

Middle Rio Grande Endangered Species Act Collaborative Program
PHVA/Hydrology Ad Hoc Work Group Meeting
December 8th 2010
9:00 am – 2:00 pm
Reclamation

MEETING SUMMARY

Actions

- Terina Perez and Dagmar Llewellyn (with Craig Borough's assistance) will develop a 1 hour PHVA/Hydrology refresher presentation for a future work group meeting.
- Leann Towne will follow up on the inclusion of the City's agreement with MRGCD (to keep a certain amount of water in the diversions in the 1990s) into the water operations calendar.
- Leann Towne, Dagmar Llewellyn, and Craig Boroughs will draft a summary of model results that highlights the key points of information.
- Leann Towne will continue to follow up with Chris Banet (BIA) to keep them informed of the work group's progress and status.
- Stephen Kissock will let the PHVA work group know the Corps plans for the hydrology component and if the Corps intends on using the newest model runs in their analysis.
- Rolf Schmidt-Petersen will talk with the Service to determine what entities already have ESA coverage; the list will be provided to the PHVA work group to include a description of how the model addresses those in the write up.
- Nabil Shafike will draft a brief explanation describing the limitations of the model's predictions of credits – including (1) the acknowledgement that the model predictions of credits does not reflect what has been observed; (2) that the PHVA work group and modeling team will continue to work on this issue; and (3) provide a list of possible reasons including confidence issue on the existing data on Elephant Butte.
- David Gensler will write a PVA data-needs specific letter for the PHVA work group within the next week.
- David Gensler will let Leann Towne know if there are expected PVA agenda items that PHVA representatives would be needed for (in order to schedule PHVA member attendance at the PVA meetings).
- **Craig Boroughs will check to see if any accounts are left "shorted" once the additional allocations are supplied on July 1st.**

Recommendations

- Several members suggested that a "pre-human Middle Rio Grande" model run (with Colorado operations in place but no operations for the middle valley, including "bypassing" the reservoirs and setting demand to 0 might be a run that could depict significant drying that would be expected if MRGCD were to stop irrigating.

Future Needs/Work:

- A short 1-hour PHVA refresher will be scheduled for the beginning of one of the next PHVA meetings.
- The triggers for shutting down ABCWUA water diversions should be revisited.
- Discussions should be had on any different operations in Angostura that might occur when MRGCD is releasing from storage.
- Consideration of the fact that in the absence of ESA management, there would probably still be relinquishments but they wouldn't be allocated for the species. Right now, in the pre-ESA run the model does no relinquishments but maybe there should be some.
- Consideration of setting a "maximum" MRGCD release.
- Determine the relationship between the gaged monsoon flows and the ungaged flow (in a previous study or report) and consider including in the model.

- There was a suggestion to talk with the Service about repeated wetting events and at what point might they be no longer beneficial?
- Explore compact compliance related to the relinquishments that might be adjusted to help in situations where we are in Article VII for multiple years in a row.
- Compact compliance calibration between San Marcial and Elephant Butte.
- The Pecos modeling comparisons need to be reviewed – to see how it was done for that situation.
- Right now, MRGCD is diverting to meet demand but the group could consider the situation where MRGCD is storing before, during, or after irrigation.
- There needs to be clarification on Article VIII and what “water in storage” it refers to; this might impact the debit and the storage of emergency drought water.
- The specific management information on the Buckman diversion(s) needs to be supplied in order to include this action in the model.
- Address the potential MRGCD operational situation where letter water delivery in July would be put into storage and the release of native water would continue.

Meeting Summary

- Leann Towne brought the meeting to order. The agenda was reviewed and approved with the addition of (1) PVA Needs Discussion and (2) General Consultation discussion. Approval of the October 26th meeting notes was postponed until the next meeting to allow members sufficient time to review them.
- All October action items were completed or are in process. The work group clarified that the original intent of holding another refresher was for new people and to facilitate discussions with the Service. However, there appears to be interest in redoing the “big” refresher. The highest priority is meeting with the Service to have iterative discussions, identify possible other model runs needed, facilitate understanding of the model/process, and answer possible questions from the Service. Attendees agreed that a short, 1-hour “refresher” presentation could be scheduled during a regular meeting for anyone interested.
- Attendees discussed the setting of the initial conditions at 2010 with the rationale that (1) there would be confidence issues if the 2012/2013 conditions were estimated and then used in the simulations; (2) there is the possibility that the BA/BO could be delayed past 2013; and (3) the modeling efforts cannot be delayed or redone every time there is a scheduling change. One suggestion solution was to label the years as ‘year 1’, ‘year 2’, ‘year 3’, etc. instead of ‘2012’, ‘2013’, ‘2014’, etc.
- The work group then discussed the “baseline” and the fact that the action agencies and the Service consider any project with a completed consultation (ESA coverage) to be part of the baseline for the system. Examples included the City of Albuquerque’s Surface Water Diversion, Albuquerque’s pumping permits (to a certain point), AMAFCA, etc. The concern was raised how these are or could be represented in the URGWOM model and if the broad coverage for all water users is equivalent. Pumping for the city and the diversions have been projected in the model runs. However, other actions are too diminutive to break out individually – URGWOM would not be the right tool for that.
- In the General Consultation discussion, attendees discussed the potential situation where parties that come forward for coverage have actions that are in range of a couple acre-ft per year. According to the technical team, these would be “lost” within the noise but the work group needs direction on whether or not these types of things need to be included or not.
- Craig Boroughs then presented the model run results by sequence for the pre-ESA water management run and the 2003 BiOp with all flow tools. He opened with a background review including (1) the latest model changes; (2) the new initial conditions, and (3) the PHVA flow tools – which include Reclamation leases of San Juan-Chama Project water, Lease water conserved after the year-to-date Otowi flow volume reaches 1,000,000 acre-ft; Relinquished Compact credits and subsequent storage of Emergency Drought water at El Vado Reservoir; Pumping from the Low Flow Conveyance Channel to the river to prevent drying; Deviations in Cochiti Dam operations to provide recruitment or overbank flows; and Alternate schedules for letter water deliveries.
 - Key points of the presentation included:

