

U.S. Department of the Interior
Bureau of Reclamation
Upper Colorado Basin Region



Glen Canyon Dam Adaptive Management Program

Glen Canyon Dam Adaptive Management Work Group Meeting

**Wednesday, August 19, 2020
9:30 a.m. – 5 p.m. MDT**

**Thursday, August 20, 2020
9:30 a.m. – 4 p.m. MDT**

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Administrative Items

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Meeting Packet Order

Tabs	Documents
	Packet Cover/Meeting Information
Administrative Items	<ul style="list-style-type: none"> • Meeting Packet Order • Federal Register Notice • WebEx Participant Information • AMWG Ground Rules
AMWG Supporting Documents	<ul style="list-style-type: none"> • AMWG & TWG Committee Membership List • AMWG Charter • AMWG Operating Procedures
Draft Agenda	<ul style="list-style-type: none"> • Agenda for August 19-20, 2020 Meeting
Draft Minutes & Action Items	<ul style="list-style-type: none"> • Draft Minutes from February 2020 Meetings • Draft Minutes from May 2020 Meeting • Action Item Tracking Report
Supplemental Materials	<ul style="list-style-type: none"> • Potential GCDAMP & Other Meetings in 2021 • Dr. Petty Memo – Program Guidance • TWP Process Document • TWG Recommendation • Flow Ad Hoc Group Charge • LTEMP ROD Table 4 – Experimental Treatments

Federal Register Notice:

<https://www.federalregister.gov/documents/2020/07/22/2020-15843/public-meeting-of-the-glen-canyon-dam-adaptive-management-work-group>

For updates, please see: <https://www.usbr.gov/uc/progact/amp/amwg.html>

Participant WebEx Information

Topic: AMWG – Day 1

Wednesday, August 19, 2020 – 9:30 am, Mountain Daylight Time

Event Number: 199 912 1277

Event Password: AMWG

Event Address:

<https://bor.webex.com/bor/j.php?MTID=m8bc1c6fc14d01bbc251a84a878566883>

Phone #: 415-524-5035



Topic: AMWG – Day 2

Thursday, August 20, 2020 – 8:30 am, Mountain Daylight Time

Event Number: 199 096 8166

Event Password: AMWG

Event Address:

<https://bor.webex.com/bor/j.php?MTID=maa7d19661f7a82551178f64659cac8b0>

Phone #: 415-524-5035

Glen Canyon Dam Adaptive Management Work Group

Ground Rules

- ✦ Arrive on time OR 10-15 minutes early to confirm WebEx connectivity and check your mic and audio settings.
- ✦ Remain MUTED when not actively speaking. Turn down cell phone ringers and other background sounds.
- ✦ Commit to FULL participation.
- ✦ Do homework before meeting begins.
- ✦ Take private and/or sidebar conversations outside/offline.
- ✦ Wait to be recognized before speaking. Always state your name and affiliation before making a comment.
- ✦ Show respect for others.
- ✦ Be concise. Stick to the topic.
- ✦ Save new business for the appointed time
- ✦ Help keep the meeting on schedule

AMWVG Supporting Documents

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Glen Canyon Dam Adaptive Management Work Group

Committee Membership List

(Updated: 08/14/2020)

SECRETARY'S DESIGNEE	ALTERNATE SECRETARY'S DESIGNEE	Designated Federal Officer (will also serve in the absence of the Secretary's Designee)
Dr. Timothy "Tim" Petty Assistant Secretary for Water and Science Department of the Interior 1849 C Street NW Washington, DC 20240 T: (202) 208-3024 Fax: (202) 208-3324 EM: timothy_petty@ios.doi.gov	Aubrey Bettencourt Deputy Assistant Secretary for Water and Science Department of the Interior 1849 C Street NW Washington, DC 20240 T: (202) 513-0314 Fax: (202) 208-3324 EM: aubrey_bettencourt@ios.doi.gov	Daniel Picard, Alternate Acting Regional Director Upper Colorado Regional Office Bureau of Reclamation 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3602 F: (801) 524-3855 EM: dpicard@usbr.gov

Federal Agencies:

1-BUREAU OF RECLAMATION	
Daniel Picard (member) 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3602 F: (801) 524-3855 EM: dpicard@usbr.gov	Kathleen Callister (alternate) 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3781 F: (801) 524-3807 EM: kcallister@usbr.gov

2-BUREAU OF INDIAN AFFAIRS	
Charles "Chip" Lewis (member) Western Regional Office 2600 N. Central Avenue, 4 th Floor Phoenix, AZ 85004-3050 T: (602) 379-6782 F: (602) 379-3837 EM: charles.lewis@bia.gov	Garry J. Cantley (alternate) Western Regional Office 2600 N. Central Avenue, 4 th Floor Phoenix, AZ 85004-3050 T: (602) 379-6750 x1257 F: (602) 379-3837 EM: garry.cantley@bia.gov

3-NATIONAL PARK SERVICE (Grand Canyon National Park)	
Jan Balsom (member) Grand Canyon National Park PO Box 129 Grand Canyon, AZ 86023 T: (928) 638-7758 F: (928) 638-7815 EM: jan_balsom@nps.gov	Billy Shott (alternate) Glen Canyon National Recreation Area PO Box 1507 Page, AZ 86040 T: (928) 608-6200

4-U.S. FISH AND WILDLIFE SERVICE	
Jeff Humphrey (member) Arizona Ecological Services Office 9828 North 31 st Avenue, Suite C3 Phoenix, AZ 85051 T: (602) 889-5946 EM: jeff_humphrey@fws.gov	Kirk Young (alternate) Arizona Fish & Wildlife Conservation Office 2500 S. Pine Knoll Drive Flagstaff, AZ 86001 T: (928) 556-2124 F: (928) 556-2125 EM: kirk_young@fws.gov

Native American Tribes:

5-HUALAPAI TRIBE	
<p>Peter Bungart (member) Hualapai Department of Cultural Resources PO Box 310 Peach Springs, AZ 86434 T: (928) 769-2234 F: (928) 769-2235 EM: pbungart@circaculture.com</p>	<p>Richard Powskey (alternate) Hualapai Tribal Council PO Box 179 Peach Springs, AZ 86434 T: (928) 769-2267 F: (928) 769-2532 EM: richard.powskey@hualapai-nsn.gov</p>
6-HOPI TRIBE	
<p>Jakob Maase (member) Hopi Cultural Preservation Office PO Box 123 Kykotsmovi, AZ 86039 EM: jmaase1@k-state.edu</p>	<p>Stewart Koyiyumptewa (alternate) Hopi Cultural Preservation Office PO Box 123 Kykotsmovi, AZ 86039 EM: skoyiyumptewa@hopi.nsn.us</p>
7-NAVAJO NATION	
<p>Richard Begay (member) Navajo Nation Heritage and Historic Preservation PO Box 7440 Window Rock, AZ 86515 T: (928) 871-7000</p>	<p>Terilyn "Kim" Yazzie (alternate) Navajo Nation Dept. of Fish & Wildlife PO Box 7440 Window Rock, AZ 86515 Cell: (505) 402-9098 Work: (928) 871-7069 NZD Fax: (505)960-6657 EM: kyazzie@nndfw.org</p>
8-PUEBLO OF ZUNI	
<p>Arden Kucate (member) PO Box 339 1203-B State Highway 53 Zuni, NM 87327 T: (505) 782-7000</p>	<p>Clyde Yatsattie (alternate) PO Box 339 1203-B State Highway 53 Zuni, NM 87327 T: (505) 782-7000 EM: Clyde.Yatsattie@ashiwi.org</p>
9-SOUTHERN PAIUTE CONSORTIUM	
VACANT (member)	VACANT (alternate)
10-SAN JUAN SOUTHERN PAIUTE TRIBE	
VACANT (member)	

Seven Basin States:

11-ARIZONA	
Clint Chandler (member) Arizona Department of Water Resources Water Planning and Permitting Division 1110 W. Washington Street, Suite 310 Phoenix, AZ 85007 T: (602) 771-8412 F: (602) 771-8681 EM: cchandler@azwater.gov	Vineetha Kartha (alternate) Arizona Department of Water Resources Colorado River Management Section 1110 W. Washington Street, Suite 310 Phoenix, AZ 85007 T: (602) 771-8552 F: (602) 771-8681 EM: vkartha@azwater.gov
12-CALIFORNIA	
Jessica Neuwerth (member) Colorado River Board of California 770 Fairmont Avenue, Suite 100 Glendale, CA 91203 T: (818) 500-1625 ext. 339 EM: jneuwerth@crb.ca.gov	Christopher Harris (alternate) Colorado River Board of California 770 Fairmont Avenue, Suite 100 Glendale, CA 91203 T: (818) 500-1625 ext. 308 F: (818) 543-4685
13-COLORADO	
John H. McClow (member) Colorado Water Conservation Board 210 West Spencer, Suite B Gunnison, CO 81230 T: (970) 641-6065 F: (970) 641-1162 EM: jmcclow@ugrwc.org	Michelle Garrison (alternate) State of Colorado 1313 Sherman Street, Room 718 Denver, CO 80203 T: (303) 866-3441 x3213 EM: michelle.garrison@state.co.us
14-NEVADA	
Sara Price (member) Colorado River Commission of Nevada 555 East Washington Avenue, Suite 3100 Las Vegas, NV 89101 T: (702) 486-2670 EM: sprice@crc.nv.gov	Peggy Roefer (alternate) Colorado River Commission of Nevada 555 East Washington Avenue, Suite 3100 Las Vegas, NV 89101 T: (702) 486-2669 EM: proefer@crc.nv.gov
15-NEW MEXICO	
Arianne Singer (member) New Mexico Interstate Stream Commission PO Box 25102 Santa Fe, NM 87504-5102 T: (505) 827-6172 EM: arianne.singer@state.nm.us	Paul Harms (alternate) New Mexico Interstate Stream Commission PO Box 25102 Santa Fe, NM 87504-5102 T: (505) 827-6126 EM: paul.harms@state.nm.us

16-UTAH	
Todd Adams (member) Utah Division of Water Resources 1594 West North Temple, Suite 3710 Salt Lake City, UT 84114 T: (801) 538-7250 EM: toddadams@utah.gov	VACANT (alternate)

17-WYOMING	
Steven W. Wolff (member) Interstate Streams Division 122 W. 25 th Street Cheyenne, WY 82002-0370 T: (307) 777-1942 F: (307) 777-5451 EM: steve.wolff@wyo.gov	Charlie Ferrantelli (alternate) Wyoming State Engineer's Office 122 West 25 th Street Cheyenne, WY 82002 T: (307) 777-6151 EM: charlie.ferrantelli@wyo.gov

Environmental Groups:

18-GRAND CANYON WILDLANDS COUNCIL	
Larry Stevens (member) 2410 East Route 66 Flagstaff, AZ 86004 T: (928) 380-7724 EM: larry@grandcanyonwildlands.org	VACANT (alternate)

19-AMERICAN RIVERS / National Parks Conservation Association)	
Matt Rice (member) 1536 Wynkoop, Ste 321 Denver, CO 80202 T: 303-454-3395	VACANT (alternate)

Recreation Interests:

20-GRAND CANYON RIVER GUIDES	
David Brown (member) 257 East 200 South, Ste 200 Salt Lake City, UT 84111 T: (801) 694-1228 EM: dbrown@swca.com	VACANT (alternate)

21-FLY FISHERS INTERNATIONAL / TROUT UNLIMITED	
John Jordan (member) 4510 E. Joshua Tree Lane Paradise Valley, AZ 85253 T: (602) 840-4224 EM: jjordan1@cox.net	John Hamill (alternate) 1254 N. Fox Hill Road Flagstaff, AZ 86004 C: (928) 606-4234 EM: hamilldrt50@msn.com

Federal Power Purchase Contractors:

22-COLORADO RIVER ENERGY DISTRIBUTORS ASSOCIATION (CREDA)	
Leslie James (member) 10429 S. 51 st Street, Suite 230 Phoenix, AZ 85044 T: (480) 477-8646 F: (480) 477-8647 EM: creda@creda.cc	Edward Gerak (alternate) Arizona Power Authority 1810 West Adams Street Phoenix, AZ 85007 T: (602) 368-4265 F: (602) 253-7970
23-UTAH MUNICIPAL POWER AGENCY	
Kevin Garlick (member) Utah Municipal Power Agency (UMPA) 696 W. 100 S. Spanish Fork, UT 84660 T: (801) 798-7849 EM: kevin@umpa.energy	Clifford Barrett (alternate) 845 Lakeview Stansbury Park, UT 84074-1912 T: (435) 882-0164 EM: cibarre@q.com

Other Stakeholders:

24-ARIZONA GAME AND FISH DEPARTMENT	
Chris Cantrell (member) Fisheries Branch 5000 W. Carefree Highway Phoenix, AZ 85086-5000 T: (602) 942-3000 EM: ccantrell@azgfd.gov	James deVos (alternate) Wildlife Management Division 5000 W. Carefree Highway Phoenix AZ 85086-5000 T: (623) 236-7302 EM: jdevos@azgfd.gov
25-DEPARTMENT OF ENERGY (DOE) – WESTERN AREA POWER ADMINISTRATION (WAPA)	
VACANT	Brian Sadler (alternate) Western Area Power Administration 299 S. Main Street, Suite 200 Salt Lake City, UT 84111 T: (801) 524-5506 EM: sadler@wapa.gov

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Glen Canyon Dam Adaptive Management Program Technical Work Group Membership List

(Updated: 8/4/2020)

TWG Chairperson	TWG Vice Chairs
<p>Seth Shanahan (10/1/16) Southern Nevada Water Authority 100 City Parkway, Suite 700 Las Vegas NV 89106 T: 702-822-3314 F: 702-822-3308 EM: seth.shanahan@snwa.com</p>	<p>Vineetha Kartha State of Arizona</p> <p>Lee Traynham Bureau of Reclamation</p>

Federal Agencies:

1-BUREAU OF RECLAMATION	
<p>Lee Traynham (member, 1/8/20) U.S. Bureau of Reclamation 125 S. State Street, Room 8100 Salt Lake City UT 84138 T: 801-524-3752 F: 801-524-5499 EM: ltraynham@usbr.gov</p>	<p>Clarence Fullard (alternate, 7/9/2020) U.S. Bureau of Reclamation 125 S. State Street, Room 8100 Salt Lake City UT 84138 T: 801-524-3809 F: 801-524-5499 EM: cfullard@usbr.gov</p>

2-BUREAU OF INDIAN AFFAIRS	
<p>Charles "Chip" Lewis (member, 8/6/13) Western Regional Office 2600 N. Central Avenue, 4th Floor Phoenix AZ 85004-3050 T: 602-379-6782 F: 602-379-3837 EM: charles.lewis@bia.gov</p>	<p>Garry J. Cantley (alternate, 12/4/06) Western Regional Office 2600 N. Central Avenue, 4th Floor Phoenix AZ 85004-3050 T: 602-379-6750 x1257 F: 602-379-3837 EM: garry.cantley@bia.gov</p>

3-NATIONAL PARK SERVICE (Grand Canyon National Park)	
<p>Jan Balsom (member, 11/3/10) Office of the Superintendent - GCNP PO Box 129 (Street: 20 South Entrance Road) Grand Canyon AZ 86023 T: 928-638-7758 F: 928-638-7815 EM: jan_balsom@nps.gov</p>	<p>Brian Healy (alternate, 11/16/15) Grand Canyon National Park 1824 South Thompson Street, Suite 200 Flagstaff, AZ 86001 T: 928-638-7453 F: 928-638-7492 EM: Brian_Healy@nps.gov</p>

4-NATIONAL PARK SERVICE (Glen Canyon National Recreation Area)	
<p>Ken Hyde (member, 8/17/16) Glen Canyon NRA, PO Box 1507, 691 Scenic View Drive Page AZ 86040 T: 928-606-6265 EM: ken_hyde@nps.gov</p>	<p>VACANT</p>

5-U.S. FISH AND WILDLIFE SERVICE	
Kirk Young (member, 11/14/12) Arizona Fish & Wildlife Conservation Office 2500 S. Pine Knoll Drive Flagstaff AZ 86001 T: 928-556-2124 F: 928-556-2125 EM: kirk_young@fws.gov	Jessica Gwinn (alternate, 5/16/16) Arizona Ecological Services Office 2321 W. Royal Palm Road, Suite 103 Phoenix AZ 85021 T: 602-242-0210 x249 EM: Jessica_gwinn@fws.gov

Native American Tribes:

6-HUALAPAI TRIBE	
VACANT	VACANT

7-HOPI TRIBE	
Jakob Maase (member, 1/8/20) P.O. Box 123 Kykotsmovi, AZ 86039 Cell: 913-448-8962 Jmaase1@k-state.edu	VACANT

8-NAVAJO NATION	
VACANT	Kim Yazzie (alternate, 8/24/17) Navajo Nation Dept of Fish & Wildlife PO Box 7440 Window Rock, AZ 86515 T: 928-871-7152 Cell: 505-402-9098 EM: kyazzie@nndfw.org

9-PUEBLO OF ZUNI	
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10-SOUTHERN PAIUTE CONSORTIUM	
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11-SAN JUAN SOUTHERN PAIUTE TRIBE	
P.O. Box 2656 Tuba City, AZ 86002 T: 928-283-1066	

Seven Basin States:

12-ARIZONA	
Vineetha Kartha (member, 12/13/13) Arizona Department of Water Resources 1110 W. Washington Street, Suite 310 Phoenix AZ 85007 T: 602-771-8552 F: 602-771-8681 EM: vkartha@azwater.gov	Craig McGinnis (alternate, 1/31/19) Arizona Department of Water Resources 1110 W. Washington Street, Suite 310 Phoenix AZ 85007 T: 602-771-0201 F: 602-771-8681 EM: cmcginnis@azwater.gov

13-CALIFORNIA	
VACANT	Jessica Neuwerth (alternate, 7/7/15) Colorado River Board of California 770 Fairmont Avenue, Suite 100 Glendale AZ 91203-1035 T: 815-500-1625 x339 EM: jneuwerth@crb.ca.gov

14-COLORADO	
Michelle Garrison (member, 12/18/19) Colorado Water Conservation Board 1313 Sherman St., Rm. 721 Denver, CO 80203 303-866-3441 x3213 Michelle.garrison@state.co.us	D. Randolph Seaholm (alternate, 11/3/10) Colorado Water Conservation Board 6085 Nile Circle Golden CO 80403 T: 303-278-3064 EM: seaholmdr@gmail.com

15-NEVADA	
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16-NEW MEXICO	
Paul Harms (member, 11/3/10) NM Interstate Stream Commission PO Box 25102 Santa Fe NM 87504 T: 505-827-1150 F: 505-827-6188 EM: paul.harms@state.nm.us	Christina Noftsker (alternate, 9/12/18) NM Interstate Stream Commission PO Box 25102 Santa Fe NM 87504 T: 505-827-____ F: 801-531-9705 EM: christina.noftsker@state.nm.us

17-UTAH	
VACANT	VACANT

18-WYOMING	
Steven W. Wolff (member, 2/3/15) State Engineer's Office 122 W. 25 th Street Cheyenne WY 82002-0370 T: 307-777-1942 F: 307-777-5451 EM: steve.wolff@wyo.gov	Charlie Ferrantelli (alternate, 10/25/18) State Engineer's Office 122 W. 25 th Street – Herschler Building 1E Cheyenne WY 82002 T: 307-777-6151 F: 307-777-5451 EM: charlie.ferrantelli@wyo.gov

Environmental Groups:

19-GRAND CANYON WILDLANDS COUNCIL	
Larry Stevens (member, 11/3/10) PO Box 1315 Flagstaff AZ 86002 Tel: 928-380-7724 EM: larry@springstewardship.org	Kelly Burke (alternate, 8/25/17) PO Box 1315 Flagstaff AZ 86002 Tel: 928-606-7870 EM: gcwildlands@icloud.com

20-NATIONAL PARKS CONSERVATION ASSOCIATION	
Kevin Dahl (member, 8/20/14) NPCA, Southwest Region 738 N. 5 th Avenue, Suite 222 Tucson AZ 85705 T: 520-624-2014 C: 520-603-6430 EM: kdahl@npca.org	VACANT

Recreation Interests:

21-GRAND CANYON RIVER GUIDES	
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22-FLY FISHERS INTERNATIONAL / TROUT UNLIMITED	
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Federal Power Purchase Contractors:

23-COLORADO RIVER ENERGY DISTRIBUTORS ASSOCIATION (CREDA)	
William E. Davis (member, 11/3/10) EcoPlan Associates, Inc. 701 W. Southern Avenue, Suite 203 Mesa AZ 85210 T: 480-733-6666 F: 480-733-0661 EM: wdavis@ecoplanaz.com	Leslie James (AMWG member, 11/3/10) 10429 S. 51 st Street, Suite 230 Phoenix AZ 85044 T: 480-477-8646 F: 480-477-8647 EM: creda@creda.cc

24-UTAH MUNICIPAL POWER AGENCY (UMPA)	
Clifford Barrett (member, 11/3/10) 845 Lakeview Stansbury Park UT 84074-1912 T: 435-882-0164 EM: cibarre@q.com	VACANT

Other Stakeholders:

25-ARIZONA GAME AND FISH DEPARTMENT	
Ryan Mann (member, 11/21/16) Arizona Game and Fish Department 5000 W. Carefree Highway Phoenix AZ 85086 T: 623-236-7538 F: EM: rmann@azgfd.gov	Dave Rogowski, PhD (alternate, 7/7/15) Arizona Game and Fish Department 506 N. Grant Street, Suite L Flagstaff AZ 86004 T: 928-226-7677 F: EM: drogowski@azgfd.gov

26-DEPARTMENT OF ENERGY (DOE) – WESTERN AREA POWER ADMINISTRATION (WAPA)	
Shane Capron (member, 6/4/12) 299 South Main Street, Ste, 200 Salt Lake City, UT 84111 T: 720-799-3441 EM: capron@wapa.gov	Craig Ellsworth (alternate, 6/4/12) WAPA, CRSP Management Center 150 Social Hall Avenue, Suite 300 Salt Lake City, UT 84138 T: 801-524-3344 EM: ellsworth@wapa.gov

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**U.S. Department of the Interior
Bureau of Reclamation
Glen Canyon Dam Adaptive Management Work Group**

CHARTER

- 1. Committee's Official Designation.** Glen Canyon Dam Adaptive Management Work Group (AMWG).
- 2. Authority.** The Grand Canyon Protection Act (Act) of October 30, 1992, Public Law 102-575; Federal Advisory Committee Act (FACA), as amended, 5 U.S.C. Appendix 2.
- 3. Objectives and Scope of Activities.** The Glen Canyon Dam Adaptive Management Program (AMP) provides for monitoring the results of the operating criteria and plans adopted by the Secretary of the Interior (Secretary), and for research and studies to suggest appropriate changes to those plans and operating criteria.

