

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 18, 2021
9:30 a.m. – 5 p.m. MDT**

**Thursday, August 19, 2021
9:30 a.m. – 4 p.m. MDT**

Intentionally left blank

Administrative Items

Intentionally left blank

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 18 – 19, 2021 Meeting
Draft Minutes & Action Items	<ul style="list-style-type: none"> • Draft Minutes from May 2021 Meeting • Action Item Tracking Report
Supplemental Materials	<ul style="list-style-type: none"> • Potential GCDAMP & Other Meetings in 2022 • Dr. Petty Memo – Program Guidance • TWP Process Document • LTEMP ROD Table 4 – Experimental Treatments

Federal Register Notice:

<https://www.federalregister.gov/documents/2020/12/21/2020-27998/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 18, 2021 – 9:30 am, Mountain Daylight Time

Event Number: 199 214 8505

Event Password: Aug18

Event Address:

<https://rec.webex.com/rec/j.php?MTID=m13bea902af78b719731c73238388a7e0>

Phone #: 415-527-5035



Topic: AMWG – Day 2

Thursday, August 19, 2021 – 9:30 am, Mountain Daylight Time

Event Number: 199 081 2526

Event Password: Aug19

Event Address:

<https://rec.webex.com/rec/j.php?MTID=mc3f8e361d6f59654a643773b1680dfec>

Phone #: 415-527-5035

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

Intentionally left blank

Glen Canyon Dam Adaptive Management Work Group

Committee Membership List

(Updated: 07/30/2021)

SECRETARY'S DESIGNEE	ALTERNATE SECRETARY'S DESIGNEE	Designated Federal Officer
Wayne Pullan (Acting) Regional Director Upper Colorado Basin Regional Office Bureau of Reclamation 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3606 F: (801) 524-3855 EM: wpullan@usbr.gov	VACANT	Daniel Picard, Alternate Deputy Regional Director Upper Colorado Basin 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) Upper Colorado Basin 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) Upper Colorado Basin 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) Renom in process 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) Renom in process 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)	
Ed Keable (member) NEW – in process Grand Canyon National Park PO Box 129 Grand Canyon, AZ 86023 T: (928) 638-7758 F: (928) 638-7815 EM: edward_keable@nps.gov	Billy Shott (alternate) Glen Canyon National Recreation Area PO Box 1507 Page, AZ 86040 T: (928) 608-6200 EM: billy_shott@nps.gov

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	
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	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
6-HOPI TRIBE	
Jakob Maase (member) Hopi Cultural Preservation Office PO Box 123 Kykotsmovi, AZ 86039 T: EM: jmaase1@ksu.edu	Stewart Koyiyumptewa (alternate) Hopi Cultural Preservation Office PO Box 123 Kykotsmovi, AZ 86039 T: EM: skoyiyumptewa@hopi.nsn.us
7-NAVAJO NATION	
Richard Begay (member) Navajo Nation Heritage and Historic Preservation PO Box 7440 Window Rock, AZ 86515 T: (928) 871-7000 EM: r.begay@navajo-nsn.gov	Erik Stanfield (alternate) NEW – in process Navajo Nation P.O. Box 3366 Page, AZ 86040 T: (480) 313-2482 EM: erikstanfield@navajo-nsn.gov
8-PUEBLO OF ZUNI	
Arden Kucate (member) PO Box 339 1203-B State Highway 53 Zuni, NM 87327 T: (505) 782-7000 EM: arden.kucate@ashiwi.org	VACANT (alternate)
9-SOUTHERN PAIUTE CONSORTIUM	
Daniel Bulletts (member) NEW – in process 1 North Pipe Spring Rd. Fredonia, AZ 86022 T: (928) 643-6278 EM: dbulletts@kaibabpaiute-nsn.gov	VACANT (alternate)
10-SAN JUAN SOUTHERN PAIUTE TRIBE	
VACANT (member)	

Seven Basin States:

11-ARIZONA	
Clint Chandler (member) Renom – in process Arizona Department of Water Resources 1110 W. Washington Street, Suite 310 Phoenix, AZ 85007 T: (602) 771-8412 F: (602) 771-8681 EM: cchandler@azwater.gov	Kristen Johnson (alternate) NEW – in process Arizona Department of Water Resources 1110 W. Washington Street, Suite 310 Phoenix, AZ 85007 T: (602) 771-8552 EM: kjohnson@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 EM: csharris@crb.ca.gov
13-COLORADO	
John H. McClow (member) Renom – in process 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	Scott McGettigan (alternate) NEW – in process Utah Division of Water Resources 1594 West North Temple, Suite 3710 Salt Lake City, UT 84114 T: (801) 538-4754 EM: scottmcgettigan@utah.gov

17-WYOMING	
VACANT (member)	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-ENVIRONMENTAL GROUP	
Larry Stevens (member) Grand Canyon Wildlands 2410 East Route 66 Flagstaff, AZ 86004 T: (928) 380-7724 EM: larry@grandcanyonwildlands.org	Kelly Burke (alternate) NEW – in process Grand Canyon Wildlands 2410 East Route 66 Flagstaff, AZ 86004 T: (928) 606-7870 EM: kelly@grandcanyonwildlands.org

19-ENVIRONMENTAL GROUP	
Matt Rice (member) American Rivers 1536 Wynkoop, Ste 321 Denver, CO 80202 T: (303) 454-3395 EM: mrice@americanrivers.org	Kevin Dahl (alternate) NEW – in process National Park Conservation Association 738 N. Fifth Ave., Suite 222 Tucson, AZ 85705 T: (520) 603-6430 EM: kdahl@npca.org

Recreational Industry:

