

CAP Oral History: Brock Reservoir

P: Phil Fortnam (CAP videographer)

Q: Kelli Ramirez (CAP interviewer)

Colby: Colby Pellegrino (Southern Nevada Water Authority)

David: David Palumbo (Bureau of Reclamation)

Chuck: Chuck Cullom (Central Arizona Project)

Bill: Bill Hasencamp (Metropolitan Water District of Southern California)

Q: This is an oral history about Brock Reservoir. And the first question is, what is Brock Reservoir, what does it do and how does it help the Colorado River system?

David: Great, well, thank you. Brock Reservoir is an off-stream reservoir located in Imperial County, California. It's really towards the bottom of the Colorado River system in the United States. It's right below and west of Imperial Dam, that's the last diversion of water in the United States to the state of California. Of California's 4.4 million acre-feet of water from the Colorado River, roughly 2.9 or so is diverted there at Imperial Dam.

Prior to Brock Reservoir, if there were any excess flows, or we sometimes call them non-storable flows in the system, they would go past Imperial Dam. They wouldn't be diverted for beneficial use in the United States and they would often pass Morelos Dam and ultimately make its way to the ocean and not be put to any beneficial use. The dynamic of the system is that water is released from Parker Dam when Imperial Irrigation District calls for water or Coachella Irrigation District calls for water and that water takes roughly three days to travel down from Parker Dam to that point of diversion. Sometimes things can happen in the intervening time, such as a rain event which would preclude the need for that water once it finally made its way to that point of diversion, so it wasn't put to use and ultimately passed and went into the ocean.

So, Brock Reservoir is a wide spot in the line, an off-stream reservoir that can store that water for use at a later time. Therefore, it could be put to beneficial use in the United States, and roughly up until the construction of Brock Reservoir, roughly on average, 70,000 acre-feet a year experienced that non-beneficial use. Again, it wasn't able to be stored and ultimately wasn't put to use for irrigation purposes or municipal purposes.

Q: Do you have anything you would like to add?

Chuck: So, one of the threshold issues there, is when it was flowing into Mexico, it hadn't been ordered by the Republic of Mexico, so we couldn't count it as a treaty delivery so it was a net loss to the Colorado River system and part of the structural deficit.

Q: So how did the idea of Brock Reservoir come about?

Colby: I guess I can go first if you want. There were a couple of different things at play at the time that Brock Reservoir came about. One was Brock Reservoir was the idea, and the concept was really firmed up through the negotiation of the Interim Guidelines. The predecessor to the Interim Guidelines was the surplus guidelines where California and Nevada planned on having the luxury of relying upon Colorado River surpluses as a bridge to developing future resources. We were in the midst of the drought that we didn't realize how severe it was going to be and Brock Reservoir was essentially...filled the need for coming up with some additional bridge resources beyond or in addition to the Colorado River surpluses. I'm going to pitch it over to Dave because there was a little bit of study that went into exactly what options might be available to do that and you're probably better suited to talk about it.

David: Sure, thanks. So the Bureau of Reclamation in partnership with MWD, I believe was involved at the time, looked at different storage opportunities on that lower portion of the system that I mentioned earlier. So a variety of different off-stream reservoirs were looked at. There is an existing off-stream reservoir called Senator Wash that's in the general vicinity of where Brock Reservoir is. It had some safety and dams issues and the thought was that it could be repaired and enhanced and store some water as well. Cost benefit ratios were developed for each of these alternatives and ultimately, how Brock Reservoir, for a variety of reasons, came out on top was from a cost perspective with respect to benefits. It was ultimately selected as the choice for that storage of what would become system efficiency intentionally created surplus in accordance with the guidelines that Colby mentioned.

Chuck: So Colby, just when Met and Southern Nevada were looking at surplus as a bridge to new supplies, you mean development of alternatives to Colorado River for future development...is that right?

