

ORAL HISTORY INTERVIEW

Anne Castle
Part 1

Tempe, AZ

26 March 2018

Interview conducted by:

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Subject Anne Castle
Date 3/26/18
Location Tempe, Arizona
Interviewer Paul Hirt
Annotator Jennifer Sweeney
Project Glen Canyon Dam Adaptive Management Program Administrative History
Notes/Bio Anne Castle was Assistant Secretary--Water and Science at U.S. Department of the Interior from 2009 to 2014. She was the Secretary's Designee to the Glen Canyon Dam Adaptive Management Program and in this capacity acted as Chair of the Adaptive Management Work Group. Castle practiced water law in Colorado from 1987-2009 and earned J.D. and B.S. degrees from the University of Colorado.

Minutes Summaries of interview content during each minute of the interview

- 0 **Part 1 of 2.** Introduction and overview of Castle's time in the Glen Canyon Dam Adaptive Management Program (GCDAMP). Castle was the Secretary of the Interior's (SOI) designee and Chair of the Adaptive Management Work Group (AMWG). Castle worked at the United States Department of the Interior (DOI) from the middle of 2009 to the end of 2014.
- 1 **Q:** We've divided GCDAMP into three main categories: scientific research, policy and management, and social engagement and institutional engagement. Would you say you were involved in all of them, some of them--which categories did you spend most of your time working in? **A:** All of them, and about equal time in each. AMWG was constantly involved in scientific research and assessment conducted by the Grand Canyon Monitoring and Research Center (GCMRC). Castle explains that GCMRC was a department of the U.S. Geological Survey (USGS), which she oversaw in her position at DOI.
- 2 The science conducted by GCMRC shaped Glen Canyon Dam operations in relation to the health of the ecosystem downstream. The cultural component was especially important in regard to the tribes' participation in AMWG. Tribal representatives' concerns about the effect of Glen Canyon Dam operations were focused and important to their communities.
- 3 The impact on archaeological sites and the treatment of both native fish species [endangered because their optimal environment was compromised by dam operations]and non-native fish [which were targeted by extermination programs]. AMWG worked constantly to balance the tribes' priorities with the obligations of the federal agencies that managed the dam.

- 4 "Policy around water balance and water responsibilities was, maybe, the driving force because the water obligations of the Upper Basin of the Colorado River to the Lower Basin is the biggest factor determining how Glen Canyon Dam operates. So fulfilling those responsibilities while taking into account the concerns of all the various stakeholders was really what the Adaptive Management Program was all about." **Q:** Let me drill down a little bit more on your duties as the SOI designee. It occurs to me that the SOI stands over so many of the federal agencies that are involved in this project: the U.S. Bureau of Reclamation (USBRR), the National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), Bureau of Indian Affairs (BIA)--all of those . . . you had to manage the relationships between all of them as the person representing DOI. Can you talk about your role at that level?
- 5 **A:** It was a "significant issue" during Castle's time at DOI. When Castle took the position, AMWG was involved in a lawsuit. Grand Canyon Trust was suing USBR and USFWS over the operation of Glen Canyon Dam.
- 6 "The federal agencies were not on the same page." Castle started at DOI in July 2009 and she chaired her first AMWG meeting the next month. Earlier in 2009 there was "significant discord" between NPS and several other DOI agencies involved in AMWG and Glen Canyon Dam operations.
- 7 "There's a lot of history there." The Assistant Secretary for Water and Science oversees USBR and USGS, while another Assistant Secretary [for Fish, Wildlife and Parks] oversees USFWS and NPS; these make up the major federal agencies involved in the operation of the dam and the administration of the area surrounding it. At the time Castle assumed the SOI designee position, agency personnel contended that it was always filled by the Assistant Secretary for Water and Science rather than the Assistant Secretary for Fish, Wildlife and Parks. This ramped up distrust and controversy among agencies. Castle thinks that, while new administrations are usually hampered by not being privy to this sort of history, in her case it was an advantage not to know.
- 8 Castle was a neutral figure--agencies could not assume that her actions would have a negative impact on their interests. Castle implemented "pre-meeting meetings" for the five DOI agencies involved in AMWG [BIA, USBR, NPS, USFWS, USGS] to preview the agenda, get an idea of the agencies' concerns and priorities and try to coordinate their positions.
- 9 All but USGS were voting members of AMWG during Castle's tenure. "They would sometimes vote differently--which I felt was inappropriate, and I wanted to ensure that the federal agencies spoke with one voice on the AMWG, that we had discussed and understood the positions of the various different agencies and figured out a way that we could move forward in a coordinated manner."

