

# **ORAL HISTORY INTERVIEW**

**Clifford Barrett**

Salt Lake City, UT

15 May 2017

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Interview conducted by:

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Glen Canyon Dam Adaptive Management Program Administrative History Project

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Subject Clifford "Cliff" Barrett  
Date 5/15/17  
Location Salt Lake City, Utah  
Interviewer Paul Hirt and Joshua MacFadyen  
Annotator Jennifer Sweeney  
Project Glen Canyon Dam Adaptive Management Program (GCDAMP) Administrative History  
Notes Cliff Barrett was Acting Commissioner of the U.S. Bureau of Reclamation (USBR) in 1981 and again in 1985. He began his career at Reclamation in 1956 in the Office of Design and Construction in Denver. Barrett holds a BS in Civil Engineering from University of Denver. He has been involved with the GCDAMP since its inception.

Minutes Summaries of interview content during each minute of the interview

- 0 Introductions. Barrett held "a whole string of positions from my old career" in the Bureau of Reclamation (USBR), but decides to concentrate on those that are related to the adaptive management program. Begins explaining positions. Describes "pushback" from boaters who did not like dam operations, specifically fluctuating flows on river.
- 1 Discussion of Glen Canyon Environmental Studies (GCES). This was not an Environmental Impact Statement (EIS). These events happened while Barrett was Regional Director in USBR [Salt Lake City]. Dave Wegner in charge of environmental studies. Barrett retired from USBR in 1989. Began work with Colorado River Energy Distributors Association (CREDA).
- 2 "We [CREDA] cooperated with George Miller on writing the legislation for the Grand Canyon Protection Act" (GCPA, 1992). GCDAMP began as a result. Other results of the Act discussed. Barrett retired from CREDA in 1993.
- 3 Began work as a consultant, representing CREDA on Adaptive Management Work Group (AMWG) and Technical Work Group (TWG). Barrett currently must attend AMWG and TWG meetings by phone or Internet.
- 4 AMWG deals with policy and TWG with science; both involve stakeholders/public relations, so Barrett works on all three aspects of GCDAMP mandate (science, policy, and stakeholder engagement). Examples of stakeholders discussed.
- 5 Initial contention among stakeholders. Much tension has been resolved.
- 6 Work on Desired Future Conditions caused conflict. Hydropower stakeholders told by AMWG that they were not part of the desired future conditions process. "Flat out. Denied." Barrett worked on changing this. He feels hydropower interests were seen by other stakeholders as the cause of problems.
- 7 "Listening to each other" the key to resolving conflict, at which Barrett thinks AMWG has been successful. "It was a matter of overcoming strong feelings of bias."
- 8 Development of scientific information is the first of three changes in GCDAMP described by Barrett. Science has proven some stakeholder assumptions incorrect.
- 9 (Continuation of above.)

- 10 Second change: Grand Canyon Monitoring and Research Center (GCMRC) was originally a USBR organization [it is now part of U.S. Geological Survey (USGS)]. Some in AMWG thought this was a conflict of interest. Changed GCMRC mission.
- 11 Third change: much more input and "interest" from Indian tribes. Western science vs. Traditional Ecological Knowledge (TEK).
- 12 Hard for scientists and engineers to deal with tribal stakeholder priorities. Their political power has increased. "What we've tried to do is to confine the whole program to what we think the legislation said: you study the effects of dam operations."
- 13 The tribes push for "rim-to-rim" point of view; "we have a lot of trouble with that." Funding is limited by legislation.
- 14 Selection of GCMRC director shifts direction of program. They are typically scientists with a particular area of specialization
- 15 (Continuation of above.)
- 16 Discussion of HFEs (High Flow Experiments). HFEs intended to build up sandbars and provide backwater habitat for humpback chub. Barrett states they were also intended to build beaches for campers and boaters; implies this was their actual primary purpose.
- 17 GCDAMP management was intended to benefit endangered species, but actually benefits recreational interests most directly. "A lot of what we do is hiding under the skirt of the Endangered Species Act."
- 18 "Fishermen and boaters" becoming more vocal. This is good--the only way to resolve conflict is to make concerns public.
- 19 Discussion of 1983-84 high water years, damage to Glen Canyon Dam.
- 20 Original EIS had the most significant impact on dam operations. Reduced fluctuations in water flow through dam. This leaves "a third of the dam's generating capacity unused."
- 21 Discussion of hydropower generation
- 22 Range of only 8,000 cfs (cubic feet per second) between low and high flows in a 24-hour period. Influenced by recreational interests and mandated by 1990s EIS.
- 23 Barrett estimates that dam is capable of 35,000 cfs flow.
- 24 The power not being generated by Glen Canyon Dam must be replaced by other means. Barrett contends that hydropower is a renewable and clean energy resource compared to coal and oil. Points to studies in Long Term Experimental and Management Plan (LTEMP) EIS.
- 25 Navajo Generating Station as related to Glen Canyon Dam, Salt River Project (SRP) and Central Arizona Project (CAP).
- 26 Hydropower should be protected as a renewable resource.
- 27 Questions posed on GCDAMP legislation aside from EIS, Barrett cannot think of any he considers key.

- 28 Brief discussion on desired future conditions report.
- 29 Economic studies. Hydropower undervalued in LTEMP.
- 30 Endangered Species Act mandated Biological Assessment/Opinion puts "a little different spin on things" as opposed to the original EIS.
- 31 CREDA's involvement in Grand Canyon Protection Act.
- 32 Specifically, the ideas of funding GCDAMP with power revenues and involving stakeholders came from CREDA.
- 33 CREDA, USBR, Parks [National Park Service (NPS)] all involved in drafting GCPA. When asked, Barrett thinks that he accomplished pretty much what he wished to do.
- 34 Most valuable aspect of AMWG: it produced cooperation and understanding among people with very different views. He expands on the scope of this accomplishment.
- 35 Built "bridges" between Upper and Lower river basin areas (which contend over water), between USBR and NPS, among stakeholders.
- 36 Hopes "the Trump thing" involving the Federal Advisory Committee Act (FACA) will not kill AMWG. [In 2017 the Trump administration suspended Federal Advisory Committee activities to conduct an internal review]. Barrett does not really think it will stop program, but could impact operations. Discussion of possible consequences.
- 37 (Continuation of above.)
- 38 Value of AMWG. Not "a waste of money."
- 39 Barrett says he tries to be optimistic about the future of Colorado River management.
- 40 Continued drought could negatively impact river management. Allocation of water is an issue that could cause problems.
- 41 Upper Basin states are entitled to revenues under the Colorado River Basin Project Act (1968), but if power generation is not occurring [due to drought/climate change] there will be problems.
- 42 States do a good job negotiating in regard to compacts. Advice to people just joining AMWG or TWG: "be patient and listen to each other."
- 43 "Accommodating Indian tribes and their whole different approach to this whole thing" a future challenge that requires sitting down and listening, being "not so quick to judge." Case in point is the brown trout.
- 44 Brown trout, a non-native species, prey on endangered humpback chub. Western science solution is to eliminate trout. Tribes consider Grand Canyon holy and an inappropriate venue for actions involving the killing of living things.
- 45 A compromise has to be reached; the problem can't be ignored. Problems with archaeological sites. Barrett questions whether monitoring such sites should be considered an aspect of dam operations.
- 46 (Continuation of above.)
- 47 People need water, electricity for farms and factories, and can only think of other problems once these basic needs have been met.