The AMP includes the AMWG. The AMWG provides advice and recommendations to the Secretary relative to the operation of Glen Canyon Dam. The Secretary's Designee is the Assistant Secretary for Water and Science who serves as the Chair. The AMWG recommends suitable monitoring and research programs and makes recommendations to the Secretary. The AMWG may recommend research and monitoring proposals outside the Act which complement the AMP process, but such proposals will be funded separately, and shall not deter from the focus of the Act.

Under Section 1802(a) of the Act, "[t]he Secretary shall operate Glen Canyon Dam in accordance with the additional criteria and operating plans specified in Section 1804 [of the Act] and exercise other authorities under existing law in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to, natural and cultural resources and visitor use." Under Section 1802(b) of the Act, "[t]he Secretary shall implement this section [of the Act] in a manner fully consistent with and subject to the Colorado River Compact, the Upper Colorado River Basin Compact, the Water Treaty of 1944 with Mexico, the decree of the Supreme Court in *Arizona v. California*, and the provisions of the Colorado River Storage Project Act of 1956 and the Colorado River Basin Project Act of 1968 that govern allocation, appropriation, development, and exportation of the waters of the Colorado River basin."

- 4. Description of Duties.** The duties or roles and functions of the AMWG are in an advisory capacity only. They are, as applicable, to:
 - a. Establish AMWG operating procedures.
 - b. Advise the Secretary in meeting environmental and cultural commitments including those contained in the Record of Decision for the Glen Canyon Dam Long-Term Experiment and Management Plan Final Environmental Impact Statement and subsequent related decisions.

- c. Recommend the framework for the AMP policy, goals, and direction.
- d. Recommend resource management objectives for development and implementation of a long-term monitoring plan, and any necessary research and studies required to determine the effect of the operation of Glen Canyon Dam on the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to, natural and cultural resources, and visitor use.
- e. Review and provide input on the report identified in the Act to the Secretary, the Congress, and the Governors of the Colorado River Basin States. This annual report includes discussion on dam operations, the operation of the AMP, status of resources, and measures taken to protect, mitigate, and improve the resources defined in the Act.
- f. Annually review long-term monitoring data to provide advice on the status of resources and whether the AMP goals and objectives are being met.
- g. Review and provide input on all AMP activities undertaken to comply with applicable laws, including permitting requirements.

All current and future Executive Orders, Secretary's Orders, and Secretarial memos should be included for discussion and recommendation as they are released. At the conclusion of each meeting or shortly thereafter, provide a detailed recommendation report, including meeting minutes, to the DFO.

- 5. Agency or Official to Whom the Committee Reports.** The AMWG reports to the Secretary through the Secretary's Designee.
- 6. Support.** The logistical and support services for the meetings of the AMWG will be provided by the Bureau of Reclamation.
- 7. Estimated Annual Operating Costs and Staff Years.** The estimated annual operating costs associated with supporting the AMWG's functions are \$400,000, including all direct and indirect expenses. It is estimated that four FTE's will be required to support the AMWG.
- 8. Designated Federal Officer.** The DFO is the Bureau of Reclamation, Upper Colorado Region, Regional Director who is a full-time Federal employee appointed in accordance with Agency procedures. The DFO or alternate will approve or call all AMWG and subcommittee meetings, prepare and approve all meeting agendas, attend all AMWG and subcommittee meetings, adjourn any meetings when the DFO determines adjournment to be in the public interest and chair meetings when directed to do so by the Secretary.

9. Estimated Number and Frequency of Meetings. The AMWG is expected to meet approximately twice a year, and at such other times as designated by the DFO.

10. Duration. Continuing.

11. Termination. The AMWG will terminate 2 years from the date the charter is filed, unless prior to that date, it is renewed in accordance with the provisions of section 14 of the FACA. The AMWG will not meet or take any action without a valid current charter.

12. Membership and Designation. Members and alternate members of the AMWG appointed by the Secretary will be comprised of, but not limited to, the following:

a. Secretary's Designee, who will serve as Chairperson for the AMWG.

b. One representative each from the following entities:

- (1) The Secretary of Energy (Western Area Power Administration)
- (2) Arizona Game and Fish Department
- (3) Hopi Tribe
- (4) Hualapai Tribe
- (5) Navajo Nation
- (6) San Juan Southern Paiute Tribe
- (7) Southern Paiute Consortium
- (8) Pueblo of Zuni

c. One representative each from the Governors from the seven basin States:

- (1) Arizona
- (2) California
- (3) Colorado
- (4) Nevada
- (5) New Mexico
- (6) Utah
- (7) Wyoming

d. Representatives each from the general public as follows:

- (1) Two from environmental organizations
- (2) Two from the recreation industry
- (3) Two from contractors who purchase Federal power from Glen Canyon Powerplant

e. One representative from each of the following DOI agencies as ex-officio non-voting members:

- (1) Bureau of Reclamation

- (2) Bureau of Indian Affairs
- (3) U.S. Fish and Wildlife Service
- (4) National Park Service

Members will be appointed to the AMWG by the Secretary, with input and recommendations from the above-referenced agencies, States, tribes, contractors for Federal power from Glen Canyon Dam, environmental organizations, and other stakeholders. Each member may also recommend an alternate member for appointment by the Secretary. Members and alternates of the AMWG will be appointed for a 3-year term

Members of the AMWG serve without compensation, except that the DFO, in his or her sole discretion, may choose to allow compensation for the Technical Work Group subcommittee chairperson according to applicable authorities. While away from their homes or regular places of business, members engaged in AMWG or subcommittee business approved by the DFO may be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in Government service under section 5703 of title 5 of the United States Code.

A vacancy on the AMWG will be filled in the same manner in which the original appointment was made.

13. Ethics Responsibility.

- a. **Members Who Are Federal Employees.** Federal members who are appointed to the AMWG are appointed in their official capacity as Federal employees. This means that when these Federal employees act in their capacity as an AMWG member, they will be subject to the ethics statutes and regulations that apply to them as Federal employees, including the avoidance of conflict of interest.
- b. **Members Who Are Not Federal Employees.** AMWG or subcommittee members who are not Federal employees shall not participate in any AMWG or subcommittee deliberations or votes relating to a specific party matter before the Department or its bureaus and offices including a lease, license, permit, contract, grant, claim, agreement, or litigation in which the member or the entity the member represents has a direct financial interest.

14. Subcommittees. Subject to the DFO's approval, subcommittees may be formed for the purpose of compiling information or conducting research. However, such subcommittees must act only under the direction of the DFO and must report their recommendations to the full AMWG for consideration. Subcommittees must not provide advice or work products directly to the Agency. Subcommittees will meet as necessary to accomplish their assignments, subject to the approval of the DFO and the availability of resources.

15. Recordkeeping. The records of the AMWG, and formally and informally established subcommittees of the AMWG, shall be handled in accordance with General Records Schedule 6.2 or other approved Agency records disposition schedules. These records shall be available for inspection and copying, subject to the Freedom of Information Act, 5 U.S.C. 552.

C. 552.



Secretary of the Interior

9/19/19

Date Signed

SEP 19 2019

Date Filed

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February 9, 2011

GLEN CANYON DAM
ADAPTIVE MANAGEMENT WORK GROUP
OPERATING PROCEDURES

FOREWARD

The Grand Canyon Protection Act (Act) of October 30, 1992, (Public Law 102-575) directs the Secretary of the Interior (Secretary) to "establish and implement long-term monitoring programs and activities that will ensure that Glen Canyon Dam is operated in a manner consistent with that of section 1802" of the Act. "The monitoring programs and activities shall be established and implemented in consultation with the Secretary of Energy; the Governors of the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming; Indian tribes; and the general public, including representatives of academic and scientific communities, environmental organizations, the recreation industry, and contractors for the purchase of Federal power produced at Glen Canyon Dam." In order to comply with the consultation requirement of the Act, the Glen Canyon Dam EIS recommended formation of a Federal Advisory Committee. To fulfill this recommendation, the Glen Canyon Dam Adaptive Management Work Group (AMWG) was established. The AMWG Charter imposes the following criteria: (1) the AMWG shall operate under the Federal Advisory Committee Act (Public Law 92-463); (2) the Chairperson shall be designated by the Secretary; (3) the Secretary's Designee, shall also serve as the Designated Federal Official under the Federal Advisory Committee Act; (4) the Bureau of Reclamation will provide the necessary support in talking accurate minutes of each meeting; and (5) the AMWG shall continue in operation until terminated or renewed by the Secretary of the Interior under the Federal Advisory Committee Act.

OPERATION

1. Meetings. The AMWG is expected to meet semiannually. The Secretary's Designee may call additional meetings as deemed appropriate. A minimum of one meeting will be held annually. All meetings shall be announced by notice in the Federal Register and by news release to local newspapers.

Thirteen members must be present (either in person or on the telephone) at any meeting of the AMWG to constitute a quorum.

Robert's Rules of Order will be generally followed, except some flexibility will be allowed as needs dictate.

The Bureau of Reclamation is responsible for arranging meetings and for other duties associated with operation of the AMWG. They will arrange for meeting location, provide staff for the Designee, prepare minutes and Federal Register Notices, and other operational requirements of the AMWG.

Meetings of the AMWG will generally be held in Phoenix, Arizona, to allow for better travel accessibility for the members as well as provide greater opportunity for the public to attend. However, the Secretary's Designee may decide upon a different location as he/she deems appropriate.

The AMWG may make recommendations to the Secretary of the Interior in response to future legislation or appropriations that may affect or impact the Glen Canyon Dam Adaptive Management Program. This may be accomplished when an AMWG member requests to the Chair, an issue to be addressed either at a regular meeting of the AMWG, at a special meeting or during a conference call. AMWG members will discuss the issue and if appropriate, make recommendations on the issue to the Secretary of the Interior in a timely manner. When any other potentially controversial topics are identified by any AMWG member, they should notify the Chair so that this procedure can be implemented.

2. Chairperson. The Chairperson will be the Secretary's Designee, who will preside over the meetings of the AMWG. In the absence of the Chairperson, a senior level Interior representative will act as Chairperson for the AMWG. The Chairperson or designated alternate must be present before a meeting of the AMWG may convene. The Chairperson or his/her alternate is authorized to adjourn an AMWG meeting at any time.

The Secretary's Designee will also be responsible for sending a formal summary report after each Advisory Committee meeting directly to the Secretary of the Interior with copies of subject summary report to be provided to all AMWG members.

3. Members. Membership shall follow the guidelines in the AMWG Charter. Members of the AMWG will be designated by the Secretary of the Interior. They shall serve for a term of four years. Members may be re-designated to serve for more than one term.

4. Alternate Committee Members. Each AMWG member may designate an alternate to serve for the same term as the member. Alternates must be identified to the Chairperson in writing. Alternates must meet the same qualifications as the member. Alternates will have authority to participate in AMWG business, including quorum and voting privileges. A list of members and alternates shall be maintained and made available to AMWG members.

5. Agenda. At least 30 days prior to any meeting of the AMWG, a draft of the proposed agenda and related information will be sent to the group members. Members shall review the agenda and return comments and proposed agenda items to the Designee within two weeks of the agenda mailing date. The final agenda will be sent to the members 15 days prior to the meeting. The Secretary's Designee shall approve the agendas.

6. Voting. The maker of a motion must clearly and concisely state and explain his or her motion. Motions may be made verbally or submitted in writing in advance of the meeting. Notice of motions to be made by any member of the AMWG should be announced in the Federal Register and presented on the agenda. Any motions proposed by any member in meetings must be related to an agenda topic and will be considered only if a simple majority of members present agree to hear it. After a motion there should be presentations by staff followed by a discussion and a call for questions. The public will be given opportunity to comment during the question period as allowed by the Chairperson. Any member of the public, who has asked to address the AMWG, shall have a minimum of two minutes to comment. The Chairperson can limit the total time allowed to the public for comments. Comments shall address the motion and not be repetitive to presentations, group discussions or other comments previously presented. The motion must be fully documented for the minutes and restated clearly by the Chairperson before a vote is taken.

The group should attempt to seek consensus but, in the event that consensus is not possible, a vote should be taken. Voting shall be by verbal indication or by raised hand. Approval of a motion requires a 60 percent majority of members present and voting. The views of any dissenting member or minority group shall be briefly incorporated into the information transmitted to the Secretary along with the majority recommendation. In addition, at his/her discretion, the Secretary's Designee may ask any individual at the meeting for the rationale related to their vote. Voting shall occur only with the formal meetings of the group.

7. Minutes. Detailed minutes of each meeting will be kept. The minutes will contain a record of persons present and a description of pertinent matters discussed, conclusions reached, and actions taken on motions. Minutes shall be limited to approximately 5-15 pages. The corrections and adoption of the minutes will be by vote of the AMWG at the next subsequent meeting. The Secretary's Designee shall approve all minutes. The Bureau of Reclamation is responsible for recording and disseminating minutes to AMWG members, generally within two weeks of the subject meeting, but in no event longer than 30 days.

9. Public Involvement. No later than 15 days prior to each meeting of the AMWG, a notice will be published in the Federal Register. Meetings will be open to the public and advertised in local newspapers. Interested persons may appear in person, or file written statements to the AMWG. Public comments can be on any issue related to operation of the Glen Canyon Dam. A specific time for public comment will be identified in the agenda. Advance approval for oral participation may be prescribed and speaking time may be limited. Minutes of the AMWG meetings and copies of reports submitted to the AMWG will be maintained for public review at the Bureau of Reclamation's Upper Colorado Regional Office in Salt Lake City, Utah, and at the Library of Congress in Washington, D.C. They will also be posted to the Bureau of Reclamation web site www.uc.usbr.gov/amp).

10. Payment of Travel. While engaged in the performance of official business at AMWG and AMWG sub-group meetings (regular, ad hoc, and Protocol Evaluation Panel meetings) away from home or their regular places of business, all AMWG members or AMWG sub-group members shall, upon request, be reimbursed for travel expenses in accordance with current Federal Travel Regulations. Alternates representing the official committee member may also receive compensation for travel expenses.

11. Open/Closed Meetings. If any member proposes discussion of a sensitive issue felt to require a closed session, he or she should so state in a proposal submitted to AMWG members in sufficient time to include it in the agenda published in the Federal Register Notice announcing the next meeting. A closed executive session may be held during a regular meeting but should be used rarely. Any sensitive cultural issues will require consultation with Native Americans prior to meeting.

Telephone conference meetings must have a notice in the Federal Register 15 days prior to the call. There must be adequate opportunity for the general public to listen to the conference call.

The AMWG may conduct business outside of formal meetings through telephone polls conducted by the Chairperson or his/her designee. In emergency situations, telephone polls can be requested by the AMWG member to act on clearly defined written motions for AMWG approval. Following approval by the Chairperson, a telephone poll will be conducted within

seven working days. During a telephone poll, all members will be contacted and requested to vote. Approval of a motion requires 60 percent majority of all members voting. The Chairperson is responsible for documenting in writing how each member voted and distributing the record to all AMWG members.

12. Reports and Record Keeping. The Annual Report (AR) required by the Grand Canyon Protection Act shall be reviewed by the AMWG. The State of the Natural and Cultural Resources in the Colorado River Ecosystem report developed by the Grand Canyon Monitoring and Research Center will be attached to the AR and shall contain information on the condition of the resources impacted by the operation of Glen Canyon Dam. The AR shall be concise, containing critical resource issues and recommendations to the Secretary on future dam operations.

Bureau of Reclamation staff will supply GSA the required information to complete the summary report for Federal Advisory Committees.

13. Committee Expenses and Cost Accounting. An accounting of the expenses for operation of the AMWG shall be maintained by Reclamation. Expenses and other information will be submitted to GSA as required by FACA. Committee expenses are limited to approximately \$500,000 annually.

SUB-GROUPS

1. Formation. The AMWG may form sub-groups in order to facilitate the mission of the AMWG as identified in the Act and the AMWG Charter. Sub-groups will be formed for completion of specific tasks or for specified periods of time. Sub-group members will be named by the members of the AMWG for their own organization, or by the Secretary's Designee. Effort shall be made to keep sub-groups small. Sub-groups will be formed or dissolved by a vote of the AMWG.

2. Requirements. Sub-groups may choose their chairperson from among the AMWG named sub-group members. The chairperson of any sub-group may convene group meetings at his or her discretion. Sub-groups may develop their own operating procedures. One standing sub-group of the AMWG will be Glen Canyon Dam Technical Work Group (TWG). The TWG membership shall consist of one representative from each organization represented in the AMWG, with the exception that two members from the National Park Service representing the Grand Canyon National Park and the Glen Canyon Recreational Area, and one representative from the US Geological Survey. All sub-groups will elect their own officers. Names of all sub-group members will be announced to the AMWG at regular meetings and will be attached to the minutes. Sub-group members may designate alternates.

3. Charge. Sub-groups will receive their charges from the AMWG. Sub-groups will work only on issues assigned them by the AMWG. They will not be empowered to follow other issues on their own. They are encouraged to submit issues to the AMWG they feel worthy of consideration and discussion, but the AMWG must approve work on all new issues. The AMWG may require the sub-groups to develop plans and direct them to come to a consensus or majority opinion at their discretion. Sub-groups shall determine their own operating procedures, which must be reduced to writing and included with the AMWG and sub-group records.

4. Reporting. Sub-groups will report at least annually to the AMWG at the request of the Chairperson. Sub-groups shall report only to the AMWG. They shall provide information as necessary for preparing annual resource reports and other reports as required for the AMWG.

5. Ad Hoc Groups. Ad hoc groups may be created by the Secretary's Designee or as a subcomponent of a sub-group. These groups may meet to discuss assignments from the AMWG or sub-group. Ad hoc meetings will not require Federal Register notices. Minutes are recommended but not required. Ad hoc groups shall report to the AMWG or the main body of the sub-group, depending upon which gives the assignment.

Adopted by vote of the AMWG on February 9, 2011, in Phoenix, Arizona.

Approved: Armen J. Coste Aug. 19, 2011
Chairperson Date

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Draft Agenda

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**Glen Canyon Dam Adaptive Management Program
Adaptive Management Work Group Meeting, August 19-20, 2020**

Wednesday, August 19, 2020

Day 1 Webinar Information:

<https://bor.webex.com/bor/j.php?MTID=m8bc1c6fc14d01bbc251a84a878566883>

Telephone: 415-527-5035 Meeting Number: 199 912 1277

FINAL AGENDA

START TIME ¹ (Duration)	Wednesday, August 19, 2020 Topic and Presenter and Purpose ²
8:30 PDT/ 9:30 MDT (:45)	<p>Welcome and Administrative: Tim Petty, Assistant Secretary for Water and Science, Department of the Interior and Secretary's Designee</p> <ul style="list-style-type: none"> ▪ Introductions and Determination of Quorum (13 members) ▪ Approval of February 12-13, 2020 Meeting Minutes ▪ Approval of May 20, 2020 Meeting Minutes ▪ Administrative Updates <ul style="list-style-type: none"> ○ Progress on Nominations and Reappointments ○ FY2021 Program Funding Status ○ Action Item Tracking Report
9:15 PDT/ 10:15 MDT (:15)	<p>In Memoriam: Charley Bullets, Kaibab Band of Paiute Indians and Southern Paiute Consortium</p> <ul style="list-style-type: none"> ▪ Words of Remembrance ▪ Moment of Silence ▪ Additional Remarks
9:30 PDT/ 10:30 MDT (:30)	<p>COVID-19 Impacts to FY20 Workplan: Joel Sankey, GCMRC</p> <ul style="list-style-type: none"> ▪ Presentation (15 minutes) ▪ Q&A and discussion (15 minutes) <p><u>Purpose:</u> To provide an update on the FY20 Workplan, with emphasis on impacts and constraints to field work due to COVID-19.</p>
10:00 PDT/ 11:00 MDT (1:30)	<p>FY2021-2023 Triennial Budget and Work Plan—Overview: Seth Shanahan, TWG Chair; Craig Ellsworth, BAHG Chair; Lee Traynham, Reclamation; and Scott VanderKooi, GCMRC</p> <ul style="list-style-type: none"> ▪ Presentation (60 minutes) ▪ Clarifying questions (30 minutes) <p><u>Additional Information:</u> 1) TWG Recommendation 2) Science Advisors' Review</p> <p><u>Purpose:</u> To assist AMWG to make a recommendation to the Secretary on the FY2021-23 Triennial Budget and Work Plan (TWP)</p>
11:30 PDT/ 12:30 MDT	LUNCH

START TIME ¹ (Duration)	Wednesday, August 19, 2020 Topic and Presenter and Purpose ²
(1:00)	
12:30 PDT/ 1:30 MDT (1:30)	<p>FY2021-2023 Triennial Budget and Work Plan—Discussion and Recommendation:</p> <ul style="list-style-type: none"> ▪ Discuss and determine consensus (or vote, if necessary) on each of the proposed changes to the budget ▪ Discuss and determine consensus (or vote, if necessary) on the full budget <p><u>Purpose:</u> To make a recommendation to the Secretary on the FY2021-2023 Triennial Budget and Work Plan (TWP).</p> <p>Proposed Motion: AMWG recommends to the Secretary of the Interior the Glen Canyon Dam Adaptive Management Program Triennial Budget and Work Plan—Fiscal Years 2021-2023 (July 29, 2020 draft).</p>
2:00 PDT/ 3:00 MDT (:15)	BREAK
2:15 PDT/ 3:15 MDT (:30)	<p>Tribal Liaison Report: Theresa Pasqual, Tribal Liaison for the Glen Canyon Dam Adaptive Management Program</p> <ul style="list-style-type: none"> ▪ Presentation (15 minutes) ▪ Q&A and discussion (15 minutes) <p><u>Purpose:</u> To report on the Tribal Liaison’s activities and meetings as well as Tribal concerns, challenges, and accomplishments.</p>
2:45 PDT/ 3:45 MDT (1:00)	<p>Basin Hydrology and Operations: Heather Patno, Hydraulic Engineer, Bureau of Reclamation</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) ▪ Q&A and discussion (30 minutes) <p><u>Additional Information:</u> August 24-Month Study</p> <p><u>Purpose:</u> To increase understanding of water supply, forecasted hydrologic conditions, and projected reservoir conditions and operations for the current and upcoming water years.</p>
3:45 PDT/ 4:45 MDT (:15)	Public Comment
4:00 PDT/ 5:00 MDT	ADJOURN FOR THE DAY

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² Action may be by consensus or a vote; and either may be a recommendation to the Secretary of the Interior or feedback to presenter(s) or to subordinate groups.