- 10 Some non-federal AMWG members were exploiting the differences among the voting federal agencies, "encouraging discord in order to impede progress." **Q:** I know you may be reluctant to talk more specifically about this, but I think that for the administrative history it would be helpful for future listeners to put a little bit of meat on those bones in the sense that you're talking about an important procedural means for gaining some policy coherency among the federal agencies. Can you talk at least in some detail about what issues you were most deeply involved in that required this extra effort in coordinating positions and policies?
- 11 **A:** In 2008 there was a High Flow release (High Flow Experiment, HFE) from Glen Canyon Dam. The intent was to stir up sediment from the river bottom, allowing the higher water level to deposit it in on the banks to replenish sandbars that had been eroded as an effect of dam operations.
- 12 The HFE happened just before the change of the presidential administration. The SOI at that time, Dirk Kempthorne [SOI 2006-2009], attended the HFE event and gave a press conference espousing the DOI's position: the purpose of the HFE was to further science, improve the ecosystem, replenish camping beaches for recreation. At the same time the superintendent of Grand Canyon National Park (GCNP) was giving a press conference one or two hundred feet away, "undermining the value of the High Flow Experiment."
- 13 The litigation by Grand Canyon Trust against USBR and USFWS was going on at this time. The GCNP administration supported the Grand Canyon Trust's position. The discord this created among federal agencies was the most "high-profile" issue during this period, but it was one of many. GCMRC/USGS wanted to assess the effects of fluctuating dam operations flows on vegetation in the Grand Canyon, but NPS refused to issue the permits required to do so.
- 14 NPS was worried that the science-gathering cruise was inconsistent with the rules and values enforced when transiting a wilderness area. Some studies, such as the "Near Shore Ecology Study," were approved by AMWG.
- 15 The three year study was meant to assess fish populations along the river, including tributaries and backwaters. The ultimate goal was to find out how dam operations affected fish populations.
- 16 The study was based on electrofishing. To sample the fish populations, extremely bright lights were aimed at the water to attract fish, then a device was placed in the water to shock them. The fish floated to the surface--some were dissected and some were tagged and released. The operation would have been noisy and disruptive, especially in a wilderness area at a time of year when motorized boats are typically forbidden.

- 17 This caused contention among the AMWG and GCMRC, USGS, and GCNP. Castle understands why agencies acted the way they did. "Everybody's trying to do their mission." Castle's goal was to allow science to be conducted while having as little impact on GCNP as possible.
- 18 **Q:** Were the tribal representatives involved in that conversation at all? I know some of them have expressed misgivings about these kinds of shocking programs. **A:** Involvement of tribal communities represented on AMWG "was mostly around control of non-native fish." Involvement was related not to the science being done, but to cold water releases through the dam that ensured the viability of the "wonderful, world-class, gold medal, blue ribbon, whatever you want to call it" trout fishery [Castle talks with a smile in her voice].
- 19 The fishery based on the optimal conditions created by Glen Canyon Dam was stocked with trout by Arizona Game & Fish (AGFD) for years. Then it turned out that trout eat the endangered native humpback chub. All of the federal agencies involved with GCDAMP are obligated to "avoid jeopardy to endangered species." When Castle started with AMWG this obligation not to harm was partially fulfilled by controlling non-native trout with extermination. Castle acknowledges that it sounds "barbaric," but that it is a standard method of fish population control throughout the country.
- 20 Electroshock extermination of trout can give humpback chub young a better chance at maturation. **Q:** Do you think there were any results from that research during the time you were involved in AMWG? Did you get results that led to actual decision-making about releases or other forms of management? **A:** "That was starting to happen toward the end of my time . . . it was so interesting because, for me, it was such a lesson in Traditional Ecological Knowledge (TEK), of, by the tribes."
- 21 The scientific consensus when Castle started with AMWG was trout eat chub; trout are non-native; agencies are charged with preserving endangered species; trout numbers need to be reduced. USBR was in charge of non-native fish control--they usually hired AGFD for this.
- 22 The tribes, especially the Pueblo of Zuni, objected. The entire Grand Canyon is sacred, but the confluence of the Colorado and Little Colorado Rivers is particularly so as the Zuni place of emergence into the world. That area is also where the greatest concentration of trout extermination occurred. The taking of at that confluence is anathema to the Zuni.
- 23 "At the time, I thought it was like the perfect law school exam, because the federal agencies are bound by law to avoid jeopardy to endangered species. The scientific consensus is, in order to fulfill that responsibility, you must control the trout numbers, and here's how you do it. The Fish and Wildlife Service was saying that. They're the protectors of endangered species and they were saying, 'You've got to control the trout.' And the tribes, to whom all of those agencies owe a trust obligation, they were saying, 'You can't do that in our sacred cultural space.'"