- Even in the wettest sequence, there were 5 dry years in a row.
 - For all sequences and all runs, the ABCWUA draws down their storage until they are using their allocation each year.
 - Even in the wettest sequence, by the end of the 10 years NM is in a compact debit situation; the amount of debit increases for the average and dry sequences.
 - Even in the wettest sequence, there are 3 consecutive years in Article VII; the total time in Article VII only increases for the average and dry sequences.
 - In Year 4 of the wettest sequence, supplemental water needs are predicted at 135,000 ac-ft; the average supplemental water need for the wettest sequence is 42, 279 ac-ft.
 - Even in the wettest sequence, drying is anticipated in all reaches; the amount of drying increases for the average and dry sequences.
 - In the dryer sequences, several times P&P operations begin in May before the continuous flow requirement is over causing the need for a large volume of supplemental water.
 - A comparison of the total predicted amount of supplemental water needed for each sequence indicates very little overall difference between the 10%, 30%, 50% and 70% exceedances (422,786; 432,009; 399,405; 486,818, respectively). The estimated total supplemental water needed for the 90% exceedance was higher at 668,541.
 - In other words, if 20,000 ac-ft of supplemental water were always available, there would be non compliance with 2003 BiOp 75% of the time; if 40,000 ac-ft were always available, then there would be non-compliance with the 2003 BiOp 40% of the time; 50,000+ ac-ft would be needed in any given year to be in compliance with the 2003 BiOp 75% of the time.
- Attendees then discussed the term “baseline” and what is being considered baseline for the consultation. Baseline is drying as it occurs now – under the 2003 BiOp requirements. The 2003 BiOp Unlimited Supply run could be used to show the conditions of meeting the BiOp. The range of drying would be described from the model runs. Even with relinquishments, supplemental water, pumping, etc. the model is predicting a huge gap between need and supply. The only reason that the 2003 BiOp hasn’t been broken yet is that nature has been providing – there have been at least 5 back-to-back good years (the annual flow out of Otowi is greater than the median). The model results indicate that the 2003 BiOp is not sustainable.
 - Attendees also discussed the real key is the projected status of the species and thus the need for completed, functional PVA models to translate the hydrological projections into a biological response. This also supports the need for longer sequences for the PVA. There is still confusion over what exactly the PVA modelers need in specific detail. The FORTRAN model is now in a daily time step and Dr. Goodman needs daily flows at gages and at the top of each subreach. It is assumed that since the RAMAS model is on a monthly time step that Dr. Miller will need the monthly average or annual flow. The work group discussed the challenges with attempting to string together 5 10-year sequences in order to achieve a longer sequence for the PVA.
 - For the next steps, Reclamation will be deciding on what is to be included in the proposed action and will begin writing the BA based on that information. The URGWOM model will be corrected for the Angostura Diversion/gage versus drain flow during P&P operations and will be rerun. Issues to consider for the second round include: (1) compact compliance calibration between San Marcial and Elephant Butte; (2) storage/release (conservation release rule for MRGCD in dry years); (3) ABCWUA shut down triggers; (4) different operations in Angostura even when MRGCD is releasing from storage; (5) Buckman diversion; and (6) gaged to ungaged flow relationships.

Next meeting: Monday, January 24th 1-4 at Reclamation;

- Tentative agenda items include: (1) summary of model results for discussion; (2) PVA letter of needs; (3) Corps update on consultation schedule/process

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- **Introductions:** Leann Towne brought the meeting to order.
- **Agenda Review:** The agenda was reviewed and approved with the addition of (1) PVA Needs Discussion and (2) General Consultation discussion.
- **Approve Oct. 26, 2010 meeting minutes:** Approval of the October 26th meeting notes was postponed until the next meeting to allow members sufficient time to review them.
- **Review Action Items from Oct. 26 meeting:**
 - ✓ Tetra Tech will check for the original email regarding the location of the River Eye's report location on the Program's website and will resend. – *completed;*
 - ✓ Tetra Tech will send Terina Perez the PHVA/Hydro Water Operations Calendar. – *completed;*
 - ✓ Terina Perez will investigate if there is a need or request to have a PHVA/Hydro work group and modeling refresher and will report back to the work group. – *completed;*
 - The work group discussed the original intent of the refresher. The purpose was to inform new people and specifically to facilitate better integration with the Service. The work group wants to make sure they successfully describe the modeling process in their documentation and to make sure there is involvement from people involved in the consultation. However, there appears to be an interest in re-doing the “big” refresher. Terina Perez and Dagmar Llewellyn offered to prepare and present this “large” refresher.
 - The highest priority is getting with the Service and having the necessary iterative discussions. It may be that other model runs will be identified but at least the Service's questions can be answered earlier instead of later and we can achieve general understanding of each other.
 - Regarding the previous large refresher, most of the PVA members attended. A short refresher could be open to all involved in the consultation process. It was suggested that a short, 1-hour refresher be scheduled for the beginning of one of the next PHVA meetings.