- 48 Barrett did not anticipate how seriously activists would pursue problems such as endangered species. When people start engaging with issues beyond basic necessities, they stop worrying about things like water supply and electricity, which underlie their ability to think about other problems.
- 49 (Continuation of above.)
- 50 Downside of collaborative decision making: "decisions that used to be made at the Bureau level, at the Park Service level, are now raised up to being made at the Assistant Secretary's [of the Interior] level, the Secretary's designee level . . . AMWG submits its suggestions to the Secretary of the Interior, not to the Commissioner of Reclamation or the Director of the Park Service." A centralization of power, "it slows things down quite a bit, I think." Politicizes decision making.
- 51 Example of stalled decision: DFC process. The recommendations made by AMWG were "challenged from the top down."
- 52 Short discussion of GCDAMP, USBR, NPS budget processes.
- 53 Budget Ad Hoc group (BAHG). Decides how budget is used, especially in case of overruns. Budgeting too far into the future can impede the adaptive aspect of adaptive management.
- 54 Budgeting decisions are important: determine what research gets done. Scientists sometimes want to pursue research that has validity, but is not tied to dam management. TWG recommends budget to AMWG, which in turn recommends budget to Secretary.
- 55 Layers of oversight.
- 56 Change in Presidential administration affects GCDAMP, but Barrett does not elaborate on this.
- 57 Some administrations are more "environmentally sympathetic" than others, at the expense of hydropower interests, Barrett thinks.
- 58 (Continuation of above.)
- 59 Adaptive management is about keeping what works best. The "tricky part is setting the right goals."
- 60 Discussion of GCES as impetus for public/stakeholder involvement in Colorado River system management and dam operations.
- 61 GCES resulted from concern about environmental impact of changing dam operations (rewinding generators).
- 62 (Continuation of above.)
- 63 (Continuation of above.)
- 64 At TWG, Barrett represents not CREDA but Utah Associated Municipal Power Systems (UAMPS). Names a few other representatives and stakeholders: Bill Davis, Leslie James, Ted Rampton.

- 65 Barrett just turned 84. Stays involved in GCDAMP because he "needs something to do," and it is still exciting and fun. "My neighbor cuts his lawn three times a week, I just go to meetings. It's different, I like it better."
- 66 Recommends that Leslie James of Phoenix be interviewed. Was involved in SRP for many years.
- 67 Recommends interviewing Randy Seaholm of Colorado. [TWG rep, Colorado Water Conservation Board]
- 68 Damage to Glen Canyon Dam in 1982-83 [1983-84] "was the scariest time in my life." Describes spillway concrete cavitation problems; refers to a "design flaw" in the spillways.
- 69 Flood lasted weeks, used plywood to increase reservoir capacity so spillways could be closed for inspection after damage. Barrett inspected the damage in a cart strung on a cable.
- 70 Barrett's first job with USBR was on the arch design of the Glen Canyon Dam. Was initially hired to work on earth dams, changed at last minute to concrete dams.
- 71 Backs off from earlier "design flaw" statement--designers did the best they could with current knowledge.
- 72 Remembers the Teton Dam failure, was in Washington at the time. A "real shocker" for the Bureau.
- 73 Barrett asks that the recorder be turned off.



## Oral History of Cliff Barrett [CB]

Salt Lake City, Utah

Interviewers: Paul Hirt [PH], Josh Macfadyen [JM], Jen Sweeney [JS]

[00:00:00]

PH: My name is Paul Hirt of Arizona State University, and we are interviewing Cliff Barrett in Salt Lake City. Today is May 15, 2017 and I'm being assisted by Jen Sweeney and Josh Macfadyen, both of Arizona State University. Cliff, thanks so much for joining us today to talk about your experiences. Could you start out by telling us your positions that you've held with the adaptive management program and the Bureau of Reclamation and the years that you've been involved?

[00:00:31]

CB: With the Bureau of Reclamation I held a whole string of positions from my old career. But the ones that are going to apply to this program probably were I was assistant commissioner for planning and operations in Washington D.C. while the Bureau was studying putting generating units on the outlet tubes. And that study produced some pushback from a lot of environmental groups. The boaters mainly because they didn't like the fluctuations in flows on the river. And so, we decided to stop that study and begin what we called the Glen Canyon Environmental Studies. Was it Glen Canyon Dam Environmental studies? I forget the exact name of it, but it was "studies." It was not an EIS it was an environmental studies thing. And just as that was getting started I transferred from Washington to become regional director here in Salt Lake City. So that study was going on while I was Regional Director, and Dave Wegner was in charge of those studies. We'd hired him specifically to do those studies. And then in 1989, the studies were still underway, getting toward pretty much being completed, I retired from the Bureau and went to work as executive director of the Colorado River Energy Distributor's Association [CREDA]. And the next few years after that it was when legislation was being written, we cooperated with George Miller in writing the legislation the Grand Canyon Protection Act. And the end result of that act then is when the GCDAMP was put together. And that's how the Adaptive Management Program began was a result of that act. And that act required the EIS to be done so that took another several years to get the EIS done. And as part of doing EIS, CREDA was kind of like a cooperating agency in that whole thing. We attended all the meetings and helped with the drafting of the EIS and all that work. Then in 1993 before that was finished, you know the ROD [Record of Decision] wasn't done on it, the environmental impact study and the record of decision weren't done I think until 1995, '96 somewhere along in there. But in '93 I retired from working for CREDA and since then I've worked as a consultant representing CREDA initially on the AMWG [Adaptive Management Work Group] for a short time and then also on the Technical Work Group [TWG].

[00:03:14]

PH: So, you've been involved both in AMWG and TWG since 1996. Right up to that?

CB: Since the beginning, yeah. (Laughs) Yeah. There was two years I dropped out. I took a two-year break. Did something else for two years and came back.

[00:03:29]

PH: Do you still attend any of the AMWG and TWG meetings?

CB: Yeah, I do all the TWG meetings. The thing is for some health reasons in my family, I cannot leave home very often, so I do most the TWG meetings by phone. For about the last year I've done all the TWG meetings in the...the things I've been doing for the program I've been doing by phone and internet and webinar and stuff like that, yeah.

[00:03:54]

PH: So, the Adaptive Management Program kind of has three parts to it. There's the scientific research part, there's the policy and management part, and there's the sort of public engagement, the social and institutional components of it. Which of those three would you say you were most involved in?

CB: Well, the AMWG deals mainly with policy issues and things like that. The Technical Work Group does mostly the science kind of things. And I've been pretty deeply involved in both of those. When you talk about public outreach, you mean uh...

PH: Well the stakeholder engagement, the development of the set of relationships between the stakeholders, the evolution of...

CB: That kind of happened both within TWG and AMWG, I think. We all tried to work with each other a lot. You know, you go to a TWG meeting and you sit around a table and there's Indian tribes there and there's federal agencies there and there's CREDA there, there's four states, and then there's the fishermen group and the Park Service, no not the Park Service but the park recreation people, and there's a whole group and that whole effort, I think, is aimed at trying to bring people together and work together on all these issues, yeah.

[00:05:15]

PH: Can you talk a little bit about how those relationships have developed or evolved over time in the years you've been involved?

CB: Well yeah, I think so. I think originally there was a lot more contention than you might think. There was trying to figure out where everyone was coming from, and what were their bottom line, and why were they there to begin with, you know. And over the years we've worked our way through a lot of that, I think. And then with this last (inaudible) the LTEMP EIS, there was a little bit more conflict there. I think basically because one of the things they had to do was decide what was the goals of the new long-term management program. Well everybody had a

different set of goals in mind. And just an illustration, I think—in the early development of the Adaptive Management Program one of the early steps was to develop what we call the desired future conditions for each resource. And we had quite a bit of conflict over some of that. Then we finally got it all ironed out. And I think some of the conflict was, when we first started out on that we tried to form a committee to determine what the future goals for hydropower would be, and we were told there was no future goal for hydropower. Flat out. Denied. So, we fought that a little bit and then we finally got hydropower put in the desired future conditions and then as we went into the LTEMP process they were trying again to ignore that a little bit. From the hydropower viewpoint, there's been a lot of push and shove, but also a lot of compromise, you know. And in the end we got where we thought we ought to be.

[00:07:01]

PH: What do you think is the reason for the success in overcoming initial conflict and getting to a more cooperative result in the end?