20-RECREATIONAL INDUSTRY	
David Brown (member) Grand Canyon River Guides P.O. Box 1934 Flagstaff, AZ 86002 T: (801) 694-1228 EM: bravedown@yahoo.com	Ben Reeder (alternate) NEW – in process Grand Canyon River Guides 4507 South Russell Street Salt Lake City, UT 84117 T: 801-860-1070 EM: benreeder33@gmail.com

21-RECREATIONAL INDUSTRY	
Jim Strogon (member) NEW – in process Trout Unlimited 401 West Christopher Point Payson, AZ 85541 T: (480) 242-2569 EM: jimstrog@gmail.com	Rod Buchanan (alternate) NEW – in process Trout Unlimited T: (209) 815-0062 EM: rodbuchanan23@gmail.com

Federal Power Purchase Contractors:

22-FEDERAL POWER PURCHASE CONTRACTORS	
Leslie James (member) Renomination – in process Colorado River Energy Dist. Assoc. (CREDA) 10429 S. 51 st Street, Suite 230 Phoenix, AZ 85044 T: (480) 477-8646 F: (480) 477-8647 EM: creda@creda.cc	Jaclyn Brown (alternate) NEW – in process Tri-State Generation and Transmission Association 1100 West 116 th Avenue Westminster, CO 80234 T: (970) 819-2484 EM: jbrown@tristategt.org

23-FEDERAL POWER PURCHASE CONTRACTORS	
Kevin Garlick (member) Renomination – in process Utah Municipal Power Agency (UMPA) 696 W. 100 S. Spanish Fork, UT 84660 T: (801) 798-7849 EM: kevin@umpa.energy	Clifford Barrett (alternate) Renomination – in process Utah Municipal Power Agency (UMPA) 845 Lakeview Stansbury Park, UT 84074-1912 T: (435) 882-0164 EM: cibarre@q.com

Other Stakeholders:

24-ARIZONA GAME AND FISH DEPARTMENT	
Julie Carter (member) NEW – in process 5000 W Carefree Highway Phoenix, AZ 85086 T: (480) 254-4567 EM: jcarter@azgfd.gov	Clayton Crowder (alternate) NEW – in process 5000 W Carefree Highway Phoenix, AZ 85086 T: (602) 717-9890 EM: ccrowder@azgfd.gov

25-DEPARTMENT OF ENERGY (DOE) – WESTERN AREA POWER ADMINISTRATION (WAPA)	
Tim Vigil (member) NEW – in process Western Area Power Administration 1800 S. Rio Grande Avenue Montrose, CO 81401 T: (970) 252-3005 EM: tvigil@wapa.gov	Brian Sadler (alternate) Renomination – in process Western Area Power Administration 299 S. Main Street, Suite 200 Salt Lake City, UT 84111 T: (801) 524-5506 EM: sadler@wapa.gov

Intentionally left blank

**Glen Canyon Dam Adaptive Management Program
 Technical Work Group
 Membership List
 (Updated: 7/30/2021)**

TWG Chairperson	TWG Vice Chairs
Seth Shanahan (10/1/16) Southern Nevada Water Authority 100 City Parkway, Suite 700 Las Vegas, NV 89106 T: (702) 822-3314 EM: seth.shanahan@snwa.com	Michelle Garrison Colorado Water Conservation Board Clarence Fullard Bureau of Reclamation

Federal Agencies:

1-BUREAU OF RECLAMATION	
Clarence Fullard (member, 7/19/21) Upper Colorado Basin 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3809 F: (801) 524-5499 EM: cfullard@usbr.gov	Kerri Pedersen (alternate, 7/19/21) Upper Colorado Basin 125 S. State Street, Room 8100 Salt Lake City, UT 84138 T: (801) 524-3729 F: (801) 524-5499 kpetersen@usbr.gov

2-BUREAU OF INDIAN AFFAIRS	
Charles “Chip” Lewis (member, 8/6/13) 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, 12/4/06) 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)	
Brian Healy (member, 7/19/21) 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	Emily Omana Smith (alternate, 7/19/21) Grand Canyon National Park 1824 South Thompson Street, Suite 200 Flagstaff, AZ 86001 T: (928) 638-7477 F: (928) 638-7492 EM: emily_Omana@nps.gov

4-NATIONAL PARK SERVICE (Glen Canyon National Recreation Area)	
Ken Hyde (member, 8/17/16) Glen Canyon NRA PO Box 1507, 691 Scenic View Drive Page, AZ 86040 T: (928) 608-6265 EM: ken_hyde@nps.gov	Rob Billerbeck (alternate,) New – in process Colorado River Coordinator, NPS 12795 W Alameda Parkway Lakewood, CO 80228 T: (303) 987-6789 EM: rob_p_billerbeck@nps.gov

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	VACANT

Native American Tribes:

6-HUALAPAI TRIBE	
Carrie Cannon (member, 9/16/20) P.O. Box 310 Peach Springs, AZ 86434 T: (928) 769-2223 EM: calisay17@hotmail.com	Peter Bungart (alternate, 9/16/20) P.O. Box 310 Peach Springs, AZ 86434 T: (928) 769-2223 EM: Peter.bungart@hualapai-nsn.gov

7-HOPI TRIBE	
Jakob Maase (member, 1/8/20) P.O. Box 123 Kykotsmovi, AZ 86039 T: (913) 448-8962 EM: Jmaasel@ksu.edu	VACANT

8-NAVAJO NATION	
Erik Stanfield (member, 7/19/21) P.O. Box 3366 Page, AZ 86040 T: (480) 313-2482 EM: erikstanfield@navajo-nsn.gov	VACANT

9-PUEBLO OF ZUNI	
Kurt Dongoske (member, 11/3/10) Zuni Heritage & Historic Preservation Ofc. PO Box 1149 Zuni, NM 87327 T: (505) 782-4814 T: 928-289-9259 (AZ Ofc) EM: kdongoske@cablone.net	VACANT