Colby: Yeah, and I'm sorry, I'm probably talking in the colloquialisms of our water resource plan, not Colorado River lingo. So what we were trying to develop, was, come 2002, Nevada was diverting more than its allocation of Colorado River water. It had been relying upon the unused apportionment of the state of Arizona to do so. And the interim surplus guidelines were a way for everyone to stop relying upon the unused apportionment of our sister states. So, seeing that our demand in the Las Vegas valley was going to continue to grow, we needed a bridge resource to get us from our Colorado River resources to whatever new water resources we might need to develop.

Bill: Yeah, and I'll add that, so at the time in 2007, as Dave said, there were a number of options that were evaluated but there was no funding identified for – to fund this project. And Nevada first came up with the idea of, well we will fund it and we will get a portion of the water saved. We were all in agreement with that concept. Metropolitan at the time, our main goal was to get ICS in

Lake Mead that we could store water in one year and take it out in another. Store, conserve water in Lake Mead one year, take it out in another year, because we were all about dry reliability. So we had gotten the storage that we wanted and Nevada was pursuing Drop 2, but some of the terms we had concerns with, we were saying, well, wait a minute, they can take the water out before the water is fully conserved; the water doesn't evaporate. And we were very skeptical of Nevada coming into California, funding a project. And so we thought about it and then we made an offer, because in 2008 we were having a terrible drought in California and we were rationing water and we went to Nevada and said, how about if you let us join you. And at first their response was no, it's our project. But after thinking about it a little bit, that we're more successful getting a project done if we collaborate together. So Nevada said yes. They changed their mind and thought it was a good idea of us to help pay for it and we reached out to CAP and brought CAP in together and then when CAP and Southern Nevada met and all agreed to fund it, all of our concerns of the project all evaporated, and we all supported it, and in fact the collaboration was so much that – California's drought was so severe and we needed some water right away that Arizona and Nevada agreed to let Metropolitan take water out before the project was even built. In advance of the project even built, we could start taking water out in 2008. So things evolved from when one agency tries to do something, there's resistance, but when we're all in it together, it's a much simpler and frankly, a better solution.

Chuck: Yeah, I'm gonna agree. I think with Bill's statement, that we're better together. Solutions are better developed from a broader group of participants. The one step back I want to provide a little context for is that Arizona's first year of fully utilizing the 2.8 million acre-feet entitlement was 2003, or 2004 but I think it was 2003 which was why there was all this necessary effort for, as Colby was talking about, in the interim surplus guidelines, to find a way for states who had correctly and appropriately used Arizona's--and relied on Arizona's unused apportionment--when CAP was starting to be fully utilized, bringing Arizona up to 2.8 then that era was rapidly coming to a close. So we all had to come

together and figure out a way for the--I think the term of art at the time was define a glide path--which was sort of not a glide path but sort of going off a cliff for, I think California. But that was part of the driver that set in motion Arizona's use and CAP's diversion set in motion a path to get to Brock Reservoir. Not intentionally, but it was part of this, as Brock as a solution set to our full development.

Q: So who paid for the project and why the cost sharing?

Colby: I'll go again. So the project was essentially two-thirds funded by Southern Nevada Water Authority and then one-sixth each by Metropolitan and CAP. The cost sharing, I think Bill already highlighted a bit of that, was the project became much more palatable when it was an interstate project instead of one state coming into another state and developing a project. Also, there was a significant cost increase that occurred during the negotiation. A cost estimate increase and we were also at the same time as this was being negotiated really getting a handle on what the expected savings of the project was going to be. We had a reservoir size, we had to really look at how you could move water in and out of that, so there was a balancing act of how much water became ICS versus how much you still needed to create an additional benefit to the system on top of what our agencies were able to withdrawal. So there was a whole bunch of different factors at play I think that lead into the cost sharing and the acre-feet that were allocated, but essentially Southern Nevada got 400,000 acre-feet of water and CAP and Metropolitan each got 100,000 acre-foot of supply associated with it.

Chuck: So do you recall what the original cost estimate was?

Bill: 272 million.

Chuck: 272?

Bill: Oh, you mean the original before that. That was the one that was in the agreement, but the one before the agreement.

Colby: No, 172 was in the agreement. I think we were in the eighties.