- 24 Castle met with the Pueblo of Zuni tribal council and elders but the meeting was not productive: "they were pretty mad at me. I think they were glad I came, but we didn't reach any sort of solution or consensus on a path forward." To tribal leaders, fish preying on each other was natural, and humans should not interfere.
- 25 As Castle's time at AMWG went forward, the scientific consensus started to turn away from trout eradication. By the end of her tenure scientists acknowledged that, while they knew that trout eat humpback chub, they did not know whether that had an impact "at the population level."
- 26 "We know that there's this interaction, but we don't know if it has a population effect . . . and at the time I thought, 'That's what the elders were saying.' And yet the scientific community had a very hard time figuring out a way to formally incorporate tribal ecological knowledge into their regimen. And I think that's still a source of discomfort in the scientific community." An Environmental Assessment (EA) was done on fish control and the tribes were closely involved in it.
- 27 Tribes disagreed on the initial result. A facilitated process resulted in a solution that seemed to work, but scientists were still in favor of control through extermination. Agreed to some terms: try to avoid extermination, make every effort not to practice it at the confluence of the Colorado and Little Colorado Rivers, USBR would investigate the possibility of live removal and relocation by helicopter.
- 28 Agreed to work with tribes on efforts to respectfully use the exterminated fish, such as processing them into fertilizer for tribal agricultural lands. As far as Castle knows, there have been no efforts since the EA to exterminate trout, both due to the controversy and because the science of determining what influences native fish populations has evolved.
- 29 **Q:** What year did that start? **A:** 2011, plus or minus a year. **Q:** Did they ever study how trout predation affected the population of humpback chub? **A:** They were trying to, and were also referring to past studies. GCMRC Chief John Hamill told Castle there was no clear link between predation and population-level impacts.
- 30 Interviewer states this is a good example of collaboration on a difficult subject. It was a "lesson learned" for Castle: on how scientists can be sure of something until evidence makes them change their minds: "a healthy skepticism will serve you well."
- 31 It was "such a real-world example of traditional ecological knowledge. People will agree with that concept in principle, but I saw it acted out. It was something that has really informed the way I think about tribal involvement in those kinds of--what we think of, from our sort of western scientific point of view, as scientifically determined." **Q:** [Preamble on Castle's connection to the science provider for GCDAMP] What kinds of science were prioritized when you came into the program, and did it evolve or change while you were there?
- 32 **A:** Castle not sure she can answer the the question of how the science evolved.

- 33 Every year, AMWG and GCMRC came up with a budget and a work plan together. The AMWG budget comes from two sources: USBR's money for Upper Colorado Basin operations and Glen Canyon Dam hydropower revenues. The hydropower contribution goes into the Upper Colorado River Basin Fund and funds most of the GCMRC science.
- 34 The funding from the Upper Colorado River Basin Fund is steady and reliable. It partly funded AMWG staffing, but mostly paid for project-related science. The funding amounted to around \$10 million every year.
- 35 Erosion of sandbars was a science topic of particular urgency. Recreation depended on them being replenished by sediment and kept free of encroaching vegetation, which was no longer subject to the scouring action of floods.
- 36 "I bet, at any given time, there were-- thirty?--line items, budget items, of different studies through Grand Canyon Monitoring and Research Center. All of that had to be figured out every year." Since AMWG met only twice a year, one meeting was largely taken up with studying project proposals and the other voting on them. Castle helped implement the change from an annual to a triennial project planning and budgeting process.
- 37 There was an evolution on the issue of predation on native fish by non-native fish. Castle is not sure about the exact science that influenced the topic, but points out that, although the Colorado River is one of the most studied areas in the world, something new is always being learned. When Jack Schmidt became Chief of GCMRC he tried to "make it more responsive to the needs and express desires" of AMWG stakeholders.
- 38 At the same time the trout extermination issue was being worked out, AMWG was trying to develop a protocol for HFEs.
- 39 Previously, an EA or EIS had to be done for each HFE. In 2009, when Castle first came in as the SOI's designee, there had just been a controversy-filled AMWG meeting on HFEs, daily fluctuating dam releases, and non-native fish control.
- 40 That March 2009 meeting generated both a recommendation report to the SOI and a minority report disagreeing with those recommendations. Castle read both reports before chairing her first AMWG meeting in August 2009.
- 41 One of the minority reports [sic] was written by Grand Canyon River Guides (GCRG), at that time represented by Andre Potochnik. Castle found it persuasive, especially in that it recommended streamlining the HFE process by eliminating the repeated environmental assessment requirement. This would require more regular monitoring of sediment conditions in the river.
- 42 The protocol allows for a HFE when conditions are right without an individual EA or EIS, and also determines the flow rate and duration of the release.

- 43 As part of Schmidt's plan to be responsive to AMWG aims and to determine the efficacy of the HFE protocol, GCMRC set up cameras to photograph the results of beach-building efforts. They took before and after pictures and published them on their website.
- 44 GCMRC also developed a predictive model for Colorado riverbed sediment based on inflows of sediment from the Paria and Little Colorado Rivers.
- 46 End of Part 1

Paul Hirt: 00:02 This is Paul Hirt at Arizona State University, interviewing Anne Castle on March 26, 2018, at Arizona State University, for--the interview is for the Glen Canyon Dam Adaptive Management Program. Anne, thank you so much for joining us today and doing this interview.