**Glen Canyon Dam Adaptive Management Program
Adaptive Management Work Group Meeting, August 19-20, 2020**

Thursday, August 20, 2020

Day 2 Webinar Information:

<https://bor.webex.com/bor/j.php?MTID=maa7d19661f7a82551178f64659cac8b0>

Telephone: 415-527-5035 Meeting Number: 199 096 8166

FINAL AGENDA

START TIME ¹ (Duration)	Thursday, August 20, 2020 Topic, Presenter, and Purpose ²
8:30 PDT/ 9:30 MDT (:15)	<p>Welcome and Administrative: Tim Petty, Assistant Secretary for Water and Science, Department of the Interior and Secretary's Designee</p> <ul style="list-style-type: none"> ▪ Introductions and Determination of Quorum (13 members)
8:45 PDT/ 9:45 MDT (:30)	<p>Federal Agency Updates (2-3 minutes each):</p> <ul style="list-style-type: none"> ▪ GCDAMP Program Funding short-term and long-term (BOR, WAPA) ▪ Glen Canyon Dam Emergency Exception Criteria (WAPA) ▪ ESA Update: Humpback chub, Razorback sucker, K. ambersnail status (FWS) ▪ Non-native Aquatic Species Management Plan (NPS) ▪ LTEMP Litigation (DOI Solicitor) ▪ Additional Items <p><u>Additional Information:</u> 1) H.R. 7617 - 2021 E&W Funding 2) PR: GCD Summer Ops 3) FRN Humpback chub 4) FRN Kanab ambersnail 5) NPS Expanded Management Plan</p> <p><u>Purpose:</u> To share updates regarding current stakeholder activities on the Colorado River that are pertinent to the GCDAMP.</p>
9:15 PDT/ 10:15 MDT (:45)	<p>Stakeholder Updates (2-3 minutes each):</p> <ul style="list-style-type: none"> ▪ States: AZDWR, AZGFD, CA, CO, NM, NV, UT, WY ▪ Tribes: Hopi, Hualapai, Navajo Nation, Pueblo of Zuni, Southern Paiute ▪ NGOs: Environmental (x2), Federal Power Purchasers (x2), Recreation (x2) <p><u>Purpose:</u> To share updates regarding current stakeholder activities on the Colorado River that are pertinent to the GCDAMP.</p>
10:00 PDT/ 11:00 MDT (:30)	<p>Stakeholder's Perspective—State of Arizona: Clint Chandler and Vineeth Kartha, Arizona Department of Water Resources</p> <ul style="list-style-type: none"> ▪ Presentation (20 minutes) ▪ Q&A and discussion (10 minutes) <p><u>Purpose:</u> This presentation will provide an overview of the State of Arizona's values, priorities, and major activities related to the Colorado River and the Glen Canyon Dam Adaptive Management Program.</p>

START TIME ¹ (Duration)	Thursday, August 20, 2020 Topic, Presenter, and Purpose ²
10:30 PDT/ 11:30 MDT (:15)	BREAK
10:45 PDT/ 11:45 MDT (:45)	<p>LTEMP Experiments Considered & Implemented for WY2020 and WY2021: Lee Traynham, Reclamation; Joel Sankey, GCMRC</p> <ul style="list-style-type: none"> ▪ Presentation (25 minutes) ▪ Q&A and discussion (20 minutes) <p><u>Purpose:</u> To update AMWG members on the process and possible LTEMP experiments that have been and may be conducted in 2020 and 2021.</p>
11:30 PDT/ 12:30 MDT (1:00)	LUNCH
12:30 PDT/ 1:30 MDT (:30)	<p>GCMRC Science Updates: Joel Sankey, GCMRC (introduction)</p> <ol style="list-style-type: none"> 1) <i>Examining variability in arrowweed physiological traits and responses to flooding</i>, Emily Palmquist, GCMRC 2) <i>Are there any more surprises? Bioeconomic models and adaptive management</i>, Lucas Bair, GCMRC <ul style="list-style-type: none"> ▪ Presentations (20 minutes) ▪ Q&A, discussion (10 minutes) <p><u>Purpose:</u> To update AMWG members on the latest results from ongoing research and monitoring efforts conducted by GCMRC in support of the GCDAMP.</p>
1:00 PDT/ 2:00 MDT (:45)	<p>Technical Work Group Chair Report: Seth Shanahan, TWG Chair; Peggy Roefer, FLAHG Chair; Ted Kennedy and Jeff Muehlbauer, GCMRC</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) ▪ Q&A, discussion (15 minutes) <p><u>Purpose:</u> To update AMWG members on current TWG activities.</p>
1:45 PDT/ 2:45 MDT (:15)	BREAK
2:00 PDT/ 3:00 MDT (:20)	<p>Lake Powell Pipeline Draft Environmental Impact Statement: Rick Baxter, Program Manager & Heather Patno, Hydraulic Engineer, Bureau of Reclamation</p> <ul style="list-style-type: none"> ▪ Presentation (15 minutes) ▪ Q&A and discussion (5 minutes) <p><u>Additional information:</u> 1) LPP DEIS website 2) Project Proponents' website</p> <p><u>Purpose:</u> Provide a basic overview of the Proposed Lake Powell Pipeline project, review projected impacts to Lake Powell pool elevation, and provide information for stakeholders to submit comments on the Draft Environmental Impact Statement.</p>

START TIME ¹ (Duration)	Thursday, August 20, 2020 Topic, Presenter, and Purpose ²
2:20 PDT/ 3:20 MDT (:20)	<p>Review of the 2007 Interim Guidelines (7.D. Review): Carly Jerla, Civil Engineer and Malcolm Wilson, Water Resources and Compliance Group Chief, Bureau of Reclamation</p> <ul style="list-style-type: none"> ▪ Presentation (10 minutes) ▪ Q&A and discussion (5 minutes) <p>Additional information: 7D Review website Purpose: Provide a basic overview of the process and status of the 2007 Interim Guidelines Review currently being undertaken by the Bureau of Reclamation.</p>
2:40 PDT/ 3:40 MDT (:10)	Public Comment
2:50 PDT/ 3:50 MDT (:10)	<p>WRAP-UP: Tim Petty, Secretary’s Designee</p> <ul style="list-style-type: none"> ▪ FY2021 ARM and AMWG meeting dates: <ul style="list-style-type: none"> ○ January 20-22, 2021 ○ February 10-11, 2021 ○ May 19, 2021 (webinar) ○ August 18-19, 2021
3:00 PDT/ 4:00 MDT	<p>ADJOURN</p> <p>Please take the time to complete a brief meeting evaluation survey—thank you!</p>

¹ Every effort will be made to adhere to the schedule and agenda, but on occasion, for unforeseen reasons, some modifications may occur.

² Action may be by consensus or a vote; and either may be a recommendation to the Secretary of the Interior or feedback to presenter(s) or to subordinate groups.

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Draft Minutes & Action Items

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Glen Canyon Dam Adaptive Management Work Group Meeting February 12 - 13, 2020

Wednesday, February 12, 2020

Start Time: 9:30 am MST

Conducting: Dr. Timothy “Tim” Petty, Assistant Secretary for Water and Science, Department of the Interior

Recorder: Carliane Johnson, SeaJay Environmental, LLC

Welcome and Administrative

Presenters & Affiliation: Dr. Timothy “Tim” Petty, Assistant Secretary for Water and Science, Department of the Interior (DOI) and Secretary’s Designee

Introductions and Determination of Quorum

Dr. Petty welcomed newly appointed and reappointed Glen Canyon Dam Adaptive Management Work Group (AMWG) and Technical Work Group (TWG) members. A quorum (13 required) was reached with 15 stakeholders represented by their AMWG member or alternate. Attendees introduced themselves with their affiliations and a short background.

Motion to Approve Minutes from August 2019 meeting

- No comments; no edits. Steve Wolff, State of Wyoming moved; Leslie James, Colorado River Energy Distributors Association (CREDA), seconded. The minutes from the August 21-22, 2019 meeting, as distributed on February 6, 2020, were passed by consensus.

Administrative Updates

Progress on Nominations and Appointments: Lee Traynham, Bureau of Reclamation (BOR), provided a list of AMWG nominees that had been approved as well as two TWG members. BOR will be soliciting nominees in the near future through the Federal Register. The packages to submit typically consist of a nomination letter (that must be date stamped within the Federal Register notice window), a resume, and a brief biography.

Update on Executive Order 13875: Dr. Petty remarked to the group that a 2019 Executive Order had required a review of all committees under the Federal Advisory Committee Act (FACA). The AMWG received high marks. The reviewers valued what this group produces, the people involved, and the analyses, among other things. The chair was very pleased about that. He notes there are plenty of open vacancies.

Presentation and Discussion

Details of the summarized presentations are included in PowerPoints available on the AMWG website as noted in the sections below.

Proposed Rule for Downlisting Humpback Chub ([download](#))

Presenter & Affiliation: Tom Chart, Jessica Gwinn, and Kevin McAbee, U.S. Fish and Wildlife Service (USFWS)

Presentation Summary

To share information about recently published 4(d) rule for the proposed downlisting of Humpback Chub.

A notification was published on January 22 that proposes to downlist humpback chub from endangered to threatened status. The Species Status Assessment (SSA), which is a compilation of information about what is known on humpback chub including the needs and current and future conditions of the species, formed the basis of the decision. A small population was lost in Yampa Canyon of Dinosaur National Monument; however, there is a strong population in the Western Grand Canyon that is expanding. Threats include changes in flow, non-native fish predations, and food supply (macro diversity). USFWS took all this information and discussed it in terms of resiliency, its representation, and its redundancy. This analysis of the population's viability has been appended to the SSA. The Upper Basin Cooperative Agreement expires in 2023, and though it is expected to continue, there is some uncertainty in that for managing flows and non-native fish. This is considered the worst-case under Scenario 1. Scenario 2 are the stressors that will be most difficult to handle, while scenario 3 is a more optimistic condition under which we can handle those threats. The conclusion to reclassify from endangered to threatened is because the fish is not at risk to extinction "now" (from 0 to 16-year timeframe) based on current conditions. When considering it under threatened status, there was the possibility of the program being diminished as well as stressors negatively affecting the species in the "foreseeable future" (16 to 40 years). The 4(d) rule will make sure that a threatened species gets the same protections as endangered. Three recovery actions were also recognized to reduce regulatory requirements: 1) translocations that can cause harm in handling; 2) non-native fish control; and 3) information and education. The comment period closes March 23. Submit electronic or hard copy comments.

Discussion/Q & A

[Chris Cantrell, Arizona Game and Fish Department (AGFD)] Was there any discussion about a distinct population segment for the Lower Basin? *[Tom Chart, USFWS] From the redundancy point of view, we abandoned that fairly quickly. It had also been considered when we did the recovery plans in the 2002 Recovery Bills.*

[Steve Wolff, State of Wyoming] Is there an assumption that the Dinosaur Monument population was extirpated because of non-natives, and has there been any discussion about reintroduction in that reach? *[Tom Chart, USFWS] It is always a mix of different factors that contribute. In the SSA, we linked it back to the construction of Flaming Gorge in the 1960s, when the Green River was cooled down and probably truncated the range of that population. It was complicated by smallmouth bass, which took off in the early 2000s, but the population had been on a downward trajectory before then dealing with channel catfish for a long time. The last humpback chub caught in that area was in 2004. The program in the Upper Basin is considering reintroducing humpback chub up there.*

[Peter Bungart, Hualapai Tribe] Do you perceive increased risk to native populations in light of the redefinition of Waters of the United States (WOTUS) under the Clean Water Act? Also, what's the ratio of species delisted compared to species that have been listed? *[Tom Chart, USFWS] We are more*

concerned for non-listed desert and Western fishes in ephemeral waters under WOTUS than we are about humpback chub. That should not affect their viability. Number of downlistings is rare. This is coordinated at the Regional level. [Leslie James, CREDA] The USFWS has good data on its website called the "Boxscore" on total number of listed species, how many have been removed, and other information.

Alicyn Gitlin, Sierra Club. Do you really think now is the time to delist given the need to improve species conditions under two of the three scenarios? *[Tom Chart, USFWS] When we wrote the SSA, we were constantly getting new information. When we characterized the scenarios, it was with equal probability, and the most drastic decline would have been if there was a real pull back on management actions of the Colorado River system, particularly with non-native fish control. We have made a lot more progress on the fate of the programs in the upper basin. The first scenario is diminishing in probability. We are in a better position than two years ago when the SSA was written that the fish is not at risk of extinction.*

[Arden Kucate, Pueblo of Zuni] One concern is that eventually we will consider hatchery-reared fish as native. Isn't that watering down the definition? *[Jessica Gwinn, USFWS] There was not a place in the SSA that addressed specifically the distinction of hatchery-reared versus native. It was more as to "where were the fish historically." [Tom Chart, USFWS] The idea would be to develop a "nearest neighbor" brooding stock in a hatchery that would be considered genetically similar and then try to translocate them to Dinosaur National Monument. The recovery plan would take a look at your concerns.*

[2020 GCDAMP Annual Reporting Meeting Update – Part 1 \(download\)](#)

Presenter & Affiliation: Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center (GCMRC)

[Presentation Summary](#)

To provide information regarding project work completed in Fiscal Year (FY) 2019 and to inform the development of the 2021-2023 triennial budget and work plan.

The presentations from the two-day Annual Report meetings will be made available on the website soon. Part 1 presentations include humpback chub, native and non-native fishes, and bug flows.

For long-term trend and spring abundance estimates of humpback chub, the current three-year average is 1,250 fish in the Little Colorado River, which is about double the trigger level from the biological opinion. For overall abundance estimates in the Little Colorado River, there is a fair amount of variability, but this also has been above the trigger. Generally, numbers look good and appear to have stabilized. There had been very few age-0 fish, which recently changed in 2019. Translocations have been going on for a number of years in the Little Colorado River above Chute Falls. These chub have higher survival rates over time, resulting in a population-level effect showing a gain 350 of fish. This is measurable and can be used to determine when action would be taken when large numbers of rainbow trout are seen. If there are higher levels of chub, then it does not make sense to do removals of rainbow trout because the conservation objectives would not be met anyway. The analysis provides a way of knowing whether the action will benefit the population.

The mainstem population has also been variable from year to year, but the three-year average is above the trigger level at 982 fish. Farther downstream is the Western Grand Canyon where few fish had been seen until around 2014. All size classes are now seen, whereas previously, it was only adults. This has

been a really interesting development. Hundreds to thousands of fish/km are being seen in the Western Canyon. This is substantial given what the numbers were even a decade ago.

Decadal temperature trends going back 25 years show warming in the Grand Canyon basin and a positive response in humpback chub. In thinking about the future under different thermal regimes (such as current conditions and a warming climate to 2 to 2.5 Celsius over the next 40-50 years), and if all reservoirs are managed the same, there would be only a little effect in the mainstem while there would be big effects in the Grand Canyon. That can have serious consequences for fish populations. There are pluses and minuses. Modest warming shows great improvements in humpback chub along with a potential boost in the aquatic food base. The biggest concern is warm water benefiting non-natives.

An overview of the second year of bug flows was also presented. These are light traps that are being collected through a citizen science effort. The hypothesis is that this daily peaking from hydropower operations creates an artificial tidal zone where aquatic insects lay their eggs in the evenings along the river margins that can die if they get dried out. The concern is that this is a reliable food supply for humpback chub. The bug flows was one approach to address this issue by improving egg laying conditions to increase insect abundance and food supply. Volunteers were used to “angle for science” in a paired study: Friday/Saturday fishing and then another group that fished on Sunday/Monday. It was found that a third more fish were caught on the weekends, which was an indication of a positive effect. Now that there is a full data set, the results are somewhat equivocal. A big response was seen in caddisfly and some bump in midges, but there is uncertainty in the data. The recommendation is to do this experiment for a third year.

Discussion/Q & A

[Leslie James, CREDA] Was the data on humpback chub translocations included in the SSA in the published proposal? Will the agencies provide new information during the comment period? It is important to get that data into the record. On the bug flow, the third prong to that is the cost. When will we have information on the costs from the last go-round? We need to factor in all this information. *[Kirk Young, USFWS] The data on humpback chub translocations weren't as quantified, but it was in the SSA. Didn't have the numbers for Little Colorado River, which were published last year. The knowledge of that data itself was probably part of the decision-making. [Scott VanderKooi, GCMRC] It was too late for that data to be included. USGS does not comment on management actions. Our role is only to provide information – we don't advocate. This is one of the challenges with these management documents. They take a lot of time. At some point, it just has to be finalized even if there is more data available. [Scott VanderKooi, GCMRC] If the bug flows are done again this year, it will be interesting for a number of reasons associated with reduced cost estimates and lower power projections.*

[Chris Cantrell, AGFD] In the abundance estimates for humpback chub in 2018-2019, there was a much larger variability in the sample while the numbers from 2013-2015 looked pretty tight. Can you explain that? Any changes in sampling protocols those years? *[Scott VanderKooi, GCMRC] Believes this was just up and down variability. A lot has to do with the fish being cooperative. When the capture probability goes down, the uncertainty estimates go up. There were no changes in methodology.*

Stakeholders' Perspective—Colorado River Board of California ([download](#))

Presenter & Affiliation: Jessica Neuwerth, Environmental Scientist, Colorado River Board of California (CRBC)

Presentation Summary

Provide an introduction to the Colorado River Board of California, outlining the organization's values, priorities, and major activities related to the Colorado River and the Glen Canyon Dam Adaptive Management Program

The Colorado River Board of California was established in 1937 to serve as the unified voice for water users representing six major water agencies (three urban and three agricultural). California has mainstream apportionment of 4.4 million acre-feet. How water is used and distributed varies by year and the type of user (quantified and unquantified). As early as 1950, California was already using its full mainstream apportionment. In 2003, the state put in place the largest urban water agreement, called the Quantification Settlement Agreement (QSA). In 2019, the state was at its lowest level of usage since 1950 due to a combination of transfers and other activities to lower water use. It is a complex system to move water where it is most needed. This includes finding new sources such as with the Carlsbad Desalination Plant and new investments in recycled water that will soon result in the availability of tens of thousands of acre feet. The Salton Sea is also right in the middle of the two biggest agricultural agencies. It used to rely on agricultural discharges, which have been declining and is causing ecological and public health concerns. We want to make sure that does not become a stumbling block. The state is interested in keeping aware of how and when water is moving from one basin to another.

Discussion/Q & A

[Jan Balsom, National Park Service (NPS) – Grand Canyon National Park (GRCA)] **What can you recover from the desalination plant and how does that add to what you can use? What are the environmental concerns?** *[Jessica Neuwerth, CRBC] That's a \$1 million investment with 60,000 acre-feet of offset. From environmental compliance, the Lower Colorado River Multispecies Conservation Program is mostly for on-river effects (damming and diversions). That's when there is the most flexibility. There is an obligation to stock 1.2 million native fish and to create/maintain 8,000 acres of habitat. It took about 10 years to put together to mitigate both federal and state effects.*

[Richard Powskey, Hualapai Tribe] **Is water from the Colorado River being used to recharge groundwater in Southern California?** *[Jessica Neuwerth, CRBC] Yes, there's been about 4 million-acre feet of water recharged in the Coachella Water District, which backfills groundwater used because many farms were already established on groundwater.*

[Peter Bungart, Hualapai Tribe] **There is a lot of groundwater pumping. How much of that recharge offsets that?** *[Jessica Neuwerth, CRBC] It varies and depends on the area, but they have actually raised ground water levels about 15 to 20 feet.*

Overview of the Upper Colorado River Endangered Fish Recovery Program ([download](#))

Presenter & Affiliation: Tom Chart, Director, Upper Colorado River Endangered Fish Recovery Program and Jessica Gwinn, Biologist, U.S. Fish and Wildlife Service

Presentation Summary

To share information about the purpose, achievements, current workplan, and future of a complementary program in the Upper Colorado River Basin

This presentation is about both the Upper Colorado River Endangered Fish Recovery Program, which was established in 1988, and the San Juan program, established in 1992, which is dealing with other

species in the Colorado River system. The Upper Colorado River program is tasked with all listed fish (Colorado pikeminnow, razorback sucker, humpback chub, and bonytail chub). There are two goals. The first is to assist in the recovery of the four listed species that are only found in the Colorado River System. The second is to allow water development to continue.

For the recovery actions, these are comparable between the two programs that involve habitat development, flow management, non-native fish control, and fish stocking. There is also a strong commitment to research and monitoring, as well as information and education and program management. Non-native fish management is probably the biggest threat. The focus is on three species (smallmouth bass, Northern pike and walleye). One of the places that was an epicenter of smallmouth bass is in Little Yampa River Canyon with population estimates of 3,000 adult fish within a 24-mile stretch that is now at 300 fish. This has been an adaptive process that has to align the fish with the hydrology. The Colorado pikeminnow has been stocked for 12 years now. We now have native young-of-the-year in San Juan River system. Colorado pikeminnow plan is also currently under review. We probably won't change its listing. Razorback suckers need to complete their life cycles. This monitoring information feeds the SSA. The hope is to publish their revised plan in 2020 for downlisting. Both programs sunset in 2023. We need to figure out a future of these recovery programs and future funding strategies.

Discussion/Q & A

[Steve Wolff, State of Wyoming] Not a question, but an acknowledgement to Tom and his staff on the San Juan program, which is critical to the states.

[Leslie James, CREDA]. Can you talk more about non-native fish management, such as who does what, where does the money come from, and what actions are being taken? There's been a distinct shift. What are the states asking the public to do? *[Tom Chart, USFWS] We focus on the non-native fish just before they spawn. We are electrofishing more than 600 miles of river and installing screens on spillways to try to contain those fish. We all recognize this is the biggest nut to crack. We communicate with others across the nation to determine the best approach (genetic technology, research to employ) for the sustainability of non-native management efforts. The states of Colorado and Utah have changed their fishing regulations to "must remove" or liberalize the catch limits. Colorado and the Colorado River Conservation District are also doing tournaments to remove these fish. This is incentivizing their removal.*

[Richard Begay, Navajo Nation] Are you working with any of the Indian tribes? *[Tom Chart, USFWS] The San Juan program has the four Native American tribes. There is constant communication with them on in-river channel catfish control programs.*

[Jan Balsom, NPS-GRCA] What can we do to develop targeted flow regimes and how do you come together on those recommendations? *[Tom Chart, USFWS] We have the luxury in Green River of an unregulated tributary that provides natural spring flows. We try to work with BOR to capitalize on that and use those tributaries as a signal for when razorback suckers are spawning, then waiting for the larvae to show up to build the peak at the right time. This is an adaptive process. We don't have as large a river as we used to, but we can still mimic the hydrographic flows.*

[Steve Wolff, State of Wyoming] Can you discuss the Flaming Gorge hydrology scenarios? *[Tom Chart, USFWS] This refers to the importance of low flow, spring flows and that intra-annual variability.*

2020 GCDAMP Annual Reporting Meeting Update – Part 2a ([download](#))

Presenter & Affiliation: Scott VanderKooi, Chief and Michael Moran, Deputy Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

To provide information regarding project work completed in FY19 and to inform the development of the 2021-2023 triennial budget and work plan.