CB: Listening to each other. Listening to each other and talking and review the law, review the legislation. The legislation even says hydropower is a resource, you know. So, we had a lot of things like that we had to deal with. I think mostly it was a matter of overcoming strong feelings of bias and I think the feeling about hydropower was [it was] hurting everything and therefore it shouldn't be a goal at all, you know. And we kind of proved that wasn't true.

[00:07:41]

PH: Um, that seems to be the purpose of these, uh, collaborative efforts to get different stakeholders with different interests and values together to talk to each other and hammer out compromises so do you feel that that effort worked out? It was successful? It's worth the effort?

CB: It's working, yeah, it's working. Sure, yeah, I think if we hadn't had that the whole program would have been in shambles.

[00:08:11]

PH: Without that?

CB: Yeah. We would have spent millions and millions of dollars on lawsuits, I think. Instead we'd sit down, talked it out, worked it out.

[00:08:17]

PH: That's very helpful news. So, what do you think have been the significant changes that have occurred in the program over the years? It's gone through some evolutionary stages; how do you see that evolution?

CB: Well, I think...(pause) two or three things. I think, the scientific knowledge which is being developed has demonstrated that some things aren't as cast in concrete as some other people thought they were, you know.

[00:08:55]

PH: For example?

CB: Oh, I think for example, the hydropower fluctuating flows were completely destructive of beaches, and... in addition I think almost everything was the fault of hydropower fluctuating flows, and we found out well that's not necessarily true. We're still learning more and more about that as we go along. We're finding more and more. So as the science is progressing, we're getting answers that says well maybe things aren't as black and white as we all thought they were. That's one reason that path has changed, I think, is the results of the science showing that that's not necessarily the way it is.

[00:09:40]

PH: Any other...you said there were three significant changes that you can think of. One is the development of scientific information.

CB: Yeah, that's one. And another big change that took place pretty early on in the program was originally the Grand Canyon Monitoring and Research Center [GCMRC] was a Bureau of Reclamation organization.

[00:10:00]

PH: Oh, it was?

CB: Yes.

PH: I didn't know that.

CB: Well not many people do. But it's true, it was a Bureau of Reclamation organization and some of the group thought that that put a huge bias on it and so they pushed hard to have it taken away from the Bureau and have it given to the Park Service or somebody.

PH: USGS.

CB: And it ended up being USGS, yes. And that was a pretty big change because it changed the makeup of the GCMRC and their mission quite a bit, I think.

[00:10:31]

PH: Do you remember when that was that they made that change?

CB: Oh no, I'm trying to remember. It was pretty early on in the game. The first couple of directors of the GCMRC were Bureau of Reclamation employees. Not old time BUREC, but they were hired by the Bureau of Reclamation to do that job. And then it turned out they formed the GCMRC as a part of the geologic survey and made it a branch of the, what's it called? The Southwest...they're headquarters go southwest geologic something or other. Anyway, so they don't work for Bureau of Reclamation anymore and I think that made quite a difference.

[00:11:08]

PH: Well what difference did it make? In the attitudes that people had about science?

CB: In the attitudes of people, yeah. It was quite different I think. And then the other things that I think happened was, uh, we're seeing now a lot of, uh I'm going to have to be careful of the words I use (laughs)...We're seeing a lot more input from Indian tribes than we had in the beginning. They're much more interested in it than they were before. And there's a big push for what they call don't use western science, use what they call traditional ecological knowledge, I think which is their view of what happens in the Grand Canyon. And there's quite a bit of...I've seen in the last two years a big push from them and a lot of support from the department on that. So, I think that we're seeing some changes there that we, we'll see more of later on I think.

[00:12:17]

PH: What do you think is resulting or might result from that particular shift?

CB: I'm not quite sure what it's gonna do. It's pretty hard for the scientists to deal with. And people like me who are long time engineers (laughs), it's a little bit hard for us to deal with. But on the other hand, those people have gained a lot of political strength they've not had in the past. You can see that in a number of ways.

[00:12:40]

PH: Do you think that will have any influence on the operation, annual operation of the river, or the dam, or the (inaudible)?

CB: I don't know if it will or not. I don't know. See what we've tried to do is confine the whole program to what we think is what the legislation said. You study the effects of dam operations and in a rather direct way, you know. And some of the tribes are pushing well they want to go rim to rim on vegetation and stuff like that, and we have a little trouble with that, frankly. We have a lot of trouble with that (laughs). Because you know the funding of the program is limited. The legislation sets a ceiling on how much money, it's all being paid for out of power revenues by the way, but it's sets a ceiling on that. And if we're trying to get studies done on what is the actual effect of dam operations on the river and the resources which are directly impacted by the river, we have a little trouble saying we're going to go rim to rim on vegetation and things like that. So, there's some struggle going on there.

[00:13:49]

PH: Can you think of any specific events that occurred over the years that caused a significant shift in emphasis or policy or relationships or the scientific research being done?

CB: Well I think one might be the selection of directors for GCMRC. You know, uh, Jack Schmidt who's the one they had before the one they have now, came in and he was deeply involved in sediment and sediment transport and that was his strong suit. And I saw, I thought a little shift

in the whole program towards that issue and away from some of the other things. And as he's now left I think I'm seeing a shift back (laughs). Not that I got any... Jack Schmidt's a great guy, but it was his focus. His focus was on...I can remember him going to AMWG meetings and him putting up his chart of the chute of sand going down the river, you know (laughs). And uh, he was just very big into that.

[0015:02]

PH: So, looking back at the various directors of GCMRC what kinds of emphasis do you see that evolve with the changes of directors. We have the sediment emphasis.

CB: Yeah.

[00:15:17]

PH: Have there been any others? I assume humpback chub.

CB: Well humpback chub is an emphasis because of the Endangered Species Act, not because of who's director of GCMRC.

PH: OK.

CB: So, um, there's always been, there's always been a lot of emphasis on the humpback chub. So, I don't think that's much of a change.

PH: OK.

[00:15:46]

PH: Alright. We saw online, as an aside, we saw a website online that had before and after pictures of sandbars along the Colorado River below Glen Canyon after these high flow events.

CB: Yeah, yeah, after HFEs, yeah.

PH: Yeah, those are really interesting photographs.

CB: Yeah, they are. Yeah, and the HFE experiments are really interesting. That's been a big push.

[00:16:12]

PH: Is that recent?

CB: No, no, I think when we did the first one was back in...I'm trying to think when we did the first HFE: It was quite a little while back. But it was a huge press event. You know, the news and dignitaries here watching. And I think that may have been part of the charm of it. I think it gave...(laughs) I'm being cynical now. But that was so much fun they did it again and again! (Laughs). But one of the things about the HFEs was that they hoped they would build beaches for campers.

PH: Uh-huh.

CB: For boaters to camp on. They said well we're building backwaters for humpback chub can use these backwaters as breeding grounds. It turns out humpback chub don't use backwaters, but they still kept going because they need the beaches anyway, you know. So, you see a lot of that. But then when you really study those photographs, what you'll find out is that when they do a HFE about I would guess a little bit less than half the beaches grow. Some get smaller because of the flows, and none of it really lasts terribly long. That's why you have the annual HFE push these days to keep the beaches going. I think one of the things we're seeing in the whole program is, you know, the law required you take care of the humpback chub and those kinds of things. But, well, a lot of the programs aimed toward benefiting recreation and boating, which is a really good thing to do, but, (pause) I'm getting pretty cynical here, a lot of what we do is hiding under the skirt of the Endangered Species Act when it's really doing it for fisherman and boaters. And they're becoming more vocal these days too. Which is good. Let's get out what we're already talking about here, and make it public what we're really talking about here. So, I think that's uh...And they've got some really great people working for them. John Jordan and John Hamill, and that crowd. They're smart. John Hamill was at one time GCMRC director.

PH: Oh really?

CB: Yes. And now he's a loud spokesman for the recreational fishing people. And he really knows what he's talking about. And that's good. I have a lot of respect for John. And we're getting back to where we're really talking about what's really going on instead of... (trails off).