Anne Castle: 00:23 Thanks for having me.

Paul Hirt: 00:24 Could you please start by telling us your name and the positions that you held in the adaptive management program, and the years in which you participated?

Anne Castle: 00:33 Sure. My name is Anne Castle, and I was the Secretary's designee and the chair of the Glen Canyon Dam Adaptive Management Work Group [AMWG] for the whole time that I was employed at the Department of the Interior, which was from the middle of 2009 through the end of 2014.

Paul Hirt: 00:58 And we've divided up the adaptive management program into three main categories: scientific research, policy and management, and then social engagement and institutional engagement. Would you say you were involved all of them, or some of them? Which categories did you spend most of your time working in?

Anne Castle: 01:19 Well, I would say I was involved in all of them. And I'm not sure that I could identify one that I spent more time in than the others. I mean, we were certainly involved in the scientific processes that were going on in conjunction with the AMWG's work through the Grand Canyon Monitoring and Research Center, GCMRC. That was a center of the US Geological Survey and I, as part of my position at Interior, I oversaw the USGS. And so the Grand Canyon Monitoring and Research Center was part of my portfolio in that sense, but that scientific group worked very, very closely with the AMWG to provide scientific data and analysis that could then shape the operations of Glen Canyon Dam to preserve or improve the environment downstream in the Grand Canyon.

Anne Castle: 02:25 So there was the scientific component. The cultural component was also very significant, particularly in connection with the participation of the Indian tribes in the AMWG. And the tribal members of the AMWG were expressing the positions and concerns of their tribal communities with the operations of Glen Canyon Dam and the effect that those operations were having downstream, and things like, um, archeological sites that were

being exposed by wind erosion and how to deal with those, um, the treatment of non-native fish in, particularly in the upper part of the Grand Canyon and in Glen Canyon itself, and the impact of all of the operations on endangered fish species. Those were all significant concerns of the tribes and we were constantly working to figure out how to accommodate the desires of the tribes and at the same time fulfill all the other missions and responsibilities of the federal agencies in connection with the operations of the dam.

Anne Castle: 03:54 So that's scientific and cultural, and then, yeah, policy around water balance and water responsibilities was maybe the driving force, because that, the water obligations of the Upper Basin of the Colorado River to the Lower Basin is the biggest factor determining how Glen Canyon Dam operates. And so fulfilling those responsibilities while taking into account the concerns of all the various stakeholders, was really what the adaptive management program was all about.

Paul Hirt: 04:45 Yeah, let me drill down a little bit more on your duties as the Secretary of Interior designee that--it occurs to me that the Secretary of the Interior stands over all of the federal agencies, so many of them that are involved in this project, and Bureau of Reclamation, which manages Glen Canyon Dam, the National Park Service and Grand Canyon National Park, you know, is right below the dam. You've got US Fish and Wildlife Service. We have the BIA [Bureau of Indian Affairs] and tribal relations, all of those, in a sense, you weren't representing any one of them. You sort of had to manage, you know, the relationships between all of them as the person representing the Department of Interior. Can you talk a little bit about your role at that level?

Anne Castle: 05:29 Absolutely. And that was a significant issue during the time that I was at Interior and was the Secretary's designee on the AMWG. When I first came to Interior, there was, number one, a lawsuit among the various AMWG members. The Grand Canyon Trust was suing the Bureau of Reclamation and the US Fish and Wildlife Service over the operation of Glen Canyon Dam. So we had litigation within the AMWG and the federal agencies were not on the same page. And I started at Interior in July of 2009, and the first AMWG meeting that I chaired was in August of 2009, so I had a lot to learn during that month. But previously, during 2009, um--there had been significant discord between the National Park Service and several of the other Interior agencies connected with decisions within the AMWG and the operation of Glen Canyon Dam.

Anne Castle: 06:57 And--there's a lot of history there of--the Assistant Secretary for Water and Science, my position, oversees the Bureau of Reclamation and the USGS. There's another assistant secretary that oversees the Fish and Wildlife Service and the National Park Service, the two other major federal agencies that were involved in the AMWG. There was even concern when I first started within the federal agencies that it was assumed that the Assistant Secretary for Water and Science would chair the AMWG, and not the Assistant Secretary for Fish, Wildlife and Parks. And there was that level of distrust and controversy among those agencies. So, I mean, when new people, when administrations change and new people come in, they have the disadvantage of not having the history, but I think in that particular case it was an advantage for me, because I didn't have any history with the Park Service, good or bad.