Part 2a of the presentation covers: 1) nutrients and temperature as ecosystem drivers and Lake Powell, 2) riparian vegetation, 3) warm-water invasive fishes, and 4) trout.

The nutrient and temperature study focused on primary producers. The method to measure this productivity is by dissolved oxygen in water as a surrogate. The data shows that even when it is broken out by season, there is a good relationship between this GPP (gross primary productivity as measured by dissolved oxygen) and aquatic insect populations. The controls on GPP are sunlight, temperature, turbidity, and nutrients (primarily nitrogen, carbon dioxide and phosphorus – the most important for plants). Soluble phosphorus is believed to be the limiting factor in primary production in the Colorado River. When the soluble reactive phosphorus (SRP) is measured, there is a reasonably good relationship, but it's not the most important. Although SRP is important there are other things coming into play such as turbidity, discharge and position in the canyon. We need to do more work on these other variables. Phosphorous gets into the river from loading into Lake Powell and coming out through the dam. This explains 55% of the variability in SRP, but there is a cycling that we don't fully understand.

Regarding vegetation monitoring, this data comes from 43 different sources (sand bars) and other 140 sites (such as flood plain deposits) that are measured multiple times per year. Native cover has increased from 2014 to 2019. Aerial photos were also used to measure and map vegetation. The overflight data is used to produce many different products including multispectral imagery for vegetative species maps, digital topography to establish flowlines, and land cover classifications. It is hoped to continue this in the next workplan because the products are useful. Would like to know how other stakeholders have been using these products.

The studies on hydrologic variables are looking at response to flow conditions in which niche models are being developed. One product that will be available soon is the percent of sand that is suitable for colonization of various kinds of plants (both natives and non-natives).

Discussion/Q & A

[Jakob Maase, Hopi Tribe] Is anyone looking at Russian olive along the Grand Canyon? *[Mike Moran, GCMRC] Don't know the specifics on that.*

[Jan Balsom, NPS-GRCA] Anyone who has spent time in the canyon knows that sand turns into vegetation. The bigger issue is how to better manage vegetation encroachment? *[Mike Moran, USFWS] Been working with the NPS on vegetation removals. These are very effective right after they are done. For some species, like arrowweed, if they are removed repeatedly, they will stop coming back.*

[Leslie James, CREDA] Is plants colonizing on bare sand a good thing or not? It may not be a good thing with non-natives. Does it depend on who is looking at it and then what do we do about it? *[Scott VanderKooi, GCMRC] The value is to understand what might show up and where. How you treat one species is probably different than another. If you have a predictive understanding of where they show up*

that can help managers on their strategies. In general, we do not want invasives. It's a very good question and difficult to answer. What do others value?

[Rob Billerbeck, NPS] Maybe some of the specificity was lost in that presentation because GCMRC is doing very good studies such as on genetics that are directly applicable to management. We're also getting specific site information on removals. They are doing a lot to relate that imagery to specific site recommendations per species.

[Kelly Burke, Grand Canyon Wildlands Council (GCWC)] There is also some learning to look at the whole suite of plants when tamarisk is removed such as with tree willow. There is an interrelationship between these species and the whole process of restoration and rehabilitation.

[David Brown, Grand Canyon River Guides (GCRG)] Historically, these beaches didn't have vegetation. This is a post-dam condition. The overflights are important and it would be a tragedy to not do them next year. *[Scott VanderKooi, GCMRC]* Having this change condition is very important.

[Peter Bungart, Hualapai Tribe] Vegetation also interferes with an HFE. This is another aspect of vegetation encroachment.

[2020 GCDAMP Annual Reporting Meeting Update – Part 2b \(download\)](#)

Presenter & Affiliation: Scott VanderKooi, Chief and Michael Moran, Deputy Chief, Grand Canyon Monitoring and Research Center

[Presentation Summary](#)

To provide information regarding project work completed in FY19 and to inform the development of the 2021-2023 triennial budget and work plan.

Green sunfish and channel catfish are both predators that can wreak havoc on native species. Catch rates from electrofishing of rainbow and brown trout along Lees Ferry to Glen Canyon (about 16 miles) show a cyclical pattern with varying peaks and troughs. The pattern is really driven by young fish. Starting to see recovery in catch rates for the boat and walk-in fishery. From 2012-2013, there were a lot of fish in the system, but it was driven by the equalization flows of 2011 and was unsustainable. By 2014, we had a sharp decline in trout abundance in Glen Canyon and throughout the system. Then moved into a low level of stability. Overall abundance was low to stable. Saw improvements in 2018-2019. It is a fairly robust population now and seeing larger class sizes.

The importance of phosphorus in the system is driving these populations and is the best predictor of rainbow trout in the Glen Canyon versus other complex flow models. In thinking about predictions and the use of science in our programs, the primary motivation of applied science is to predict how change occurs if we do nothing versus if we take actions. What that means is that we should not worry about precision; we need to worry about the trend of the populations. For brown trout, we have catch statistics, but you have to be careful with that data because catch probability changes. By using mark/recapture methods, we can understand the trends, and that's what we really should be doing. Also finding that brown trout seem to be able to get food better than rainbow trout (either they have better access to food or better feeding success). We need to pay attention to this because these fish are behaving differently even though both are trout. We are now focused on sampling rainbow trout abundance. Last couple years, there is some evidence of migration and recruitment, probably from the Marble Canyon reach.

Discussion/Q & A

[Jan Balsom, NPS-GRCA] Should we be comforted or terrified about these numbers of sunfish, catfish and brown trout? All the numbers are problematic to the natives. At the same time, there's all this dispersal from flood events. We have a hard time connecting all the pieces into a system approach. Can you connect those dots?

[Scott Vanderkooi, GCMRC] You could think about this in terms of risk such as in the Little Colorado River where humpback chub have done pretty well in spite of the conditions. It is something to pay attention to. We haven't really monitored catfish so don't have a sense of what's there. They have probably been pushed down there from the floods, but the chub have persisted, which is an encouraging sign. The other encouraging sign is the lack on non-natives in the mainstem, particularly in the Western Canyon. That has changed over the past 20 years and is one of the most interesting stories because we have gone from mostly non-natives to mostly natives. There are some things that are going right. We still need to think about risk of brown trout. They have been in the system for a while, but we are starting to see some responses that we had not seen before. We responded quickly to green sunfish, which speaks to the effectiveness of this program to identify risks when we see them. It is more encouraging than terrifying.

Tribal Liaison Report

Presenter & Affiliation: Theresa Pasqual, Tribal Liaison for the Glen Canyon Dam Adaptive Management Program

Presentation Summary

To report on the Tribal Liaison's activities and meetings as well as Tribal concerns, challenges, and accomplishments.

(No visual presentation.) This Tribal Report relays a number of issues of concern regarding work and resources that are part of the AMWG program. Four of the issues are: 1) overall tribal participation in the adaptive program and their perspectives, 2) proposed downlisting of humpback chub, 3) the workplan and budget including projects proposed by the tribes, and 4) knowledge assessment. Tribal representatives have said we need to get to a larger conversation to better understand the underlying issues that tribal stakeholders have about this program. There has been continued frustration by several tribal stakeholders on the lack of understanding of the relational aspects of how one affects the other. The program's approach of Western Science oftentimes excludes that tribal voice. It affects the "data" that we have available to this program. As to humpback chub, there are concerns about what the downlisting means to the species. Is the amount of knowledge that we have enough to make this decision? Discussions about the triannual workplan and budget also continue with a number of calls planned. She is pleased that the response from colleagues is proactive and the tribes have been engaged as early as possible. There has been much discussion regarding knowledge assessment. Part of that goes back to trying to answer to the idea that knowledge assessment could become a tool between what we know and don't know. This seemingly straightforward assessment oversimplifies how the tribes view those resources. There are five tribal communities each with their own unique sociocultural ways. We acknowledge that the data being sought requires an investment of time and funds and many people to commit to this long-term work. Lastly, if the body as a whole has to go before a tribal council, it is not out of the realm for them to ask, "What is the benefit to the tribes and tribal communities?" We might need to change that perspective to help accomplish this work.

Discussion/Q & A

[Kurt Dongoske, Hopi Tribe] Only thing to add would be about the knowledge assessment. If tribal perspectives are presented, will they be treated equally? Will the science override tribal perspectives?

[Jan Balsom, NPS-GRCA] We have asked our tribal colleagues to provide a lot to this program, but then the question is what goes back to those communities. I don't know if we have come up with that information such as school programs or reports or the science that the tribes can use in their own management. Has that come up? *[Theresa Pasqual, Tribal Liaison]* Ideas have been discussed. This came up during the river trip on their needs. There was real thought processing from non-tribal members who said they were going to think about this including the academic and economic needs. We've talked about how to share published work outside of this program. The biggest challenge is that we are part of a world in which systems, processes, laws, and programs have been overlaid on the tribes. Knowing that they exist within this "system" much like the resources we are analyzing (fish, plants, sediments), tribal people are part of that system, but it never gets talked about from that perspective. What you see as a need is a result of us living in that system. That is the fundamental challenge. We are trying to get to that core, but it requires knowing how tribal communities fit into that system and how we are supposed to respond to that system. The deadlines on the horizon do not encourage deep conversations.

[Charley Bulletts, Southern Paiute Consortium] An old colleague referred to it as natives and non-natives in the Grand Canyon ecosystem. We are putting ourselves into the natives category of fish, plant and bug. It is sometimes hard to answer something to a non-native who knows it all and has the money to study it all. This is an inside joke when we hear about non-natives talking about the system. He commends Theresa on her work and that words speak louder than pictures.

[Richard Powskey, Hualapai Tribe] A quick story about the 100-year anniversary of Grand Canyon National Park. A grassroots group wanted one of the tribes to participate, but many of the tribes didn't want to be involved because it was a hundred years of exclusion. It took a while to be able to get that stuff vetted out. We did come to a place where we got our foot in the door to make a difference over the next 100 years, but there is a lot of history and its interpretation that does not include the native component. It is not talked about too much. When the Park Service did the logo for the 100-year anniversary, we asked if they would put a handprint to at least show a small piece of our involvement. They didn't do it. It is an analogy that our presence isn't really identified. It's important to be upfront about it. We might lack scientists, but we do have researchers. It is important to get a good perspective about these studies, but that data is more important to the tribes for what we are trying to push for such as lands or water rights. How is it going to benefit us and be tailored to our needs? That is the bigger picture. Then there are the politics involved with respect to funding. This is some of the information that needs to be recognized. That is what we are looking at from a tribe as to how this program might benefit us. *[Dr. Petty, AMWG Chair]* It is a fair question and good to hear your perspectives.

Annual and Extraordinary Maintenance at Glen Canyon Dam ([download](#))

Presenter & Affiliation: Robert "Bob" Martin, Facility Manager, Glen Canyon Dam, Bureau of Reclamation

Presentation Summary

Provide AMWG members with information and improve understanding of maintenance schedule at Glen Canyon Dam.

Glen Canyon Dam was put into service in 1965 with eight generating units at 1,320 MW at full pool. Life cycle maintenance is very important. Replacement is generally on a 25-year cycle with the windings and 45 years for the turbines and transformers. Equipment is not removed when it hits that age; there is an assessment program that rates each piece of the equipment. We look five years out from the expected replacement date. There is an outage schedule that considers the budget, the engineering requirements, the time to acquire the new piece, and then the time to get the equipment back in service. Future large capital replacements will include the switching gears and transformers in 2021.

Discussion/Q & A

[John Jordan, ~~International Federation of~~ Fly Fishers International (IFFFI)/Trout Unlimited] He had heard that a substantial drop would occur in the flow of the river during an upcoming maintenance activity. What would be the period of time and would that be a steady flow? That would have a substantial impact on recreational fishing. *[Bob Martin, Glen Canyon Dam] There is a recommendation to remove a broken piece of tailrace slab, which we are looking to do in March 2021 so we would need the flows to get down to 4,000 cubic feet per second (CFS). [Heather Patno, BOR] Yes, it would be a steady flow of 4,000 CFS during the day and a different flow during the night for 4 to 5 days. [Scott VanderKooi, GCMRC] We thought about the research opportunity when we first became aware of it in late fall. It almost completely derailed us from writing the annual report. There was a lot of excitement about the potential for learning about all the resources. We are pleased that it has been put off so we have time to plan for it. It is a great opportunity because flows like that have not been seen in a very long time.*

[Jan Balsom, NPS-GRCA] It is important to recognize all the different parts and pieces. We have been thinking a lot about the 4,000 CFS flow from the management side. We also recognize all the different things in the maintenance and schedule, and how to do that with the least amount of disruption.

[David Brown, GCRG] If it is 1,300 MW at full pool, what is it actually now? What is getting taken out? What is the output? Think there was discussion about putting this facility into renewable generation, but a single wind turbine only generates 1-3 MW each. *[Bob Martin, Glen Canyon Dam] It is closer to 1,000 MW now. That is the capacity. What is getting taken out depends on the demands. The Western Area Power Administration (WAPA) directs how much to release. That constantly changes. [Heather Patno, BOR] We should have numbers in capacity in both acre feet and CFS, but the MW numbers we get from WAPA. For February, it was around 300 MW, but it depends on the month and capacity. Will need to look at that again to know for sure. [Steve Johnson, WAPA] I'd have to work on getting those exact numbers. It depends on the monthly volumes. We try to match our customers' needs to the extent possible within the guidelines. Generally, it is 300 to 600 MW across the year. The main thing to understand is the loss of efficiency. That is very important. The same amount of water makes a lot fewer megawatt hours. This is an important concept. We are not extracting as much energy from that lake because of the loss of head. If we ever get into full runoff in Glen Canyon, it is wide open. Would love to see that again at a 60,000 CFS HFE. [Leslie James, CREDA] Think there is a pictogram that compares output between wind farms and turbines. Believe the loss is about a third of capacity.*

[Ed Gerak, CREDA] With the reduced flow, I'd like to look at excavating the downstream lump that's causing a head differential. *[Bob Martin, Glen Canyon Dam]* We had a study done on the lump and it's about a 1-3-inch difference. We would need to get to the technical service center in Denver to see if there is any appreciable loss of head.

Basin Hydrology and Operations ([download](#))

Presenter & Affiliation: Heather Patno, Hydraulic Engineer, Bureau of Reclamation.

Presentation Summary

To increase understanding of water supply, forecasted hydrologic conditions, and projected reservoir conditions and operations for the current and upcoming water year.

For 2020 snowpack at Lake Powell, we are right about where we were last year. We don't know what is coming because January 1st only tells us what has occurred, which is about 40%. It isn't until about April when we have about 90% of the total amount. We have not seen the inflows for the snowpack to get us into an equalization tier. Moving forward to 2021, with 9 million acre-feet (for both minimum and maximum), it is showing shortage conditions. With equalization level, the range is higher. There is a significant amount of uncertainty with this forecast in 2021, which is very far into the future. We are trying to determine if we have enough capacity to move the equalization volume within the maintenance schedule. We will need to discuss the shift in regulations and reserves.

There are differences in temperature from Lake Powell releases that cause the downstream to get warmer in the summer before converging again in the winter. This is normal, but it changes during dry years. During periods with significant spring inflows (a rise of 50 feet), we see a decrease in dissolved oxygen at the penstock. We know the conditions that cause this. It is of short-term duration (June to mid-November). If we see the conditions occur again, we will begin discussions on what will happen.

Discussion/Q & A

[Scott VanderKooi, GCMRC] Can someone explain the equalization pattern and how high will it go? *[Heather Patno, BOR]* There is a lot to that question. Simply, the level was taken from 602(a) Storage and put into the interim guidelines. That is why it increases. *[Steve Wolff, State of Wyoming]* Yes, as time goes by, those demands go up by demands and we will use the storage in Lake Powell by three feet every two years.

[Jan Balsom, NPS-GRCA] In terms of the reservoir levels, you are controlling the amount of storage in Lake Powell by the reservoirs up above it. Is that right? What you can control is based on the reservoirs from above and their own environmental documents. If you were full at the upper end, would you release? How do you balance all these environmental commitments and power needs in a multi-tier system that starts at different reservoirs? *[Heather Patno, BOR]* Each reservoir upstream has their own RODs that drive their ESA operations. As that water comes down it includes tributary flows that we don't have any control over. As the inflows increase, then you see differences in the elevations. That is why we have the 24-month study because each has its own flows with their own RODs. Then we see what is happening at Lake Powell. Part of that planning includes WAPA.

[Peter Bungart, Hualapai Tribe] Saw an article that said even though we had a good snowpack, because of the dry conditions, the soil is going to soak up a lot of the water before it ever reaches the reservoir. What is your assessment of that? *[Heather Patno, BOR]* That's correct. While we had a good

last year, the conditions dried up and that's what is frozen in the system. The soils are going to soak up that water.

First Day Meeting Adjourned at 5:00 pm

Thursday, February 13, 2020

Start Time: 8:30 am MST

Administrative Updates (continued from Day 1)

Tim Petty, AMWG Chair, especially new members, make sure you give Lee comments on the packages.

Action Item Tracking Report (presented on Day 2): First item is planning for future years by developing monitoring metrics and streamlining the Glen Canyon Dam Adaptive Management Program (GCDAMP) guiding documents. As a start, we have the metrics used in the Long-term Experimental and Management Plan (LTEMP) environmental impact statement (EIS) decision analysis as well as the knowledge assessment. As we develop the 2021-2023 workplan, BOR and GCMRC will be looking at where we have consensus on existing metrics and will flag areas where we need to spend time and effort to determine the best approach to track the status of certain resources. We also need to ensure a science advisor is in place to assist in that effort.

Second item is the temperature control paper, which is available. There is currently no silver bullet. The most recent biological opinion is looking at how we can get both warmer and cooler temperature releases. That is a very broad challenge. Believe this action item is complete.

Third item is Tribal support. DOI provides funds to support tribal participation. Historical records were provided as well as input from tribal representatives. Believe this action item is complete, but still need to hold space for conversations with tribal representatives.

Fourth item is the TWG take up of the High-Flow Experiment (HFE) Assessment action item. The TWG chair recently established the Flow Ad Hoc Group that will be chaired by Peggy Roefer, Colorado River Commission of Nevada. Their report will be reported to the AMWG in May 2020. This action item will remain open pending that deliverable.

GCDAMP Funding Update: Lee Traynham, BOR, as to the budget for FY20, the program was fully funded at the same levels as last year. There is uncertainty in future funding. There was an issue with FY19 funds, but after stakeholders expressed their concerns, Congress returned the funds to make the group whole. That put us in a bit of a limbo in FY20 with a continuing resolution in which we were not included of "prior funding" because of this special appropriation and did not have funding for part of the year. We are in good shape for 2020. It is uncertain for 2021 and beyond.

Stakeholder Updates:

To share updates regarding current stakeholder activities on the Colorado River that are pertinent to the GCDAMP.

Jan Balsom, NPS-GRCA, shared a video with respect to how the Park Service addresses concerns of the tribes. We at Grand Canyon have been trying to come up with a new strategy for the next 100 years. We can't erase the past. The video is an example of how we are working on this future with a number of partners. Over the last three years, the park is turning its East Entrance into a cultural site. All tribes are

participating. This is to change the narrative and allow our tribal communities to be more visible and active. It is time to change the dialogue and take the next step. This is a generational shift and where we are hoping to go with our tribal partners.

Chris Cantrell, AGFD, there has been uptick on boater and walk-ins. The fishery is still in recovery and have not met catch rate goals. No plans for stocking this year because of the recovery. We know the stocking does work. Also had a Tag Study with interesting findings that shows our assumptions were accurate. There was a maximum of 17% downstream movement of three miles but some moved back up four miles. Pretty close to what we expected.

John Jordan, HFFFI/Trout Unlimited, nothing to report except to say that these updates are a really nice idea as part of our meetings.

Jessica Neuwerth, Colorado River Board of California, no updates. Just watching snowpack.

Peggy Roefer, Colorado River Commission of Nevada, with respect to the Flow Ad Hoc Group, reminds everyone about the hydrograph objectives, please flesh out the outline.

Arden Kucate, Pueblo of Zuni, looking forward to build capacity and to include tribal interests in the discussions.

John McClow, Colorado Water Conservation Board (CWCB), no specific update. The Colorado Water Conservation Board is hard at work and studying the feasibility of demand energy.

Kevin Garlick, UMPA, nothing from the power users. Simply looking forward to understanding the HFE studies and how that affects power production.

Steve Wolff, State of Wyoming, nothing to report

Leslie James, CREDA, she brought a treasured artifact from the 1999 AMWG river trip when the vision and mission were created.

Kirk Young, USFWS, there are opportunities to comment. Humpback chub comments are due on March 26. Also comments on the Kanab ambersnail delisting proposal are due on March 6. Razorback will occur sometime after that. We have a USGS expert panel looking at habitat feasibility for the Colorado pikeminnow to see if there are conservation opportunities. Will share that with the group in May.

Chip Lewis, BIA, nothing to report now, but our regional archeologist has been able to get funding for tribal youth programs and recent spring restoration work with Hopi youth. He was in DC this week accepting an award with our tribal youth. Hualapai wants to get into that, too.

Peter Bungart, Hualapai Tribe, gratified that AMWG appointment was approved, but notes that most tribal positions are still pending. If there is any way to expedite those, especially in light of being able to vote on the Triennial Work Plan, that would be great.

Jakob Maase, Hopi Tribe, the next river trip is scheduled for May.

Jan Balsom, NPS-GRCA, (Rob Billerbeck, NPS) non-native fish environmental assessment (EA) and FONSI in early fall. Based on concern with brown trout, the latest science is still unclear why we are seeing increases there and are concerned about predation on humpback chub. The EA is to try something new that was suggested by the tribes to incentivize harvest and reward the anglers to remove and consume

the non-natives. Also want to provide opportunities for tribal youth to spend some time in the canyon. Regarding the budget, now that we got the FONSI signed, we have applied for every way to apply for a budget. There is a time lag between applying and getting the money. Brown trout is a shared concern. *(Ken Hyde, NPS-GLCA) The tribal youth program will start this fall. No discretionary money. Have \$50,000 to kick off the incentivize harvest that should start this fall. The park has committed to also provide any contingency funding. We don't want to stop it if we run out of money. In 2022, this is the first year we can get DC funds. Also looking at other opportunities to fund this. In the past, there had been some funding for brown trout that is routed through another mechanism that goes to Grand Canyon. Still looking at that. AGFD is looking at National Fish and Wildlife Foundation (NFWF) grants that we can't apply. Also looking at a line item in the budget, but that is a 2 to 3-year process. Because this is new, we are working closely with GCMRC to link together, track it, measure it, to make sure it is effective. Working with AGFD on the design and BOR to make sure we are approaching it the right way on information they will need. Hydropower also suggested pursuing the NFWF grant.*

Larry Stevens, Grand Canyon Wildlands Council, has received funding to restore a tamarisk site that will transform a very degraded habitat into native vegetation stand. About fishing, lures are great, but won't catch as much as with bait. Also, blue gills are quite good to eat and kids like to catch these.