Action: Terina Perez and Dagmar Llewellyn (with Craig Borough's assistance) will develop a 1 hour PHVA/Hydrology refresher presentation for a future work group meeting.

- ✓ Leann Towne will confirm if the City's agreement with MRGCD (to keep a certain amount of water in the diversions in the 1990s) was incorporated into the water operations calendar. – *completed;*
 - Nothing obvious was found in the Ops calendar.

Action: Leann Towne will follow up on the inclusion of the City's agreement with MRGCD (to keep a certain amount of water in the diversions in the 1990s) into the water operations calendar.

- ✓ Terina Perez will forward the URGWOM model output slots list/document to the PVA work group with a specification that is “for your information.” – *completed;*
 - At the PVA meeting earlier this week, Dr. Goodman requested all the outputs provided in ASCII, “tab delineated.” The tech team members indicated this could easily be done once the PHVA agrees to the model runs to be done.
- ✓ Craig Boroughs will incorporate the newest ACAP tables into the model. – *completed;*

- ✓ Leann Towne will email the 2003 Storage Spreadsheet (for the methodology) and the 2002 Forecast Volumes to Craig Boroughs for reference in the model P&P calculation description. – *completed*;
 - The reason for this action was that there is a range of P&P storage between 8,000 and 30,000 ac-ft. The intent was to look at results from 2002 for actual computed storage requirement and to compare to the spreadsheet. However, we don't have a spreadsheet for 2002, only 2003. The URGWOM model has the 2003 methodology for P&P storage calculation but we wanted to apply 2002 volumes to make sure it would produce what was expected. Then we could document what was happening. The storage requirement might not be reached and that needed to be reflected in the model. The write up shouldn't be long but it still needs more work.

Action: Leann Towne will continue to follow up with Chris Banet (BIA) to keep them informed of the work group's progress and status.

- Craig Boroughs will write up a description of the model's P&P calculation process. – *in progress*;
- ✓ Marc Sidlow and/or Stephen Kissock will inform William DeRagon of the URGWOM model updates/changes and the new unlimited supply and 2003 BiOp With All Tools runs expected soon. – *completed*;
 - This information was provided to William DeRagon, the outcome is unknown. Reclamation has also discussed the model run updates with William at a consultation meeting.

Action: Stephen Kissock will let the PHVA work group know the Corps plans for the hydrology component and if the Corps intends on using the newest model runs in their analysis.

- ✓ Nabil Shafike, Marc Sidlow, and Craig Boroughs will revise the initial conditions to be estimates of the end of 2010 conditions based on projections of current conditions. – *completed*;
 - The work group discussed the potential issue that may arise from the situation where the new BO is expected to be implemented in 2013 but the initial conditions are set for 2010. However, this update is still better than even older conditions. The rationale for this decision includes (1) there isn't time to project conditions to 2013 and there would not be a lot of confidence in those projections anyway; (2) the start date of the BO could be delayed past 2013 but the work has to begin somewhere.
 - Labeling the first year as "starting with currently known conditions" and then labeling each subsequent year numerically (ex. 'year 1', 'year 2', etc.) instead of assigning an actual year (ex. 2012, 2013, etc.) is one possible solution that indicates 10 years of runs but is not tied to the consultation scheduling.
 - Attendees then briefly discussed the Service's 'talking point' letters and the possible effect those could have on the modeling schedule. Reclamation is still processing the letter internally and no official decisions have been made on whether or not the "plans" will change as a result. Reclamation still intends to have the BA finished early next year. The current model with the current assumptions will be used.
 - A question was raised regarding what is considered the baseline and how that is addressed in the modeling. Is it consistent with what the Service is saying?
 - It was explained that the federal agencies (Reclamation, Corps, FWS) see the authorities project similarly. Any existing project with a completed consultation (ex. the surface water diversion) becomes part of the baseline; this includes any non-federal party that has ESA compliance through another vehicle (ex. AMAFCA, City's EPA storm water, Buckman Diversion, etc.).
 - The cities pumping and the diversions (with the exception of Buckman) have been projected for the model runs.

- One non-federal endeavor has been to seek broad coverage for all the water users but there is concern that they are now hearing if the other parties already have ESA coverage they become part of the baseline. This is a concern because it is not known if these are equivalent.
- However, these other actions are too diminutive to break out individually – URGWOM would not be the right tool for that.
- The Buckman diversion is not included in this model version since there was not enough information on the management available at the time to create the rule sets. There is also the timeframe issue – there is a schedule in place in order to get the BA out.
- The work group also discussed needing a list of the other entities that have ESA coverage so that the PHVA knows what pieces are included or missing from the model and can provide descriptions in their documentation.