Anne Castle: 08:11 And so it--they couldn't assume that I was going to act in ways that were detrimental to their interests. And I certainly tried not to do that. We tried to coordinate the--positions of the five different Interior agencies that were involved in the AMWG, and started having pre-meeting meetings among just the federal agencies to talk through the agenda and figure out what everybody was thinking and what the different agencies were worried about or wanting to promote, and coordinating our position. Because previously, the federal agencies, there are five of them involved, one of those is USGS, the other four have, are designated members of the AMWG. So Fish and Wildlife Service, National Park Service, Bureau of Indian Affairs and Reclamation are all members and were all voting members of the AMWG at the time that I started. And they would sometimes vote, ah, differently--which I felt was inappropriate, and I wanted to ensure that the federal agencies spoke with one voice on the AMWG, that we had discussed and understood the positions of the various different agencies and figured out a way that we could move forward in a coordinated manner. Because it was also true that, because the federal agencies were following different paths, some of the AMWG members, the other non-federal members, were exploiting those differences and, you know, encouraging discord in order to, uh, impede progress.

Paul Hirt: 10:32 Now, I know you may be reluctant to talk more specifically about this, but I think, for the administrative history, it would be helpful for future listeners to put a little bit of meat on those bones in the sense that you're talking about an important procedural means for gaining some policy coherency among the federal agencies. Could you talk at least in some detail about what issues you were most deeply involved in that required this extra effort at coordinating positions and policies?

Anne Castle: 11:07 Yeah. Well, there were, there were a number of different examples--it's, I think, of public record that in 2008, there was a high flow release from Glen Canyon Dam, an experiment to hopefully stir up sediment from the bed of the river and, with the high flows, deposit that sediment higher than it otherwise would have gone on the banks of the river to replenish some of the sandbars that previously existed that had been eroded away by just, sort of, normal operations of both the dam and just normal function of the river. Several high flow experiments had been done before that, but there was one done in late 2008, so just before the change of administration. The Secretary of the Interior at the time, Dirk Kempthorne, came to that, the high flow release, and, um, was--espousing the position of the Department of the Interior that this was something that was being done to further the science, to improve the ecosystem, to replenish camping beaches, to improve recreation.

Anne Castle: 12:36 And he was giving a press conference to that effect. And as I understand it--I wasn't there--but I've been told that about a hundred or two hundred feet away, the Superintendent of Grand Canyon National Park was also giving a press conference, undermining the value of the high flow experiment. And so, that was at a time when this litigation was ongoing, the Grand Canyon Trust suing the other two federal agencies, the National Park Service was--I--stop there. Grand Canyon National Park was supporting the litigation of Grand Canyon Trust against the other federal agencies. There was significant discord. So that was, that was one of the issues that we had to deal with. Others were, um, less--high profile. But things like USGS, the Grand Canyon Monitoring and Research Center arm of USGS, was trying to do science in the Canyon around the impact of flows on vegetation, so they were looking at vegetation within the range of fluctuation of the releases from Grand [Glen] Canyon Dam and comparing that vegetation to vegetation that is unaffected by operations, and seeing what they could learn about the impact of dam operations on vegetation. Well, in order to do scientific research in the park, you have to get a Park Service permit.

Anne Castle: 14:26 And the Park Service was denying those permits to USGS because they were concerned about, part of the park is a wilderness area. And they were worried that the impact of the scientific cruise was inconsistent with wilderness values. That was one of the concerns. There were studies that were approved by the AMWG. Things like, one, I recall, was called the Near Shore Ecology Study. That was a scientific study over, I believe, a three-year period, where they were looking at what fish were present and breeding in various locations up and

down the river, including backwaters and back channels and tributaries, and so trying to get a handle on where the endangered fish species are living and breeding, where the trout are, just to get a better feel for how these different fish communities are living in the canyon, and of course the ultimate goal was to figure out how they're impacted by operations of the dam and might be benefited by different types of operations.

Anne Castle: 15:59 So the Near Shore Ecology Study involved electrofishing at night. What that means is, you have boats in the river with great big lamps, shining bright light into the river and attracting the fish, and they put a big ball, a metal ball that conducts electricity into the water, and shock the water. And that brings the fish to the surface, you scoop them up, you--some of them were dissected, some were just examined and tagged and put back into the river. Well, you've got boats roaring around at night with bright lights and a whole bunch of scientists doing stuff in a wilderness area. And usually in the Park Service's non-motor season, because they, Grand Canyon National Park, has a season for motorboats and they have a season when no motorboats are allowed. So that whole scientific operation gave the Park Service a lot of heartburn, and they had to permit it.

Anne Castle: 17:10 Um, and so there was tension between the AMWG and Grand Canyon National Park, between USGS and the Park, over those kinds of things that were, um, everybody's trying to do their mission, you know, and they have different missions. Those different agencies have different responsibilities. And it was a source of controversy that could be allowed to fester, and be exploited, or, what we tried to do was to get people in a room together and figure it out. And put limits on the scope of the activities that were of concern, and to allow the science to take place, but in a way that was minimally disruptive to the values of the Park.

Paul Hirt: 18:07 Were tribal representatives involved in that conversation at all? Because I know some of them have expressed misgivings about these kinds of, you know, shocking programs...

