

**Middle Rio Grande Endangered Species Collaborative Program  
Science Work Group  
19 April 2011 9:00 am – 11:15 am  
Interstate Stream Commission  
550 San Antonio  
Albuquerque, New Mexico**

*Action Items*

San Acacia Fish Passage Peer Review Recommendations

- At a later ScW meeting, the workgroup will compare the peer review recommendations with the LTP to determine if those recommendations are incorporated in the LTP. This will be a future ScW agenda item.  
*This is an agenda item for the May 17<sup>th</sup> ScW meeting.*

“Augmentation and RGSM Genetic Variability” SOW Development

- Alison Hutson will check with Jeanne Dye to see if BOR has the genetics data needed for this study.
- Stacey Kopitsch, Alison Hutson, Jen Bachus, Peter Wilkinson, Douglas Tave and Dana Price agreed to constitute the small group that will draft a SOW by May 15.
- Stacey Kopitsch will email the small group to schedule a meeting to complete the task.

Population Monitoring and Population Estimating Peer Review

- Science is requesting CC to identify a process for incorporating peer review findings across all peer reviews done by the Collaborative Program, and to identify how the Science workgroup is involved. Science workgroup recommended the CC funnel action items from peer review reports down to the workgroup; in addition, if the workgroup identifies anything it views as important for consideration, this may be funneled back up to the CC to bring to its attention.

EC update

- Next meeting is April 21 from 9am to 1pm at Reclamation.
- May 19 EC meeting will include Adaptive Management.

CC update

- All day meeting on May 4 from 10is to 4pm to focus on the LTP.

Adaptive Management update

- Two-day workshop will be held on May 18 and 19.
- A three-day workshop was held April 5-7. Notes from the contractor should be available soon.

Other Action Items from April 2011 Science meeting:

- Douglas Tave will ask Jericho about adding fish gender information to the Age and Growth study.
- Stacey Kopitsch will check on the draft report due date for the Age and Growth study.

### May Science Meeting

- Possible joint ScW and HRW presentation by City of Albuquerque on Albuquerque's stormwater program
- Discussion of adding fish sexing to the Age and Growth study (request for Jericho Lewis to be present for the discussion)

### Continuing Actions from February 2011 Science meeting:

- Stacey Kopitsch will ask Monika Mann (PMT Liaison to DBMS) if the DBMS can provide a list of references they have for water quality data. April 2011 update: This request has been made; waiting to receive this information.

### Meeting Summary

#### 1. Introductions and Agenda Approval

- Those present introduced themselves and the agenda was accepted with change to the Action Item Review by removing the Adaptive Management Update.

#### 2. Approval of 3/15/11 ScW Meeting Minutes

- There were changes that needed to be made before the minutes could be considered for approval.

#### 3. Action Item Review

Jen Bachus reviewed the list of action items.

- A meeting to discuss the Food Availability SOW is needed – This came up during the October joint meeting and is moving ahead.
- Lisa will check notes to see if Jason would give same Propagation Study synopsis at the EC – completed. Jericho gave the synopsis to the March EC meeting. Note: this is not a study but refers to the activities in 2010 performed by captive propagation facilities.
- The action item for Jericho requesting information on the Columbia Study from Yvette was left on the Action Item list because its status and intent is unclear.
- Review of the 2010 Effectiveness Monitoring Report – completed. Alison Hutson reported that it was completed by the March 30 deadline.
- Adaptive Management Update – This action item was about an email sent by Yvette McKenna and was a notification to any ScW members that did not receive the email. This action was removed from the items list.
- RGSM Propagation Activities: Rebecca Houtman will develop a contact list for the Biopark – completed. Rebecca developed a contact list for all participants in this effort and this is being coordinated by the Biopark. Note: This refers to the 2011 Egg Monitoring effort, not propagation activities.
- Stacey Kopitsch will ask Monika Mann if DBMS can provide a list of references for water quality – Stacey Kopitsch said the information has been requested of DBMS, although she has not yet received it.