David Brown, GCRG, looking into an alternate for AMWG. Keeping up with all the downlistings. There are also various pump storage proposals around Little Colorado. They seem speculative, but still need to be treated seriously. Preparing for our guides training seminar at end of March. It's very educational for both on land and on the water. Any stakeholders interested should consider it.

Scott VanderKooi, GCMRC, there are new fact sheets available that were developed last fall regarding interactions between rainbow trout and humpback chub. These are summaries of the studies. Another fact sheet is on the management of sand in the canyon with the objective of protecting cultural resources.

Brent Esplin, BOR, this year is the review of the interim guidelines. The review will be kicked off in March and April. There will be a basin-wide webinar. Hope to complete the review by mid-December. The guidelines are a look back, while next year will start the re-negotiation of those expiring guidelines.

[Long-Term Funding Considerations – Hydropower Revenues vs. Appropriations](#) [\(download Part 1\)](#) [\(download Part 2\)](#)

Presenter & Affiliation: Brian Sadler, WAPA and Kathleen “Kathy” Callister, BOR

[Presentation Summary](#)

To provide information regarding long-term funding uncertainties and important considerations for various potential funding sources.

[Brian Sadler, WAPA] BOR owns and operates the dam. As the power leaves, WAPA takes over to market and deliver it while revenues go to operations and associated projects. Rates are cost-based – what is brought in, covers costs, which include BOR expenses and cash to fund replacements. Some risks to cash flow include: 1) the replacements program including unexpected replacements, 2) environmental programs –this is a risk because it is a fixed amount no matter whether revenues drop or expenses increase, and 3) purchase power. Lake elevations dropped significantly in 2018, then went up in 2019, but they are not at the levels they were in 2017. In 2019, the overall purchase power is \$16.4

million; it will be \$10.7 million for 2020. Reason is because lake elevations are much higher, allowing WAPA to generate electricity much more effectively. Environmental funding is \$21.4 million, which will be provided to BOR. The big issue is to find a solution for FY23 and beyond.

[Kathy Callister, BOR] An authorization is an act by Congress to permit a program or to fund a program, but it does not actually grant the funding. An appropriation is needed for that. This allows the federal agency to make payments from the Treasury. Funded by two laws: the Grand Canyon Protection Act as well as an act in Veterans Affairs and HUD that allowed funding for the GCDAMP. Then we move to appropriations. In FY 2020, Public Law 11694 gave us those funds and identified where they were coming from. The process begins at the Office of Management and Budget to provide guidance to the agencies. Then the president releases his budget and Congress comes up with an appropriations bill that becomes law when the president signs it.

In February, the president released a budget for FY22. The agency will start its FY23 budget process this October. The president's current budget includes \$21.4 million for Colorado River activities. Funding is based on a three-year process. All the money needs to be obligated in the fiscal year.

Discussion/Q & A

[Steve Wolff, State of Wyoming] Is the \$21.4 million in the current budget hydropower dollars or will it be appropriated? *[Brent Esplin, BOR]* Both ways were requested. One of them will be funded.

[Larry Stevens, Grand Canyons Wildlands Council] Was there rollover money last year that will be factored into this year and can a risk assessment be made over next three years of planning? *[Scott VanderKooi, GCMRC]* We got an agreement to move those funds from FY19 into FY20. Part of the challenge was the ending of the five-year agreement with USGS that needed to be put into place again.

[John Jordan, IFFFI/Trout Unlimited] Once you have this money, is that allocated between the lower basin and the upper basin? Is there much discretionary spending? If the funding is reduced, is the reduction split equitably among the programs? *[Kathy Callister, BOR]* There is \$1.4 million allocated to consumptive uses and water quality. The \$20 million is divided based on historic numbers. The program splits are based on each of the budget workplans. We haven't had to deal with a reduction, but it probably would be equitable.

[Steve Wolff, State of Wyoming] With the reduced funding scenario, when are we going to hit a bottom point? *[Brian Sadler, WAPA]* Our goal is to find a solution for FY23 and beyond. *[Brent Esplin, BOR]* We need to find certainty on funding this program in the future. What does a sustainable funding model look like? Hope to roll that out soon. We need to fill the gap. Maybe this means more federal cost share with the states. How do we build this support? We need to have those discussions.

[Leslie James, CREDA] Brian and Brent said they are looking at FY23 and beyond for a solution, but the FY23 budget is coming up this October. Also, the president's budget on Monday included language to divest WAPA assets. That's a challenge and takes a lot of non-federal parties to push back on those kinds of proposals. *[Brent Esplin, BOR]* Part of this is an educational issue, such as transferring Department of Energy (DOE) funds to DOI. New people in Congress need to be educated on the issues.

Long-Term Experimental and Management Plan (LTEMP) Litigation Update

Presenter & Affiliation: M. Rodney "Rod" Smith, DOI Solicitor's office

Last fall, three groups sued the department on NEPA grounds on the December 2016 ROD. These were Save the Colorado River, Living Rivers, and the Center for Biological Diversity. The complaint is that we should have done more to consider climate change, and to include that process in the purpose and need statement. They expressly noted decommissioning and operational scenarios. The Administrative Record will be filed on April 3 and briefs will probably be filed in late summer or early fall. Several states are also exploring becoming intervenors. Let Rod know if your organizations have any interest in this.

Discussion/Q & A

[John McClow, CWCB] What are the opportunities for financial benefit to the plaintiffs? *[Rod Smith, DOI] Not going to address that specifically except to say, in general, at least one of the plaintiffs seems driven to oppose water projects in general.*

2020 GCDAMP Annual Reporting Meeting Update – Part 3 ([download](#))

Presenter & Affiliation: Michael Moran, Deputy Chief, Grand Canyon Monitoring and Research Center

Presentation Summary

To provide information regarding project work completed in FY19 and to inform the development of the 2021-2023 triennial budget and workplan.

This presentation is on the science updates related to sediment, archaeological, socioeconomic and hydropower.

Last fall with no HFE, the suspended sediment monitoring showed one big spike in late July and then that was it. The cumulative sand load was only about 6,000 metric tons (MT). That was not enough to conduct an HFE. In terms of long-term sediment management on the Paria River and Little Colorado River, even during periods of good inputs, we have intervals in between when there is winnowing and erosion, which create setbacks. Multi-sand accumulation is really only possible during above average tributary sand supply and below average dam releases when you get a lot of erosion. Campsite Area Monitoring shows areas decreasing, but since about 2012, this decrease might be leveling off mainly due to vegetation expansion. A number of areas have been mapped using single and multi-beam sonar. The conclusions suggest that most sand bars seem to be increasing over time (although small) and that controlled floods seem to be an effective condition for sandbar growth.

Wind transport of sediment can help preserve some of the archeological sites. Experimental vegetation removal on sandbars was begun in 2019 to help offer protection. GCMRC is monitoring these actions by conducting surveys before and after treatment.

Regarding socioeconomic research, one thing that is being looked at are tribal perspectives to recognize Navajo values and to prioritize management goals. This is a completed survey of the Navajo Nation that shows the majority of respondents do value and support implementation of flow experiments to improve downstream resources. There is a willingness to pay a value of \$1.44 per day for that work.

The LTEMP goal for hydropower research is to increase Glen Canyon Dam electric generation and minimize costs. One result is that the business-as-usual scenario has more negative operational costs, but they are offset by lower emissions, suggesting that this is the best way to go.

Discussion/Q & A

[Larry Stevens, Grand Canyon Wildlands Council] Is sand accumulating on the channel bed in the Upper Marble Canyon? The data you have stop in 2012 or 2014 for the lower part of Marble Canyon. Can the sand stored on the floor of the river in Upper Marble Canyon be understood to be a resource to restore sand bars following a springtime HFE? *[Mike Moran, GCMRC]* Yes, that is probably the best place to look for it. The results from Project A should tell us that.

[Leslie James, CREDA] You have to be careful about how to describe “business-as-usual” because the non-business-as-usual case does not reflect current restrictions. It would be nice to have no restrictions so the resource can be used by the customers, but the reality is that we have restrictions. She cautions the assumption that business-as-usual will result in more costs. *[Mike Moran, GCMRC]* Maybe we haven’t looked at it that way. Will pass your comment along.

[Jan Balsom, NPS-GRCA] Sandbars are starting to stabilize, we have vegetation encroachment, which we knew would need to be removed. The modeling efforts are lining up with what we are observing. This is confirming the model assumptions. *[Mike Moran, GCMRC]* The presentations should be posted soon so that all the studies can be looked at. *[Rob Billerbeck, NPS]* When we did the LTEMP modeling, it was wildly exciting to see that we had stopped the decrease in the beaches. That is huge. The camping beaches are static, but that is much better than decreasing. Modeling did predict the future.

[Scott Vanderkooi, GCMRC] We are continuing to learn from those models. These rich data streams are allowing the science to move forward. Some of the challenges of reduced sand is going to be a test in terms of management actions.

[David Brown, GCRG] There are differences in Marble Canyon and Grand Canyon camping. They are not equivalent. Maybe it is not the stabilization you are looking for.

Technical Work Group Chair Report ([download](#))

Presenter & Affiliation: Seth Shanahan, Technical Work Group (TWG) Chair

Presentation Summary

To update AMWG members on the TWG meetings held October 2019 and January 2020, including the results of the 2019-2020 Knowledge Assessment.

The Flow Ad Hoc group (FLAHG) has been finalized. The group started to define their first objectives and will develop potential hydrographs to meet those objectives. TWG is also thinking about such things as the LTEMP lawsuit, the pumpback hydro project, and potential ideas of stocking razorback suckers in Grand Canyon and bonytail chub in Lake Mead. There has been interest in learning more about how a spring HFE will be triggered. Another topic stemmed from the fall 2019 releases of high temperature and low dissolved oxygen. There was a lot of concern over a three-day period this could be a problem for rainbow trout during a time when juveniles are potentially vulnerable. It is also very important to recognize that the knowledge assessment is not a panacea for everyone and not respectful of tribal perspectives. This is an outstanding item to figure out. The Wiki page is going to be helpful for the workplan especially in a budget year to get access to information very quickly.

Discussion/Q & A

[John McClow, CWCB] If we could get a one-month advance notice of the confluence of temperature and low dissolved oxygen, is there anything that can be done to prevent that? *[Lee Traynham, BOR]*

The concern is that an operational change could impose detrimental impacts to the facility. The TWG has started to talk about other possible types of mitigation strategies. It is also a spatially confined issue, which gives more options for site specific mitigation.

[Larry Stevens, Grand Canyon Wildlands Council] An earlier effort of the knowledge assessment was quite complicated and slow, but all that information was compiled in a library. What happened with that? There were also surveys under the Eagle Protection Act. What about those surveys? With golden eagle populations crashing, we can't afford to ignore them. *[Seth Shanahan, TWG Chair]* Not familiar with background information, but the report is on the Wiki page. Will have to look into that back-up information. There had been a recent email string on golden eagle that can be sent to you.

[FY2021-2023 Triennial Budget and Work Plan \(download\)](#)

Presenter & Affiliation: Seth Shanahan, TWG Chair; Craig Ellsworth, Budget Ad Hoc Group (BAHG) Chair; Lee Traynham, Bureau of Reclamation; Scott VanderKooi, Grand Canyon Monitoring and Research Center

Presentation Summary

To discuss the BAHG process and seek AMWG initial input on the FY21-23 Triennial Work Plan

[Seth Shanahan, TWG Chair] The workplan and budget will reflect your guidance and input. In March 2019, AMWG approved a process that lists what needs to be accomplished by August for document approval. Right now is the discussion of priorities. The first opportunity for AMWG review will be the draft issued in July. Recommendations will then be made to the Secretary in August.

[Craig Ellsworth, BAHG Chair] The first phone call of the BAHG occurred last week to have discussions with BOR and GCMRC. This is now your opportunity to be part of those conversations and communicate stakeholder ideas. The BAHG page on the Wiki will help conduct internal communications and the sharing of information that may be on multiple websites, and not so easy to find. Contact Craig or Peggy to get more information about accessing and using the Wiki.

[Lee Traynham, BOR] We are considering DOI's guidance from August 2019, which was to focus on the LTEMP. All of the efforts that you have heard in this meeting have implications for the program. We have a good baseline in the current workplan. Starting with that we want to identify the things that are working well and then flag those things that are either not working well or where we have enough information. Large programmatic efforts include the monitoring metrics, which are going to take some time to develop as well as track and report. The knowledge assessment can be improved and we have talked about including tribal perspectives. As a federal advisory committee, we can't lobby, but we can communicate better about the purpose of the group, so that might be something to include. We need to have a plan in place for our priorities if we should have a reduction in funding. There should be many opportunities for everyone to engage. If you feel you are not being heard, contact Lee, Scott, Seth or Craig.

[Scott VanderKooi, GCMRC] He keeps hearing questions about the guidance. It was a topic of our first BAHG call. Take a look at the document that Dr. Petty released in August 2019. This is what we will follow. The Science Plan related to LTEMP that was published three years ago underwent a review. Our determination is that the Science Plan does not need to be revised. It is still applicable.

Discussion/Q & A

[Lee Traynham, BOR] What is important to you? What do you want to see to continue? Are there new projects or proposals to consider? Any areas to reduce or things that didn't work out? How do we prioritize? How does it support LTEMP goals and management decisions?

[Larry Stevens, Grand Canyon Wildlands Council] This process within overall LTEMP was to think about where we want to be in 20 years. The Argonne National Lab did all the models that LTEMP is based on such as fish dynamics. Do we have access to those models and how well did they work? **[Craig Ellsworth, BAHG]** *Good point. The models for the LTEMP came from GCMRC, some from BOR, and some from Argonne. Most importantly there is documentation. How can those models be kept updated with the latest studies and information that would be useful today or for any process in the future?*

[John Jordan, IFFF/FFI/Trout Unlimited] The bigger picture for AMWG is that the ultimate decision rests with GCMRC about what is done with the projects. It would be helpful to get from the principal investigators their views on where they are going with those projects. Pure knowledge pursuit drives good science, but it has to be in line with the program. **[Scott VanderKooi, GCMRC]** *We will push back a little on that. We will hear from the principal investigators as to what they think is important to continue and what has been sufficiently addressed. Science is not just an end to itself, ~~but~~ and our role is very much to support this program. We need to meet the stakeholders' needs.*

[Chris Cantrell, AGFD] In previous budget years, our contracts incurred a 10% cut. That is not sustainable. Maybe we should focus on the core needs and then look at the rest of the budget. He would like to see a conversation about utilizing the Native Fish Contingency Fund.

[Larry Stevens, Grand Canyon Wildlands Council] About the planning process, given the uncertainty, establishing some "Plan Bs" would be good to do. For example, if we don't continue bug flows, then what is the next step?

[Jessica Neuwerth, CRBC] We need more information about brown trout life histories. Would like to see more effort studying that species, perhaps similarly to what we did with rainbow trout. We've also seen a booming population of native fish, we need to continue to monitor that and understand what is driving that.

[Steve Wolff, State of Wyoming] We heard a need for a new set of imagery, which is expensive. If it is a new project, someone probably needs to drop off the list. **[Scott VanderKooi, GCMRC]** *It is a big expense, but we have been planning for that. It is a big priority to understand how things are changing over time.*

[John Jordan, IFFF/FFI/Trout Unlimited] There is no facilitator at this meeting. Where are we at with our science advisor? We have our own areas of interest and we also have to consider giving up something to achieve our most pressing needs. **[Lee Traynham, BOR]** *BOR is considering moving forward on that. The science advisor is also a critical piece. The previous contract expired and hope to award that soon.*

[Leslie James, CREDA] We provided input after the annual reporting meeting on what we know in each of the program areas. We heard from Park Service there was an 84% reduction of brown trout in Bright Angel Creek since 2012. Then we made an assumption to cut a million dollars. What are the programs we think can go? Some are regulatory requirements and others are good to know.

[Jan Balsom, NPS-GRCA] It is really important to do the regulatory things. Do we decide to spend less money because something is not yet a big problem? This is basically a risk assessment and each of us needs to do this analysis. Some projects can be delayed, but some have big effects in larger water years. The system seems to be improving; it would be unfortunate to step back from that positive trajectory.

[Larry Stevens, Grand Canyon Wildlands Council] The triennial budget plan is to figure out priorities in this three-year plan. Are we contributing to the 2007 interim operating criteria? What are the spring time HFE needs? There is still a lot of work that needs to be done before we get to a springtime HFE. We need to plan that process. It would be deeply disappointing if there is not a solid plan on how to conduct a springtime HFE. We need to have the data and information in place to answer that.

[John Jordan, IFFFEI/Trout Unlimited] What is the role of the agencies in this process? We have found a string of previous guidance documents on different topics. Have we escaped from the burden of those and can we just focus on relevant current issues? **[Lee Traynham, BOR]** *The Secretary ultimately retains decision-making authority. Part of our role, is to get stakeholder feedback, but also to make sure recommendations are feasible and have a good chance of being agreed upon by leadership.*

[Peter Bungart, Hualapai Tribe] We have heard for a long time about the tribes' views of Western science and the prominent paradigm. If we can take one step to recognize that it would have to include a more ecological and comprehensive look about how these dams have changed the resources. We need to bridge the gap between the Western Science model and tribal points of view.

[Peggy Roefer, Colorado River Commission of Nevada] The knowledge assessment might not be the right tool, but we need some tool to understand the resources and what we know about them.

[Kirk Young, USFWS] Do we need to consider to manage temperature? Should we try to work out this TCD application at Glen Canyon to manage these things?

[Larry Stevens, GCWC] There are some challenging proposals coming up about pump storage. Should we consider constructing these experimental facilities?

[Lee Traynham, BOR] Any additional feedback can be sent by email or phone, but we are going to move quickly so feedback is needed sooner rather than later.

Potential Water Year 2020 Experiments ([download](#))

Presenter & Affiliation: Lee Traynham, Bureau of Reclamation and Scott VanderKooi, GCMRC

Presentation Summary

To update AMWG members on the process and possible LTEMP experiments that may be conducted in 2020

[Lee Traynham, BOR] In this Program we're attempting to establish a balance between specific experiments and being flexible with respect to adaptive management. The TWG meets in January for an annual reporting meeting in which we can look at current resource conditions and results from previous experiments. We must notify and offer consultation with the tribes a minimum of 30 days before an LTEMP experiment. We convene a planning and implementation team in advance of implementing any LTEMP experiment. They will make a consensus recommendation to DOI and the Secretary or Secretary's Designee will make the ultimate decision. See table shown of the 2020 LTEMP experiments and timing of the discussions.

[Scott VanderKooi, GCMRC] Current conditions are at 20,000 MT. That sounds like a lot of sand, but the last HFE in fall 2017, we had 750,000 MT. We are a long way from that. Mass balance from Marble Canyon is typically what we see from operations. We are not on a trajectory to do a spring HFE unless something extraordinary happens. One potential experiment is to continue the bug flows into Round 3.

[Lee Traynham, BOR] Bug flow implementation is May through August. Trout management flow (TMF) is designed to disadvantage trout. The TWG team had concerns about whether we were really prepared for this experiment and our knowledge gap. We know that tribal consultation is an important and necessary component of initiating TMFs. Hope to start that. One item not included is the potential for power plant capacity flows. We would like that to be on the table, too.

Discussion/Q & A

[Leslie James, CREDA] Regarding bug flows Part 3, will that process incorporate when a synthesis report will be available from all three years of work to make future decisions? We need to make that part of the decision-making process in the workplan. How do we talk about the apron maintenance thing? It is not an experiment, but it is a learning opportunity. **[Scott VanderKooi, GCMRC]** *That might be more important for the workplan. It is important and needs to be part of the discussion.* **[Lee Traynham, BOR]** *The TWG would be good place to talk about the apron maintenance project.*

[Larry Stevens, Grand Canyon Wildlands Council] Are the vegetation manipulations expected to continue? Is there a study design and study controls? **[Rob Billerbeck, NPS]** *We had a good meeting with GCMRC on Monday and we see the role of vegetation removal on beach encroachment to continue.*

[John Jordan, IFFEF/Trout Unlimited] The potential was to have one week of very reduced flows. Thought that was related to structural repairs versus a natural reduced flow from the lump. Also, when we have the discussion about spring HFEs, if we have that event, we might still proceed with caution about having that when we are prepared rather than if it happens. In discussing the process of getting tribal perspectives, what are the answers to their questions? Do we have the answers to implement a TMF? **[Lee Traynham, BOR]** *The reduced flows are two separate things, but someone raised a concern about looking at both.* **[Scott VanderKooi, GCMRC]** *As to the spring HFEs, we see them in terms of monitoring. The way we structure those monitoring programs, they will get at whether the event happens in spring or fall. It has been 12 years since we had a spring flow like that occur. It would be good to prepare, but we still have baseline monitoring currently in place for physical, biological, and cultural resources. Related to trout management flows, we need to think through that information again. We know a lot about rainbow trout, but we may have plateaued on our predictive capabilities.*

[David Brown, GCRG] About “the bump,” 4,000 CFS is still not an inconsequential amount of water so it might not be as advantageous as some people think. We need to complete the study about being a spring HFE to be prepared for that.

Final thoughts and Public Comment

[Kelly Burke, GCWC] Supports having a facilitator. It is like insurance – you don’t need it until you do need it. In regards to Dr. Petty’s guidance memo, be careful about simplifying it down to the things on the slides. Also in that memo is the directive to look at spring experiments. Grateful for that and we should be mindful of it. That memo also didn’t replace the guidance memos of the past, which are important to remember as well. We start to lose the adaptive management perspective if we only look at the LTEMP.

Wrap-Up

Presenter & Affiliation: Dr. Timothy “Tim” Petty, Assistant Secretary for Water and Science, Department of the Interior and Secretary’s Designee

This was really great engagement and to see all the new people. We still have open positions. When he met with Secretary Bernhardt last fall, he fully recognized the decade [of research, monitoring, and other work that supported development of the LTEMP EIS and](#) that everyone [participated](#) ~~had~~ in that process. It is up to this group to help bring the projects back to our priorities and what is legally binding us. This is what this committee is all about. The TWG has some of the best work being accomplished. We are getting great input from them. It is an informed decision when that information is presented to the Secretary. This is also one of the few basins that is not being controlled by a judge who will not think of all the areas that are needed and what is most important to the resources.