10-SOUTHERN PAIUTE CONSORTIUM	
Daniel Bulletts (member,) New – in process 1 North Pipe Spring Rd. Fredonia, AZ 86022 T: (928) 643-6278 EM: dbulletts@kaibabpaiute-nsn.gov	VACANT

11-SAN JUAN SOUTHERN PAIUTE TRIBE	
PO Box 2950 Tuba City, AZ 86045 T: (928) 283-1066	

Seven Basin States:

12-ARIZONA	
Kristen Johnson (member,) New – in process Arizona Department of Water Resources 1110 W. Washington Street, Suite 310 Phoenix, AZ 85007 T: (602) 771-8552 EM: kjohnson@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	
Chris Harris (member, 11/3/2010) Colorado River Board of California 770 Fairmont Avenue, Suite 100 Glendale, CA 91203 T: (818) 500-1625 ext. 308 F: (818) 543-4685 EM: csharris@crb.ca.gov	Shana Rapoport (alternate, 7/19/21) Colorado River Board of California 770 Fairmont Avenue, Suite 100 Glendale, CA 91203-1035 T: (818) 500-1625 x308 EM: rapoport@crb.ca.gov
14-COLORADO	
Michelle Garrison (member, 12/18/19) Colorado Water Conservation Board 1313 Sherman St., Rm. 718 Denver, CO 80203 T: (303) 866-3441 x3213 EM: 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	
Seth Shanahan (member, 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	Peggy Roefer (alternate, 6/6/16) Colorado River Commission of Nevada 555 E. Washington Avenue, Suite 3100 Las Vegas, NV 89101 T: (702) 486-2669 EM: proefer@crc.nv.gov
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) 827-4130 F: EM: christina.noftsker@state.nm.us
17-UTAH	
Scott McGettigan (member, 7/19/21) Utah Division of Water Resources 1594 West North Temple, Suite 3710 Salt Lake City, UT 84114 T: (801) 538-4754 EM: scottmcgettigan@utah.gov	Betsy Morgan (alternate, 7/19/21) Utah Division of Water Resources 1594 West North Temple, Suite 3710 Salt Lake City, UT 84114 T: (801) EM: edmorgan@utah.gov

18-WYOMING	
VACANT	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-ENVIRONMENTAL GROUPS	
Larry Stevens (member, 11/3/10) Grand Canyon Wildlands Council PO Box 1315 Flagstaff, AZ 86002 Tel: (928) 380-7724 EM: larry@springstewardship.org	Kelly Burke (alternate, 8/25/17) Grand Canyon Wildlands Council PO Box 1315 Flagstaff, AZ 86002 Tel: (928) 606-7870 EM: gcwildlands@icloud.com

20-ENVIRONMENTAL GROUPS	
C. Sinjin Eberle (member,) New – in process P.O. Box 1828 Durango, CO 81302 T: (720) 373-0864 EM: seberle@americanrivers.org	VACANT

Recreation Interests:

21-RECREATIONAL INTERESTS	
Ben Reeder (member, 2/16/16) Grand Canyon River Guides 4507 South Russell Street Salt Lake City, UT 84117 T: (801) 860-1070 EM: benreeder33@gmail.com	David Brown (alternate, 7/14/16) Grand Canyon River Guides P.O. Box 1934 Flagstaff, AZ 86002 T: (801) 694-1228 EM: bravedown@yahoo.com

22- RECREATIONAL INTERESTS	
Bill Persons (member,) New – in process Fly Fishers International 14621 North 22 nd Lane Phoenix, AZ 85023 T: () EM: bpersons51@gmail.com	Gary Tallman (alternate,) New – in process Trout Unlimited T: () EM: gary.tallman@nau.edu

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 (alternate, 11/3/10) CREDA 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 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 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

Intentionally left blank

**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

Intentionally Left Blank

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

Intentionally left blank

Draft Agenda

Intentionally Left Blank

Glen Canyon Dam Adaptive Management Program Adaptive Management Work Group Meeting, August 18-19, 2021

Wednesday, August 18, 2021

Day 1 Webinar Information:

<https://rec.webex.com/rec/j.php?MTID=md09fda69eaf69ab35603d64093a020cd>

Telephone: 415-527-5035 Meeting Number: 199 214 8505 Password: Aug18

D R A F T A G E N D A

START TIME ¹ (Duration)	Wednesday, August 18, 2021 Topic and Presenter and Purpose ²
8:30 PDT/ 9:30 MDT (:45)	<p>Welcome and Administrative Updates: Wayne Pullan, Secretary’s Designee to the Adaptive Management Work Group (AMWG) and Mike Harty, Facilitator to the AMWG</p> <ul style="list-style-type: none"> ▪ Webinar Protocols ▪ Introductions and Determination of Quorum (13 members) ▪ Approval of May 19, 2021 Meeting Minutes ▪ Administrative Updates <ul style="list-style-type: none"> ○ Summary of May Meeting Evaluation ○ Nominations and Reappointments ○ Action Item Tracking Report <p><u>Additional Information:</u> 1) Member Status Summary 2) Action Item Tracking Report</p>
9:15 PDT/ 10:15 MDT (:15)	<p>Review of Colorado River Operations Agreements: Bureau of Reclamation</p> <ul style="list-style-type: none"> ▪ Presentation (15 minutes) <p><u>Additional Information:</u> 1) 2007 Interim Guidelines and Review 2) Long-Term Experimental and Management Plan 3) Drought Operations Agreement</p> <p><u>Purpose:</u> To provide context for the operations and hydrology update, this presentation will briefly review statutory obligations (Law of the River), Records of Decision (Interim Guidelines, LTEMP), and other agreements (DROA) relevant to the operations of Glen Canyon Dam.</p>
9:30 PDT/ 10:30 MDT (1:00)	<p>Basin Hydrology, Water Quality, 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> 1) 24-Month Study 2) 5-Year Projections 3) News Release: 5-Year Projections 4) News Release: Drought Operations</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>
10:30 PDT/ 11:30 MDT (:15)	BREAK