Action: Rolf Schmidt-Petersen will talk with the Service to determine what entities already have ESA coverage; the list will be provided to the PHVA work group to include a description of how the model addresses those in the write up.

- ✓ Work group members were asked to consider “how” model tool sensitivity analysis could or should be accomplished in preparation for the December 8th meeting. – *completed*;
- ✓ Terina will request the Service to have Jen Bachus as a PHVA workgroup member – *completed*; *The Service said they cannot provide a PHVA member at this time.*
 - Attendees discussed the importance of making sure there are iterative discussions with the Service and making sure the hydrology being worked on is understood. A possible work-around could be to include updates/discussion through the consultation team meetings or maybe quarterly URGWOM/Service meetings for information sharing. The work group needs to make ties between modified operations with valid biology needs and valid science/geomorphology/bosque ET/hydrology. All of this needs to be brought to the Service.
 - **General Consultation Discussion:** Attendees discussed the potential situation where parties that come forward for coverage have actions that are in range of a couple acre-ft per year. According to the technical team, these would be “lost” within the noise but the work group needs direction on whether or not these types of things need to be included or not. There is also concern that some non-federal entities don’t see a reason to be involved at all since they don’t have foreseen actions that need coverage; this could result in people not being engaged in this process.
 - **Presentation: Model Run Results (Estimated 4 hours including working lunch)**
 - Craig Boroughs presented on the URGWOM Simulation Results for Pre-ESA Water Management and 2003 BiOp With All Tools. The presentation consisted of an overview of the runs and simulation results presented by sequence. Attendees were encouraged to provide questions and suggested areas for improvement. *Please refer to the actual presentation for additional details.*
 - The last model changes included (1) The Elevation Area Capacity (ACAP) tables were updated; (2) the rule for setting allocations for storage of Emergency water were corrected to include allocations resulting from any relinquishment at the simulation Start Time step (previously hadn’t been); (3) hypothetical simulation determines flow needed to met upstream targets for efficiency and the bounds were “tweaked” slightly.
 - Reservoir storage and account status was estimated for December 31, 2010 and used for the new initial conditions. These estimates were based on conditions at the time of the analysis, and assumed accounting adjustments and movement of water before the end of the year. *(Please refer to the presentation slide for a list of accounting changes).*

- Craig presented a table with all the new predicted initial conditions. Reclamation is starting with nearly 10,000 ac-ft of lease water in Abiquiu (previously closer to 5,000 ac-ft). There is a large compact credit - 235,000 ac-ft compared to ~95,000. It was pointed out that 10,000 ac-ft is being leased from the Water Authority to cover the October actions but that is not included in the table.
- Initial existing unused allocation for storage of emergency drought water is set up separately and tracked throughout the model. There is enough in the initial conditions already to fill El Vado for the next year – if there is runoff. Within the baseline for the model for the 10 years are the projections of groundwater and the effect of that pumping.
- Fifteen simulations were completed with all 5 10-year hydrologic sequences. These included 5 runs for the pre-ESA water management scenario; 5 runs for the 2003 BiOp With All Flow Tools and 5 runs for the unlimited supply that are used to evaluate the total amount of supplemental water needed to meet the defined flow targets for a scenario and provide the information on river condition should the targets be met.
- The PHVA flow tools include:
 - (1) Reclamation leases of San Juan-Chama Project water – set as 12,000 ac-ft annually for the first 5 years and then 8,000 ac-ft for the remaining 5 years. Attendees briefly discussed the presidential signing of a federal action that would cause the uncontracted allocation of 2,990 ac-ft to no longer be available. It is unknown how soon this could occur. If this is to occur during the 10-year evaluation period, it could have an impact on the model simulations. Unfortunately, the work group cannot address this further until more information is known.
 - (2) Relinquished Compact credits and subsequent storage of Emergency Drought water at El Vado Reservoir – relinquished credits occur on January 1st. If the Compact credit is greater than 100,000 acre-ft, the relinquishment is computed as the Credit minus 70,000 acre-ft. A credit of 235,000 acre-ft will result in a relinquished credit of 165,000 acre-ft. There is no need for an upstream relinquishment in this situation.
 - If relinquished, 1/3 would be allocated to each: ESA, MRGCD, and the municipalities. Attendees discussed that 1/3 of the 165,000 ac-ft is more than the municipalities would actually receive. But it depends on the City of Santa Fe’s utilizations.
 - The implication is that if the water is there, it will be relinquished, and then Texas will accept. This could drive NM into a debit situation in the years down the road.
 - Emergency Drought water for MRGCD is used to meet the MRGCD Demand after native Rio Grande water is used but before MRGCD SJC water is used. It was suggested that Emergency Drought water not be used before native water because of the Article VIII situation. The relinquishment water isn’t subject to Article VII and Article VIII meaning we can store and release regardless; and thus better protect resources from a “call to release” from Texas.
 - It was pointed out that the model treats all water in El Vado as applicable to Article VIII – it is not differentiated.
 - (3) Pumping from the Low Flow Conveyance Channel to the river to prevent drying – pumping at the south boundary, north boundary, and Neil Cupp is represented in this model version. The start up is a function of different trigger low flows at San Acacia for each site (130, 100, 180 cfs respectively).