[00:18:47]

PH: You in your oral history interview that the Bureau of Reclamation did with you, Brit Story did in 1996, there's a significant section in there about the 1982-83 floods during that El Niño period.

CB: Oh yeah.

PH: Do you think that that flood had any impact on dam operations, on the developing GCES, the environmental studies program? Was that an event that caused some shifts?

CB: I don't really think so, not that much. Because it was, and that was not the fault of the people operating the dam. That was caused by just huge amounts of water had to be passed through the dam and a design fault in the spillway, which caused a huge problem, which had to be corrected, and it was kind of a heroic effort putting that together and getting the job done and saving the dam. But I think the impacts down the river were uh...

[00:19:53]

PH: Was that equivalent to a high flow event?

CB: A huge high flow event! Much more than a high flow event (both laugh). Much more than a high flow event, yeah. Much more than a high flow event. The big change in dam operations, I think, came as a result of the original EIS. When we did the record of decision and set ceilings on how

much you could release from the dam, you actually lost about a third of your generating capacity in the dam. Because you just can't...the generators there and you wouldn't even let as much water go through as the generators would hold because you had the ceilings on it. And so...

[00:20:29]

PH: Why was that? What was the rationale for...

CB: They wanted to cut down the fluctuations.

PH: Ah.

CB: So, they set a ceiling on high you could go and a ceiling on how low you could go and that reduces the amount of fluctuation. The same thing in the ROD for the LTEMP study, it has the same thing. It's a different set of numbers. It's actually a little bit better for us than they were before, but they're...they didn't raise the ceiling. So, we're still sitting here with a third of the generating capacity unused.

[00:21:04]

PH: So, um, the high fluctuations and releases from the dam prior to the EIS were designed to maximize benefits for the hydropower system trying to meet load.

CB: To maximize the value of the power. Yeah, yeah. Load following. You generate electricity when you need it. Not when you don't need it (laughs). And when you need it you need really all you can to meet that need.

[00:21:28]

PH: And so, the EIS then led to a situation in which, um, the dam operators had stopped...

CB: Parameters, yeah.

PH: Load following and...

CB: They still do load following but not as much as they did before.

PH: Not as much.

CB: Yeah. They still try to maximize their power. And I think when the Record of Decision for this (inaudible 21:50) is fully implemented we'll do better load following than we did before.

PH: Uh huh.

CB: But the top and the bottom are still set. And some of that is not...I'll give you an example, the maximum daily changes, like, I'm trying to think of this now, be sure I get this right, 8,000 cubic feet per second between these ranges.



[00:22:18]

PH: Over a 24 hour period?

CB: Yeah, about 8,000 second feet daily change comes out of an environmental study which was done clear back in the '90s for the original EIS based on the survey of, basically, recreationists don't want any more than 8,000 second foot change. Because it makes the water level go up and down while they're going down the river. You know, I took a trip down the river with a bunch of them one time and they made their point. That was before we did the EIS. But they put their beaches on the boat at night [put their boats on the beaches at night]...

PH: And they'd be high and dry in the morning.

CB: And in the morning, they're high and dry. (Laughs) Yeah that's the issue. But a lot is driven by recreational interests.

[00:23:02]

Josh Macfadyen: Just for clarification, could you tell us how much capacity the dam can do? Is it 16,000 or 20,000? I don't know per second. And what a maximum power, like a big power day, what would you need?

CB: Well I don't have those figures in my head. Right off the top.

JM: Well I have no idea how it works, so...

CB: Yeah, I'm trying to think. It has to do with cubic feet per second and I'm thinking we could originally have gone up to about 35,000 CFS and we're down now to around 20, something like that. Yeah.

[00:23:37]

PH: So, since you worked for CREDA you're familiar with the larger hydropower system.

CB: Yeah.

PH: Can you tell us a little bit about how the larger power planners adapted to having Glen Canyon Dam's operations constrained in terms of their fluctuation to meet demand? How do they make up for that?

CB: The only thing you can do is buy more generation. So you build coal-fired plant or oil-fired plant. Then you build transmission lines to replace it. I don't have the numbers in my head, but there's some really good economic studies done on the LTEMP EIS about what it costs to replace that power. Because you have to go out and float bonds and build another plant. And another thing that, I think, is changing as we get down the line a little bit is the impact that all that has on what we're calling now global warming and air quality control. Because, you know, hydropower is a renewable resource which does not produce any air pollution and is being replaced by coal or oil, which does. And, uh, there's some pretty good studies in the LTEMP EIS on that issue. In

fact, they show some pretty dramatic numbers, I think, what, the tons of, uh, what are they, bicarbonates, whatever it is that you're not supposed to put in the air.

PH: CO2.

CB: CO2, yeah. The result from decreasing generation and replacing it with which is the most practical source of replacement. You can't replace hydro with wind, because you have to have something that goes all the time. You have to have a coal fire plant or oil plant to replace that.

PH: Baseload.

CB: Baseload, yeah. So that's part of the issue, I think.

[00:25:29]

PH: The Navajo, the coal-fired Navajo Generating Station was built in the 1970s.

CB: Yes.

PH: And it was built to integrate with the existing hydropower system.

CB: Yeah.

PH: Do you know much about how those were integrated together?

CB: Well I think the Navajo Generating Station basically was built to provide pumping power for Salt River Project in Arizona.

PH: And the Central Arizona Project.

CB: And the Central Arizona Project, yeah. Because they use those huge pumping plants down the lower river where they pump the water out and all that. And that's what that was basically built for, yeah. What to do that with.

PH: Now that's just a minority of the power.

CB: Yeah.

PH: Although, Navajo Generating Station is slated to close down now.

CB: It is. It's gonna shut down in a year. (Laughs) Yeah, it's gonna shut down in a year and I don't know what they'll do to replace it. But I think, you know, with the emphasis that is coming these days with global warming and climate control things like that we'll find more and more thought being given to regarding hydropower as a renewable resource that ought to be protected, instead of...

[00:26:40]

PH: You think decisions related to management of the river are going to begin to reprioritize clean energy, hydropower generation as clean energy for...

CB: Well, one has that hope. I don't know if it will work or not. But I think, you know, this administration [Trump] I think is probably more open to that, than the last group was. We're all kind of waiting to see who fills all the slots in the Department of Interior to see about that.  
(Laughs)

PH: It's taking some time.

CB: It's taking some time, yeah.

[00:27:10]

PH: Another question for you, can you mention or alert us to any key reports or documents that you think were particularly important to the development of the adaptive management plan? You've mentioned the EIS. Is there anything else that we should be aware of that you think was significant in the development of the program?

CB: I can't bring up any in my mind right away, no.

[00:27:34]

PH: Alright. And how about key individuals? You mentioned the gentleman who was head of GCMRC as being significant in shaping the direction of some of the research.

CB: Yeah.

PH: Any other key individuals that really made a difference in the program?

JM: That was David Wegner, right?

PH: No, the GCMRC director was...

CB: Jack Schmidt.

PH: Jack Schmidt.

CB: Jack Schmidt, yeah.

[00:28:03]

PH: Dave Wegner was...

CB: He was head of the Grand [Glen] Canyon Environmental Studies.

PH: The GCES program.

CB: The Bureau did those, yeah. Yeah, he was with the Bureau then and he left and went to work with some congressional staffers I think. And I don't know where he is now. He's in Tucson I think.

PH: Yeah, he's in Tucson. We're gonna interview him sometime this year.

CB: Any other big reports that you want to look at, I can't really come up with off the top of my head. There's some interesting work that the AMWG did, which kind of puts the program...and I don't think they really wrote reports on it, but there was that whole study on desired future conditions. That might be worth looking at.

[00:28:50]

PH: When was that?

CB: I'm thinking that was in the early stages of the Adaptive Management Program. It was after I left, and went to work as a consultant instead of directing. It was done after that. So, I would say '98, '99. Somewhere along in there, I don't know. But they did do a paper on that and there's a desired future conditions report which is fed into the study.

[00:29:20]

PH: Was there only one of those?