#### 4. Rio Grande Silvery Minnow Health Study Presentation – Joel Lusk

- Mr. Lusk used a power point and handed out a hard copy of it to the workgroup. He presented a general summary of the study findings, which was a two-year study funded through the Bureau of Reclamation. For the study, they proposed to examine a variety of water quality measures and fish health measures. They contacted other organizations to help with the study and his report was a summary of that work. Mr. Lusk noted the pH data from USGS are currently being refined.
- He explored the different types of water quality factors. For fish biologists, limiting water quality factors are most important including dissolved oxygen (DO), temperature, pH, salinity, etc. The modifying water quality factors include hardness of the water, nutrient status, high oxidation, etc. The toxic factors include things like petroleum, metals, pesticides or drugs. Finally there are societal factors like regulations and policies on solid waste such as plastics or garbage. For this study, they focused on the limiting water quality factors and fish health.
- Silvery minnows were collected for observations, including necropsy, gross observations, and histopathology (tissue quality and organs). As part of the study, the Dexter Fish Health Unit was contracted to do the pathology assessment including parasites, bacteria and viruses in the fish they collected. UNM also looked at immune response (MHC) from parasitic loads in the summer; however there was not a lot of data from that study. In the necropsy study they also analyzed the chemicals in the RGSM tissue including DDT, PCB, fire retardants, insulating chemicals, organic pesticides, oils and heavy metals. They used multiprobes for continuous observations over time.
- Mr. Lusk showed the fluctuations in DO in the water by time periods.
- Mr. Lusk described the six sampling locations they included in their study. They sampled from the summer of 2006 through the spring of 2007 and then again from fall of 2007 through summer of 2008. There was a gap during summer 2007 when sampling did not occur.
- In the pathogen assessment, the study found a lot of parasites but not the bacteria they were looking for. Mr. Lusk presented a plot showing the incidence of bacteria relative to water temperature; the higher the temperature, the higher the incidence of bacteria. Parasites were not affected by varying conditions.
- The study examined the temperature component of how fish grow. Temperatures did not track longitudinally, and were higher in the first year of the study than the second year. Warmer temperatures did affect fish size.
- Mr. Lusk described in detail the analysis of Fish Opercula Deformity (FOD), where the gill is not covered by the opercula. The study created an index that indicated the frequency of the abnormalities. Heavily stressed fish had more abnormalities. It was noted that FOD has been observed in five different species of fish in the Rio Grande and San Juan River basin, as well as in hatchery fish. A longitudinal study was conducted using archival fish from several decades. Box plots presented show stressed fish with a lot of abnormalities (year 1 fish are from 2006, year 2 fish from 2008).

A comment was made that FOD is almost universal in hatcheries. Mr. Lusk suggested that different hatchery systems could be evaluated to determine why they get different FOD results to see what might be contributing (e.g., could factor in to increased survival success in while when stocked).

- Mr. Lusk reviewed possible causes of FOD seen in the silvery minnow, including turbulence, suspended sediment (SSC), genetic causes, contaminants (e.g., PCBs), nutritional causes, temperature, and mechano-transduction. He was asked if they studied age correlates and he answered that they did not but they did choose larger fish because they were easier to see. Those with the deformity had bones that were less dense.

Mr. Lusk reviewed each possible cause. Turbulence and SSC could lead to erosion of the opercula, however the study determined it was not erosion of the opercula causing FOD as opercula were not abraded. Bones were less dense and some curling was detected. In addition, SSC is not an issue in hatcheries where FOD is also seen. He speculated that the cause could be cold water in early development or it could be nutrition, and these are worth investigating further such as a dosing study examining temperature and nutrition. He agreed that internal pH affected Calcium in bones but not the pH of the fish environment. In trying to understand what caused the condition, they considered genetics but did not come to a conclusion; however, it would be a rare event for the same genetic mutation to arise in 5 different species across two river basins.