Important dates:

- May 20, 2020 – AMWG webinar
- August 19-20 next in-person meeting
- January 20-22, 2021 – next reporting meeting

Meeting Adjourned at 3:00 pm MST

Meeting Attendees–Wednesday, February 12, 2020

AMWG Members, Alternates, and Leadership

Jan Balsom, NPS-GRCA
Cliff Barrett, UMPA (webinar)
David Brown, GCRG
Peter Bungart, Hualapai
Kathleen Callister, BOR
Chris Cantrell, AGFD
Brent Esplin, BOR
Kevin Garlick, UMPA
Leslie James, CREDA
Steve Johnson, WAPA
John Jordan, ~~HPF~~FFI/Trout Unlimited
Charles “Chip” Lewis, BIA

John McClow, State of Colorado
Jessica Neuwerth, Colorado River Board of
California
Timothy Petty, DOI and Secretary’s Designee
Daniel Picard, BOR
Richard Powskey, Hualapai Tribe
Peggy Roefer, Colorado River Commission of
Nevada
Brian Sadler, WAPA
Steve Wolff, State of Wyoming
Kirk Young, USFWS

USGS/GCMRC Staff

Helen Fairley
Ted Kennedy (webinar)
David Lytle

Michael Moran
Scott VanderKooi

Bureau of Reclamation Staff

Tara Ashby
Heather Patno
Alex Pivarnik

Jennifer Scheel
Lee Traynham
Chris Watt

Interested Persons

Rob Billerbeck, NPS
Charley Bullets, SPC
Danielle Carmon, NPS-GLCA
Tom Chart, USFWS
Winkie Crook, Hualapai Tribe
Kurt Dongoske, Pueblo of Zuni
Sinjin Eberle, American Rivers
Craig Ellsworth, WAPA
Michelle Garrison, State of Colorado
Jessica Gwinn, USFWS

Jeff Humphry, USFWS
Ken Hyde, NPS-GLCA
Sara Larsen, UCRC
Arden Kucate, Pueblo of Zuni
Jakob Maase, Hopi Tribe
Craig McGinnis, State of Arizona
Theresa Pasqual, Joint Tribal Liaison
Richard Begay, Navajo Nation
Erik Skeie, State of Colorado Rod Smith, DOI

Webinar Attendees

Kelly Burke, GCWC
Kevin Dahl, National Parks Conservation
Association
Alicyn Gitlin, Sierra Club
Paul Harms, State of New Mexico

Ryan Mann, AGFD
Kevin McAbee, USFWS
Lisa Meyer, WAPA
Emily Omana Smith, NPS

Meeting Attendees, Thursday, February 13, 2020

AMWG Members, Alternates, and Leadership

Jan Balsom, NPS-GRCA

David Brown, GCRG

Peter Bungart, Hualapai Tribe

Kathleen Callister, Reclamation

Chris Cantrell, AGFD

Brent Esplin, BOR

Kevin Garlick, UMPA

Leslie James, CREDA

Steve Johnson, WAPA

John Jordan, ~~HPFF~~FFI/Trout Unlimited

Charles "Chip" Lewis, BIA

John McClow, State of Colorado

Jessica Neuwerth, Colorado River Board of
California

Timothy Petty, DOI and Secretary's Designee

Daniel Picard, BOR

Peggy Roefer, Colorado River Commission of
Nevada

Brian Sadler, WAPA

Steve Wolff, State of Wyoming

Kirk Young, USFWS

USGS/GCMRC Staff

Helen Fairley

Dave Lytle

Michael Moran

Scott VanderKooi

Bureau of Reclamation Staff

Tara Ashby

Heather Patno

Alex Pivarnik

Jennifer Scheel

Lee Traynham

Stacie Wylie

Chris Watt

Interested Persons

Richard Begay, Navajo Nation

Rob Billerbeck, NPS

Kurt Dongoske, Pueblo of Zuni

Sinjin Eberle, American Rivers

Craig Ellsworth, WAPA

Jessica Gwinn, USFWS

Jeff Humphrey, USFWS

Ken Hyde, NPS

Arden Kucate, Pueblo of Zuni

Jakob Maase, Hopi Tribe

Seth Shanahan, TWG Chair and SNWA

Erik Skeie, State of Colorado

Webinar Attendees

Cliff Barrett, UMPA

Kevin Dahl, National Parks Conservation
Association

Alicyn Gitlin, Sierra Club

Paul Harms, State of New Mexico

Vineetha Kartha, Arizona Department of Water
Resources

Ryan Mann, AGFD

Kevin McAbee, USFWS

Lisa Meyer, WAPA

Emily Omana Smith, NPS

Jeffrey Woner, Arizona Tonopah Irrigation
District

Abbreviations

ADWR – Arizona Department of Water Resources

AMP – Adaptive Management Program

AMWG – Adaptive Management Work Group

AGFD – Arizona Game and Fish Department

BAHG – Budget Ad Hoc Group

BOR – Bureau of Reclamation

cfs – cubic feet per second

CRBC – Colorado River Board of California

CREDA – Colorado River Energy Distributors Association

CWCB – Colorado Water Conservation Board

DOI – Department of the Interior

EA – Environmental Assessment

EIS – Environmental Impact Statement

ESA – Endangered Species Act

FACA – Federal Advisory Committee Act

FEIS – Final Environmental Impact Statement

~~IFFI – International Federation of Fly Fishers~~

[International](#)

FLAHG – Flow Ad Hoc Group

FONSI – Finding of No Significant Impact

FY – Fiscal Year (October 1 – September 30)

GCDAMP - Glen Canyon Dam Adaptive Management Program

GCMRC – Grand Canyon Monitoring & Research Center

GCRG – Grand Canyon River Guides

GCWC – Glen Canyon Wildlands Council

GPP – gross primary productivity

GRCA – Grand Canyon National Park

HFE – High Flow Experiment

~~IFFI – International Federation of Fly Fishers~~

km – kilometer

MSCP – Multi-Species Conservation Program

LTEMP – Long-Term Experimental and Management Plan

MT – metric ton

MW – megawatt

NFWF – National Fish and Wildlife Foundation

NPS – National Park Service

QSA – Quantification Settlement Agreement

Reclamation – Bureau of Reclamation

ROD – Record of Decision

Secretary – Secretary of the Interior

SNWA – Southern Nevada Water Authority

SRP – soluble reactive productivity

SSA – Species Status Assessment

TMF – Trout Management Flows

TWG – GCDAMP Technical Work Group

UMPA - Utah Municipal Power Agency

USFWS – United States Fish & Wildlife Service

USGS – United States Geological Survey

WAPA – Western Area Power Administration

Glen Canyon Dam Adaptive Management Work Group Meeting (webinar) May 20, 2020

Start Time: 9:00 AM Mountain Daylight Time (MDT)

Conducting: Dr. Timothy “Tim” Petty, Assistant Secretary for Water and Science, Department of the Interior (DOI)

Recorder: Carliane Johnson, SeaJay Environmental, LLC

Welcome and Administrative: Tim Petty, DOI Assistant Secretary for Water and Science and Secretary’s Designee

Introduction and Determination of Quorum (13 members)

[Tim Petty, DOI] Welcomed newly appointed and reappointed Glen Canyon Dam Adaptive Management Work Group (AMWG) and Technical Work Group (TWG) members. A quorum was reached with 14 members or alternates represented. Several member nominees were also present. Attendees introduced themselves with their affiliations.

Approval of [February 12-13, 2020 meeting minutes](#) (*postponed until August 2020*)

The minutes were just sent out so will wait until August to approve to give everyone time to review.

Action Item Tracking Report Update ([presentation](#))

The following updates were reported by Lee Traynham, Reclamation:

- AMWG consideration of next 20 years of the Long-Term Experimental and Management Plan (LTEMP). Reclamation is committed to streamlining of the guiding documents and to developing monitoring metrics to track resource conditions. It is anticipated that progress will be made in the upcoming work plans. It is a major focus.
- Tribal funding for their participation in the AMWG. These funds are not coming out of the AMWG budget, but instead are appropriated dollars contributed by each of the DOI agencies. This has been under discussion and the determination was made that participation funding in the Triennial work plan for Fiscal Years (FY)21-23 will remain at current levels.
- TWG to take up High-Flow Experiment (HFE). The Flow Ad Hoc Group (FLAHG) has been established and is chaired by Peggy Roefer, Colorado River Commission of Nevada. The FLAHG is working with Grand Canyon Monitoring & Research Center (GCMRC) to develop a hydrograph with a potential for a release as early as spring 2021. This item has been addressed.

Progress on nominations and reappointments

[Tim Petty, DOI] There has been good progress moving nominees forward through the process. Last year there were some delays, and it was important to get input from new leadership in the states and invite them to submit nominees.

Impacts from and response to Covid-19

- a. **[Tim Petty, DOI]** Secretary Bernhardt is in New Mexico and Arizona today to reopen some of the National Park Service (NPS) sites. The federal government is working with state governors' offices. The primary consideration for opening parks and offices is on public health, especially for those with pre-existing conditions. Tribes are also working hard to address public health issues.
- b. **[Brent Esplin, Reclamation]** Since mid-March, Region 7 has been on maximum telework. It has been working well. For example, a power plant rotation program was implemented with three-person crews that are in their duty stations for a week and then working elsewhere for a week. Managed to do this with very few closures of facilities and keeping some contract work going such as with the Navajo Nation on construction of a regional water system in New Mexico. Some maintenance work will slow down. Hope to bring some people back in the next couple of weeks.
- c. **[Jan Balsom, NPS Grand Canyon National Park (GRCA)]** GRCA's new superintendent Ed Keable has been on the job for eight days. It is an odd and challenging time to arrive when the park is closed. Ed will attend the next AMWG meeting. GRCA has a year-round community of 2,500 people to service such a big operation, all of which was suspended, but it is starting to open bit by bit. There was a limited South Gate opening last weekend with 1,000 to 1,100 people coming in per day. The East Entrance will remain closed in deference to what the Navajo Nation is facing. This weekend the park will enhance further services to allow for overnight use and day hiking. The visitor center, food services, and others places will remain closed. Maybe 5,000 to 6,000 visitors will be allowed in the park, which seems a reasonable amount to host. Concessionaires are still working on their re-opening plan. GRCA is using Centers for Disease Control (CDC) guidance to figure out ways to resume river operations, which is hoped to launch June 14. Everybody needs to get back on the river, but we need to do it safely without taxing the park's capabilities and knowing these trips will be going through Navajo Nation.
- d. **[Billy Shott, Superintendent, Glen Canyon National Recreation Area (GCNRA)]** GCNRA has been challenged with the same sets of conditions that other parks have faced. The park has been able to stay open only if it can be done safely. Several use areas and visitor centers have been closed. There had been staffing issues, along with Arizona and Utah, on invasive species management mostly related to aquatic mussels. This resulted in temporary changes to regulations to continue to monitor and record, which turned out to be effective. The largest access issue was closing the boat ramps. This weekend will be the first to have all ramps open except one. A number of areas remain closed where GCNRA does not have the resources available to manage. There are concerns for

Navajo Nation about the Antelope Point Public Use Area and Ramp. The park is working with everyone to figure out what that re-opening will look like.

- e. **[Scott VanderKooi, U.S. Geological Survey (USGS) GCMRC]** GCMRC has been on telework for two months now. Looking at moving back over next weeks to months. Teleworking has ranged from easy to difficult depending on the position such as those working in the sediment and aquatic labs. There have been a number of limitations for field work due to the river closures and for the Navajo Nation. This has involved working with colleagues to do some small field activities that included fixing gauges and taking shorter day trips with one to two people. Spring (April through May) is typically a very busy field time and have had to make difficult decisions. Half of the trips were canceled and the rest have been postponed. Trips that were seasonally dependent, such as when fish are moving, were the ones canceled. GCMRC is also supporting its tribal partners on their river trips (one was cancelled and three postponed until the fall). Scott appreciates everyone working through this challenging time. The health and safety of staff have been most important.

Tribal Liaison Report: Theresa Pasqual, Tribal Liaison for the Glen Canyon Dam Adaptive Management Program (GCDAMP)

The impacts from Covid-19 are on everyone, but worst by far have been the impacts on the tribal communities. Tribal colleagues are in the states of Arizona, Utah, and New Mexico with the Navajo Nation spanning across all three states. There are jurisdictional challenges and the tribes are operating in a changed environment. We have a number of different programmatic goals to achieve this year and other processes in play such as the triennial work plan and budget. We need to keep these things moving along. Theresa is very grateful to Reclamation (Lee and her team) and GCMRC (Scott and his team) to step up the number of webinars and calls and other outreach they have done to respond to tribal colleagues. Our communities are all different in size and resources available. We need to ensure that everyone can receive our communications because some are limited in internet access and mail delivery. Theresa checked in with her colleagues in April when they were beginning to see cases in their communities. Tribal communities have been some of the hardest hit by the pandemic. Concerns include impacts to the tribal elders, who do a lot of cultural work. The communities are under extreme closures, many through the end of May while the Navajo Nation is closed through June 7. We need to double down on our communication efforts to make sure they are receiving information. As states and other businesses open up, people need to realize that many tribal communities will still be dealing with this.

GCDAMP Triennial Budget and Work Plan Development Process: Seth Shanahan, TWG Chair and Craig Ellsworth, Budget Ad Hoc Group (BAHG) Chair (presentation)

[Seth Shanahan, TWG] The process schedule was approved by AMWG March 6, 2019. It is an intense process to develop the budget and work plan that started with the annual reporting meeting in January, then established priorities in February. There has been a lot of activity since. Seth thanked everyone who has been part of that process and provided information to support the discussions. One of the successes of an adaptive management process is the participation of the stakeholders. There is nothing specific for AMWG to be doing in May, but it is still important for this body to provide direction. Currently, the TWG received the second draft of the work plan on May 20 and will be reviewing it over

the next two weeks. Comments will be provided to federal agencies by June 8. The third draft will be available before the June 23 TWG meeting in which recommendations will be developed. The final draft will be prepared and submitted to AMWG on July 29. TWG will then submit recommendations at the August meeting. It has been very helpful that everyone is following the schedule, which helps us to achieve the deadlines.

[Craig Ellsworth, BAHG] Craig appreciates everyone's participation. It has been great. The last two BAHG calls will be to: 1) talk to science advisors about their impressions, and for 2) BAHG to discuss their recommendations. There may be some flexibility in the dates to make sure everyone can review the second draft. There is a BAHG site on the Wiki, which contains notes from calls and other information.

Q&A/Discussion

[Larry Stevens, Grand Canyon Wildlands Council (GCWC)] **What about the backlog of maintenance at the dam? Will that result in a flurry of activities?** *[Brent Esplin, Reclamation] Some is just routine maintenance that can be caught up on pretty quickly. Bigger issue may be the transformer replacement contract, which may affect future releases.*

Overview of Draft FY21-23 Triennial Budget and Work Plan ([presentation](#))

[Lee Traynham, Reclamation] Everyone is reminded that there are a number of guidance documents to meet compliance obligations. There is also general uncertainty with respect to both source and amount of funding in future years. This needs to be considered and incorporated into the work plan with an eye to remaining flexible and adaptable. Reclamation started its baseline for the upcoming Triennial Budget and Workplan with the 2018-2020 budget. The current budget looks similar with only modest adjustments in proposed funding. One of the most important steps in the process is to incorporate stakeholder input. Lee appreciates everyone's engagement. The feedback resulted in both adjustments and inclusions in the second draft. There were a few changes in Project A and Project B. Project C largely stayed the same except for the addition of Project C-12 to support partners in developing monitoring metrics that came out of the experimental funds. We need to continue to discuss whether we have appropriate funds for that. Biggest difference between the first and second drafts is cultural resources Project D, many of which are compliance requirements. Projects D.5 through D.7 are the items that Reclamation had requested proposals from tribal partners on mitigating dam operations. Seven proposals were received, which will be included in the second draft of the work plan. The next step will be for DOI agencies to flag projects that are closely tied to compliance to arrive at the must-haves versus nice-to-haves.

[Scott VanderKooi, GCMRC budget] GCMRC's emphasis in the work plan is the LTEMP implementation. A number of experiments have to be evaluated each year to make sure they will not negatively impact resources. This is foremost as the work plan is being developed. In the presentation shown, a summary of each of the project's elements was provided along with previous and current triennial budgets, and the LTEMP resources areas for the following: 1) streamflow, water quality, and sediment transport; 2) monitoring sediment storage; 3) riparian vegetation monitoring and research; 4) effects of dam operations on archaeological sites; 5) controls on ecosystem drivers; 6) aquatic invertebrate ecology; 7) humpback chub population dynamics; 8) salmonid research and monitoring; 9) warm-water native and non-native fish monitoring and research; 10) socioeconomic research; 11) hydropower monitoring and research; 12) geospatial science data management and technology; 13) remote sensing overflight in

support of long term monitoring and LTEMP; and, 14) leadership, management, and support. One thing not funded by the Program, but important and worth mentioning, is the Lake Powell Water Quality project. This project is not funded by GCDAMP, but it affects what goes down the river corridor. Overall, there had been a lot of stakeholder feedback, a series of BAHG calls, virtual TWG meetings, and comments received in writing. It was all very helpful, but also challenging because of the varying goals across the groups. For the budget, the most significant change was the overflight remote sensing project. USGS's budget burden also bumps up quite a bit in FY23 because of a new facility. FY21 is above anticipated budget levels. It is hoped to fund the overflight project from that savings. FY22-23 are at expected levels.

Q&A/Discussion

[John Hamill, Trout Unlimited] Why the increase in overflight costs from \$75,000 per year in FY19-20 to \$300,000 in FY22-23? *[Scott VanderKooi, GCMRC] That money was proposed to be set aside to help defray costs of the overflights. The out years are for the processing of the data, but that was largely done when we got to the FY18-20 work plan.*

[Sara Price, Colorado River Commission of Nevada] How was the dollar amount calculated for the monitoring metrics and how would funds be applied? *[Lee Traynham, Reclamation] The dollars in the line item are for subject matter expert support from GCMRC, tribal members, and others. Probably 50% to 75% of the metrics have already been identified for the program. It has been harder to determine appropriate metrics for some of the resources, including whether they will be feasible for modeling and if we can observe their values over time. The funds will complement other funding allocated for the science advisors' work on this effort.*

[David Brown, Grand Canyon River Guides (GCRG)] What happened with the Western Grand Canyon modeling projects? *[Scott VanderKooi, GCMRC] Those projects were included in the first draft, but a way could not be found to fund them with the budget constraints. In the event of an HFE impact on sediments, there is a proposal in the experimental funds project to look at those dynamics in the lower canyon. That is condition dependent.*

[John Hamill, Trout Unlimited] Is there any expectation for conducting a spring power plant capacity flow in FY21-23? *[Scott VanderKooi, GCMRC] There was mention of this in February. GCMRC is brainstorming with the FLAHG. One idea is to put together a low maintenance flow followed by a power plant capacity flow to try to mimic conditions of a spring HFE. There is a hydrograph being discussed. Peggy Roefer is considering a call soon with the FLAHG. [Seth Shanahan, TWG] In addition, it is important to recognize that the FLAHG is having this conversation. We will need an assessment to determine if there is sufficient flow and then FLAHG can make recommendations. In trying to make this process work, we need to be flexible and make sure there aren't any set expectations.*

[Sara Price, Colorado River Commission of Nevada] Will the science advisor take the lead on monitoring metrics? *[Lee Traynham, Reclamation] No, Reclamation and the federal agencies will take the lead on the metrics while leveraging the expertise of the science advisor.*

[Kelly Burke, GCWC] Will the Navajo Nation be involved anywhere in Project D? *[Lee Traynham, Reclamation] The Navajo Nation had a proposal for a vegetation study that was outside of the scope of*

the Colorado River ecosystem. There had been discussions about other potential vegetation work, but because of Covid-19, it was going to be difficult to get any further proposal submitted.

Basin Hydrology and Operations Update: Heather Patno, Reclamation (presentation)

Reclamation has new visual resources. A link is provided in the slide presentation on where to get them. At this time, about 85% of average precipitation has been received in the Upper Colorado. With dry soil conditions coming into the season, the forecast was for below average spring runoff. Then there was a high pressure ridge starting in April that was both dry and 10-20 degrees above normal temperatures. Since April, the snow pack has plummeted for the season. Spring peaks are anticipated soon for the upper basins; some have completed their peaks and are drying out. Every single forecast of unregulated inflow has decreased. For Lake Powell's unregulated inflow, operational decisions are set by the 24-month study although there is a potential for an April adjustment based on elevations. There are no further opportunities for adjustment for water year 2020. Ten percent was lost from April to May due to the warmer conditions and will probably have dryer conditions moving forward. The maintenance schedule for water year 2021 will change because of Covid-19 impacts. There is also the potential for steady lower flows in water year 2021. With the elevations decreasing, the capacities are also decreasing. For Lake Powell, no updated May temperature release data are available, but can expect to see some increases. This is something to watch and be aware of as we move through the season.

Q&A/Discussion

[Tim Petty, DOI] The graphics have been extremely helpful. Please contact Lee if members have questions for Heather or about her analysis. She is a good teacher to help understand the details.

[Leslie James, Colorado River Energy Distributors Association (CREDA)] What would be the other reasons for low steady flows in 2021 besides the overflights? *[Heather Patno, Reclamation]* There would be the May low flows over Memorial Day for the overflight that Scott talked about. Also the potential for the 4,000 cubic feet per second maintenance flow for work on the apron at the beginning in March.

[Kelly Burke, GCWC] When have we seen in the past this change in warming temperatures above normal and what plays out in the summer season? It looks dramatic. Despite a good snow pack, are we more equivalent to a poor snow pack/greater drought environment? How does that fit in with previous years? *[Heather Patno, Reclamation]* Will have to get information back to you about previous years. What has happened compared to drought years is because of the dry soil conditions even with the reasonable snow pack. Soils captured a lot of the water in the snow that had melted very quickly and the warm temperatures kept the soils dryer. Runoff conditions are being forecast for the rest of the year.

Tribal Liaison Program Update (Kerry Rae, Chief of Staff to the Assistant Secretary for Water and Science) (presentation)

We are at a point in the program that allows an opportunity to conduct an evaluation of the Joint Tribal Liaison (JTL) Program in which there are two half-time liaisons. The program lost Sarah Rinkevich at the end of FY19. Theresa Pasqual is currently the only tribal liaison. Kerry thanks Theresa for keeping the program afloat while it is being reviewed. In looking at the guidance, the liaison position reports to the

Secretary's Designee. The key is regular communication between the Designee and liaison. The current term expires September 2020. The plan is to have a vacancy announced and filled by October 2020. Input is now being requested on the JTL program including confirmation of support if you believe the program is beneficial. The new program will likely include a single full-time liaison who works at Reclamation but has a direct line of communication with the Assistant Secretary's office. Submit comments by June 19.