Pumping is set to shut down after the San Acacia flow returns to greater than 150 cfs. Only the south boundary pump is operational year round – the others cease on June 30th. The model does not simulate diversions to the Bosque del Apache.

- (4) Deviations in Cochiti Dam operations to provide recruitment or overbank flows – modeled for the first 3 years since current authorization is through 2013. Conservation storage is allowed at Cochiti if the conditions are satisfied. The model establishes a target volume to store and a timing for when to store for the Cochiti deviation base on the forecasted volume and checked against the forecast peak flow.
- (5) Alternate schedules for letter water deliveries – letter water represents a contractor’s payback to the river for offsets elsewhere in the basin by either paying back MRGCD or the Compact for when the deletions occurred. Letter water delivery is set for ½ to each (MRGCD and the Compact).
 - Craig reviewed the conditions and timing of the Albuquerque Letter Water deliveries and the Combined Account deliveries (please see presentation slides). Attendees briefly discussed how modification of the timing of deliveries could be an action that might benefit the valley as a whole.
 - The intent is to determine if there is any benefit – for the species or in meeting targets flows or use of less supplemental water by changing the timing of the deliveries.
 - When the forecast is less than 50% the Cochiti deviation is not even considered. This is one situation when a letter water delivery could help. For example, the Water Authority moved their water at the end of this year’s Cochiti deviation to extend the peak and/or manage the recession.
 - In the long-term, it would be ideal to set up some transfers the way they are actually done but it is complicated. The planning model is not set up to address this yet. An example was shared that for a letter water delivery in July, MRGCD would put that into storage and would continue releasing native water.
 - This is an improvement for the planning model to address.
 - If the relinquishment tool were turned off, we could see how often this alternate delivery is triggered.
- *Scenarios:*
 - The pre-ESA Water Management scenario has no targets (targets in the table are all set to zero) and the operation for establishing step downs in targets to manage recession and control the rate of drying after river rewetting is turned off. The Cochiti deviations, however, are modeled through 2013 to reflect the current authorization. There are no flow tools, no leases, no LFCC pumping, no new relinquished Compact Credits, and no alternate schedule for letter water deliveries.
 - It was commented that it is MRGCD’s irrigation that is keeping the river wetter than it would be if MRGCD were not in operation. It is assumed that with no releases and no irrigation, drying would be extensive even up to Alameda. However, it is a concern that this “extent of drying” is not acknowledged or understood.
 - Attendees discussed a “pre-human” Middle Rio Grande model run with demands set to 0, reservoirs “bypassed” (no storing of native supplies), but with Colorado operations as a possible run that would

help to depict this significant drying. This might be a worthwhile scenario to look at to indicate what an unmanaged river would really look like for the middle valley.

- The 2003 BiOp With All Flow Tools scenario has all the 2003 BiOp targets in place with step down after the continuous flow requirement. There is a 25% adjustment (or safety factor) applied where targets are increased by 25% because actual operations cannot be modeled exactly (ex. lag times). This adjustment is to better simulate the supplemental water use.
 - Craig then reviewed the details of the BiOp Targets with Step Downs. There is an operation for establishing the step downs in targets for Isleta, San Acacia, and San Marcial for the purpose of managing the recession and to control the rate of drying after any river rewetting.
 - It was pointed out that there are no releases for a step down if supplemental water is to be conserved after the year-to-date Otowi flow volume reaches 1,000,000 acre-ft.
 - Also of note is that targets will not be met if there is no supplemental water available.
- *Results:*
 - **10 % exceedance sequence:**
 - Flow at Embudo: even in the “wet” 10-year sequence there are 5 consecutive dry years, most likely as a result of the impacts of Article VII.
 - ABCWUA Supply: the Water Authority draws down their storage in the first 5 years until they are using all their allocation each year; this result is the same for both the pre-ESA and 2003 BiOp w/ tools and is independent of the hydrology.
 - It was suggested that the triggers for shutting down ABCWUA should be considered – especially adjusting accordingly for a deviation.
 - SJC Supply at Heron: the supply is very low to start because this is just project supply so 96,200 ac-ft are lost at the first of each year.
 - Compact Credit – pre-ESA: we go into a debit by the end of the 10 years. The debit ranges from approximately 230,000 for the pre-ESA scenario to 350,000 ac-ft for the 2003 BiOp scenario.
 - Article VII Status – BO Tools: with relinquishments, usable storage is “pushed up” so we come out of Article VII sooner.
 - Attendees brought up the concern that in absence of ESA management, there would still be relinquishments but they wouldn’t be allocated for the species. The current model doesn’t reflect this practice (of credit relinquishments) for the pre-ESA run but maybe it should.
 - Credit prediction improvements are still being worked on. The model tends not to predict credits but in reality we do get credits. There is also poor accuracy between San Marcial and Elephant Butte.
 - We have the historical data computed inflow to Elephant Butte compared to San Marcial but the data doesn’t follow a certain trend. The regression equation to relate San Marcial flow to the reservoir inflow is still being explored.