Bill: Right, yeah roughly \$80 million.

Chuck: Yeah, cause Southern Nevada, your share was about a hundred?

Colby: Uh huh

Chuck: Cause we were 28, I think.

Colby: Yeah, it was the upfront commitment, and the project ended up coming in significantly under budget.

Chuck: And ahead of schedule, I'm told.

David: Correct.

Chuck: Yeah, so the, do you remember the net, what the total cost was because we got significant money back.

Bill: Right. It was 272 an acre-foot was the original cost.

Colby: Not million.

Bill: Yeah, not million. Two thousand two acre-foot, but it came in closer to two fifty when we actually...

David: It was \$172 million was funded up front and then roughly \$20 million was returned as not needed because it came in under budget.

Chuck: Ahead of schedule and under budget. Done day.

Bill: Yeah, and so part of the numbers that Colby's was relying on, we relied on the 70,000 acre-foot a year that Dave said the project was estimated to save in the EIS and then calculated that out for the life of the project, and then divvied up 600,000 to the funders and the rest of millions of acre-feet over the life of the project would accrue to the system.

Chuck: And that was important that there be a significant accrual to the system, because Bill described earlier initial skepticism from, in the lower basin in Arizona and in California to what became system efficiency ICS, which is miraculously insulated from evaporation and rightly so, since I have some of it, but there was significant skepticism in the upper basin about that concept and that's one of the reasons why it was helpful for the three lower basin agencies to come together and more importantly for the limitation on the yield of ICS, because at the time it was expensive water for CAP. And this idea that it would persist and be available was a significant reason why we were able to step up and fund our share.

Bill: And it was 600,000 total, but also only 40,000 acre-feet a year could be delivered, so we also couldn't take all of our ICS out right away. It was designed so that more water would be added than we could take out on average each year.

Chuck: So there would always be a system benefit accrual.

Bill: Average.

Chuck: On average, yeah, yeah.

David: I probably should have mentioned that the first question how this actually works, how it benefits the system. So I had mentioned water being released

from Parker Dam takes three days, that water to get to Parker Dam is released from Hoover Dam, coming out of Lake Mead that takes about two days to get to Parker Dam and then the three-day delivery down to that point at diversion. So once we had water stored in the reservoir, Brock Reservoir, that would have otherwise not been put to beneficial use, it's sitting there so when IID, Imperial Irrigation District, makes its next order, instead of releasing that water from Hoover Dam or Parker Dam, it stays up there in the system and we release it out of Brock Reservoir and it's delivered for use in Imperial Valley and that's the mechanism that creates that system water up in Lake Mead for delivery ultimately to MET, SNWA or CAWCD.

Q: Perfect.

Chuck: And the sizing was sort of an optimization exercise for the put in sizing the turnout and the release and actual storage.

David: Exactly, Exactly. Lots of different permutations looked at of how we don't want too big of a reservoir cause if it doesn't fill out and you're spreading that water very thin and it's evaporating so lots of discussion about how to best size the reservoir and ultimately it was 8,000 acre-feet and it was divided in half so there's a berm in the middle that there's two 4,000 foot reservoirs, 4,000 acre-foot reservoirs, to reduce that evaporation and if we don't need to spread it out, that water isn't there for any particular reason. It's conserved in just one of the cells of the two-cell reservoir.

Q: I think we covered this. What does Metropolitan, Southern Nevada and Central Arizona Project get in return for the funding? I think, Colby, you addressed that.

Colby: Yeah we get ICS credits, but we also get the system benefit associated with the project as well. So at the time in which we negotiated the agreements, Bill mentioned that they thought they were gonna take all of their water out before the project was even built or very early in the life of the project and

SNWA anticipated following very shortly on MET's heels and starting to take out our 40,000 acre-feet a year through conservation and various other efforts within the agencies, Metropolitan is the only one that has withdrawn water and what's the amount you guys have taken out Bill?

Bill: Thirty-four – 34,000, so there's still five 566,000 acre-feet of the original left.

Colby: Yeah, so there's a significant benefit in the storage volumes that it's created in Lake Mead.