- The study next considered contaminants. They suspected PCBs might be responsible but found levels of PCBs in fish well under the concentration that would justify this as a concern for FOD. Nutrition was an important consideration and low levels of Vitamin C could be responsible. But hatchery fish, where the diet is optimized, also had the deformity. He explained how this deformity would limit the amount of suction in a fish (trouble with buccal pressure) which was necessary to get food into the body.
- Temperature did affect the level of the deformity. They did correlate water temperature with fish age but Mr. Lusk did not have that data with him for this presentation. They did determine that cold temperatures showed a higher incidence of the FOD. He suggested this could be a future research item. Temperatures at the edges of the river were both higher and lower than the thalweg temperature and therefore reduced ability to relate temperature effects on incidence of FOD. Temperatures in the thalweg were measured as the water was drying and were noted to be high (e.g. 38°C compared to LC<sub>50</sub> of 36°C); with side habitats at even higher temperatures that can be considered lost habitat.
- Mr. Lusk next reviewed oxygen levels in the water (DO). Storm water events lowered the DO in the river. Algae tended to generate oxygen and Mr. Lusk used oxygen saturation values to ameliorated changes in temperature and turbulence. Elevated respiration was associated with storm events, and removes oxygen from the river. Mr. Lusk was asked if they did a correlation and what was the associated R<sup>2</sup> value. Mr. Lusk offered to provide that data. In the Rio Grande, there was lower oxygen saturation in the spring (likely due to increased flows) and the highest level was in

the summer. Then it was lower in the fall and higher in the winter. The study found that the changes in DO were more pronounced by storm events (causing lower DO) than by changes in the seasons (i.e. temperature-driven), so the saturation was reflected in the changes in the environment. Mr. Lusk showed a graph depicting oxygen saturation at the 3-hour LC50, NALC, and chronic. Chronic was identified as 30 days below that threshold, with different events occurring up to 8 hours. Mr. Lusk indicated there are differences between what is managing for lethality and managing for recovery. 75% saturation is recommended for recovery.

- Mr. Lusk shared recommendations related to DO and SSC:
  1. Quantify chronic, behavioral effects or avoidance of RGSM from low dissolved oxygen;
  2. Evaluate mechanisms of low DO events in storm runoff in relation to sediment discharge.
  3. Quantify acute effects of suspended sediment as a physical pollutant or as oxygen demand
- Mr. Lusk presented a graph depicting total suspended sediment (TSS), hypoxia, and silvery minnow CPUE over time in San Acacia from April 1993 to August 2010. He noted this is worth looking at, that over 10,000 mg/L of TSS they see an effect either directly or via suffocation. He summarized findings on DO, TSS, and primary productivity. Alameda was good except during storm events where DO dropped to zero (0) up to 20 times per year. High respiration leads to loss of productivity. Sources of low DO include stormwater, suspended sediment, and sediment oxygen demand; and low DO events likely affect silvery minnow.
- Mr. Lusk presented information on toxic water quality with a box plot comparing total PCBs, total DDTs, and total PBDEs in silvery minnow tissues during 2006-2008. Zinc can be seen as the problem in terms of metals. PCBs were noted at 30ppb which is not a level of concern for silvery minnow. He noted that with these toxic water quality measures, they have found that DDT and PCBs were not of concern for the silvery minnow, but fire retardants were - especially at Los Lunas.
- Mr. Lusk concluded by thanking Reclamation for funding the study and expressing appreciation for individuals who participated and contributed to the study. The study concludes that much remains to be learned about the environmental variable (water quality) that affect the health and survival of the silvery minnow. He invited questions and comments.
  - The first comment was when a graph like that is generated, it is necessary to separate out what is seasonally relevant. Also, storm water events are acute events, and there will be some fish killed. But if it is chronic (DO saturation decreased) - it might have a delayed effect. If this is not for an extended period of time, the fish can recover. Oxygen could stay low for several days and in the river flow, it would change.