Action: Nabil Shafike will draft brief explanation describing the limitations of the model's predictions of credits – including (1) the acknowledgement that the model predictions of credits does not reflect what has been observed; (2) that the PHVA work group and modeling team will continue to work on this issue; and (3) provide a list of possible reasons including confidence issue on the existing data on Elephant Butte.

- MRGCD Supply: maximum MRGCD release is 790 if the maximum supply is available; remember that this “wet” sequence had 5 consecutive dry years in a row.
- Increased Angostura Diversions – Comparison: the pre-ESA values are less; this is assumed because there are no relinquishments in this run. These differences result in different timing for P&P operations.
 - In response to a question regarding how much is released at the Central Wasteway when 400 cfs is diverted during P&P operations at Angostura, it was explained that nothing is released at the wasteway. But in reality, MRGCD would keep everything in the drain.
- Supplemental water supply: during the 5 consecutive dry years emergency drought water can't be stored. The predicted total supplemental water needed to meet the current targets (from the unlimited supply runs) is an average of 40,000 ac-ft even for the wet scenarios.
- Cochiti Deviations – BiOp: a deviation is predicted for the middle of Year 3.
- River drying: drying occurs in both the pre-ESA and the 2003 BiOp runs but it is less when the tools are applied. In terms of critical drying – this could mean that drying even occurs in the Albuquerque reach. We do have to correct the return of water at the Central wasteway (as discussed above). Concern was raised that the gage flow is being met but since there are no other upstream targets drying above the gage, drying might not be adequately depicted. There are also the possible impacts to the supplemental water predictions. The work group agreed this change would be needed for the BA.
- Representative monsoon volume is related to the gaged tributary flows; and while this is not an exact flow, it does provide an idea of the flow.
- **30 % exceedance sequence:**
 - Flow at Embudo: there are 4 consecutive dry years, and 6 total dry years predicted
 - ABCWUA Supply: the same trends are predicated at the 30% exceedance as for the 10% exceedance
 - Compact credit: even with big monsoons, the compact credit still declines. The local, ungaged monsoonal flow is not included in the model (only the gaged flow is included). A relationship has been developed between the gaged monsoon flows and the ungaged flow but the work group needs to determine if they want this included in the model and if so, how.
 - Supplemental Water Needed Total: the average predicted supplemental water need is about 43,201 ac-ft. In Year 2 and Year 10, the predicted need is 123,000 ac-ft.
 - Cochiti deviations: are predicted to occur twice within this sequence.

- River drying: there are several occasions when recruitment flows occur naturally. The Cochiti deviation is important for these periods of multiple dry years in a row.
- **50 % exceedance sequence:**
 - Flow at Embudo: there is only 1 average year and the rest are dry; Article VII will trigger a dry year classification even in theoretically wet years.
 - ABCWUA Supply: the same trend as observed in the 10% exceedance.
 - Article VII: Article VII is in affect for almost the entire 10-years for both scenarios, although it is worse in the pre-ESA scenario. There is a relinquishment at the beginning of the sequences but not another relinquishment occurs in the 10 years. Attendees discussed compact compliance related to the relinquishments that could be adjusted to help in situations where Article VII is in effect for multiple years in a row.
 - Supplemental Water Needed Total: the average predicted supplemental water 39,940 ac-ft but can be as much as approx. 102,000 ac-ft in Year 5.
 - Cochiti deviations: deviations are predicted to occur twice in this sequence.

- **70 % exceedance sequence:**
 - Flow at Embudo: all 10 years are classified as dry.
 - ABCWUA Supply: same trends observed as in the other sequences. Please note that full allocations are not available at the first of the year, so the remaining amount is supplied on July 1st.

Action: Craig Boroughs will check to see if any accounts are left “shorted” once the additional allocations are supplied on July 1st.

- Compact credit – the same pattern as with the 10% exceedance is observed; only the debit is not as severe.
- Angostura Diversions: there is a difference between the pre-ESA and the 2003 BiOp scenarios. In Year 6, P&P operations started before the ending of the continuous flow requirement – this resulted in a large volume of supplemental water needed (and released in the pre-ESA run).
- Supplemental Water Needed Total: the average supplemental water need is predicted to be around 48,000 ac-ft.
- Cochiti deviations: the Cochiti deviation is predicted to occur once in this sequence.
- River drying: there are long, extended periods of drying predicted; even with no flow targets there is not enough water.
 - While the overall drying may or may not be different between scenarios/sequences, it is still unknown how important the effect of drying is on the fish.
 - The work group revisited past discussions on the prospect of present a spatial depiction of drying through the valley on a monthly time step by subreach. Attendees were reminded that there are a lot of runs and lot of time steps.
 - It was shared that the NM Economic Development Department (EDD) has been invited to attend the PHVA meetings to provide input on how to better depict these