Chuck: Yeah and you know I mentioned earlier, you know that our interest in CAPs/CAWCDs interest in Brock and understanding the need to reduce system losses or inefficiencies in the lower part of the lower basin. The structural deficit is reduced because of Brock Reservoir. We don't talk about that benefit but that's part of the enduring benefit of Brock from CAWCD's perspective. Is when we talked about the structural deficit in the million, 1.2 acre foot volume, that was pre-Brock. I think that because we have that, because we've reduced some of those downstream losses, it's helping to adjust that deficit downward so that's in addition to the ICS, that's a significant benefit.

Colby: And not to get overly emotional, but it strengthens partnerships and those have proven invaluable to managing through the conflict and crisis on the river. So the more things we work upon together, the more we learn about each other and our systems and our constraints which helps us all make better water management decisions.

Chuck: Yeah, and it helps us understand why good people might have mediocre positions.

{ALL CHUCKLE}

Q: Okay. Question five, if no one else has anything to add is, how is the project managed?

David: So the Bureau of Reclamation managed the project. We again worked with Metropolitan Water District on some of the alternatives evaluation and then once that was selected and circled, we began the final design process and once the funding came in towards the end of 2017, or very end of, excuse me-- not 2017, 2007--completed the final design, the environmental compliance and then let the contracts to build the project and then manage its construction. Worked very closely with my three colleagues here over the course of that period of time, briefing on a regular basis, how the project was going, lots of good questions about that. And we also brought on employees from Southern Nevada Water Authority to help manage the construction and it's in a fairly remote location in the middle of the desert, along the border with Mexico and we needed quite a bit of help with construction inspection, material testing, construction management and so we had a lot of folks working down there and we relied on our partners for some help with that as well.

Chuck: So Dave, who did the design.

David: Great, great question. Thanks. Our technical service center, our folks in Denver. We had two primary groups, the reservoir itself was a geotechnical challenge. It's sand, constructing that reservoir in the sand so our geotechnical group, our technical service center designed that and then we have seven miles of canal and a siphon that goes under an interstate that our water conveyance groups designed in our technical service center in Denver.

Bill: And Dave was the actual project manager who did a great job, keeping us informed, resolving disputes, making sure the project came in on schedule, under budget. It was really Dave's tireless work to get it done and he was a great project manager for Reclamation on this.

Chuck: We all share that view. He was always available to answer our / my questions, other people's questions about how Reclamation was expending money, about whether we were going to be under budget and ahead of schedule and all that as we were dealing with drought and other issues.

Colby: Yeah and it was interesting because the project was conceived and started pre-recession but construction really occurred through the heart of the recession and for us personally, Dave talked about the inspectors, but that was a really big benefit to our organization as construction literally came to a halt locally. That we were able to find other work for our staff and prevent having to lose that staff so that was really a mutually beneficial thing that came out of it. Chuck just mentioned briefly getting lots of questions and I think it was a ton of cost scrutiny just because that's what everyone was doing through the recession and we funded the project up front. All of our money was transferred at the front end and then spent over the course of the next several years. I don't think we would be allowed to do that today.

Chuck: Because of Brock.

Colby: Because of Brock.

Chuck: Our audit system is different. Yeah.

Colby: Yeah, and in large part because we transferred large volumes of money upfront and then went into our recession and our financial folks said, why aren't we paying that out and earning the interest that we might not have been concerned about pre-recession. So there were a lot of interesting little nuances. We talked about Dave being a great project manager and one thing I remember was that there was a fuel cost adjustment that was meant if, cause fuel costs were skyrocketing, that we would pay the contractor more if fuel costs went up and actually we used it in the opposite way and got a significant amount of money back.

David: That's right. We got roughly \$2 million back because those cost escalators go both ways and everyone...the contractor was betting that prices were going to go up and they wanted some assurance that if they bid at x dollars for that fuel and it did go up, they'd get compensated, but it ended up going down and ultimately had much to their chagrin and cut off their check for two million dollars.

Q: That's great actually.