START TIME ¹ (Duration)	Wednesday, August 18, 2021 Topic and Presenter and Purpose ²
10:45 PDT/ 11:45 MDT (1:00)	<p>Panel Discussion—Federal Agency Leaders Discuss Drought</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) ▪ Q&A and discussion (30 minutes) <p><u>Purpose:</u> Leadership from federal agencies will describe drought planning and their focus for agency preparation and potential response. A structured Q&A session may also be included.</p>
11:45 PDT/ 12:45 MDT (1:00)	LUNCH
12:45 PDT/ 1:45 MDT (:30)	<p>Tribal Partners Report</p> <ul style="list-style-type: none"> ▪ Presentation (20 minutes) ▪ Q&A and discussion (10 minutes) <p><u>Purpose:</u> To report on the GCDAMP Partner Tribes’ activities and meetings as well as Tribal concerns, challenges, and accomplishments.</p>
1:15 PDT/ 2:15 MDT (:45)	<p>Basin Fund Status and Long-term Funding Considerations for Hydropower Revenues and Appropriations: Brian Sadler, CRSP Administrative and Technical Services Manager, Western Area Power Administration and Kathleen Callister, Resources Management Division Manager, Bureau of Reclamation</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) ▪ Discussion (15 minutes) <p><u>Additional Information:</u> 1) FY22 President’s Budget - Reclamation 2) House – Draft E&W Appropriations Bill</p> <p><u>Purpose:</u> To provide information regarding long-term funding uncertainties and important considerations for various potential funding sources.</p>
2:00 PDT/ 3:00 MDT (:15)	BREAK
2:15 PDT/ 3:15 MDT (:30)	<p>FY 2022 Budget and Work Plan: Seth Shanahan, Technical Work Group Chair; Lee Traynham, Adaptive Management Group Chief, Bureau of Reclamation; and Michael Moran, Acting Chief, Grand Canyon Monitoring and Research Center</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) <p><u>Additional Information:</u> 1) BAHG Recommendation 2) FY22 Draft Reclamation Budget 3) FY22 Draft GCMRC Budget</p> <p><u>Purpose:</u> To inform a recommendation to the Secretary of the Interior regarding the FY 2022 Glen Canyon Dam Adaptive Management Program (GCDAMP) budget and work plan.</p>

START TIME ¹ (Duration)	Wednesday, August 18, 2021 Topic and Presenter and Purpose ²
2:45 PDT/ 3:45 MDT (1:00)	<p>FY 2022 Budget and Work Plan Recommendation: Facilitated by Mike Harty, Kearns and West, Inc.</p> <ul style="list-style-type: none"> ▪ Q&A, discussion, and action (60 minutes) <p><u>Additional Information:</u> 1) Motion Recommended by the TWG (06/16/2021) <u>Purpose:</u> To finalize a recommendation to the Secretary of the Interior regarding the FY 2022 Glen Canyon Dam Adaptive Management Program (GCDAMP) budget and work plan.</p>
3:45 PDT/ 4:45 MDT (:15)	Public Comment
4:00 PDT/ 5:00 MDT	ADJOURN FOR THE DAY

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.

**Glen Canyon Dam Adaptive Management Program
Adaptive Management Work Group Meeting, August 18-19, 2021**

Thursday, August 19, 2021

Day 2 Webinar Information:

<https://rec.webex.com/rec/j.php?MTID=m63d00c2f63fba06314755725a036dca5>

Telephone: 415-527-5035 Meeting Number: 199 081 2526 Password: Aug19

D R A F T A G E N D A

START TIME ¹ (Duration)	Thursday, August 19, 2021 Topic, Presenter, and Purpose ²
8:30 PDT/ 9:30 MDT (:15)	<p>Welcome and Administrative: Wayne Pullan, Secretary’s Designee to the Adaptive Management Work Group (AMWG) and Mike Harty, Facilitator to the AMWG</p> <ul style="list-style-type: none"> ▪ Introductions and Determination of Quorum (13 members) ▪ Revisit any outstanding items from the previous day
8:45 PDT/ 9:45 MDT (:30)	<p>Federal Agency Updates (2-3 minutes each):</p> <ul style="list-style-type: none"> ▪ WAPA: Glen Canyon Dam Emergency Exception Criteria ▪ FWS: Humpback chub, Razorback sucker, K. ambersnail ESA status ▪ NPS: Non-native Aquatic Species Management Plan ▪ DOI Solicitor’s Office: LTEMP Litigation ▪ BIA, GCMRC, Reclamation ▪ Additional Items <p><u>Additional Information:</u> 1) News Release: GCD Summer Ops 2) FRN Humpback chub 3) FRN Kanab ambersnail 4) FRN Razorback sucker 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 (:30)	<p>Proposed Rule for Downlisting Razorback Sucker: Julie Stahl, Deputy Director, Upper Colorado River Endangered Fish Recovery Program and Kevin McAbee, Fish Biologist, U.S. Fish and Wildlife Service</p> <ul style="list-style-type: none"> ▪ Presentation (20 minutes) ▪ Q&A and discussion (10 minutes) <p><u>Additional Information:</u> 1) FRN Razorback sucker</p> <p><u>Purpose:</u> To share information about the recently published 4(d) rule for the proposed downlisting of razorback sucker.</p>