- scenarios. They are potentially willing to come to the table and offer other funding paths to explore.
- Attendees agreed that the spatial depiction of drying was of interest, but until the need/application/purpose was refined and better understood, it was agreed that it would not be pursued further at this time.
 - MRGCD Storage: there are only 2 years in this sequence when storage is close to full – resulting in shortages 5 years in a row.
 - **90% exceedance sequence:**
 - Flow at Embudo: all years are classified as dry (with dry targets).
 - SJC Supply at Heron: there is a shorted water supply at Heron for the allocations so allocations are split between January and July. There may even be a few years where full allocations aren't received.
 - Angostura Diversions: P&P operations take effect early in 2 years;
 - Supplemental Water Needed Total: there are 2 cases where P&P operations begin in May resulting in MRGCD having basically no storage and no diversions. All water would be used to attempt to meet the continuous flow requirement and flow targets.
 - The old WAM subcommittee (SWM predecessor) estimates of water need ranged from 20,000 to 90,000 ac-ft with the average around 50,000 ac-ft. The model predicted average is about 25,000 ac-ft. The continuous flow requirement and timing of the P&P operations does “drive” the estimated supplemental water requirement up.
 - It was suggested that there be discussions with the Service about repeated wetting events and at what point those might no longer be beneficial.
 - There are 2 questions related to the BA:
 - (1) Are we doing a comparative analysis – comparing the pre-ESA model run to what?
 - Yes, there will be comparisons but not of the projected 10 years. We will have to describe operations under to the 2003 BiOp (ex. in terms of how things dry, etc.) for the descriptive purposes and for the “snap shot” in time.
 - Attendees briefly discussed the Pecos consultation and how/if there was comparison of a “now snap shot” to a point 10 years out. It is believed that a historical analysis was done for the Pecos consultation, but this should be researched.
 - (2) How should we summarize the drying? The amount of water available versus the predicted need – especially in terms of the amount of time predicted to not be in compliance with the BiOp?
 - Attendees then discussed the “baseline.”
 - The baseline is the snap shot of where we are now – drying as it occurs under the 2003 BiOp requirements. We can use the 2003 BiOp Unlimited

Supply run to show the predicted conditions of meeting the BiOp.

- The range of drying and the range of expected conditions with biological impacts would be described from the model runs. The baseline will be described in terms of potential ranges of possibility and then compared to proposed action(s).
- The only reason the 2003 BiOp has been met for the last 4 or 5 years is because the annual flow out of Otowi has been greater than the median (i.e., mother nature has provided the needed water).
- Currently in the model, MRGCD is shown as diverting to meet demand; however, this could be changed to reflect periods when MRGCD would instead store.
- Even with relinquishments, supplemental water, pumping, etc. the gap between the predicted need and the known supply is huge. We have been lucky to have had really good back-to-back “natural” supply or the 2003 BiOp would not have been met years ago.
 - The graph of the total predicted supplemental water needed proves that the baseline is not sustainable.
 - Concern was raised that a biological justification needs to be provided to support the proposed deviation from the 2003 BiOp. People are going to assume that the adaptive management will provide the “scientific approach” to meeting the current requirements.
 - Attendees were reminded that it is the status of the species through time that matters. Hypothetically, what might happen should there be absolutely no water management (for the species) for the next 10 years but the species doesn’t go extinct?
 - Projecting the status of the species into the future is more the PVA and the Service’s role in the BiOp while looking at jeopardy.
 - Cochiti deviations: Cochiti deviations were predicted to occur twice in this sequence.
- The final slides presented were “summary” graphs of the predicted supplemental water needs for comparison purposes.
 - In a quick review of these graphs, attendees pointed out that there is very little overall difference in the total predicted supplemental water need between the 10%, 30%, 50% and 70% exceedance (422,786; 432,009; 399,405; 486,818, respectively). The estimated total supplemental water needed for the 90% exceedance was higher at 668,541.