Chuck: So the liner at Brock is an interesting design feature. Do you want to talk about that?

David: Oh sure, sure. So I mentioned that the reservoir is in sand and I had many instances where I got stuck out there when we were scoping the area out in the sand.

Bill: In your vehicle, I take it.

{All chuckle}

David: In my vehicle. No quick sand. So it's a high density polyethylene liner also uses fuel, diesel fuel, and it's – or subject to diesel fuel prices and fluctuations and that was ultimately laid down, seamed together, welded together we call it, and then ultimately covered with soil cement. So we mixed cement in with the soil to cover that geo technical membrane. There were other layers that were part of that system but we needed that geo membrane on the ground to cover the entire reservoir so as to avoid that seepage and loss of the water that was stored in the reservoir because of the sand. It was white in color also and going out there and seeing essentially a square mile covered with white film, people had to wear sunglasses while they were working on top of that reservoir before that soil cement went on because it was a bit bright.

Q: That is awesome. Okay question six. What were the challenges you faced in the process and are there still challenges?

David: I can take a stab at that. There were are a couple of engineering-type challenges. I mentioned that there is a siphon and some pipes that go underneath the interstate. There's two nine-foot diameter pipes that go under the interstate. We originally looked at boring underneath the interstate and putting those pipes through while traffic was running on top and ultimately decided the risks were too high. You have high volume. It's interstate 8, high volume of truck traffic and if you had any subsidence while that boring was going on, it could be catastrophic. So what we decided to do was construct a detour on the interstate, challenging in and of itself. Had to work very closely with Caltrans to get all the permits to do it, some added costs to divert an interstate off of its pathway onto another road while we constructed essentially an open trench to install the pipes, so that was one other challenge. Maybe another challenge is...I mentioned Coachella Valley Water District, they take their water from the All American Canal which feeds Brock Reservoir and we had to split that, we called it bifurcating, that turnout keeps the water running to Coachella and at the same time construct the new canal so there was a lot of engineering challenges associated with that. Ultimately we're able to get that done without an impact to Coachella Valley Water District's water deliveries.

Bill: Another challenge we had from the funders' perspective is Brock Reservoir would get water from the All American Canal. And the All American Canal is operated and maintained by the local irrigation district, Imperial Irrigation District, and they're responsible for all the costs of the All American Canal. But because the canal provided water to both IID and Brock Reservoir, both IID and the project would pay for some of the improvements to the canal and that was one area of dispute we had with Reclamation along the way {inaudible} the proper funding chair and we felt there were some areas that IID

should have been responsible for some of the areas that we ended up covering.

Cuck: We are going to get back \$1.5 million back some day.

David: Okay.

Chuck: Someday. Because that's...there was some capacity issue because of sediment in the All American Canal and in order to achieve the, what is it, 9,000 CFS inflow...

David: Eighteen hundred CFS in Brock but quite a bit more in the canal, you're right.

Chuck: Right, so we needed 1800 on top of whatever IID's seasonal flow capacity and in order to achieve that, sediment needed to be removed from the All American and that was one of the points of significant, thoughtful and rational discussion in some lawn chairs in Santa Fe as I recall. Someone came out and said, oh by the way, we spent this money to make this work. Shouldn't IID have ponied up for that, but you know it's a small price to pay. But we're going to get that 1.5 back to dredge that canal.

Colby: To roll back a little earlier in the process, you know one of the issues we had was Transboundary, NEPA and the ESA.

Chuck: Right

Colby: That the capture of unstorable flows was having an impact in Mexico and we desperately did not want to be the poster child for Transboundary, NEPA, and ESA litigation. So we worked very hard with the NGO community and with our delegation to make sure that didn't happen.

Bill: Right because there already was a lawsuit on the All American Canal on the lining of the canal and that was resolved by getting federal legislation that says both the All American Canal and Drop 2 should go forward regardless of any other provision of law.

Chuck: And so just to put a finer point on it, the excess, the unstorable flows, could have been argued as an environmental benefit or an environmental resource in Mexico if there was an effort to extend NEPA and ESA issues into the Republic of Mexico and so that would have created a significant obstacle to doing the project.