Anne Castle: Right.

Paul Hirt: ...(unintelligible) fish.

Anne Castle: 18:22 Involvement of the tribal representatives and the communities that they represented was mostly around the control of non-native fish. Not so much, at least I don't remember, that it was around these scientific investigations. But because of the cold-

water releases from Glen Canyon Dam, a wonderful world class, gold medal, blue ribbon, whatever you want to call it, trout fishery has grown up in the reach of the river just below the dam. And Arizona Game and Fish stocked it with trout for years and years and years. Maybe they still do. But turns out trout eat humpback chub, and all the federal agencies are obligated to avoid jeopardy to endangered species, and the humpback chub is an endangered species in the Colorado River. And so the scientific evidence and recommendation at the time that I started with the AMWG was to control non-native fish, which means kill trout.

Anne Castle: 19:48 And, um, you know, it sounds--to an outsider, it sounds kind of barbaric, but as I understand it, game and fish departments all over the country have been using these same kinds of methods for fish control for centuries--not that long--decades. And what they do is they electroshock the fish, and in this case, they're not tagging them and throwing them back, they're killing. And the object is to reduce numbers, and that was being done in the Grand Canyon to reduce trout numbers in an effort to give the humpback chub babies, especially, a better chance. And--

Paul Hirt: 20:35 Do you think there was any, um, results from that research during the time that you were involved in AMWG? Did you get results that led to actual decision-making about releases or other forms of management?

Anne Castle: 20:49 Yeah, that was starting to happen toward the end of my time at the Interior Department. And it was so interesting because for me, it was such a lesson in-- traditional ecological knowledge of, by the tribes.

Anne Castle: 21:11 And it's kind of a long story, but I'll tell you how I learned, what I learned and how I learned it. So scientific consensus, at the time that I started, was: trout eat chub. We've got non-native trout, we're trying to preserve the native endangered species, we need to get the trout numbers down. And so the Bureau of Reclamation, being the operational agency, they were carrying out non-native fish control, meaning that they would either-- they'd usually hire--Arizona Game and Fish or some fish agency to go out and electroshock the fish. The tribes, most particularly the Pueblo of Zuni, objected to that procedure because to them the entire Grand Canyon is a sacred place. And to the Zuni, the confluence of the Colorado River and the Little Colorado River is their place of emerging from the, from the underworld. And it's a particularly sacred place.

Anne Castle: 22:41 Well, that's where the humpback chub are, in the Little Colorado River, and that's where the most concentration of trout control was being employed. So the Pueblo of Zuni objected forcefully to that practice because the taking of life in a sacred place is anathema, and the fish control was taking the life of the trout. And it was--at the time I thought it was like a perfect law school exam. Because the federal agencies are bound by law to avoid jeopardy to endangered species. The scientific consensus is, in order to fulfill that responsibility you must control the trout numbers, and here's how you do it. The Fish and Wildlife Service was saying that. They're the protectors of endangered species, and they were saying, "You've got to control the trout." And the tribes, to whom all of those agencies owe a trust obligation, they were saying, "You can't do that in our sacred cultural space." And so it was, it was a very difficult dilemma. I went to the Pueblo of Zuni and met with the Tribal Council and the tribal elders to try to see what we could do. It was not a particularly productive meeting. They were pretty mad at me. Um--I think they were glad I came, but, um, but we didn't reach any sort of solution or even a consensus on a path forward. But one of the things they said to me was, one of the tribal religious elders said,

Anne Castle: 24:47 "You're saying trout eat chub. Well, chub eat chub. These fish have existed together for decades. Why do you have to interfere? Big fish eat little fish. That's just the way things happen."

Anne Castle: 25:11 At the time my scientific buddies were saying, well, yeah, but trout eat chub in greater numbers than chub eat chub, and so you've got to control the trout. As my time with AMWG went on, the scientific consensus started to turn, and toward the end, the scientists at the Grand Canyon Monitoring and Research Center, were saying trout eat chub, big fish eat little fish, but we don't know if the predation of trout on chub has an effect at the population level. So we know there's this interaction, but we don't know if it has a population effect. And that's what we're interested in: the population effect. And at the time I thought, "That's what the elders were saying." And yet the scientific community had a very hard time figuring out a way to formally incorporate tribal ecological knowledge into their regimen. And I think that's still a source of discomfort in the scientific community.

Anne Castle: 26:42 So anyhow, that was, that was a big deal while I was at Interior. One of the things that we did during that time was we did an environmental assessment on non-native fish control, and the tribes were very much involved in that. They didn't like the first

result that the federal agencies came up with. We had some sort of facilitated process to try to get everybody's opinions on the table and to get them to work together to come up with a solution that they could, everybody could live with. And at the end of the day, we finally came up with something that, that seemed to work. While that process was ongoing, the scientific community hadn't yet changed its mind, and they were still saying: we think we need to electroshock the trout.