START TIME ¹ (Duration)	Thursday, August 19, 2021 Topic, Presenter, and Purpose ²
9:45 PDT/ 10:45 MDT (:30)	<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>
10:15 PDT/ 11:15 MDT (:15)	BREAK
10:30 PDT/ 11:30 MDT (:45)	<p>LTEMP Experiments Considered & Implemented for WY 2021 and WY 2022: Lee Traynham, Adaptive Management Group Chief, Bureau of Reclamation and Michael Moran, Acting Chief, Grand Canyon Monitoring and Research Center</p> <ul style="list-style-type: none"> ▪ Presentation (20 minutes) ▪ Q&A and discussion (25 minutes) <p><u>Purpose:</u> To review the process and update AMWG members on LTEMP experiments that have been and may be conducted in 2021 and 2022.</p>
11:15 PDT/ 12:15 MDT (1:30)	LUNCH
12:45 PDT/ 1:45 MDT (:45)	<p>GCMRC Science Updates: Michael Moran, Acting Chief and Ted Kennedy, Research Ecologist, Grand Canyon Monitoring and Research Center</p> <ul style="list-style-type: none"> ▪ Presentation (30 minutes) ▪ Q&A and discussion (15 minutes) <p><u>Purpose:</u> Bring AMWG members current with the latest research and selected monitoring results from GCMRC.</p>
1:30 PDT/ 2:30 MDT (:30)	<p>Technical Work Group Chair Report: Seth Shanahan, Technical Work Group Chair</p> <ul style="list-style-type: none"> ▪ Presentation (20 minutes) ▪ Q&A, discussion (10 minutes) <p><u>Purpose:</u> To update AMWG members on current TWG and ad hoc group activities.</p>
2:00 PDT/ 3:00 MDT (:15)	BREAK

START TIME ¹ (Duration)	Thursday, August 19, 2021 Topic, Presenter, and Purpose ²
<p>2:15 PDT/ 3:15 MDT (:30)</p>	<p>GCDAMP Monitoring Metrics: Helen Fairley, Social Scientist and Michael Moran, Acting Chief, Grand Canyon Monitoring and Research Center</p> <ul style="list-style-type: none"> ▪ Presentation (10 minutes) ▪ Discussion (20 minutes) <p><u>Additional Information:</u> 1) Monitoring Metrics Draft Plan 2) June TWG Presentation <u>Purpose:</u> To provide information regarding an LTEMP ROD action item and to solicit feedback from the AMWG regarding the proposed approach, objectives, and timeline.</p>
<p>2:45 PDT/ 3:45 MDT (:10)</p>	<p>Public Comment</p>
<p>2:55 PDT/ 3:55 MDT (:05)</p>	<p>WRAP-UP: Wayne Pullan, Secretary’s Designee to the Adaptive Management Work Group</p> <ul style="list-style-type: none"> ▪ Service Recognition ▪ FY2022 AMWG and AR meeting dates: <ul style="list-style-type: none"> ○ January 11-13, 2022 ○ February 9-10, 2022 ○ May 18, 2022 (webinar) ○ August 17-18, 2022
<p>3:00 PDT/ 4:00 MDT</p>	<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.

Draft Minutes & Action Items

Intentionally Left Blank

Glen Canyon Dam Adaptive Management Program Adaptive Management Work Group Meeting May 19, 2021

Start Time: 8:00 AM Pacific Daylight Time (PDT)

Conducting: Wayne Pullan, Secretary's Designee to the Adaptive Management Work Group (AMWG) and AMWG Chair

Recorder: Carliane Johnson, SeaJay Environmental, LLC.

Facilitator: J. Michael Harty, Kearns & West, Inc.

Welcome and Administrative

Introductions and Determination of Quorum

[Michael Harty, Facilitator] Roll call was taken and a quorum reached with 17 members represented.

Opening Remarks

[Wayne Pullan, AMWG Chair] Welcomes Kerry Rae, Chief of Staff in the Office of the Assistant Secretary for Water and Science. [Tanya Trujillo](#) is the nominee for Assistant Secretary for Water and Science. Her confirmation hearing, as well as the confirmation hearings of [Robert Anderson](#) as Solicitor of the Department of Interior (DOI) and [Shannon Estenoz](#) as DOI Assistant Secretary for Fish, Wildlife and Parks occurred yesterday before the Senate Energy and Natural Resources Committee. It is important to note all the great work that was done during the spring disturbance flow. There remains a commitment that Reclamation will hire a Tribal Liaison. Expect more news on that within the next few months. Steve Wolff is moving on to a new position and will no longer be the Wyoming AMWG member.

Approval of February 10-11, 2021 meeting minutes

[Wayne Pullan, AMWG Chair] The draft was distributed on April 28; no edits were received. **[Steve Wolff, State of Wyoming]** Motion made to approve the February 10-11, 2021 minutes. **[Paul Harms, State of New Mexico and Richard Begay, Navajo Nation]** Seconded the motion. **[Wayne Pullan, AMWG Chair]** Minutes were passed by consensus.

Nominations and Appointments

[Wayne Pullan, AMWG Chair] A [45-day notice](#) was published in the Federal Register on April 28 to solicit nominations for the AMWG. Applications need to be postmarked or submitted electronically by June 14. [Any vacant positions or those with terms ending in 2021](#) should consider submitting their nominations.

FY 2021 Program Priorities Update

[PRESENTATION] **[Lee Traynham, Bureau of Reclamation (Reclamation)]** Details were provided on the following topics: Administrative updates for DOI, Reclamation, and U.S. Geological Survey (USGS). All the Fiscal Year 2021 (FY21) funding has been transferred to Reclamation. Deadline for member nominations is June 14, 2021. Updates on the [Action Item Tracking](#) will be discussed later in the meeting, while three other items (charter renewal, humpback chub, monitoring metrics) were highlighted. Additional updates were provided on staffing and support services, budget and funding, and program management.

Q&A and discussion

[Sara Price, Colorado River Commission of Nevada (CRCN)] Supports new members receiving an orientation on topics such as the budget and charter.