Q&A/Discussion

[Kelly Burke, GCWC] **Is the decision to go forward with one full-time position fixed? What is Theresa's experience in this? Kelly thinks the program is valuable.** *[Lee Traynham, Reclamation] She may be having audio issues. If possible, maybe we will circle back around to Theresa once her connection is restored.*

Potential Water Year 2020 LTEMP Experiments and Bug Flow Experiment (Lee Traynham, Reclamation and Scott VanderKooi, GCMRC) ([presentation](#))

[Lee Traynham, Reclamation] The LTEMP Record of Decision (ROD) includes a process to implement flow-based experiments at Glen Canyon Dam. (See the list of potential experiments that were provided in the presentation.) Sand budget model results in the negative show we're not near conditions to warrant an HFE. There will not be a spring HFE in 2020. For trout management flows (TMF) there is still interest in refining the design questions. Expect more conversations on those. The decision memo approving the bug flows experiment was issued on April 24. That led to notifications and a press release. We'll talk in August about a potential fall HFE.

[Scott VanderKooi, GCMRC] It was not an eventful winter or spring for sediment conditions with only about 55,000 metric tons from the Paria River, which is probably an order of magnitude off the trigger for an HFE. There are also declining trends in Upper Marble Canyon. Overall, the balance is negative. Bug flow implementation for 2020 gives bugs the "weekends off." Would expect to see a response with aquatic insect abundance. Seeing some interesting trends. Given the complex ecosystems, this was the recommendation to move forward to a third year of the project, which was approved in late April and the project implemented in May. Have not had the ability to access the river and make use of citizen science. Thanks to Jan and colleagues at Park Service for collecting data since early May. The citizen science effort will resume assuming there is a river re-opening in June. Sill confident that if we collect the data, we should be able to capture peak caddis fly emergence. It will be a challenge if things don't turn out and there is no monitoring in 2020; however, we are looking at an ecosystem response. The experiment will still allow us to detect a response in 2021.

[Chrystal Dean, WAPA] There have been no big changes regarding hydropower prices. Remaining funding does not meet end of year target balance, but is good enough to move forward. No major concerns. Everything remains stable as expected.

Q&A/Discussion

[Larry Stevens, GCWC] **Can you put the Paria inflows in a flow duration context to see the probability of upcoming spring HFEs? It seems like a normal year for the Paria.** *[Scott VanderKooi, GCMRC] It is believed this has been looked at, and over time, it has changed. The likelihood has decreased of those events occurring with enough sediments during winter. Even going back to original HFE protocol, with*

double peaks in fall and spring/winter, it has changed over the last 10-20 years, but Scott will follow up to get an answer to the question.

[Vineetha Kartha, Arizona Department of Water Resources] Does the \$138 million not meet WAPA's target? What is the target and how short are we? *[Chrystal Dean, WAPA] There are several things that go into that calculation and it is different each year. [Brian Sadler, WAPA] The Basin Fund target balance is \$174 million with \$136.4 million projected for end of this year. Still going to be short. Bug flows are around \$400,000, which is not a significant amount so not as concerned. Projected expenses and purchase power and capital expenditures are all being looked at. A balance of \$174 million is needed to reduce risks.*

Federal Agency Updates

LTEMP Litigation

[Rod Smith, DOI Legal Counsel] The general allegation of the litigation is redo the 2016 LTEMP National Environmental Policy Act (NEPA) document because the climate change discussion was not sufficient. In the wake of Covid-19, many courts have cancelled in-person events, but filings and other electronic work can be done so the litigation continues. New developments include a number of parties that were likely to have intervened, have done so at this point including six of the seven states, water districts, and CREDA. There is a "cross claim" from Irrigation and Electric Districts of Arizona (IEDA), who fit in the middle. Right now, waiting on the filing of the Administrative Record, which is due June 2. Once that is done, will anticipate some briefs filed and a briefing in the fall.

Interim Guidelines 7.D review

[Rod Smith, DOI Legal Counsel] The 7.D review is a reference to subsection 7(D) of the 2007 guidelines for purposes of evaluating the effectiveness of the program some time prior to 2020. This is a high priority. Activities worked on to date include: 1) determining the scope, which was a retrospective look back; and 2) seeking public input on the report with a series of webinars. Next step is to draft the report and get more comments.

Long-term Funding

[Steve Johnson, Western Area Power Administration (WAPA)] On April 12, Reclamation produced a white paper on these programs. This was the culmination of the "Gang of 6" – three people from WAPA and three from Reclamation – to consider what the future will look like with an understanding that power revenues are starting to dwindle. WAPA averages \$12.5 million per year, which is what is being considered. The short answer is that the bulk of that would go to GCDAMP with some funds to the Recovery Implementation Programs (RIPs). This is not settled yet.

[Kathy Callister, Reclamation] The RIP group is starting to meet and gather information to submit a report to Congress in September 2021. The white paper is a starting point to those conversations. Brent is looking to put together a DOI team. A lot of the partners are the same on the two programs. We will keep everyone informed. The good news is that the money was identified in the President's budget for FY21. Now need to see what comes through Congress.

Q&A/Discussion

[Sara Price, Colorado River Commission] Is the workgroup just federal parties? *[Kathy Callister, Reclamation] It is federal, state, tribal and non-governmental partners, specifically focused on the RIP, but applicable to both programs.*

Proposed downlisting of humpback chub

[Kirk Young, US Fish and Wildlife Service (USFWS)] The humpback chub proposed downlisting rule comment period was opened in January 22 and closed March 23. Navajo Nation requested government to government consultations. Will reassess publication of final rule depending on those consultations. The Kanab ambersnail delisting was published January 6 and the comment period closed March 6. Expect finalization on that rule in a year. All comments are accessible at www.regulations.gov. USFWS is working on responding to comments.

Expanded Non-native Aquatic Species Management Plan

[Ken Hyde, NPS] A Finding of No Significant Impact (FONSI) was signed for the NPS Non-Native Aquatic Species Management Plan and everything has been finished with the tribes. The proposal of incentivized harvest is being completed now with \$180,000 in funding for it and looking at additional options. Over the next two weeks, we will be finalizing the agreement with the Glen Canyon Conservancy which will operate the program. Hope to start the incentivized harvest program in October 2020, which will include a kick-off event. Tribal youth will be included as well as rewards for brown trout heads that are turned in by anglers participating in the program. Everything is proceeding as planned.

Technical Work Group Chair Report: Seth Shanahan, TWG Chair ([presentation](#))

The TWG last met by webinar April 15-16. Next meeting will also be by webinar June 23-24. This is when a budget recommendation is planned as well as a lot of other continuing topics. Peggy Roefer, the FLAHG chair, has scheduled a meeting on June 2 on possible hydrographs. After that, we want to evaluate impacts on other resources if that hydrograph is implemented. The measures need to be quantifiable and demonstrable. TWG has also engaged rainbow trout fishery experts on the status of the fishery who have noted a lot of key trends. Also heard from stakeholders that sediment drivers in Western Grand Canyon is an important issue to understand. Don't believe potential next steps are in the current budget plan – will need to discuss this. Regarding the Administrative History Project with Paul Hirt and his team at Arizona State University, this could result in an orientation packet that could be very useful for new members. This history is accessible and permanently archived at www.GCDAMPHistory.org. Feedback is also being requested to be sent to: paul.hirt@asu.edu. Other meeting dates are: October 14-15 and January 20-22.

Q&A/Discussion

[Larry Steven, GCWC] If we do move forward with monitoring metrics would this be an Ad Hoc group? *[Lee Traynham, Reclamation] That is a discussion to have. The federal agencies would likely kick-off the review and then propose next steps to the AMWG. It is presumed they may send direction and action items to the TWG. [Seth Shanahan, TWG] Agree. Would also point to the Record of Decision that this is a DOI responsibility. The longer answer is that after internal considerations and funds directed toward this activity, there will be engagement with the TWG and AMWG and possibly other groups. We want to get this moving along.*

Stakeholder Updates

[Larry Stevens, GCWC] It is hoped to start a restoration plan for Paria Beach in the dead tamarisk area later this year. Another project through Northern Arizona is looking at food base of midge species with diatoms and algae on macrophytic vegetation. Changes have been significant in diatom assemblages over the years and want to document that. This is a two-year study with preliminary results expected at the end of this year.

Public Comment

No public comment.

AMWG Next Steps: Tim Petty, DOI

Next AMWG is August 19-20, 2020. The goal is to meet in Flagstaff. Will keep everyone informed. Will also ask for feedback on items today including the February meeting minutes, tribal liaison program comments, feedback on second draft of triennial budget and work plan, and any feedback on the August meeting agenda.

Adjourned at: 1:10 PM MST

Meeting Attendees

AMWG Members, Alternates, and Leadership

Timothy Petty, *DOI and Secretary's Designee*

Brent Esplin, *Designated Federal Officer*

Cliff Barrett, *UMPA*

David Brown, *GCRG*

Peter Bungart, *Hualapai Tribe*

Kathy Callister, *Reclamation*

Chris Cantrell, *AZGFD*

Kevin Garlick, *UMPA*

Ed Gerak, *CREDA*

John Hamill, *IFFI/Trout Unlimited*

Leslie James, *CREDA*

Steve Johnson, *WAPA*

John Jordan, *IFFI/Trout Unlimited*

Vineetha Kartha, *Arizona Department of Water Resources*

Charles "Chip" Lewis, *Bureau of Indian Affairs*

John McClow, *State of Colorado*

Jessica Neuwerth, *Colorado River Board of California*

Daniel Picard, *Reclamation*

Peggy Roefer, *Colorado River Commission of Nevada*

Brian Sadler, *WAPA*

Steve Wolff, *State of Wyoming*

Kirk Young, *USFWS*

Bureau of Reclamation Staff

Tara Ashby

Marlon Duke

Clarence Fullard

Heather Patno

Alex Pivarnick

Lee Traynham

USGS/GCMRC Staff

Lucas Bair

Kim Dibble

Helen Fairley

Michael Moran

Jeff Muehlbauer

Emily Palmquist

Joel Sankey

Scott Vanderkooi

Department of the Interior

Kerry Rae, *ASWS Chief of Staff*
Theresa Pasqual, *Joint Tribal Liaison*

Rodney Smith, *Solicitor's Office*

Interested Persons

Todd Adams, *Utah Division of Water Resources*
Jan Balsom, *NPS-GRCA*
Richard Begay, *Navajo Nation*
Rob Billerbeck, *NPS*
Charlie Bullets, *Southern Paiute Consortium*
Kelly Burke, *Grand Canyon Wildlands Council*
Shane Capron, *WAPA*
Tom Chart, *USFWS*
Pat Connors, *Platte River Power Authority*
Kevin Dahl, *National Park Conservation Association*
Kurt Dongoske, *Zuni*
Chrystal Dean, *WAPA*
Sinjin Eberle, *American Rivers*
Craig Ellsworth, *WAPA*
Sheri Farag, *Arizona Salt River Project*
Michelle Garrison, *State of Colorado*
Jessica Gwinn, *USFWS*
Amy Haas, *UCRC*
Paul Harms, *State of New Mexico*
Jeff Humphrey, *USFWS*
Ken Hyde, *NPS-GCNRA*
Sara Larsen, *UCRC*
Jakob Maase, *Hopi Tribe*

Ryan Mann, *AZGFD*
Adam McNally, *Arizona Salt River Project*
Scott McGettigan, *State of Utah*
Kevin McAbee, *USFWS*
Craig McGinnis, *State of Arizona*
Lisa Meyer, *WAPA*
Christina Noftsker, *State of New Mexico*
Emily Omana Smith, *NPS-GRCA*
Bill Persons, *FFF/Trout Unlimited*
Sara Price, *Colorado River Commission of Nevada*
Dave Rogowski, *AZGFD*
Seth Shanahan, *TWG Chair and SNWA*
Billy Shott, *NPS-GCNRA*
Arianne Singer, *General Counsel State of New Mexico*
Eric Skeie, *State of Colorado*
Shannon Snyder, *USEPA*
Larry Stevens, *Grand Canyon Wildlands Council*
Jim Strogen, *FFI/Trout Unlimited International Federation of Fly Fishers*
Melissa Trammell, *NPS*
Jeffrey Woner, *K.R. Saline & Associates*

Abbreviations

ADWR – Arizona Dept. of Water Resources
AZGFD – Arizona Game and Fish Department
AMWG – Adaptive Management Work Group
BAHG – Budget Ad Hoc Group
BIA – Bureau of Indian Affairs
Reclamation – Bureau of Reclamation
CDC – Center for Disease Control and Prevention
CREDA – Colorado River Energy Distributors Assn.
DOI – Department of the Interior
~~IFFFI – International Federation of Fly Fishers~~ [International](#)
FLAHG -- Flow Ad Hoc Group
FONSI – Finding of No Significant Impact
FY – Fiscal Year (October 1 – September 30)
GCDAMP -- Glen Canyon Dam Adaptive Management Program
GCMRC – Grand Canyon Monitoring & Research Center
GCNP – Grand Canyon National Park
GCNRA – Glen Canyon National Recreation Area
GCRG – Grand Canyon River Guides
GCWC – Grand Canyon Wildlands Council
GRCA – Grand Canyon National Park
HFE – High-Flow Experiment
~~IFFF – International Federation of Fly Fishers~~
JTL – Joint Tribal Liaison
LTEMP – Long-Term Experimental and Management Plan
MST – Mountain Standard Time
NEPA – National Environmental Policy Act
NPCA – National Parks Conservation Association
NPS – National Park Service
RIP – Recovery Implementation Program
TMF – Trout Management Flows
TWG – Technical Work Group
UMPA -- Utah Municipal Power Agency
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey
WAPA – Western Area Power Administration

**GLEN CANYON DAM ADAPTIVE MANAGEMENT WORK GROUP
ACTION ITEM TRACKING REPORT**

Note: Items marked “Closed” will be removed from the next iteration of the report.

ITEM No. / DATE	ACTION ITEM	ASSIGNED TO / DUE DATE	STATUS
Item 2017.Sep.01	<p>At its next meeting, AMWG will consider a process for planning for the next 20 years of LTEMP.</p> <p><u>February 2018 update:</u> This will be addressed through the development of monitoring metrics and by the streamlining of GCDAMP guiding documents as described in the LTEMP ROD.</p> <p><u>August 2018 update:</u> DOI will be working on this over the next year with input from the AMWG with the target to complete the process by the end of 2019. This action item will remain open until the entire process is completed.</p> <p><u>March 2019 update:</u> Personnel transitions in the program office and the government shutdown have impacted progress on this item. A more detailed update will be provided at the May webinar. This action item will remain open until the entire process is completed.</p> <p><u>May 2019 Update:</u> Planning for the next 20 years of LTEMP is a high priority for Reclamation, and, now that the Adaptive Management Group Chief position has been filled, Reclamation intends to make substantive progress on this issue this fiscal year (by September 30, 2019).</p> <p><u>August 2019 Update:</u> This action item will move forward as directed and informed by the Guidance Memo issued by the Secretary’s Designee in August 2019.</p> <p><u>February 2020 Update:</u> Information and experience from the 2019-2020 Knowledge Assessment and from development of the 2021-2023 TWP will inform this action. Additional emphasis is on assembling critical elements including program staff (e.g. biologist, archeologist, tribal liaison), facilitator, and Science Advisor to support this effort.</p> <p><u>May 2020 Update:</u> The draft FY21-23 budget and workplan includes funding support to develop and track monitoring metrics and and to streamline guidance documents. Beginning Oct 20, Reclamation and GCMRC will initiate review of the LTEMP FEIS metrics. This work will be a focus for FY21, but will likely be ongoing through the FY21-23 TWP.</p> <p><u>August 2020 Update:</u> See above.</p>	Lee Traynham / ongoing	Open

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Supplemental Materials

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Potential GCDAMP & Other Meetings in 2021

Days	Dates	Meeting	Comments
JANUARY			
W-Th	Jan 6-7	CRAB meeting	
M	Jan 18	Martin Luther King Holiday	
W-Th	Jan 20-21	Annual Reporting Meeting – Phoenix, AZ	
Fri	Jan 22	TWG Meeting – Phoenix, AZ	
Tu-Th	Jan 26-28	CRTR meeting	
FEBRUARY			
M	Feb 14	President's Day Holiday	
Tu	Feb 9	DOI Federal Family Meeting - Phoenix, AZ	
W-Th	Feb 10-11	AMWG Meeting – Phoenix, AZ	
	Feb	Possible Salinity work group meeting	
MARCH			
Sun	Mar 14	Daylight Savings	
M-F	Mar 15-19	School Spring Recess in Flagstaff	
Th	Mar 18	Flaming Gorge WG	
APRIL			
W-Th	Apr 13-14	TWG Meeting – Phoenix, AZ	
	Apr	Possible Salinity work group meeting	
Th	Apr 15	Flaming Gorge WG	
Th	Apr 22	Fontenelle WG	
W	Apr 28	MSCP Steering Committee meeting	
MAY			
	May	MSCP work group	
W	May 19	AMWG Webinar	
M	May 31	Memorial Day Holiday	
JUNE			
	June	Possible 100 th Salinity Forum	
W-Th	Jun 16-17	TWG Meeting – Phoenix, AZ	
W	June 23	MSCP Steering Committee meeting	
JULY			
Sun	Jul 4	Independence Day Holiday	
AUGUST			
Th	Aug 12	Flaming Gorge WG	
Tu	Aug 17	DOI Federal Family Meeting – Flagstaff, AZ	
W-Th	Aug 18-19	AMWG Meeting	
Th	Aug 18	Fontenelle WG	
	Aug	Possible Salinity work group meeting	

Days	Dates	Meeting	Comments
M-F	Aug 23-27	Fall semester starts at NAU – Flagstaff, AZ	
		SEPTEMBER	
M	Sep 6	Labor Day Holiday	
		OCTOBER	
M	Oct 11	Columbus Day	
W-Th	Oct 13-14	TWG Meeting – Phoenix, AZ	
	Oct	Possible 101 st Salinity Forum	
W	Oct 27	MSCP Steering Committee meeting	
		NOVEMBER	
Th	Nov 11	Veteran's Day Holiday	
Th	Nov 25	Thanksgiving Holiday	
		DECEMBER	
Sa	Dec 25	Christmas Day Holiday	



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

AUG 14 2019

MEMORANDUM

To: Brent Esplin, Designated Federal Officer, Bureau of Reclamation
Regional Director, Upper Colorado Region
Kathleen Callister, Resources Management Division Manager, Bureau of Reclamation
Upper Colorado Region
Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center (GCMRC)
U.S. Geological Survey (USGS)

From: Timothy R. Petty, Ph.D.
Secretary's Designee
Assistant Secretary for Water and Science

Subject: Glen Canyon Dam Adaptive Management Program Guidance

The Colorado River faces many challenges in the coming years, especially with an ongoing drought now in its 19th year. As such, it is important that the Glen Canyon Dam Adaptive Management Program (GCDAMP) is managed in such a way as to ensure consistency with the Grand Canyon Protection Act (GCPA) and the priorities of the Secretary of the Interior, and in accordance with the Law of the Colorado River and the Glen Canyon Dam Long Term Experimental and Management Plan (LTEMP) Record of Decision (ROD) and Final Environmental Impact Statement (FEIS).

The GCDAMP plays a central role in ensuring compliance with multiple laws associated with the operation of Glen Canyon Dam. It provides a process for cooperative integration of dam operations, downstream resource protection and management, and monitoring and research. Under the GCPA, Reclamation and GCMRC conduct research and monitoring and consult with specific stakeholders on that research and monitoring. The Adaptive Management Working Group (AMWG), a Federal Advisory Committee, is the vehicle through which Reclamation accomplishes this consultation. The AMWG also makes recommendations to the Secretary per the LTEMP ROD.

LTEMP Implementation

The primary guiding documents for the GCDAMP will continue to be the LTEMP FEIS and ROD, which provide the framework for adaptively managing Glen Canyon Dam operations and management actions associated with downstream resources through 2037. This program guidance document will help ensure continuity and continued successes within the GCDAMP under the current administration and in the years to come. The priorities identified in the LTEMP ROD for the GCDAMP are as follows:

- Management and Experimental Actions
- Mitigation and Environmental Commitments
- Research and Monitoring

In addition, the Department of the Interior (Interior) has recently prioritized the responsible development and production of renewable energy on federal lands. To this end, I encourage the GCDAMP to work within the LTEMP framework to seek ways to improve the value of the hydropower resource. This work may include continued engagement with Project N of the GCDAMP Fiscal Years (FY) 2018-20 Triennial Workplan (TWP) and with interested AMWG stakeholders regarding the current science and policy regarding dam operations.

Updating Guidance Documents

I direct Reclamation, USGS, and other Interior agencies to work with the AMWG to update the GCDAMP guiding documents to reflect and be fully consistent with the priorities outlined in the LTEMP FEIS Section 1.4 and emphasized in Section 6.1(c) of the LTEMP ROD. These guiding documents include the GCDAMP strategic plan, vision, mission, and charter.

With the challenges faced in FY 2018 regarding funding for the GCDAMP and the need to ensure appropriations are requested through the federal budget process, Interior supports continuing with the three-year workplan and budget process. The current FY 2018-20 GCDAMP TWP and budget process demonstrated that it can improve program efficiency by reducing the time and effort spent on annually developing a workplan and budget. The GCDAMP should continue to review the TWP annually to ensure it meets the priorities and goals of the GCPA and GCDAMP.

The development of the TWP and budget for FY 2021-23 will commence in late FY 2019 and continue through FY 2020. Its development should include consultation with members of AMWG, who will recommend to the Secretary whether they support the planned projects and funding. Reclamation and GCMRC will take the lead in drafting the FY 2021-23 TWP. The TWP and budget should focus on compliance priorities including:

- Maintaining dam releases consistent with applicable laws;
- Activities associated with the Endangered Species Act;
- Actions necessary for compliance with the National Historic Preservation Act; and
- Research and monitoring as required by the Grand Canyon Protection Act.

Activities that concern annual release volumes from Glen Canyon Dam—including discussion of Drought Contingency Planning and new negotiations of the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead—will be underway in FY 2019 or in the coming years. The GCDAMP and AMWG guidance documents discussed here should consider any implications of these ongoing discussions.

The LTEMP Scientific Monitoring Plan will continue to provide a framework for the scientific support needed to complete the monitoring and experimentation specified in the LTEMP FEIS

and ROD. This plan will help ensure that long-term monitoring and research activities are aligned with the LTEMP FEIS and ROD and the GCDAMP decision making process. In accordance with the LTEMP ROD, the Science Plan will be reviewed every three years and may be updated as needed. The next review will occur in conjunction with the start of the next TWP development process in early FY 2020. Also, in accordance with the LTEMP ROD, specific details concerning the means to collect, analyze, and report information required to support development of recommendations by the AMWG and decision making by Interior will be included in the TWP.