- Anne Castle: 27:44 But there were things that were agreed to, like, we'll try to avoid it. We'll really try to avoid doing it at the confluence of the Colorado and the Little Colorado. If we have to do it, we're going to talk to you about what we do with those fish. We'll try, we'll investigate live removal, which means you scoop them up and you helicopter them out, which is really expensive, but they, Bureau of Reclamation said, "We'll investigate that." And if that is just not feasible, we're going to work with you to figure out how we can deal with the dead fish in a way that honors them. For example, use it for fertilizer on tribal agricultural lands, or some, something like that. So that was all in the environmental assessment, and that was ultimately something that seemed to work for most of the parties involved. But they've never done another electroshock since that, as far as I know, since that environmental assessment process started and the science was evolving.
- Paul Hirt: 29:03 What year did that start? Do you remember?
- Anne Castle: 29:08 I'm going to say 2011, but I may not have that right. It's plus or minus a year.
- Paul Hirt: 29:17 And did they ever do the studies to show whether the trout predation on the chub had an effect on the chub populations?
- Anne Castle: 29:30 Well, they were trying to do those studies. And, and I think they were gleaning from the studies that had already been done that that might be the case. So I, I don't know if they've done further work on that, but I just remember that the chief of GCMRC at the time, John Hamill, saying to me, we're not sure anymore that this predation has an effect at the population level, and it may not. So given that, and given the position of the tribes, I don't know why you'd do it.
- Paul Hirt: 30:19 That's a great story, and very illustrative of the core of the adaptive management program is collaboration. And that's just a wonderful example of an effort to collaborate on a difficult topic in which people start out in conflict with each other and come closer to an understanding where people can move

forward, everybody can move forward, with a sense that their concerns were heard and that decisions were modified to try to have the best possible outcome.

Anne Castle: 30:52 Yeah, it was a real lesson learned for me. First of all, about how scientists can be absolutely sure of something and then change their minds. And so, you know, a healthy skepticism will serve you well. And secondly, such a real-world example of traditional ecological knowledge that, I mean, people sort of agree with that concept in principle, but I saw it acted out and it was, it's something that has really informed the way I think about, um, tribal involvement in those kinds of, what we think of from our sort of western scientific point of view, as scientifically determined.

Paul Hirt: 31:49 Can I ask you--? I want to dig a little deeper both on your experiences incorporating the tribes, but also your experiences as, so you were head of Water and Science and the US Geological Survey is kind of the center for collecting the research that supports the AMWG program, and you were a representative up one step above them and over them. Can you talk a little bit about what kinds of science were being prioritized when you came in and whether the kinds of research that was being done evolved or changed over the time that you were there?

Anne Castle: 32:39 Well, I can, I can talk a little bit about it. I'm not sure I can answer the question about an evolution of the science over the time that I was there. The way the AMWG functioned when I came in was, every year the staff of the AMWG, together with Grand Canyon Monitoring and Research Center, would come up with a budget and work plan. And the budget for the AMWG comes from two sources: from the Bureau of Reclamation's money for Upper Colorado River operations, but they also get revenues from the power generated by Glen Canyon Dam that goes into the Upper Colorado River Basin Fund. And there's a fixed pot of money that comes out of the Basin fund every year that funds most of the science through GCMRC. And that's, that was about ten million dollars a year. So it's a well-funded program with very steady and reliable funding.

Anne Castle: 34:07 So it's not subject to the ups and downs of appropriations. That money just comes out of the Basin fund. So the budget and work plan would rely on the funding from Reclamation, which was a smaller number, and the funding from the Basin fund. And they needed to fund the staff involved in the operations of the AMWG, but that's a very small number. Mostly what they were funding was the science. And so they needed to figure out

ten million dollars' worth of science every year. And you can fund a lot of science with ten million dollars a year, especially if you know that it's going to be there year after year. So the things they were working on when I came in were like this Near Shore Ecology Study, they were surveying the sandbars because the loss of sandbars from erosion was a big concern, particularly of the Park Service, because the sandbars are where people who float the river camp at night, and if there aren't any sandbars anymore, the whole river recreation, um, is impacted.

Anne Castle: 35:26 And not only were the sandbars being eroded, they were being more overtaken by vegetation, because the Grand Canyon was not getting the same kind of flood flows that it used to receive before the dam was built. And so the vegetation, whereas it used to be scoured by the spring floods, it was now encroaching farther and farther down into the, um, into the banks. So they were, they were surveying the sandbars, and there were just a million different studies going on. I mean, I bet at any given time there were thirty line items, budget items, of different studies through Grand Canyon Monitoring and Research Center. So all of that had to be figured out every year and, you know, the AMWG only meets twice a year. And so one of the meetings would be, here's what we're going to propose for the budget and work plan. And the other one was okay, now vote on it, and that would take up a lot of time.