[Jeff Humphrey, U.S. Fish and Wildlife Service (USFWS)] Expresses gratitude on Reclamation's responsiveness to the Tier 1 early interventions on humpback chub.

[Larry Stevens, Grand Canyon Wildlands Council (GCWC)] What is the timing on decisions on actions for humpback chub? **[Lee Traynham, Reclamation]** Reclamation will be submitting a draft proposal to USFWS. Actions will depend on conditions and fish numbers. Potential positive responses to the metric (i.e. increased numbers of juvenile chub) are not likely to be immediate. Actions will be ongoing. **[Arden Kucate, Pueblo of Zuni]** Requests that the tribes are kept informed of the timing and the analysis. **[Lee Traynham, Reclamation]** The proposal will be in draft for input to be received. The actions associated with Tier 1 consist of enhanced conservation (i.e., doing more of what has already been done).

[Larry Stevens, GCWC] Natural larval variability of humpback chub is not well understood. It would be useful to compare this with other fish species. **[Lee Traynham, Reclamation]** Review of the five-year triggers or future research may include looking at humpback chub relative to other fish.

[Kurt Dongoske, Pueblo of Zuni] Will the draft monitoring metrics receive review by the science advisor? **[Lee Traynham, Reclamation]** Yes, they will review both the process document and the annual report, which will pilot the proposed metrics.

Proposed FY 2022 Budget and Work Plan

[PRESENTATION] **[Seth Shanahan, Technical Work Group (TWG) Chair]** The TWG is following a process that was approved in 2019 to provide an annual budget recommendation to AMWG by the August meeting. The Budget Ad Hoc Group (BAHG) and TWG are currently considering potential changes to FY2022 of the triennial work plan (TWP).

[PRESENTATION] **[Lee Traynham, Reclamation]** Reclamation's modest budget shortfall in FY22 is expected to be made up from overage in FY21 and FY23. A detailed breakdown was shown of the FY22 budget. The only change that Reclamation is proposing is for the Technical Service Center to complete its work in FY22 on dissolved oxygen monitoring and risk assessment.

[PRESENTATION] **[Mark Wimer, Acting Chief, Grand Canyon Monitoring & Research Center (GCMRC)]** Details of GCMRC's budget and how the allocations will meet project plans were discussed.

Q&A, Discussion, and Action

[Leslie James, WAPA] It is recommended, given the extreme drought conditions, that consideration be given for holding onto carryover funds because of the unprecedented implications to the Basin fund.

Basin Hydrology and Operations Update

[PRESENTATION] **[Heather Patno, Reclamation]** Starting to see an increase in storage in some reservoirs, but others are decreasing. Peak snow water equivalent inflow occurred on March 30 at 89% of median. Dry antecedent soil moisture conditions preceded record warm temperatures and dry precipitation, which began in April 2020 and have continued through today. Dry soils will soak up the runoff prior to it reaching the reservoirs, thereby decreasing runoff forecasts and potential this spring.

The expectation is for significant dry conditions to continue through 2021. In January, Reclamation projections triggered activity under the Drought Response Operations Agreement (DROA), which involves enhanced monitoring and coordination, but not operational changes. No adjustment to balancing occurred in April and 8.23 million acre-feet (maf) will be released for WY2021. The tier determination is set in August and if the projected elevations are observed, Powell will be in the Mid Elevation Release Tier with 7.48 maf released in WY2022 under both the most and maximum probable forecasts. This will put Lake Mead in Level 1 shortage for the first time since the 2007 Interim Guidelines were implemented. The minimum probable unregulated inflow forecast scenario projects Powell going into the Lower Elevation Balancing Tier in WY2022 with a release of 7.0 maf. This projection would put Mead in a Level 2 shortage beginning in WY2023.

A new slide has been added to the presentation to show Lake Powell release temperature to track this metric as requested at the February AMWG meeting. Projected most and minimum probable temperatures are for record warm releases downstream into the Grand Canyon. Dissolved oxygen levels will be a concern in the future with decreasing elevations at Powell and the potential for low DO levels with increased inflows and elevations.

Q&A, Discussion, and Feedback

[Leslie James, WAPA] How much flexibility will there be within the months of October, November, and December during the releases? **[Heather Patno, Reclamation]** Normally, that flexibility has been exercised during high flow events. Reclamation will have to discuss this with WAPA.

[Paul Harms, New Mexico] If Lake Powell is at Lower Elevation Balancing Tier in water year 2022, is there much chance for balancing and thus a higher release, or will Mead have more volume than Powell that will limit the release? **[Heather Patno, Reclamation]** There is a lot of uncertainty, but once the lower balancing tier is entered, there is the potential for releases above 7.0 MAF.

Water Year 2021 LTEMP Experiments & Flow Adjustments - Bug Flows, Overflight, and Spring Disturbance Flow [\[PRESENTATION\]](#)

[Lee Traynham, Reclamation] The presentation provides an overview of the Long-Term Experimental and Management Plan (LTEMP) experiments for water year 2021. High Flow Experiments were not triggered due to insufficient sediment accumulation. The macroinvertebrate production flows (“bug flows”) experiment was not recommended for a fourth year.

[Mike Moran, GCMRC] Next step on bug flows will be for GCMRC to submit a draft synthesis report later this year. A review panel would then likely be convened with the hope that results will be available by early 2022 in time for possible project implementation that year. The remote sensing overflights, which are expected to start on May 29, 2021 are not considered an experiment, but the flow action and data collection is critical for GCMRC research. Monitoring was completed during the spring disturbance flow to assess effects of the flow action.