Mr. Lusk agreed and added that suspended sediment is different in the spring than in the summer and fall. The fish need to have a chance to escape low DO events. There are some fish that cannot, but most are able to get away from such events. Very few silvery minnows were found in low DO conditions

indicating avoidance.

- A comment was made that the total available food supply could be a concern. In storm events, everything gets flushed out of the system and resets the whole system until it settles down. It is important to think about the big picture.

Mr. Lusk agreed. Also, during the day there might be super saturation. In these low DO events, it is a huge metabolic change but at what cost? It saps the fish's energy to get away from areas of low DO. These events are not good for the fish; in terms of recovery, the repeated stress from very low DO events is not desirable. A high amount of oxygen is needed so they can deal with those harsh events.

- Mr. Lusk was asked about low DOs and if he thought about this species adaption to those situations. The comment was made that minnows are found in isolated pools with bad conditions, so the only way this species could have adapted to those extreme conditions was to be isolated in such conditions over and over again and the survivors came through as dominant in the population. It was what helped them survive in the river.

Mr. Lusk responded that there are no data to support that. A good study would be to look at hemoglobin, etc. to see if there is such an adaptation.

Mr. Lusk said they are physiologically tolerant but it is best to go to management at higher concentrations. It is not managing for lethality; in a recovery situation you do not want half of them to die. A comment was made that the Program does not control storm water runoff or wastewater discharge. That is controlled by AMAFCA and EPA.

- It is important to talk about storm water and wastewater discharge here. Mr. Lusk suggested a study could find some of those things out fairly quickly. But it is also important to know we also have these conditions in the other tributaries like the Rio Puerco and others that were not associated with urban storm water but storm water in general. So the watersheds and erosion were also important to consider in dealing with suspended sediments and peak flows. He also encouraged fishery managers to think about it.
- Mr. Lusk was asked if from this study he considered this a chronic problem, and he agreed because it occurs multiple times each year. Following up, he was asked if the study was looking at long-term recovery. He said the first thing to consider was that it was a phenomenon that needs to be considered and there is a need to investigate the mechanisms involved. Secondly, there were a lot of water quality data without any interpretation and this study tries to get to the interpretation of water quality data that have been collected. Thirdly, they should consider how the phenomenon reduced animal productivity. Respiration and the sediment were actually reducing the number of animals. The goal is to increase the population of fish and manage for chronic conditions. As temperature and nutrition affected the productivity of the fish they needed to know how they were moving around the environment

during those events.

- A comment was made regarding catfish, for example, in low DO they do survive but there are consequences. The fish get sick and then start to die because of chronic DO – too low for too long. A series of events that are chronic can have serious effects on the long-term.

- A question was asked if the erosion altered the algae.

Mr. Lusk agreed that it did but did not have that data with him. He said the fish just couldn't pull in enough oxygen during those stressful events. They were not doing it as efficiently during a high flow. Those were things requiring additional investigation.

- A question was also asked if FOD affects physiological function.

Mr. Lusk responded that likely yes, and there is a need to directly study the buccal pressure to document effects on feeding.

- It was commented that the problem with FOD was a global problem in hatcheries. Here we have 25% with this problem. Not one study came up with a clear cause and effect answer. They could get some correlations so some say it is a disease - others say no, it is nutrition – still others say it is inherited. Nobody knows the answer for sure or what the effect is upon the fish. The other problem is that it is not a single anatomical thing. You cannot categorize on gradations; gradations are seen across fish species in terms of severity and type of FOD (farmed fish). It is a hot button issue in aquaculture because consumers outside the US rely on fish. Mr. Lusk added that FOD is not global/universal in the wild, but is seen in hatcheries more often. A comment was made that surrogate species could be examined also for FOD. Mr. Lusk added that some incidental information for other species (e.g., fathead minnow) has been collected where FOD is observed, however that was not a controlled study on those species.