Colby: Yeah and something that's very hard to describe because in some cases Mexico would divert nonstorable flows and use them for agriculture and some case they wouldn't and the US has no control over that, so even quantifying the impact would be difficult. There was significant environmental mitigation done as a part of the project including habitat restoration, I think the plateau horned lizard got a nice plot of land out of this. But there was...the other thing I would say, we talked a little bit about IID. One of the other struggles we had there is just like the river system as a whole doesn't have a lot of regulatory storage, IID has almost no regulatory storage. So I know when Reclamation began negotiating the operating agreements with IID, there was certainly a desire to use the reservoir to help manage IID's diversions in addition to the nonstorable flows and being the funders of the project that wanted to see the project successful and create not only the system benefits and/or ICS benefits we were very concerned about IID being able to fill the reservoir for other purposes and then there not be space available when a nonstorable flow needed to be captured.

Chuck: Right and just to maybe amplify that point, the timing when IID might want to utilize Brock or Drop 2 to manage some of their water orders would likely coincide with changes in water orders because of rainfall or changes in their use pattern and so that's...you know if IID is parking their water in Brock, it

cannot interfere with the significant singular purpose of the reservoir which is to capture those nonstorable flows. One of the unique aspects from my perspective and still some challenge is the long-term maintenance of the facility because the funders paid up front, I forget the amount, but put money in a fund with Reclamation to pay for the continual maintenance.

David: Correct. About \$8 million, just put in a fund.

Chuck: And my recollection might be faulty, but you debit out of that and we track those expenditures still.

David: I believe so, for a twenty-year period, if I am remembering correctly.

Chuck: And so that's the, Colby mentioned, the agreement between, the operating agreement between the United States and IID that framed what the relationship is, what expenditures, as Bill was talking about, what an appropriate costs for normal IID maintenance operations versus what IID can charge to maintain and operate Brock and that's part of the ongoing process to keep that facility adding value.

David: Yes

Q: Any other challenges you want to talk about?

Chuck: Just to put a finer point on it, the discussions we had were largely informational, sort of tracking, making sure that we could tell our constituents. So let me just...quick anecdote. I drafted the board brief for \$27.2 million, writing a check to the United States for Brock Reservoir. We had not briefed the board, I mean we had kept them informed but we went to the board in one go to write a \$27.2 million check with the promise that we would get the ICS and the long-term conservation benefits to the system. That was a significant one-time expenditure for a water management purpose so just to manage CAP supply

to make this investment. So ensuring that we could communicate that every dollar of that 27.2 was spent appropriately and consistent with the agreement was something that we spent a lot of time every month on the phone understanding with Reclamation and there were, you know, I think you've heard the four issues over the course of that project. There weren't a lot, it was very well managed and I personally appreciated that.

Colby: Yeah, I agree.

Q: Okay so it was originally called Drop 2. What was the change from Drop 2 to Brock and who is Brock?

David: I'll go ahead and answer that and certainly welcome any input. So Drop 2 was the original name up until the 2010 timeframe, that's what it was called because it was adjacent to Drop 2, a drop, a hydropower production drop on the All American Canal. The water was diverted right about at Drop 1 and ultimately went into...after seven miles of the canal...went into the reservoir. When it was released from the reservoir, it went back into the All American Canal for delivery to Imperial Irrigation District just below Drop 2 on the system. Brock was, Warren Brock was a farmer in the Imperial Valley that had leased the land that the reservoir ultimately was on. The reservoir was on federal land, we call it federally withdrawn land. It was drawn by the Bureau of Reclamation and we leased that back to the Brock family to do experimental farming on that land. They, a variety of techniques were tested out by the Brock family that ultimately led to efficiencies, and irrigation practices, and farming practices in Imperial Valley and perhaps beyond. And the Imperial Irrigation District, towards the end of the construction of the project, wanted to name that after Warren H. Brock and went through the process, federal process, to make that naming happen and that's what occurred. Support by the funding partners through that process and we as the Department of the Interior ultimately approved that naming.