Q&A and discussion

[Sara Price, CRCN] Given the synthesis work, is there a way to keep planning of the FY22 bug flow experiment on track? **[Lee Traynham, Reclamation]** Next steps recommended in the Planning and Implementation Team report are being worked on now, including a synthesis report and external review. If there is interest in revising the hydrograph, that might be an appropriate task for the TWG and

the Flow Ad Hoc Group (FLAHG), but is there enough information for the FLAHG to work with if the GCMRC synthesis or WAPA's projected costs are not yet available? **[Brian Sadler, WAPA]** WAPA has an action to look at purchase power and how the flows might affect hydropower. WAPA will be discussing this with the TWG this summer. WAPA will also be assessing the 7.48 MAF as well as a potential high flow experiment (HFE). **[Jan Balsom, National Park Service (NPS) Grand Canyon National Park (GRCA)]** NPS recognizes the funding concerns, but ultimately Glen Canyon Dam Adaptive Management Program (GCDAMP) is charged to monitor and reduce impacts to natural resources. **[Lee Traynham, Reclamation]** If there is interest in tasking the TWG, please propose a recommendation for AMWG consideration prior to the August meeting. **[Larry Stevens, GCWC]** One discussion topic would be for GCMRC to help us understand what environmental concerns can we learn from the drought? **[Lee Traynham]** Is this different from the 7.48 MAF discussions? **[Larry Stevens]** It would be important to understand the larger conceptual issues about how river ecosystems change in response to drought. **[Arden Kucate]** We need to give full consideration to learning more about the drought and its impacts to natural resources.

Federal Agency Updates

GCMRC Leadership Update

[Scott VanderKooi, Acting Director at Southwest Biological Science Center (SBSC)] Mike Moran became acting GCMRC chief following Mark Wimer's detail, with assistance from Ted Kennedy.

GCDAMP Program Funding (BOR, WAPA)

[PRESENTATION] **[Kathy Callister, Reclamation]** This presentation highlights the FY22 federal budget process. **[Brian Sadler, WAPA]** Purchase power projections have increased by \$15 million for the rest of this fiscal year. The 7.48 MAF expected next year is going to affect WAPA in many ways. It is dry across the entire basin with Lake Powell elevations continuing to drop. Projected revenues have dropped by 3% and it is getting worse. WAPA is going through a process now to evaluate rate and expenses.

ESA Update: Humpback Chub Status And Proposed Downlisting

[Jeff Humphrey, USFWS] The Upper Basin Office is currently reviewing comments on the downlisting, but no deadline is known at this time. The Kanab ambersnail delisting is undergoing taxonomic considerations with a determination expected soon. An expert panel for the razorback sucker will be established later this summer to better understand augmentation of the Lake Mead population and overall recovery of the species.

Expanded Non-native Aquatic Species Management Plan

[Ken Hyde, NPS] NPS is continuing the incentivized harvest program and getting results back from the Brown Trout Bonanza, which was meant to attract more anglers, catch more brown trout, and expand outreach efforts. A presentation about the program will be given at the June TWG. NPS is pleased with the program, but still not harvesting the number of fish that had been expected.

LTEMP Litigation

[Rod Smith, DOI Solicitors Office] The status has only moved slightly since last update. The court is currently deciding on some factual issues such as questions on the scope of the Administrative Record. Briefings are at least 30 days out from when the Administrative Record is decided. Another update will be provided at the next AMWG meeting.

Interim Guidelines

[Valerie Deppe, Reclamation] Reclamation is working internally to prepare for this process and will reach out to stakeholders as part of that preparation. Will also be hiring a senior water advisor to work with leadership in both the Upper and Lower Colorado Basin regions, as well as the Commissioner's Office, to help facilitate this work. Contact with the tribes on best methods for engagement and any capacity building they might need has begun.

Other

[Kathy Callister, Reclamation] An invitation will be extended to Secretary Haaland for the stakeholder river trip in the Grand Canyon.

Technical Work Group Chair Report

[PRESENTATION] **[Seth Shanahan, TWG Chair]** There is a possibility to have the October meeting in person, but no decision has been made. One action the BAHG is working on now until October is to develop workplan prioritization criteria for the TWG's consideration. A panel will convene at the next meeting to discuss Lake Powell elevation. The TWG heard a presentation on Benthic & Hyporheic Anoxia (BHA) in April that highlighted an issue not many had known about and its potential implications. Another study presented to the TWG in April was on macroinvertebrate egg-mass desiccation and its impacts on population dynamics. The TWG also heard from the NPS about their LTEMP riparian vegetation project plan. Ryan Mann from Arizona Game and Fish Department (AZGFD) reported on concerning findings from their brown trout and rainbow trout monitoring at Lees Ferry.

Stakeholder Updates

States: Arizona Department of Water Resources (ADWR), AZGFD, CA, CO, NM, NV, UT, WY

[Scott McGettigan, UT] The Lake Powell Pipeline supplemental environmental impact statement continues to move forward. **[Steve Wolff, WY]** This is his last AMWG meeting with a new position at the [Southwestern Water Conservation District](#).

Tribes: Hopi, Hualapai, Navajo Nation, Pueblo of Zuni, Southern Paiute Consortium

[Jakob Maase, Hopi Tribe] The Hopi Tribe has moved on to Phase 2 opening. The office is open although the entrance is still closed. Should be in Phase 3 in a few months, if numbers continue to go down.

[Peter Bungart, Hualapai] Less restrictive with field meetings and catching up with consultation requests. The majority of tribal members are vaccinated. **[Erik Stanfield, Navajo Nation]** Will be submitting a nomination package. The monitoring trip has been scheduled for August 5-13. All Navajo Nation offices are open with some travel restrictions but expected to ease with increasing vaccinations.

[Arden Kucate, Pueblo of Zuni] Contact tracing has flat lined. Anyone over 12 can get vaccinated.

[Daniel Bullets, Southern Paiute Consortium] Everything is open with a river trip scheduled in June.

NGOs: Environmental, Federal Power Purchasers, and Recreation

[Larry Stevens, GCWC] GCWC is moving forward next winter on a vegetation project at Paria Beach to replant with native plant species. **[Leslie James, CREDA]** No update except for the drought concerns.