- Someone else asked if the study found that temperature was an important consideration.

Mr. Lusk agreed. He noted that Mark Brennan was doing some low temperature research. Most of the research being done was for cold water fish in a warm water environment.

- Mr. Lusk was asked what formula he used for his fish health assessment.

Mr. Lusk said the Health Assessment Index (HAI) was the standard health assessment index and was used. It considers cumulative abnormalities and summarizes as a score.

- Mr. Lusk was asked if he would be open to a future presentation of this study to the CC. He agreed.

- A question was asked about annual productivity.

Mr. Lusk said it was 3.5 grams/m<sup>2</sup> per day, equivalent to carbon and some sites were as high as 17 like at Alameda. The study was looking for correlation there. The comment was made that higher productivity will increase chemicals in fish, pulling them into the biota matter (or in sediment).

- Concerning PCB prevalence: It was noted that the PCBs were in the sediment now. Those big spikes could be due to what was already there. There could be some concentrated sources to look at. Mr. Lusk agreed. A comment was made that PCBs are everywhere now and cannot be controlled.
- Mr. Lusk explained briefly how fire retardants (PBDEs) occurred and were a factor. They are found in children's pajamas, and are increasing. It is a problem for people who eat fish.
- Mr. Lusk was asked about the timeframe for the study report. He replied there are about 30,000 data points and substantial report volume and he hopes to have a report out in a couple of months. He will take into account the comments discussed at this presentation.

#### 5. San Acacia Fish Passage Peer Review Report Recommendations and "Augmentation and RGSM Genetic Variability" SOW Development

- ScW is tasked with developing a SOW for a study coming out of the San Acacia Fish Passage Peer Review recommendations. This study is to examine augmentation and effects on RGSM genetics. The draft SOW is due June 1.
- Stacey Kopitsch explained this task comes from the CC, which looked at the full recommendations and identified this one as a task for this year. ScW discussed and decided that a smaller group of ScW interested in writing the SOW will complete this by May 15.
- There was a question as to the levels of augmented fish recaptured, and perhaps this was too low. It was clarified that these levels vary but recently there has been a larger proportion of tagged (i.e., augmented) fish collected during monitoring. There was also a question as to the genetics data availability, and that this should be known before this study is started.
  - Alison Hutson said she would check with Jeanne Dye to see if there is the genetics data to conduct this study.
- There was a question on the peer review of the genetics program overall. It was clarified that the CC decided to do the peer review on population estimation and population monitoring next, and then genetics.



- Grace Haggerty felt that would affect interpretation. There is a lot of hesitancy by some on the genetics part.
  - Jen Bachus asked for volunteers for the small group to work on it. Stacey, Alison, Peter, Doug and Dana agreed to participate. Stacey Kopitsch will email the small group to schedule a meeting to complete the task
  - ScW discussed the available genetics dataset, and whether the study would focus on existing data using new information (new technology and new markers) and what is even possible to accomplish. It was expressed that the genetic question had been a huge question. It was discussed last year, nothing ever came from it at that time. A comment was made that at the last EC meeting one of the peer review panelists remarked on the lack of synthesis for information from Program studies and that was a need.
  - Stacey Kopitsch added that another task for ScW was on the remainder of the fish passage peer review recommendations. At a later ScW meeting, the workgroup will compare the peer review recommendations with the LTP to determine if those recommendations are incorporated in the LTP. This will be a future ScW agenda item.
    - This is on the agenda for the 5/17 ScW meeting
6. Update on Population Monitoring and Population Estimating Peer Review SOW
- A question was asked for the peer review process overall, and how recommendations would be implemented or not. Part of the identified process for peer review should be how to incorporate it once the Program receives the results.
  - ScW discussed the need for clear direction from the CC and some agreement on how to use peer review. As a result, Science is requesting CC to identify a process for incorporating peer review findings across all peer reviews done by the Collaborative Program, and to identify how the Science workgroup is involved. Science workgroup recommended the CC funnel action items from peer review reports down to the workgroup; in addition, if the workgroup identifies anything it views as important for consideration, this may be funneled back up to the CC to bring to its attention.
7. Program update
- EC update – Stacey Kopitsch said the next EC meeting would be on April 21 from 9am to 1pm at Reclamation. The May 19 EC meeting will include adaptive management
  - CC update – An all-day meeting is schedule on May 4 from 10am to 4pm to focus on the LTP.