CB: I think there was only one. There was a lot of drafts of it but the final one, which was adopted, yeah...

PH: I think it would be interesting...

CB: I think it was adopted by the AMWG by a vote. It was a desired future conditions thing.

[00:29:35]

PH: Great.

CB: I can't think of any other right off the top of my head. There's some interesting economic studies done.

PH: Yeah?

CB: You know, we thought that in the LTEMP process that power was being pretty much undervalued in the economic studies and so Western Area Power Administration found out that the University of Oklahoma and some other people were doing a study on environmental and economic impacts of hydropower. And that study is certainly worth looking at, I think. It paints quite a different picture than what the LTEMP did. And then there's, uh, I'm trying to think if there's anything else on the...well not right off the top off my head I can't think of any. Some other documents that might be useful to look at would be when they did the Record of Decision they had to do a Biological Assessment and a Biological Opinion on the...

[00:30:56]

PH: Endangered species?

CB: On the endangered species. Those are kind of worth looking at too because they put a little different spin on things. Yeah.

[00:31:06]

PH: Looking back at all the years that you've been involved, you said that you were kind of a representative of CREDA and they hydropower interests. What do you think you were able to accomplish in those years (CB laughs) as a representative of that interest group?

CB: Well I think CREDA, uh, and I'm not trying to pat myself on the back here, I think CREDA had a lot of input into George Miller's work on the Grand Canyon Protection Act. We had quite a bit of input into that then which was from our viewpoint was pretty successful. And then George Miller, he, after it was all over he and I shook hands and said, "We did a good job here," you know.

[00:31:52]

PH: What kind of influence or impact on the legislation itself did you work on?

CB: We talked about funding of the program. That's how it came to be funded out of power revenues. We talked about the need for, you know, the adaptive management involving stakeholders in the whole program. That was part of the effort we had there. So, I think it was an official relationship there, yeah.

[00:32:22]

PH: Do you think we should try to interview George Miller at some point? Do you think he would have valuable perspective on this?

CB: Well I think he certainly has a very powerful perspective on it, yeah. (Laughs) It was his push for the legislation, yeah. He might give you some different viewpoints than I'm giving you on it, but yeah.

[00:32:49]

PH: And he was the key sponsor and so the negotiation over what would go into the bill was between him and his staff and what, everybody in AMWG or key people?

CB: Well it wasn't an AMWG thing because the adaptive management program didn't exist until after the legislation. That was part of the good thing in the legislation. We got put into it the Adaptive Management Program so it didn't get locked down tight forever in one piece of legislation. You know, so, that was a good piece of work. I think basically involved in drafting legislation was the Bureau, represented a lot by David Wegner, and us, and then the Western Area Power Administration was involved in it, so yeah. I think the Park Service was deeply involved also.

[00:33:42]

PH: Was there anything that you hoped to accomplish that you weren't able to? And why?

CB: (Laughs) Well now...(laughs). Some unrealistic hopes, yeah (laughs). No, I think it came out as about as good as I thought we could get it, yeah.

[00:34:10]

PH: You touched on this a little bit earlier, but I want to ask you again, what do you think has been the value of the program over time?

CB: The value of the AMWG program?

PH: Yeah.

CB: I think it has produced a lot of understanding and cooperation between people who have completely different views, what ought to be happening below the dam. Why the dam is the way it is. You involve four states, actually all seven states are involved in the AMWG program. Because the way the Colorado River is operated, it's basically driven by the Colorado River Compact, which is the compact between the basin states. That decides how much water you can run down in a year. The Colorado River Compact and the later interim operating agreements all those things, they have a big impact on what happens here. And I think the AMWG helped bring all those kind of people together a little bit more. It built a little bridge between the upper basin and the lower basin on some of these issues. I think it also built some bridges between Reclamation and the Park Service, who at one time I think were not very much speaking to each other. Well they did, but they weren't listening to each other (laughs) a better way of putting it (laughs). And then bringing in the fishermen groups and the boating groups, because they all have a deep interest, which a lot of people don't understand, and then that gives them a forum to lay out their issues and their problems. And then you have the Indian tribes who I think are listened to so much more now than they were before. And so, I think the program has produced a lot of good in bringing people together. And I think it's working. It's working. I would really hate to see the FACA thing kill the AMWG program. I don't think it will, because I think cooler heads will prevail, you know.

[00:36:21]

PH: FACA being the Federal Advisory Committee Act?

CB: The Trump thing you know about where we're gonna stop all the FACA activities until September, which is really a problem, because we were right in the middle of putting together a budget for GCMRC and the Bureau for the next three years. And we would at least like to get the next year done. But their fiscal year starts in October. Doesn't it? October 1 begins the fiscal year? And if they don't come up with something they're in deep trouble.

[00:36:50]

PH: So, this order from the Trump administration to suspend the activities of AMWG for a while, that is going to stop the budgeting process?

CB: I don't think so. Because they'll have to go ahead without us. They'll have to go ahead without us. But I think based on some conversations we've had, I think they're still going to talk to us about it. We won't have a formal meeting or formal webinars, but I think they almost have to talk to us. Because I'll tell you what GCMRC and the Bureau came in with their first draft budgets, they were 30% over ceiling for the first year. For the first year, '18, they're 30% over ceiling. So they gotta reduce their budgets by 30%. And how they pick which ones they'll keep which ones they'll let go, if they don't ask the stakeholders they're gonna be in real trouble, I think. And I think they will. I think they will ask us about that. In fact, we've seen some indications that they'll be willing to talk to us about it because they have to move forward, they can't just stop the program.

PH: Right.

CB: As much as some parties might want to (laughs).

PH: Some might want that (laughs).

CB: Some budget conservatives might actually want this. I think a lot of the FACA stuff they were thinking this is wasted money, you know. But in this instance, this is not wasted money. In fact, most of the AMWG people fund their own participation. We don't get paid to do that by the federal government. We get paid by the power users for me to go to it, and the boaters pay for their guy to go to it, and the fish guys pay for their guy to go to it. It's not costing the government a whole lot of money except some federal employees who are involved in it. But their total budget is pretty high, but I think people don't realize that's the Adaptive Management Program, not the Federal Advisory Committee program.

PH: Right, that's all the research and monitoring taking place.

CB: Yeah, which has to take place. You have to have research and monitoring.

PH: You can't learn.

CB: No, you can't.

PH: Otherwise...yeah.

CB: Yeah.

[00:38:49]

PH: If there are any, you have a fairly positive view of the program and its accomplishments. Are there any key limitations that you'd like to see overcome? Is there anything, any changes you'd like to see in the program in the future that would make it work even better?

CB: No. (Long pause...) Not right off the top of my head. It's working. Given what they have to work with and what the challenges are I think it's working pretty well.

[00:39:36]

PH: So, you're hopeful about the future of the program?

CB: Oh yeah. Yeah.

PH: And about the future of Bureau of Reclamation, the future of management of Colorado River? Step back a little bit. Are you optimistic or pessimistic about the larger picture about Colorado river management in the seven basin states?

CB: I try to be optimistic, but I think there is as we come down, and this is not a Glen Canyon Dam issue, this is more a Colorado River Operations issues, as you come down if the drought continues and it turns out to be a long term, permanent shift in how much water we're gonna have, I think there's gonna be some real issues on the Colorado River. And I think the states are going to have to work that out. States and Mexico are involved in all that and that could be a real challenge. That could be a real challenge. Because there's the upper basin is not using all their water, but they save it in Glen Canyon Dam in case they want to use it. And the lower basin states, they're using every drop of their water and running short so you may someday see some shifts in...I'd really hate to think that happens but I think one solution would be to renegotiate the Colorado River Basin compact. I don't know if that will ever happen or not, but there's a lot of things there. And then also the use of power revenue to support these studies is very deeply impacting the upper basin states because they get under the Colorado River Basin Project Act they have projects which are authorized, or could be authorized, which are entitled a share of the basin revenues. Well, if the basin revenues go down because there's no power generation and there's no way for them to share. And that could be one huge issue someday. I don't see it happening any time soon, but if you look way down the line there could be some real problems.