Colby: It's going to create a fascinating incongruency for future generations that go through our systems and search for Brock Reservoir and can't find any agreements.

Q: How would you characterize the project's success?

Bill: So I'll start by saying I think it was a tremendous success. Of course. We wouldn't be doing this video if it weren't, but, or audio. But I think it's the single largest conservation project that we've ever undertaken. It was envisioned that 600,000 acre-feet of water would be diverted perhaps by now, but instead only five percent of that amount has been diverted. Almost the entire savings is accrued to Lake Mead. Hundreds of thousands of acre-feet. I think the report that is coming out this week shows the savings are probably a little less than the 70,000 that were assumed, but that's likely due to the fact that the system is being run tighter all over so there's less water capture so the...but the water is being effective and that water is not being lost over the border anymore by tightening this system and this project, the over deliveries are down substantially. And so I think it's cost effective and it has been probably the single biggest reason that we've stayed out of shortage all these years by saving this water every year and keeping it in Lake Mead.

Chuck: So I'll, I figure we'll all get to talk about what we think about the project's success. I want to also agree that it's a tremendous success we noted earlier that it was ahead of schedule and significantly under budget. I want to amplify Bill's point that one of the significant benefits of Brock is not only the physical infrastructure, but also the learning that Reclamation has undertaken to utilize that resource and to build new forecasting and modeling tools on how to optimize deliveries on a daily basis. Prior to Brock, part of it is the technology advancements, but part of it was just, it wasn't time yet to put those tools in place but the Yuma area office has its own riverware-based modeling tool that optimizes how it manages the train of water coming at it every day and that

wouldn't, it would be harder to put that in place without this new bit of infrastructure.

The other point is, the other soft benefit is, that others below Parker are, because of work with Reclamation, are keenly aware of the water ordered but not delivered issue and have tightened those water orders and schedules up in a way that wasn't in place before 2000, before Brock. That's part of the story about there's less water available to capture. I think, the way I think about it is that prior to Brock's operation, the excess flows to Mexico were routinely above 100,000 acre-feet a year. That's on top of what was going in the mode and today the excess flows to Mexico are routinely in the 25,000 to 30,000 acre-feet. Part of that's hydrology. We don't get a lot of flows in the Gila system because it hasn't rained a lot, but it's more about the way we are using Brock and managing water orders in the lower, lower part of the Lower Basin.

Colby: Yeah, I think in a lot of ways it served as a model for investing, you know a common investment in a water supply project. We've had successes beyond that between our three agencies under the same model with Mexico and I think every one of us up here can say that we've talked about this project nationally and internationally and it's often a project that gets a significant amount of attention because it was sort of creative in the way that we came together and funded something that made the system better off and still got a benefit out of it ourselves.

David: I think everybody captured the success very well and I'll just add to what Colby said earlier on the emotional side just working well together, in it of itself, I think was a great success building relationships, trusting each other, working through the challenges with the dredging and other challenges that came up over the course of the project and I think that in it of itself is a success, with the relationships

Q: So what is the legacy of this project?

Chuck: So I'll go first. So there's a significant tie between the...what Colby and Dave were talking about relationships and trust and all that. There's a significant tie or a thread from what we were able accomplish in Brock Reservoir to the implementation of the Drought Contingency Plan. We did Brock, we did the pilot run of the YDP, we did the Drought Response MOU, we did the Pilot System Conservation Program and DCP. They all, I think, stem from the successful collaboration of model that was developed in Brock Reservoir. Colby talked about creative funding with system benefit and agency benefit, and I would add a unique partnership with Reclamation who was able to do what Reclamation does incredibly well, which is manage the system and build stuff, when you build stuff.

