM LOG
(Updated March 20, 2018)

Item No.*	Action Item	Meeting/Or ignation Date	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
1	Provide RBS/CPM stocking/capture/recapture data		PIs to PO	Annually before Jan. 1		
2	Provide Preliminary Draft Report Presentations		PI	Annually at Feb. meeting		
3	Review LRP		BC	Annually at fall meeting		
4	Review Peer Review Comments from the February and May meetings		BC	Annually at fall meeting		
5	Provide Draft Reports		PIs to PO	Annually by end of March		
6	Scopes of Work		PIs to PO	Annually by end of March		
7	Provide Final Reports		PIs to PO	Annually by end of June		
8	Annual Data Delivery		PIs to PO	Annually by June 30		
9	T&E Species Data		BC to PO	Annually by Dec. 31		
10	Annually compile T&E data and Program progress into summary to address overall Program recovery goals/objectives for presentation at annual meeting		PO/BC	By Annual Meeting in May		
11	Distribute Consolidated Data and list of annual data collected and available in the Program's database		PO to BC	Annually by Jan. 31		

BIOLOGY COMMITTEE ACTION ITEM LOG
(Updated March 20, 2018)

Item No.*	Action Item	Meeting/Or ignation Date	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
12	Recapture analysis on PIT tagged fish		Durst	Annually by March		
13	Coordinate CPM stocking closely with Reclamation 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	5/2011 – provide update and extend as needed		
15	Pursue effects study on Hg/Colorado Pikeminnow with other groups/programs	1/14/10	Program Office lead	ongoing		
16	Include benchmarks for recovery in LRP (amended to also included in Pathways document and monitoring protocols)	12/5/14	Whitmore	1/5/15	ongoing	
17	Status updates for the LRP	12/2/15	PIs to Whitmore	2/23/16	ongoing	
18	Make Program peer-reviewed publications available to Program participants	11/29/16	PO (Mata)	02/21/17	ongoing	
19	Determine disposition of Razorback <300 mm TL	02/21/17	NMFWCO	5/16/17	ongoing	11/28/2017 but TBD FY 2019
20	Draft a plan for Colorado Pikeminnow stockings	02/21/17	PO, NMFWCO, and NMDGF	2/21/17	On hold	
21	Determine if BIA selenium study can be shared with BC and share if permission granted	5/16/17	BIA and PO	7/13/17	05/20/2018	
22	Develop structure for Monitoring Plan and Protocols 2012 to be incorporated into other SJRIP documents will be added to LRP	7/13/17	PO	11/28/17	ongoing	

BIOLOGY COMMITTEE ACTION ITEM LOG
(Updated March 20, 2018)

Item No.*	Action Item	Meeting/Origination Date	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
23	Contact Southern Ute Tribe with regards to the Roundtail Chub stocking efforts	11/28/17	PO	2/20/2018	05/20/2018	
24	Coordinate aerial flights for base flow imaging	11/28/17	BC (Lamarra)/PO (Franssen)	2/20/18	Ongoing	
25	Non-native fish stocking procedures to be sent to signatories	02/20/2018	Crockett and Ruhl	3/30/18		
26	PO send out Colorado Pikeminnow PVA for review	02/20/2018	PO (Durst)	3/30/18		
27	PO provide recommend on fish length for PIT tagging	02/20/2018	PO	5/22/2018		
28	PO summarize Colorado Pikeminnow Stocking Option for 2018 and out years	02/20/2018	PO	03/15/2018		
29	Revise Navajo Nation SOW for PNM Fish Passage	02/20/2018	PO	03/19/2018		
30	PO provide a synthesis presentation at annual meeting	02/20/2018	PO	05/23/2018		
31	SOW for open and maintain Phase II Project	02/20/2018	PO	03/19/2018		
32	March 15 Conference Call add agenda item 1200 acre feet for riparian restoration project	02/20/2018	PO	03/15/2018		

BIOLOGY COMMITTEE ACTION ITEM LOG
(Updated March 20, 2018)

Item No.*	Action Item	Meeting/Or ignation Date	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
33	Discuss with CC about having future Annual Meetings in Farmington, NM	02/20/2018	PO	05/31/2018		
34	Send out RFP and guidance to BC in March	02/20/2018	PO	03/01/2018		
35	Prioritization of capital projects agenda item in May Meeting.	02/20/2018	PO/BC	05/22/2018		
36	APS present on Morgan Lake to Coordination Committee after one year of operation.	02/20/2018	APS	05/30/2019		
37	Consider what criteria would make Phase III wetland project a "success"	5/16/17	BC	7/13/17		2/20/2018
38	Provide BC a list of technical projects PO is suggesting be included in AWP	7/13/17	PO	11/28/17		2/20/2018
39	Email the Peer Review Assessment to the CC	11/28/17	PO	2/20/2018		12/6/2017
40	Coordinate with BOR in getting APS on the list of capital projects to fund	11/28/17		2/20/2018		01/31/2018
41	Email temperature experiment PowerPoint to BC member and Bestgen Report	11/28/17	PO (Gilbert)	11/30/17		11/30/17
42	Send PIT tag data to Casey Pennock in January	11/28/17	PO (Durst)	2/20/2018		1/5/17

BIOLOGY COMMITTEE ACTION ITEM LOG
(Updated March 20, 2018)

Item No.*	Action Item	Meeting/Or ignation Date	Responsible Party(s)	Due Date	Revised Due Date	Date Completed
43	Evaluate the feasibility and use of 9mm PIT tags	11/28/17	BOR (McKinstry)	2/20/2018		03/20/2018
44	Add the topic of flow regime to February agenda	11/28/17	PO	2/20/2018		03/20/2018
45	Email Angela Hills report on peak flows	11/28/17		2/20/2018		11/29/2017
46	Provide comments to TNC on the Phase III Project concept report	11/28/17	BC	01/01/2018		02/20/2018
47	Develop a revised Phase III Project Report/SOW	11/28/17	TNC	02/20/2018		02/20/2018
48	Develop a SOW to get experts to evaluate the water and/or fish passages (No SOW needed)	11/28/17	BOR/PO	2/20/18		No longer needed
49	Pursue Non-native fish stocking procedures	11/5/09	Crockett and Ruhl	2/23/16		02/20/2018
50	Consider what criteria would make Phase III wetland project a "success"	5/16/17	BC	7/13/17	2/20/2018	In SOW
51	Provide BC a list of technical projects PO is suggesting be included in AWP	7/13/17	PO	11/28/17	2/20/2018	02/20/2018

*Items were re-numbered after changes were made

Yellow highlight indicates annual action items

Green highlight indicates new action items

Red highlight indicates completed action items that will be removed from the next iteration of the Action Item Log