[00:41:44]

PH: Any lessons in the success of AMWG? Are there any lessons in there that could be applied to the states negotiating over shortages on the Colorado River?

CB: Well I think it's a different kind of program all together. The states have done a pretty good job of negotiating out their compacts and things like that. You go back to the days when they were negotiating out the compact in the 1940s I think it was when they did all that. And they worked together very, very well, and I think they can still do that. They just have to recognize that they're...

PH: We're all in this together?

CB: Somebody has to win and somebody has to lose. (Laughs) But as the United States together we're winners, you know, as I'm saying.

[00:42:30]

PH: Do you have any advice for new members who would be joining AMWG or TWG? Because, one of the things we're going to produce is an orientation packet for new members so they can



come up to speed on the program and progress. Do you have any key pieces of advice you'd give to somebody joining the program?

CB: I would suggest they listen carefully and be patient with each other. Because you...I see it, you know the people I work for, there's a lot, well not a lot, there's some impatience with other people in the AMWG, and I'm one of them. You know, you don't know where these guys are coming from on this and I think we just need to have a little bit more understanding, a little bit more patience. Again, I think one of the real challenges we're going to have in the not too distant future is accommodating the Indian tribes and their whole different approach to this whole thing. And I think we just really have to sit down and listen and not be so quick to judge. And maybe we can work this out. I don't know. It's hard to tell.

[00:43:44]

JM: Can you expand on that? You mentioned traditional ecological knowledge earlier and can you expand on maybe some ways that those two different ways of thinking about science can be in the natural world?

CB: Well yeah, I'll give you an example that kind of jumps out about every third meeting we have. One of the things that, the brown trout, which is not a native species, and the rainbow trout, which is definitely not a native species are killing...in some situations, they go downstream and eat the baby humpback chub. So, the immediate reaction from the western science perspective is well let's just get rid of the rainbow trout and brown trout and control them. When there's too many of them we'll let the fishermen take them out of the river and they won't go down and eat the humpback chub. Which makes a lot of logical sense from a western science viewpoint. But the Indian tribes say wait, you're taking life in the Grand Canyon. And the Grand Canyon to them is a very holy and spiritual place, and you don't go down there and kill things. Now, what do you do? Yeah but something has to be done, because you can't just ignore them.

PH: Interesting conundrum.

CB: It is. It's tough. But then you find those kind of... and then they say well the archaeological sites, you know, they'll say the archaeology sites are being destroyed. Well we say who's destroying them? Well the campers come around and walk around and kick the stones over, you know. That's a stretch, but people going to look at the archaeological sites hurt the archaeological sites. We say, well why is that an effect of dam operations? Well but we have to take care of it anyway because it's within the...you know. So, there's all kinds of things there that really need to be worked out. And I would suggest that in the next few years we need to have a lot more patience and understanding in trying to understand that. Because they're, like I said, the Zuni and some other tribes are just really coming out of their boxes and talking about this and wanting to do stuff about it. And the Department [of Interior] and the Bureau of Reclamation are trying to accommodate them as much as they can. So, you just have to go along with that and then help that situation.

[00:46:18]

PH: That reminds me of the shift that occurred in the 1970s and '80s in terms of managing the Colorado River. In your oral history interview with Brit Story in 1996 you mentioned that prior to the 1970s at least it was kind of a family affair. And people with the Bureau of Reclamation would talk to representatives from the states and decisions would be made pretty quickly and efficiently about how to manage the river to meet the needs of the states, etc. And you mentioned that sometime in the '70s and early '80s that there was more and more pressure from environmentalists to insert themselves and broader publics into the process, and I think you even mentioned that you had kind of misjudged that change as it was coming along, and can you talk a little bit about that important shift and how it happened?

CB: Well I guess it just, well...I think as over time we developed water projects to develop an economy and a society which was developing, and they wanted the water really bad because they need to have their farms, they need to have their factories, they need to have their electricity and all that. And then as a society we got all these things we get more comfortable, and then we now have time to say, "oh but you know maybe we need to worry about the humpback chub now, and maybe we need to worry about these other things now." And I just really never really fully grasped in those earlier years, the impact that would have on the program. How strong those things would be. But I think it's because, I'm trying to think of a good way to put this, when you solve a problem and then people don't have to worry about that problem then they can worry about the next one, and they're not so worried about water anymore because they got all the water they need and they've got all the electricity they need and they've got food and they've got money. So now we can worry about these other things. But when you start worrying about those things, the things that are making it (laughs) making it possible are also hurting these other things and they need to go back and rethink some of those things. And I think as a society our whole society is much more oriented toward environmentalism and protecting these things. I'm not saying that's bad, but that's the way it is. They're much more oriented to that towards now than they were before. And we have to learn to deal with that.

[00:49:03]

PH: It sounds a little bit like the same thing is happening now with the growing influence of the tribes that it wasn't a central part of the decision-making process before. And now it is, and there's this adjustment period?

CB: We can afford to do it now and we couldn't do it before, yeah. I think that's right.

[00:49:26]

PH: Is there anything else that you think we're not paying attention to yet, that we're going to have to start paying attention to?

CB: Not right off the top of my head (laughs) no. We got too much to pay attention to now, yeah. No I think...

PH: It's gotten pretty complicated.

CB: It has gotten very complicated.

[00:49:43]

PH: Well talk about that a little bit. How has decisions, in your mind, there's pros and cons to every change. Some people win, some people lose. We have more participation, more voices, more values represented, what's the downside to that? Is it all good, or have we lost something in the process of that?

CB: Well yeah you talk about the decision-making process, I think what I'm seeing happening is decisions that used to be made at the Bureau level and the Park Service level, are now raised up to being made at the assistant secretary's level, or the secretary's designee level. You know, like, AMWG submits its suggestions to the Secretary of Interior, not to the Commissioner of Reclamation, or the Director of the Park Service.

[00:55:33]

PH: So you've seen a centralization.

CB: It's a centralization, it's a centralization of power, yeah.

[00:55:39]

PH: Is that good, or bad? What are the pros and cons of that centralization?

CB: It slows things down quite a bit, I think.

PH: Because you have to wait for...

CB: You have to wait for answers, and then you have...

PH: Does it politicize it more?

CB: Yes. Absolutely.

[00:55:56]

PH: Can you think of any instances in which the local people, like AMWG, or a group of decision-makers, you know, worked something out, and then sent it on up for approval and it got either stalled or stymied?

CB: Yes. I'll give you an example is desired future conditions for the Colorado River, which are all pounded out by AMWG. They all agreed to it. And then over time it's being challenged from the top down.

[00:52:29]

PH: Any other examples that you can think of?

CB: Not right off the top of my head, no.

[00:51:35]

PH: When you were in Washington you spent a lot of time focused on policy and budgets. And that's something we haven't talked about much yet today. But in your 1996 oral history you talked about how important the budgeting process is for determining what gets done.

CB: Well yeah, that's true. In those days, I was with the Bureau of Reclamation's budget, that's what I was working on. And we couldn't do anything if it wasn't budgeted. You had to get your budget and get your appropriated funds from Congress and move forward. And the Adaptive Management Program is a little bit different animal, because it gets its budget was set by law. It said you'll use power revenues and here's the ceiling, and it indexes each year according to the CPI and all that. So, they know how much money they got to spend. Now, some of the agencies, I know the Bureau of Reclamation and the Park Service both are using other sources of money to do things they want to do which they feed into the AMWG program. And that works good. But budgeting is a big issue. It's a huge issue.

[00:52:43]

PH: So even though the AMWG budget is set statutorily and it's reliably there, I imagine there must have been some debates and controversies over how to allocate that funding. What kind of research...

CB: We have that every year. (Laughs) We have that every year, yeah. It's like I said, they come out with a budget that's 30% over the budget, over the ceiling, then you have to decide well what things we're not going to do. And the technical working group, the TWG group has a budget ad hoc group called the BAHG group, (laughs) which I'm a member of.