There's also a very significant tangible benefit for CAP. The way in which we implement, the way we changed our view of intentionally created surplus, ICS, as a flexible tool to help us deal with temporary reductions or vulnerabilities in our supply and leading to invest in system conservation programs to benefit Lake Mead were the tools we used to work with our Arizona partners to implement the Drought Contingency Plan. If we hadn't started with Brock and 100,000 acre-feet of resource to build a mitigation plan, we would not have been able to grow that ICS into 400,000 acre-feet, which is part of our DCP implementation mitigation plan in Arizona. The willingness to invest in water conservation turned into a willingness to invest in mitigation of \$60 million to implement DCP in Arizona. So from my perspective, what we have learned from our partners in California and Nevada on using Lake Mead and the river system in creative ways allowed us to reach the latest success, which is putting the DCP in place in Arizona.

Bill: Yeah, and I would even go maybe a little further. Prior to 2005, 2006, I would say that Metropolitan had a somewhat adversary relationship with both CAP and Southern Nevada Water Authority. Pat Mulroy in 2003 called Metropolitan a rogue water agency and blamed California for the loss of their surplus supplies earlier than would have otherwise occurred because we didn't have

the QSA done in time. CAP was routinely criticizing our, some of our actions reviewing it. And while we got along at a personal level, professionally there was not a lot of trust and everyone was on their own. People we looked to Southern Nevada to solve its own problems, everyone looked to California to solve our own, and don't mess with us while your solving your own problems. When the decision to jointly fund Brock came about, all that changed. We all... it was a new reality going forward that let's, the whole is better than the sum of the parts, the whole is bigger than the sum of the parts. And we can do a lot more working together. Chuck made, rolled off the list, he also could have added funding, conservation, and Mexico, and 319 and 323 and other successful partnership story. But the partnership goes beyond just these projects. Metropolitan and CAP's board regularly get together. There's a CAP breakfast tomorrow that a whole bunch of our board members are going to. My general manager and Colby's general manager regularly talk and communicate about issues and strategies. None of that happened before Brock Reservoir. It was a different culture and a different world back there then, and today we all are realize we're in it together and realize that none of us are better unless all of us are better.

Colby: I think there are many legacies to the project and I agree with everything Bill and Chuck said. To put a finer point on it for Southern Nevada, there was a seven states agreement that predated the record of decision for the Interim Guidelines and part of that seven states agreement was Southern Nevada getting access to an interim supply of water in exchange for stopping the pursuit of developing the Virgin River water within the state of Nevada that we had permitted through the state of Nevada. That was a significant issue particularly for the state of Arizona. The development of tributary water. And so in a way, coming up with this temporary supply of water enabled us to fulfill the obligations of the seven states agreement and ultimately move forward in agreement on what became the shortage guidelines shortly thereafter. So I think that's one legacy. I think another one is you know the realization and collective thinking of the states around creating our own destiny and if we

were sitting around waiting for federal funding, I'm looking at Dave but I should be looking at Congress, to fund a project like this, we would still be waiting and I think that, being blunt, but I think that's true. That, you know, if this basin is going to meet the challenges of this century, we cannot sit and wait for federal funding to materialize to solve those problems and this was a really creative way to take funding from the water agencies, get it into the system. Reclamation still maintains control and operation of the system, which is very important in their role as water master and many other reasons, but finding ways to get the coalition of the willing to do the things that need to be done that are prudent for water management in the face of climate change in drought and this is just, I think, the first early example of us getting together to do that.

David: Wow. Going last again I think you all have captured it very well. Me, the only thing that I'll add which is may be somewhat redundant is this idea of coming up with a solution that has multiple beneficiaries; it benefits the system, there's efficiencies there that will, everybody appropriately said, will leave water at Lake Mead for benefit of the system, for everyone's benefit whether it's water supply, even hydropower production, keeping us out of shortage and then also having those individual benefits to the state to Arizona, California, and Nevada. And being creative, folks getting together and working collaboratively through a process to come up with a solution that benefits the individuals and benefits the whole. And one last thing to add since there wasn't a question on it is just a, I briefly mentioned it, but Reclamation is finalizing a report that summarizes the water savings of Brock Reservoir, the costs and has a good recap of the first ten years of the operation of the reservoir so that's available, we'll be available by the time this is done and it's a good resource as well.

Q: I want to congratulate you all on a very successful project and thank you for coming out and sharing your story.