- Adaptive Management update
  - A three-day workshop was held April 5-7 and they should be seeing some notes from the contractor on it. The next workshop is scheduled for May 18-19.
  - The comment was made regarding Adaptive Management that there was a process for long-term management, and it should not just be a plan put on the shelf. It needed to be an active process.
  - The question was raised as to the level of engagement of adaptive management with the PVA modeling and how those would interface. That was an ongoing discussion. Hypotheses and questions coming out of the PVA could be answered through adaptive management process. People have shown up for PVA and there were active discussions on this topic. A comment was made that it would be useful to have some ground rules as to how PVAs will fit into adaptive management instead of a free for all approach. It was shared that the PVA workgroup is aware of the concern that the PVA models are considered in adaptive management, and that this linkage exists. The adaptive management plan is under development.
  - Douglas Tave asked if ScW could discuss using the Age & Growth study fish to include a sexing study. We might need to get Jericho here to talk about it. It should not be that expensive a project. This discussion of adding fish sexing to the Age and Growth study (request for Jericho Lewis to be present for the discussion) will be added to the May ScW agenda.
    - This is a discussion item for the May 17<sup>th</sup> ScW meeting

11:00 Joint Workgroup Presentation – Hydraulics of the Los Lunas Habitat Restoration Site - Stephen Kissock

The presentation began at 11:15 and went until 11:30.

**Next ScW Meeting May 17, 2011 from 9:00 am to 11:30 am at Interstate Stream Commission**

#### **Science Workgroup (ScW) Meeting Attendees**

**April 19, 2011 9:00 a.m. to 11:30 a.m.**

<b>Name</b>	<b>Agency</b>	<b>Email</b>
Rick Billings	ABCWUA	rbillings@abcwua.org
Douglas Tave	State of New Mexico	<a href="mailto:Douglas.tave@state.nm.us">Douglas.tave@state.nm.us</a>
Alison Hutson	State of New Mexico	<a href="mailto:Alison.hutson@state.nm.us">Alison.hutson@state.nm.us</a>

Michael Porter	Army Corps of Engineers	<a href="mailto:Michael.d.porter@usace.army.mil">Michael.d.porter@usace.army.mil</a>
Dana Price	Army Corps of Engineers	<a href="mailto:Dana.m.price@usace.army.mil">Dana.m.price@usace.army.mil</a>
Mike Marcus	TetraTech	<a href="mailto:mike.marcus@tetrattech.com">mike.marcus@tetrattech.com</a>
Stacy Kopitsch	FWS	<a href="mailto:Stacey_kopitsch@fws.gov">Stacey_kopitsch@fws.gov</a>
Grace Haggerty	NMISC	<a href="mailto:Grace.haggerty@state.nm.us">Grace.haggerty@state.nm.us</a>
Peter Wilkinson	NMISC	<a href="mailto:peter.wilkinson@state.nm.us">peter.wilkinson@state.nm.us</a>
Jen Bachus	FWS	<a href="mailto:Jennifer_bachus@fws.gov">Jennifer_bachus@fws.gov</a>
Mark Brennan	FWS	<a href="mailto:Mark_brennan@fws.gov">Mark_brennan@fws.gov</a>
Beiling Liu	NMISC	<a href="mailto:beiling.liu@state.nm.us">beiling.liu@state.nm.us</a>
Joel Lusk	FWS	<a href="mailto:Joel_lusk@fws.gov">Joel_lusk@fws.gov</a>