PH: The TWG BAHG (laughs).

CB: The TWG BAHG (laughs). I'm a member of the TWG BAHG (laughs). We were working very hard on trying to get the budget put together for the next three years. Especially next year. In fact, we were kind of pushing the CREDA side was kind of pushing, let's do a one year budget and not settle on three-year budget until we get some more people on board from the administration. Because some of the thinking was, you said a three-year budget then you wouldn't change it for three years. Year one, year two, year three, we're locked down. Which takes away the learning experience—what happened year one should change year two should change year three. We kind of had a little trouble wrestling about that. But the whole process has to be worked out and budgeting is very important because it does control what research we're going to do. We have research that directly applies to the Grand Canyon program, but I think the same researchers are also finding really interesting studies they'd love to do, and interesting and scientifically valid, and important, but really don't impact Grand [Glen] Canyon Dam operations. We find some money in their budget to do that. We (inaudible) "you shouldn't be doing this." But, uh...

[00:54:42]

PH: Have there been any significant debates over funding since you've been involved that you can recall, or significant issues that had to be resolved over how funding decisions would be made?

CB: No, I think what happens, the way the process is that the Technical Working Group recommends a budget to the AMWG, and AMWG recommends a budget to the Secretary [of the Interior]. So, there's that process. How we decide what we're going to recommend it to the Secretary is what it comes down to. And you try not to, well you shouldn't, recommend to the Secretary anything that's over budget, because he hasn't got any money to do that with, so it's then how do we decide what's more important to put in the budget than other things. There's some debate about that, certainly.

[00:55:24]

PH: How long has it been since the Secretary of Interior had to approve the budget? Was there ever a time in which the budget was managed autonomously?

CB: Not for this program, no. I think not for anybody—actually, no matter what agency you work for, the process is you draft your budget, the Secretary recommends to OMB, OMB decides, then it comes back down with feedback, so there's always...well there's oversight, but, uh...

[00:55:53]

PH: Could the administration sweep those funds, or, uh, say that you can't spend them? Or is that authority not there because of the law?

CB: I'm not sure. I think the law says you, the law sets up the program and authorizes the money to spend on it, so I'm not sure they could, I just don't think they could say we're not going spend the money that's authorized for us, we're going to put in the bank and save it or do something with it, but I don't see that happening. I just don't see that ever happening.

[00:56:23]

PH: Do you think the change in administrations in Washington D.C. at any point since you've been involved have a significant spill-over effect on the local level of management, or are you kind of...is AMWG sort of insulated from, you know, presidential changes?

CB: I don't think they're insulated from it.

PH: No?

CB: No, I don't. Because you know a change in the Secretary, a change in the Deputy Secretary directly impacts the program because the person in charge of the AMWG program is the Secretary's Designee. He's appointed by the Secretary.

[00:57:01]

PH: Can we go back and look at those presidential changes and have you, I mean, when Obama came in and new people were appointed to Interior, what kind of changes do you remember seeing as a result?

CB: Well I think you'll find a lot more environmentally sympathetic administration than we did under like under the George W. Bush administration.

[00:57:31]

PH: And what would that mean?

CB: Well it means when you put together your program, you say well we're gonna concentrate more on humpback chub than we are on power. Something like that, you know.

[00:57:46]

PH: And so, under the Bush administration, you feel that there was a little more emphasis on power than on...

CB: No, I'm saying weren't quite as strict. They weren't quite such hardliners. They weren't being quite as vocal. I think in the Obama administration we had some people who were pretty hard liners.

[00:58:06]

PH: How about the Clinton administration? What was the character or influence of that?

CB: I don't really remember that far back.

PH: Alright, so I won't go back to the first Bush then.

CB: No, don't go back to the first Bush, or Carter or any of those people.

[00:58:25]

PH: Alright. The whole concept of adaptive management that the AMWG is based on was kind of an artifact of the 1990s. Late '80s and early '90s was a time in which scholars and resource managers sort of floated this idea of flexible adaptive management. Do you remember when that first came in as a management paradigm, and what did you think of it and how easy was it to sort of embrace it?

CB: I guess the first time I had really thought about it or got involved with it was with this program. Was with this program. And I remember...

[00:59:05]

PH: Did it seem to make sense to you at the time or did it feel like a fad?

CB: No, it made sense to me and it still does make sense to me. It's a lot better than just drawing a line and saying this is what we're going to do no matter what. OK we'll experiment with this and see how it works and if it doesn't work we'll change it. We'll try to get what works best. That makes a lot of sense to me. You adapt your management to reach the goal you want to set. And that's the tricky part is setting the right goals.

[00:59:33]

PH: Well what was the nature of decision making prior to this embrace of adaptive management?

CB: You just decide what you're going to do and that's it. I don't think we were planning on experimenting and letting people from the outside come in and say well you should try this. The stakeholder involvement wasn't that great. And the flexibility wasn't there.

[01:00:04]

PH: Do you think NEPA, the National Environmental Policy Act of 1969, had a significant impact on public involvement in environmental analysis or was it not until GCES came in that really anything began to change in how the Colorado River and Glen Canyon Dam were operated?

CB: When you talked about Colorado River and Glen Canyon Dam it was probably GCES what did it.

PH: That's what did it?

CB: Yeah. Yeah, I think so. I can remember as regional director we did the GCES and then we actually modified so our operating criteria for the dam did what we thought helped. And I remember meeting in my office down the hall here where a group of environmentalists came and said why don't you do an EIS? And I said why would we do an EIS? They said, so you can change your operations. We *did* change the operations. (Inaudible) Because the EIS is a long complicated expensive process. I thought we had made the changes necessary, but they were pushing very hard for an EIS because it gives them a forum. When you do an EIS, its published in the government's Federal Register and everybody has a chance to talk about it and so it really opened up the forum for them. And then they pushed for it and I think if I would have been on their side I would have done the same thing.

[01:01:22]

PH: How did the GCES program get started?

CB: Like I said we were looking at the results of the study we did to put power plants on the outlet tubes and the environmental impacts of those were causing some concern. And so, we decided we will do an environmental study on the impacts of Glen Canyon Dam. That was a Bureau decision.

PH: That was not pushed by a statute, that was a Bureau decision?

CB: That was a Bureau decision.

[01:01:47]

PH: I think I remember hearing something about James Watt was a little bit involved in authorizing that.

CB: Yeah, I think that's true.

PH: And he was interested in that because environmentalists were...

CB: I think so.

PH: Putting a lot of heat on the Interior Department and Bureau of Reclamation at the time.

CB: I think so, yeah.

PH: So this was accommodating an interest group that was becoming more powerful at that time?

CB: Yeah.

[01:02:19]

PH: And how did that evolve? The environmentalists were pushing for an EIS, you guys were saying we could do the same thing without all the complications.

CB: So, they went to George Miller and got the Grand Canyon Protection Act authorized, which requires an EIS.

PH: And that was 1992?

CB: Yeah.

[01:02:37]

PH: So, the GCES started around 1982?

CB: '82, '83 somewhere around there, yeah. Really early on, yeah.

PH: How did it develop to the point where an Act of Congress finally intervened?

CB: Well I think the environmentalists were pushing that because we said...we thought we'd made the changes we needed to make. They wanted more changes. I think that was what it was.

PH: I see.

CB: So they went to George Miller and got the...That's how it happened.

[01:03:05]

PH: Well, do you guys [referring to MacFadyen and Sweeney] have any additional questions you'd like to ask? I've gone through my list and added some to it.



JM: Well how do you feel? It's been over an hour. Do you want to...

CB: I'm alright.

[01:03:21]

JM: Ok, we could continue. Do you have, Jen, anything? I think we covered a lot of the big sort of structural issues and what these different agencies do. Now what, just personally, what's your—you're still involved, really involved, which is pretty neat.

CB: Yeah.