It is also important that the GCDAMP develops and implements monitoring metrics for the resource goals and objectives defined in the LTEMP ROD. Interior directs the AMWG to develop recommendations for these monitoring metrics to assist Interior in their development. The recommended metrics should build on existing LTEMP conservation measures, environmental and recreational goals, and other easily identifiable goals. As the process continues, additional goals can be developed.

Future research proposed and undertaken by the GCDAMP should be tied directly to LTEMP resource goals and objectives and continue to be focused on providing the best available science such that decision making is science-based and continues to work towards ensuring benefits to as many resources downstream of the dam as possible. This should be done in a collaborative process involving AMWG and TWG members, the Science Advisors Program, and ad hoc groups as needed. Several areas to consider as identified by the GCDAMP partners include:

- Evaluation of the threat posed by invasive non-native species.
- Exploring vegetation management to benefit high value recreational beaches and protect vulnerable archaeological sites.
- Considering impacts to hydropower as part of the development of a LTEMP experiments and study plans.

Operating Criteria and Operational Flexibility

The LTEMP ROD provides guidance for hourly, daily, and monthly releases (see, for example, Table 3, p. B-4). In accordance with the LTEMP ROD Attachment B Section 1.2 (Page B-7), I encourage Reclamation to continue to utilize operational flexibility at Glen Canyon Dam in response to varying hydrological and other resource-related conditions. As warranted, Reclamation, in consultation with Western Area Power Administration (WAPA), should continue to make adjustments to hourly, daily, and monthly release volumes within the water year in response to operational, resource-related, and hydropower-related issues.

In response to stakeholder input at recent AMWG meetings, the feasibility of conducting Spring High Flow Experiments (HFE), along with modeling for improvements and efficiencies that benefit resources including natural, cultural, recreational, and hydropower should be explored. As a potential starting point, I encourage you to consider opportunities to conduct higher spring releases within power plant capacity, along with spring HFEs that may be triggered under the current LTEMP Protocol.

Conclusion

This guidance is not meant to be all encompassing or to preclude additional scientific investigations that can improve the resources downstream of Glen Canyon Dam that are consistent with the LTEMP. The GCDAMP should seek ways to continuously improve the program, including searching for efficiencies and improvements and listening to the States, Tribes, and other program stakeholders.

The GCDAMP and AMWG are vital to ensuring Interior's responsibilities under the GCPA and the LTEMP ROD, and I greatly appreciate Reclamation, USGS, other Interior bureaus, and our external partners' dedication to ensuring Glen Canyon Dam is operated in a manner that protects, mitigates impacts to, and improves downstream resources.

**Approximate Timelines for the Development and Implementation of the TWP (Table 1) and
Criteria for Review and Revisions (Section 2.7)**

March 6, 2019

Passed by Consensus by the AMWG

Table 1. Approximate timelines for the development and implementation of the TWP. Dates shown are estimated targets. Dates are shown which implement the 2021-23 TWP for reference.*

Month	Year-1 (2020) (development of TWP)	Year-2 (2021)
December (year prior)	GCMRC and Reclamation produces annual project reports document for GCDAMP review.	
January	Annual reporting meeting and information synthesis (2 days) followed by 1-day TWG meeting to review budget and provide initial guidance to GCMRC and Reclamation. TWG reviews progress in addressing Information Needs and research accomplishments.	Annual reporting meeting (1-2 days) followed by 1-day TWG meeting with a primary emphasis on reporting results/findings/scientific advances on previous work plan.
February	GCMRC meets with tribes and DOI agencies. GCMRC follow-up with BAHG on priorities and areas of emphasis on TWP. GCMRC meets with cooperators to develop projects. AMWG meeting to discuss initial priorities. DOI and Federal family input.	
March	GCMRC and Reclamation will develop an initial TWP based on DOI priorities and input from scientists, the TWG, and DOI/DOE family. Initial TWP presented to DOI and Secretary's Designee.	
April	GCMRC meets with tribes and DOI agencies. April TWG meeting to consider draft TWP, including anticipated funding sources. Unresolved issues or conflicting priorities will be resolved by DOI in consultation with the DOI Family. GCMRC begins development of second draft TWP.	BAHG and TWG considers potential changes to the Fiscal Year 2 TWP based on criteria in section 2.7.
May	GCMRC and Reclamation provide a second draft TWP to the BAHG, Science Advisors, DOI agencies, and tribes for their review and comment. GCMRC meets with tribes, BAHG, to get input on TWP. GCMRC develops third draft of TWP.	
June	GCMRC and Reclamation finish third draft for review. TWG meets to provide input on the draft GCMRC and Reclamation TWP and provide a recommendation to the AMWG.	TWG recommends Fiscal Year 2 (2022) budget of TWP to AMWG.
July	GCMRC and Reclamation provide a final draft TWP to the AMWG for their review.	
August	AMWG meets to provide input on the GCMRC and Reclamation draft TWP and provide a recommendation to the SOI.	AMWG recommends Fiscal Year 2 (2022) budget of TWP to SOI.
September	SOI reviews the budget and work plan recommendation from AMWG.	
October 1	Fiscal Year 1 begins under the TWP guidance.	Fiscal Year 2 begins under the TWP guidance.
November 1	Consumer Price Index becomes available.	
Late November	Science and management meeting with DOI and cooperators.	Science and management meeting with DOI and cooperators.
December	Budget is finalized. USGS produces GCMRC annual project reports document for prior year work.	GCMRC produces annual project reports document.

Table 1 (continued). Approximate timelines for the development and implementation of the TWP. Dates shown are estimated targets. Dates in parentheses are shown which implement the 2021-23 TWP cycle for reference.

Month	Year-3 (2022)	Year-4 (2023)
January	Annual reporting meeting and information synthesis (2 days) followed by 1-day TWG meeting to review initial results and findings of TWP. Potential TWP changes may be identified.	Process starts again under year 1.
February	BAHG/agencies/tribes meetings to consider mid-work plan adjustments to TWP, February through March.	
March		
April	Consider mid-work plan adjustments at TWG meeting. BAHG and TWG considers potential changes to the Fiscal Year 3 TWP based on criteria in section 2.7.	
May		
June	TWG considers and recommends mid-work plan adjustments to TWP and a recommendation for Fiscal Year 3 (2023) budget.	
July		
August	AMWG meets and considers mid-work plan adjustments to TWP recommended by TWG and recommends Fiscal Year 3 (2023) budget to the SOI.	
September		
October 1	Fiscal Year 3 begins under the TWP guidance.	
November 1	Consumer Price Index becomes available.	
Late November	Science and management meeting with DOI and cooperators. New TWP development meeting within DOI.	
December	USGS produces GCMRC annual project reports document for prior year work.	

* Table 1 calendar years have been updated to reflect development of the 2021-2023 Triennial Work Plan.

2.7 Criteria for Review and Revisions of the Budget and Work Plan

In order for the TWP process to be successful in reducing the administrative burden on the GCMRC, Reclamation, and the GCDAMP, it must have clear criteria for making changes to the budget and work plan. Revisions of the year two budget are intended to be limited to unexpected changes due to a scientific requirement or merit, or administrative needs. Year three changes may be more substantive according to the guidelines below. The individual steps of the process, including roughly when meetings should occur and their objectives, are provided in Table 1. The burden of an appropriate rationale for proposing a change falls upon the proposer to make a persuasive argument to the TWG and AMWG. The following criteria will be used by GCMRC, Reclamation, and TWG in making recommendations to AMWG on changes to the budget and work plan:

- **Scientific requirement or merit:** New information gained during the implementation of monitoring and research projects may result in a need to alter methods, scope, or timelines in the work plan or substantially alter or eliminate a project. This is a science need based on the experience of implementing an already approved project. This does not represent a shifting priority (e.g., policy change), but a scientific learning process which results in needed modifications to carry out the goals of the Program.
- **Administrative needs:** Administrative, policy, or programmatic changes may occur within the time-frame of an approved TWP. Examples might include the mitigation of an impact resulting from ESA, NHPA, or tribal consultation, a change in the “overhead” charges of a federal or state agency, a significant reduction of the balance of available funds, or a failure to secure permits.. As soon as an administrative event occurs that affects the TWP, GCMRC (or relevant agency – such as DOI) will notify the TWG.
- **New initiatives:** New initiatives may be brought up for discussion by members during BAHG or TWG budget discussions (see Table 1) for consideration by Reclamation and GCMRC. These new initiatives may need to be considered by the GCDAMP Program Manager prior to requesting either GCMRC or Reclamation to develop a proposal for mid-work plan consideration. If DOI determines it is beyond the scope of a mid-work plan change, then the initiative could be considered during the development of the next work plan. Given that the budget will likely be fully accounted for, direction on funding source within the current budget will be required for discussion with the GCDAMP Program Manager. Revisions must comply with the Budget Principles (see Section 2.1).

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Glen Canyon Dam Adaptive Management Program Technical Work Group Meeting, June 23-24, 2020

ACTION ITEMS, MOTIONS, and VOTES

MOTIONS AND VOTES

TWG Chair and Vice Chair

Motion made by Larry Stevens, seconded by Kevin Dahl, and approved by consensus

The TWG reappoints Seth Shanahan to the position of chair and Vineetha Kartha to the position of vice chair to the Glen Canyon Dam Technical Work Group for Fiscal Year 2021.

2021-2023 Triennial Budget and Work Plan

Motion made by Kevin Dahl, seconded by Larry Stevens, and approved by consensus

The TWG recommends that the AMWG recommend for approval to the Secretary of Interior the Triennial Work Plan and Budget FY 2021-2023 as provided to the TWG on June 23, 2020 and as requested to be revised by the TWG during their meeting on June 23 and 24, 2020.

Revisions requested by the TWG on June 23 and 24, 2020:

1. Include the GCMRC B.4 work element in the budget (\$58,000 for first 2 years and \$64,000 for year 3).
2. Remove and/or reduce GCMRC D.2 (approximately \$39,000 in year 1, \$36,000 in year 2, and \$54,000 in year 3) and GCMRC D.3 (approximately \$28,000 in year 1, \$29,000 in year 2, and \$0 in year 3).
3. Include Havasu Creek and LCR-mouth gage in GCMRC A.1 at 17,000/year.
4. Please change GCMRC Project N verbiage (Pg 294) from "*For example, modeling a change in ramp rates to maintain or improve the hydropower and recreational resource objectives is a possible application of GCMRC Project N.*" to: "**For example, modeling a change in ramp rates to improve the hydropower resource objective is a possible application of Project N.**"
5. In accordance with direction provided by the AMWG as described in the FLAHG charge, include a project and/or project element to support the FLAHG charge, and provide funding if necessary.
6. Remove Reclamation B.4, TWG Chair reimbursement (25,000 for FY 2021)

7. Propose AGFD and GCMRC look to integrate work efforts to allow for an additional TRGD site to be monitored. Cost estimate for going from 1 TRGD to 2 TRGD sites is approximately 67,000.
8. Prioritize the use of available, unprogrammed and unspent funds from FY 2020, 2021 and 2022 towards funding GCMRC G.6 (JCM-West) in 2023.

ACTION ITEMS

1. Members are asked to support the family of Charley Bulletts with cards and letters. Please contact Theresa Pasqual for correspondence instructions. In addition, [AMWG and TWG](#) members are asked to share photos and memories of Charley with Reclamation to support a remembrance to be held during the August AMWG meeting.
2. [Reclamation and USGS](#) to continue to report updates related to monitoring and mitigation for dissolved oxygen conditions downstream of Glen Canyon Dam. Request that future “current condition” updates include temperature and DO thresholds for humpback chub.
3. [NPS](#) asked for additional information regarding the Cultural Resources Monitoring (CRM) program.
4. [Grand Canyon River Guides](#) (Ben and Zeke) asked to consider how the Adopt-A-Beach surveys could complement or be integrated into existing monitoring programs.
5. Several requests for consideration by the [FLAHG and GCMRC](#) regarding spring HFEs. There were questions during the modeling and flycatcher presentations. Can we have a discussion on the impacts of spring HFEs on flycatcher habitat and to discuss the questions that came up during the HFE modeling discussion? Can we also be sure to consider the impact of timing on the value of power production? There are different impacts depending on whether it is a spring or fall HFE. Could we have a full-day brainstorming about what we do and don't know?
6. Request for review and presentation related to [GCMRC's](#) recent publication on the fate and transport of mercury. Request to include any information regarding uranium mining around and water quality and quantity impacts through Grand Canyon?
7. [Administrative History Ad Hoc Group](#) to review Paul Hirt's completed website and report out at the October TWG meeting.

Message distributed to the TWG via email on December 20, 2019:

In addition, TWG Chair, Seth Shanahan, recently established a new Flow Ad Hoc Group (FLAHG) in accordance with TWG operating procedures and with input from the TWG. The FLAHG will be moving forward under the leadership of Ms. Peggy Roefer with the following charge:

FLAHG Charge

In accordance with direction provided by the AMWG at its August 18, 2018 meeting, and the Secretary Designees August 14, 2019 guidance to BOR and GCMRC, the FLAHG is charged with working with GCMRC to evaluate opportunities for conducting higher spring releases that may benefit high value resources of concern to the GCDAMP (recreational beaches, aquatic food base, rainbow trout fishery, hydropower, humpback chub and other native fish, cultural resources, and vegetation), fill critical data gaps, and reduce scientific uncertainties. As a starting point, the FLAHG shall consider the benefits of and opportunities for conducting higher spring releases within power plant capacity. The FLAHG and GCMRC will report their initial findings to the TWG in April 2020 so that the TWG and GCMRC can report their conclusions to the AMWG in May 2020.

The FLAHG is also charged with working with GCMRC to develop and propose a project element in the FY 2021-2023 Triennial Budget and Work Plan to identify other spring high flow options that may be allowed under the current LTEMP ROD (as determined by DOI) that may benefit high valued resources of concern to the GCDAMP (defined above), fill critical data gaps, and reduce scientific uncertainties.

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TABLE 4 Implementation Criteria for Experimental Treatments of Alternative D

Experimental Treatment	Trigger ^a and Primary Objective	Replicates	Duration	Annual Implementation Considerations ^b	Long-Term Off-Ramp Conditions ^c	Action if Successful
<i>Sediment-Related Experiments^d</i>						
Spring HFE up to 45,000 cfs in Mar. or Apr.	Trigger: Sufficient Paria River sediment input in spring accounting period (Dec.–Jun.) to achieve a positive sand mass balance in Marble Canyon with implementation of an HFE Objective: Rebuild sandbars	Not conducted during first 2 years of LTEMP, otherwise implement in each year triggered, dependent on resource condition and response	≤96 hr	Potential short-term unacceptable impacts on resources listed in Section 1.3; unacceptable cumulative effects of sequential HFEs; sediment-triggered spring HFEs will not occur in the same water year as an extended-duration (>96 hr) fall HFE	Sediment-triggered spring HFEs are not effective in building sandbars; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow
Proactive spring HFE up to 45,000 cfs (Apr., May, or Jun.)	Trigger: High-volume year with planned equalization releases (≥10 maf) Objective: Protect sand supply from equalization releases	Not conducted during first 2 years of LTEMP, otherwise implement in each year triggered, dependent on resource condition and response	First test 24 hr; subsequent tests could be shorter, but not longer, depending on results of first tests	Potential short-term unacceptable impacts on resources listed in Section 1.3; unacceptable cumulative effects of sequential HFEs; will not be implemented in the same water year as a sediment-triggered spring HFE or extended-duration fall HFE	Proactive spring HFEs are not effective in building sandbars; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow

B-10

TABLE 4 (Cont.)

Experimental Treatment	Trigger ^a and Primary Objective	Replicates	Duration	Annual Implementation Considerations ^b	Long-Term Off-Ramp Conditions ^c	Action if Successful
<i>Sediment-Related Experiments (Cont.)</i>						
Fall HFE ≤96 hr up to 45,000 cfs in Oct. or Nov.	Trigger: Sufficient Paria River sediment input in fall accounting period (Jul.–Nov.) to achieve a positive sand mass balance in Marble Canyon with implementation of an HFE Objective: Rebuild sandbars	Implement in each year triggered, dependent on resource condition and response	≤96 hr	Potential short-term unacceptable impacts on resources listed in Section 1.3; unacceptable cumulative effects of sequential HFEs	This type of fall HFE is not effective in building sandbars; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow
Fall HFEs longer than 96-hr duration up to 45,000 cfs in Oct. or Nov.	Trigger: Sufficient Paria River sediment input in fall accounting period (Jul.–Nov.) to achieve a positive sand mass balance in Marble Canyon with implementation of an HFE longer than a 96-hr, up to 45,000-cfs flow Objective: Rebuild sandbars	Implement in each year triggered; limited to total of four tests in LTEMP period	Up to 250 hr depending on availability of sand duration of first test not to exceed 192 hr	Potential short-term unacceptable impacts on resources listed in Section 1.3; unacceptable cumulative effects of sequential HFEs	Extended-duration fall HFEs are not effective in building sandbars; resulting sandbars are no bigger than those created by shorter-duration HFEs; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow

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TABLE 4 (Cont.)

Experimental Treatment	Trigger ^a and Primary Objective	Replicates	Duration	Annual Implementation Considerations ^b	Long-Term Off-Ramp Conditions ^c	Action if Successful
<i>Aquatic Resource-Related Experiments^e</i>						
Trout management flows	Trigger: Predicted high trout recruitment in the Glen Canyon reach Objective: Test efficacy of flow regime on trout numbers and survival of humpback chub	Implement as needed when triggered after consultation with Tribes; test may be conducted early in the 20-year period even if not triggered by high trout recruitment ^f	Implemented in as many as 4 months (May–Aug.)	Potential short-term unacceptable impacts on resources listed in Section 1.3	TMFs have little or no effect on trout recruitment after at least three tests; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment triggered by predicted high trout recruitment in Glen Canyon, taking into consideration Tribal concerns
Tier 1: Expanded translocation of humpback chub in the Little Colorado River	Trigger: Number of adult or subadult humpback chub in the Little Colorado River reach below Tier 1 triggers Objective: Increase number of adult and subadult humpback chub	Implement in each year triggered unless determined ineffective	As needed	Potential short-term unacceptable impacts on resources listed in Section 1.3	Expanded translocation has little or no effect on increasing the number of adult or subadult humpback chub; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow
Tier 1: Implement head-start program for larval humpback chub	Trigger: Number of adult or subadult humpback chub in the Little Colorado River reach below Tier 1 triggers Objective: Increase number of adult and subadult humpback chub	Implement in each year triggered unless determined ineffective	As needed	Potential short-term unacceptable impacts on resources listed in Section 1.3	Head-start program has little or no effect on increasing the number of adult or subadult humpback chub; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered and existing resource conditions allow

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TABLE 4 (Cont.)

Experimental Treatment	Trigger ^a and Primary Objective	Replicates	Duration	Annual Implementation Considerations ^b	Long-Term Off-Ramp Conditions ^c	Action if Successful
<i>Aquatic Resource-Related Experiments (Cont.)</i>						
Tier 2: Mechanical removal of nonnative fish in Little Colorado River reach	Trigger: Tier 1 actions ineffective; humpback chub numbers in Little Colorado River below Tier 2 triggers Objective: Increase number of adult and subadult humpback chub	Implement in each year triggered unless determined ineffective after consultation with Tribes	Monthly removal trips (Feb.–Jul.) until “predator index” or adult humpback chub reach acceptable levels (see Appendix O)	Potential short-term unacceptable impacts on resources listed in Section 1.3	Mechanical removal has little or no effect on reducing predator index in the Little Colorado River reach; no population-level benefit on humpback chub; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment when triggered, taking into consideration Tribal concerns
Low summer flows (minimum daily mean 5,000 to 8,000 cfs) to target $\geq 14^{\circ}\text{C}$ at Little Colorado River confluence	Trigger: Initial experiment: in the second 10 years of the LTEMP period, when target temperature of $\geq 14^{\circ}\text{C}$ can be achieved only with low summer flow Objective: Increase humpback chub growth	Subsequent experimental use if: (1) initial test was successful, (2) humpback chub population concerns warrant their use, (3) water temperature appears to be limiting recruitment, and (4) target temperature of $\geq 14^{\circ}\text{C}$ could be achieved only with low summer flow	3 months (Jul.–Sep.)	Potential short-term unacceptable impacts on resources listed in Section 1.3	Low summer flows do not increase growth and recruitment of humpback chub; increase in warmwater nonnative species or trout at the Little Colorado River; long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed; or sufficient warming does not occur as predicted	Implement as adaptive treatment when conditions allow

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TABLE 4 (Cont.)

Experimental Treatment	Trigger ^a and Primary Objective	Replicates	Duration	Annual Implementation Considerations ^b	Long-Term Off-Ramp Conditions ^c	Action if Successful
<i>Aquatic Resource-Related Experiments (Cont.)</i>						
Macroinvertebrate production flows	Trigger: None Objective: Improve food base productivity and abundance or diversity of mayflies, stoneflies, and caddisflies	Target two to three replicates	Up to 4 months (May–Aug.) ^g	Potential short-term unacceptable impacts on resources listed in Section 1.3; coordinate planning with other experiments to avoid confounding conditions or results	Steady weekend flows have little or no benefit on food base, trout fishery, or native fish; increase in warmwater nonnative species or trout at the Little Colorado River; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment in target months when conditions allow
<i>Riparian Vegetation Experiments</i>						
Non-flow vegetation treatments	Trigger: None Objective: Improve vegetation conditions at key sites	Not applicable	20 years if successful pilot phase	Potential short-term unacceptable impacts on resources listed in Section 1.3	Control and replanting techniques are not effective or practical; or long-term unacceptable adverse impacts on the resources listed in Section 1.3 are observed	Implement as adaptive treatment if invasive species can be reduced and native species increased

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^a Triggers will be modified as needed during the 20-year LTEMP period in an adaptive manner through processes including ESA consultation and based on the best available science utilizing the experimental framework for each alternative.

^b Annual determination by the DOI. Any implementation will consider resource condition assessments and resource concerns using the annual processes described in Sections 1.3 and 1.4.

^c Suspension of experiment if the DOI determines effects cannot be mitigated.

^d Details of implementation of sediment experiments are presented in Section 2.1.

^e Details of implementation of aquatic resource experiments are presented in Section 2.2.

^f The decision to conduct TMFs in a given year will consider the resource conditions, as specified in Section 1.3, and will also involve considerations regarding the efficacy of the test based on those resource conditions.

^g The duration and other characteristics of experimental macroinvertebrate production flows could be adjusted based on the results of initial experiments.