- In other words, if 20,000 ac-ft of supplemental water were always available, there would be non-compliance with the 2003 BiOp 75% of the time; if 40,000 ac-ft were always available, then there would be non-compliance with the 2003 BiOp 40% of the time; 50,000+ ac-ft would be needed in any given year to be in compliance with the 2003 BiOp 75% of the time.
 - At the conclusion of the model run results presentation, it was suggested that a “rolled up” summary of the highlights for each sequence be written.
- Action:** Leann Towne, Dagmar Llewellyn, and Craig Boroughs will draft a summary of model results that highlights the key points of information.
- **Question:** Since we are changing the Central Wasteway, should we also put a cap on the District’s water that would be released in any year?
 - **Response:** The tech team has been discussing the development of a hydrologically dependent system; however, the rule (based on Article VII, storage conditions, next year’s forecasts, etc.) would be very complicated. The MRGCD representative explained that he thinks this would be unrealistic to pursue right now.
 - **Sensitivity Analysis Discussion:** The purpose of this agenda item is to discuss how we might be able to determine the sensitivity of the results and the sensitivity or impacts of the different water management flow tools. We need this to evaluate the benefits of individual tools and determine when a specific tool makes a difference in what we are trying to achieve. One suggestion was to run the pre-ESA water management scenario adding one tool or similarly running the 2003 BiOp minus a tool.
 - It was pointed out that if there is not enough water an incremental analysis won’t address how to get more water into the system.
 - The known water supply is the same limited amount regardless of sequence and in every case the 2003 BiOp cannot be sustained. Scientific support and adaptive management is needed to justify any deviation from the 2003 BiOp. Even with relinquishments, there is a “gap” between the Service’s starting point and what the analysis indicates can be done.
 - The 2003 BiOp With All Flow Tools run and the pre-ESA with existing supplement water program are the runs that are needed for the BA. However, it was suggested that an explicit no-MRGCD irrigation/operations run be modeled to offer additional support to the unsustainability of the 2003 BiOp by indicating exactly how dry the river would be without irrigation operations.
 - The bottom line is that we don’t have the right tools now to “close the gap” between where the analysis indicates we have to be while still providing certainty to water users and maintaining the species.
 - The biological component has to come from the PVA.
 - There is no up front solution and it is probably going to be hard to get to a solution.
 - With the known supplies, the concern is that there is not enough even for the average years or maybe even good years.
 - **PVA Needs/Interactions:** In order to be statically defensible, the PVA projections need multiple long-term hydrology. Right now, the input/output hydrology does not fully meet that need. What is needed is broader statistical evaluation of hydrologic conditions that can be put into the PVAs.
 - In a PVA update, it was shared that by March 2011 there should be 2 functional PVA models capable of taking the current status of minnow and expected range of conditions over some period of time and arrive at some reasonable projected idea of where the species could be at.
 - The minnow is a very volatile species that will experience great ups and downs. There is some opportunity or capability of the species to respond rapidly and greatly. The population might ebb and flow but it has been recently learned that the minnow

has great capability to avoid extinction. This is supported by the sheer existence of the minnow and the persistence through the last 400 years of water use, and 80 years of MRGCD operations, and 40 years of flood operations. However, both PVA models still need good hydrologic inputs.

- Dr. Goodman needs daily flows at gages and at the top of each subreach for the last 18 years (1990 through 2007); part of his intent is to run a retrospective calibration run on the FORTRAN model. It is assumed that since the RAMAS model is on a monthly time step that Dr. Miller will need the monthly average or annual flow.
 - It was cautioned that Dr. Goodman be made aware that there is not a lot of data on the drying part. There is the RiverEyes information back to 2001 but it was restructured in 2007 to collect more detailed information. (Apparently Dr. Goodman already has the RiverEyes information).
- Both models base the reproduction of the fish on the volume of water available for spring spawn. The survivorship of the minnow is affected by the extent of habitat which is related to drying.
- In order for the PVAs to be defensible, they need to have a longer time period even though the consultation is only 10 years; 10 years is not rationale from a biological position.
 - Attendees discussed that the reasons URGWOM is only running 10 year sequences is because (1) there is limited data and there are impacts of having to repeat multiple years, (2) URGWOM model complications occur with longer sequences, and (3) the action agencies positions on having a longer-run.
 - There are climate change and possible legal issues that the action agencies are concerned with, so the evaluation periods remain at 10 years sequences.
 - Attendees discussed the possibility of stringing together 5 10-year sequences but how to select those sequences is unknown. Plus, there is the concern that stringing sequences back to back is not defensible and would require having to use the same sample generating process including starting again from the paleo-data.
 - There is the old URGWOP sequence and Nabil has strung 5 10-year sequences together at least once.
 - URGWOM has all the “pieces” built in but it is labor intensive and there is still the limited data issue. Maybe some of the locations could be replicated annually or monthly, but one challenge is how to arrive at a daily time step.
- The PHVA work group needs to understand exactly what is needed for the PVA models. Once that has been clarified, the group could brainstorm scopes of work for getting that data.
 - Reclamation has what they need for the BA for the water operations and water operation science for consultation of actions. But there is a critical gap – we still need to know what the scenarios mean to the fish. And the PVA is the tool to get that component.
 - If the PVAs won’t be available for use in the BA, then the agencies would have to proceed with technical expertise and judgment to relate the hydrology to the biology since that is the next best tool. In the end, the proposed actions/plans have to be defensible.
 - Attendees discussed a possible request for a joint meeting in January but the next PHVA meeting will be focused on the needs for the BA. Once the

written letter of clearly stated PVA needs has been provided, the PHVA work group could respond in writing how they recommend the needs be approached.

Action: David Gensler will write a PVA data-needs specific letter for the PHVA work group within the next week.

○ **Next Steps**

- For Reclamation, the next step is deciding what will be included in the proposed action(s) and then begin the writing of the BA based on that information.
- The URGWOM model will be corrected for the Angostura Diversion & P&P operations; the pre-ESA and 2003 BiOp scenarios will be rerun.
- A summary of the model results will be drafted for discussion at the next meeting.

○ **Next Meeting: Monday, January 24th from 1:00 pm to 4:00pm at Reclamation;**

- Tentative agenda items include: (1) summary of model results for discussion; (2) PVA letter of needs; (3) Corps update on consultation schedule/process

Action: David Gensler will let Leann Towne know if there are expected PVA agenda items that PHVA representatives would be needed for (in order to schedule PHVA member attendance at the PVA meetings).

PHVA/Hydro Work Group 26 October 2010 Meeting Attendees					
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