JM: And I guess maybe what do you see as a role for consultants, people like yourself now? Are you just one more voice from one agency, but you've got a lot of history with this, and we're writing a history and we'll have a different input, but you've got a lot of experience to share.

CB: I think the role of consultant is to represent his people at the table, you know. And, uh, I believe in doing that. Actually, at the Technical Working Group, I'm not a representative of CREDA I'm a representative of Utah Association of Municipal Power Systems [UAMPS], which is a CREDA member, and that's how power gets its two people at the table.

PH: Who is the second person?

CB: The actual appointed guy is Bill Davis, who's a consultant at CREDA also. He's a fish and wildlife biologist. He's a fish biologist really. So we have two skills at the table. But we basically take our direction from CREDA. And Leslie James. You've met Leslie James I think, haven't you? She's the executive director of CREDA, she's the AMWG member from CREDA. Leslie James is the AMWG member from CREDA. Ted Rampton is the AMWG member from UAMPS, and at the TWG I represent Ted. Bill Davis represents Leslie James. That's how it works. Yes and we all sing off the same chart, there's no.... We talk to each other, you know (laughs).

[01:05:20]

JM: Do you plan to keep doing it?

CB: Well, you know, a guy has to have something to do. I had my 84<sup>th</sup> birthday in February.

JM: Wow. Congratulations.

PH: Congratulations. My Mom just turned 84 in April.

CB: I don't know how much longer I'll be doing this, but I have deep interest in it and it's exciting and fun. Like I say, a guy has to have something to do. My neighbor cuts his lawn three times a week, and I just go out and come to meetings. It's different, but I like it better (laughs).

[01:05:52]

PH: Is there anybody like Leslie James or others who are more knowledgeable about the power side of this, you know, AMWG that we should interview?

CB: I think Leslie James is probably the power person you'd need to interview.

PH: Has she been involved for a long time?

CB: Oh, from the beginning. She took my place. When I left CREDA she took my place. Well, there was one other guy in between there for a year and a half, but she's basically been the driver of CREDA for quite a long while.

PH: So, we should try and interview her.

CB: Yeah, interview her.

JM: Where does she live?

CB: She lives in Phoenix.

PH: Really?

CB: Uh huh.

PH: That's convenient.

[01:06:32]

JM: Perfect. Is that where CREDA is based?

CB: That's where the office is, yeah. Yeah, the office was here [Salt Lake City] until I left, and then they hired Leslie James and they moved the office to Phoenix. That's where she lived. She has deep history in power. She was Salt River Project person for a number of years.

[01:06:55]

PH: Anybody else who's been around a long time that would have an interesting perspective that we should interview?

CB: There's a fellow from the state of Colorado that I would suggest you interview.

PH: Garrett. Dave Garrett.

CB: No, no, Dave Garrett he was one of the science advisors. I'm talking about the representative on TWG from Colorado. Oh, I can't think of his name. That's my fault, I can't think of people's names anymore.

PH: I could look that up. A TWG rep from Colorado? Been around a long time?

CB: Been around a long time. Randy, Randy Seaholm, Randy Seaholm. Have you heard that name?

PH: How do you spell his last name?

CB: You're nodding [referring to Jen Sweeney], she's heard that name already (laughs).

PH: How do you spell his last name?

CB: S-E-A-H-O-L-M, I think. Seaholm, just like you'd sound it. Yeah, he's been around a long time.

[01:07:57]

PH: Alright, if there are no more—do you have any stories you'd like to tell us? For example, we're all really interested in the drama of 1982-83 when you had to put the plywood up so you could raise the dam some more.

CB: (Laughs) Yeah, that was scary. I'll tell you that, that was the scariest time of my life.

PH: Yeah, well, tell us that story. We'd like to hear it.

CB: Well it was—there's a couple of videos out on that you could, you know (laughs).

PH: Oh ok.

CB: But yeah, it was—I don't think it was a design mistake it was just they didn't really, nobody had ever thought about it I guess, as the water goes over the spillway, it creates little bubbles and then the bubbles explode and they pop the concrete and chip out the concrete. And when you have a huge flow like they had, we had there and for so long a time it caused big cavities in the concrete spillway. And you start seeing red water come out the end, which means there's a lot of sandstone in the water, and it was a scary time. It was really scary.

PH: How long did that last? Days or weeks?

CB: Weeks. Then we put the plywood up so we could close the spillway gates and shut them off. And we went down there, I actually took one of those little trips down there. I had a little cart on a cable to see what was going on down there. And we had some magnificent design people in Denver who figured out what was going on and they figured out how to fix it, and we got an emergency contractor in there and we got the whole darn thing fixed before the next season. Before the next flood started. It was an amazing piece of work, it really was. And I don't take much credit for that because I didn't do any of it. All I did was sit at the top and say yeah go do this (laughs). It was not my work, it was somebody else's work. It was a scary time.

[01:09:45]

PH: You did a little bit of, if I remember correctly, some design work, stress test design work in your early, very early career in the fifties.

CB: My first job with the Bureau was on designs of Glen Canyon Dam. Yeah, actually the design of the dam, the arch structure itself. Which at that point in time, the first one ever built was Hoover Dam, a thin arch dam, and we've thinned them down a lot since then. But it was still a... very interesting thing. It was kind of, I wasn't—any of the brains behind it. In those days, we used Marshall calculators instead of computers, you know. And we were computing the stresses in the dam as it was being designed and one of the most famous dam designers in the world, a fellow named Merlin Copen worked for the Bureau then. And he was in charge of

designing the dam itself, and I worked for him, directly for him. And I just happened to luck into that job. Actually, (laughs) you can turn this thing off (laughs) I was hired to work in earth dams.

JS: Should I?

CB: No, it's alright.

JS: OK.

CB: But this is not part of the interview. I was hired by the Bureau to work in the earth dam section because I was really interested in earth mechanics. Because I had studied that when I was in the Army Corps of Engineers. And I interviewed the guy who was head of the earth department and he hired me, but when I reported for work they said well we've changed our mind we're going to put you in the concrete dam section. Why? Well because that's where we have a vacancy for you. So, I went to work for them. It was probably one of the best things to ever happen because I got to meet with this man Merlin Copen and he was really something else. He was a whiz, he knew what he was doing, and we had dam designers from all over the world come to Denver to visit with Merlin Copen. And he'd invite me to sit in the meetings with him, because he liked me for some reason. And I did that for about a year. Then I moved on to something else.

[01:11:44]

PH: You mentioned earlier in the interview that there was a design flaw in the outflow.

CB: Oh, I don't say it's a design flaw, it's just they didn't know. So, it was...since then they've created a design which avoids that.

PH: Right.

CB: When we rebuilt it, we built it to a new design. When I say flawed that means they sort of made a mistake, and that isn't really true. They just did the best they could with what they knew and the knowledge they had at the time, and that's what they did.

[01:12:12]

PH: It's like adaptive management. You do the best you can and then you go to work, and then you monitor and then adapt.

CB: And once they found the problem, they were in the process of modifying dams—to create that kind of spillway were being modified. Flaming Gorge has been modified, Glen Canyon has been modified, several others have all been modified to do that new design. To avoid that problem.

[01:12:35]

PH: It's interesting, if you had stayed in earthen dams, you would have been at the center of the storm when Teton Dam blew out.

CB: Well I kind of was anyway (laughs).

PH: You were anyway?

CB: (Laughs) Because of where I was in Washington at the time, yeah. Teton Dam blew out, yeah, it's true.

[01:12:51]

PH: What kind of impact did that have on the Bureau?

CB: Quite a bit. Quite a bit. That was a real shocker for everyone in the Bureau. One of our dams failed. You don't like that. And it had quite an impact. Quite an impact.

[01:13:06]

PH: Did you change design, or change...

CB: Oh yeah. The whole design of every one of those dams has changed since then. And they've gone back and modified almost all the major earth dams have been modified to solve that problem. There's not a problem--Is this still going?

PH: Yes.

JS: It is, would you like me to turn it off?

CB: Yeah, shut it off.

[01:13:30] End