Anne Castle: 36:35 So yeah, right? Hooray (laughter). And the TWG, the Technical Work Group, would be involved, but there was also a Budget Ad Hoc Group, but it was still way too much. So part of what we did while I was there was to change that to a biennial process from an annual process and then ultimately to a triennial process, so that you only had to think about it once every three years. And there were opportunities to change course in midstream if something wasn't going well or something new needed to be done, but for the most part, it has to be done less frequently now.

Anne Castle: 37:19 So, in terms of evolution, there was this evolution in the thinking about the predation of the non-native fish. I--I can't remember how that played out in terms of scientific studies-- (pause) and it seemed like we were always learning more and it may be one of the best-studied reaches of river in the world, but there was always more to investigate and more to learn. Jack Schmidt, when he took over as the Chief of GCMRC, was trying to make it more responsive to the needs and expressed desires of the different AMWG participants. And he certainly did that in terms of reporting. For example, another thing that was

going on at the same time as this non-native fish control environmental assessment was we were trying to do the environmental compliance for a protocol for high flow releases from Glen Canyon Dam. Previously they had had three different high flow releases, I think in 1994-- no, that's not right. Anyhow, three of them. The last one was in 2008.

Paul Hirt: 39:03 There was a flood in 1993, if that's what you're thinking of--

Anne Castle: 39:06 No, no, these, I'm talking about intentional high flow releases. So it might've been, I don't know, '94, '98 and 2008, something like that. I know two of them were four years apart, and then there was a gap. But they had to do independent environmental compliance for each one. And so you had to gin up an EIS [Environmental Impact Statement] or an EA [Environmental Assessment] and do all the public notice and have the participating cooperating agencies, and hearings and, you know, it's a big deal to do environmental compliance like that. And actually when I first came in to be the Secretary's designee, so this is 2009, there had been a very contentious meeting of the AMWG in March or April of 2009 at which there was a lot of controversy. And it was about high flow releases and non-native fish control, and the operations of the dam in the fluctuations that are done twice daily to follow the load requirements of the electrical grid. And that March of 2009 meeting resulted in a report to the Secretary that said, here's what we recommend, and a minority report that said we disagree, and we recommend, you know, Plan B. So, one of the things that I did was read those reports before I chaired the first AMWG meeting in August of that year. And I remember very well one of the minority reports was written by the Grand Canyon River Guides, who were at the time represented by Andre Potochnik. And it seemed to me to be a very well-reasoned letter with recommendations.

Anne Castle: 41:22 And one of the recommendations in that report was: we need to find a way to do these high flow releases when conditions are right without having to do environmental compliance for each one. And at the time I thought, "Well, that makes sense." And so, it wasn't immediately, um, at that first meeting, but we started to talk about having a protocol for high flow releases. So we would examine the conditions in the river and see how much sediment was residing on the bed of the river. And if there was a lot of sediment that could be spread up higher and replenish the beaches and offset the erosion, then we would do a high flow experiment. So we did the environmental compliance for that protocol, and that remains in place today

and allows Reclamation and GCMRC to determine if conditions are right and if they are, to do a high flow release.

- Anne Castle: 42:34 And it even has a matrix for the flow rate and duration of the high flow release based on how much sediment they find in the bed. So that was all going on, and the point of this story is that, because they were having more regular, now, high flow releases under the protocol, people were really, really interested to see if it was having an effect on the sandbars and the camping beaches and, you know, is it doing what it's supposed to do? And so GCMRC, I think as part of the push to be responsive to the needs of the AMWG representatives and their agencies, set up cameras that take photos, you know, on some regular basis. And they're looking at sandbars, so they could take before-and-after pictures. And then GCMRC would publish before-and-after pictures on their website pretty quickly after a high flow release took place and then they could monitor it over time and see, okay, well we got, we replenished this sandbar, but then what happened? Did it last, or did it just get eroded away and are we doing any good?
- Anne Castle: 44:19 And so that was just an example of how I saw the science at GCMRC being adapted to be more responsive to operational needs and, um--to measure whether we were succeeding, you know, and whether we should keep going with these experimental treatments.
- Paul Hirt: 44:49 There's a wonderful website that the GCMRC manages now, that collects all of those before-and-after photos from the different HFEs [unintelligible] and it's very accessible and easy to explore for anybody. It's open to the public. And it's, to me, one of the best examples of making science accessible to the interested public. I love that website. So it's interesting to me to hear that you were chair of AMWG at the time when, um, that effort began.
- Anne Castle: 45:25 Absolutely.
- Paul Hirt: 45:26 (Unintelligible) successful.
- Anne Castle: 45:27 And they developed, as part of that whole process, they developed a model that would predict the amount of sediment on the bed of the river based on inflows and sediment measurements from the Paria River and the Little Colorado. Yeah. Right. So that's something that I think is maybe unique in the world. I'm not sure, they didn't have anybody to crib from in building that model.

Pause in recording, end of Part 1