[Kevin Garlick, Utah Municipal Power Agency (UMPA)] UMPA is assessing drought and federal power costs on market conditions.

Public Comment

None.

AMWG Next Steps

[Wayne Pullan, AMWG Chair] Acknowledges Mark Wimer, GCMRC Acting Chief, whose last official day was May 17. Steve Wolff, who has been with the AMWG since 2014, is also appreciated for his service.

[Lee Traynham, Reclamation] The August meeting will not be in person. Reclamation will be considering future in-person meetings and will provide sufficient advance notice.

Next AMWG Meeting: August 18-19, 2021

- Major agenda topics:
 - FY22 budget and workplan
 - GCMRC science updates
 - Stakeholder's perspective
 - Tribal liaison report
- Please send your suggestions for additional agenda items to Kearns & West (talpaugh@kearnswest.com) with a cc to Reclamation by June 30, 2021.

Meeting adjourned at 11:31 PST

Meeting Attendees

AMWG Members, Alternates, and Leadership

Jan Balsom, NPS-GRCA

Cliff Barrett, UMPA (Alternate)

Richard Begay, Navajo Nation

Peter Bungart, Hualapai Tribe

Charlie Ferrantelli, State of Wyoming (Alternate)

Kevin Garlick, UMPA

Michelle Garrison, State of Colorado (Alternate)

Paul Harms, State of New Mexico (Alternate)

Jeff Humphrey, USFWS

Leslie James, CREDA

Arden Kucate, Pueblo of Zuni

Jakob Maase, Hopi Tribe

John McClow, State of Colorado

Jessica Neuwerth, CRBC

Wayne Pullan, AMWG Chair

Daniel Picard, Designated Federal Officer

Sara Price, CRCN

Peggy Roefer, CRCN (Alternate)

Brian Sadler, WAPA (Alternate)

William "Billy" Shott, NPS-GLCA (Alternate)

Larry Stevens, GCWC

Steve Wolff, State of Wyoming

Department of the Interior Staff

Kerry Rae

Rod Smith

USGS/GCMRC Staff

Lucas Bair

Darrin Thome

Ted Kennedy

Scott VanderKooi

Michael Moran

Mark Wimer

Reclamation Staff

Tara Ashby
Kathy Callister
Valerie Deppe
Erin Foraker
Clarence Fullard
Dave Isleman
Heather Patno

Dave Isleman
Kerri Pedersen
Shana Tighi
Lee Traynham
Nathan Watson
Nicholas Williams

Interested Persons

Terra Alpaugh, Kearns & West
Rob Billerbeck, NPS
Daniel Bulletts, Southern Paiute Consortium
Kevin Bulletts, Southern Paiute Consortium
Shane Capron, WAPA
Julie Carter, AZGFD
Kevin Dahl, NPCA
Kurt Dongoske, Pueblo of Zuni
Craig Ellsworth, WAPA
Sheri Farag, Salt River Project
Alicyn Gitlin, Sierra Club
Jessica Gwinn, USFWS
Michael Harty, Kearns & West
Amy Haas, Upper Colorado River Commission
Brian Healy, NPS
Ken Hyde, NPS
Carlaine Johnson, SeaJay Environmental
Kristen Johnson, ADWR
Sara Larsen, Upper Colorado River Commission
Mike Lyndon, NPS
Ryan Mann, AZGFD

Kevin McAbee, USFWS
Scott McGettigan, State of Utah
Craig McGinnis, ADWR
Betsy Morgan, Utah
McKenna Murray, Utah
Lisa Meyer, WAPA
Liz Payton, Colorado State University
Bill Persons, FFI/TU
Ted Rampton
Shana Rapoport, CRBC
Shane Sanders, AZGT Cooperatives
Gene Seagle, NPS
Seth Shanahan, TWG Chair and SNWA
Caroline Schmiedt, Platt River Power Authority
Erik Skeie, State of Colorado
Russell Smoldon, Arizona Power Users
Erik Stanfield, Navajo Nation
Zach Stevens, DRLawFirm
Jim Strogon, FFI/TU
Mary-Ellen Walsh, Arizona State Historic Preservation Office
Jeffrey Woner

Abbreviations

AMWG – Adaptive Management Work Group
ADWR – Arizona Department of Water Resources
AZGFD – Arizona Game and Fish Department
BAHG – Budget Ad Hoc Group

maf – million acre-feet
MDT – Mountain Daylight Time
NGO - Non-Governmental Organization
NHPA – National Historic Preservation Act

BHA – Benthic & Hyporheic Anoxia
BIA – Bureau of Indian Affairs
CRBC – Colorado River Board of California
CRCN – Colorado River Commission of Nevada
CREDA – Colorado River Energy Distributors Association
CRSP – Colorado River Storage Project
DOI – Department of the Interior
DROA – Drought Response Operations Agreement
FFI – Fly Fishers International
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—Grand Canyon Wildlands Council

GLCA – Glen Canyon National Recreation Area

GPP – gross primary productivity
GRCA – Grand Canyon National Park
LTEMP – Long-Term Experimental and Management Plan

NPCA – National Parks Conservation Association
NPS – National Park Service
PI Team – Planning/Implementation Team
PDT – Pacific Daylight Time
Reclamation – Bureau of Reclamation
ROD – Record of Decision
SBSC – Southwest Biological Science Center
Secretary – Secretary of the Interior
SNWA – Southern Nevada Water Authority
SPC – Southern Paiute Consortium

TU – Trout Unlimited
TWG – GCDAMP Technical Work Group
TWP – Triennial Budget and Work Plan
UCRC – Upper Colorado River Commission
UMPA - Utah Municipal Power Agency
USFWS – United States Fish & Wildlife Service
USGS – United States Geological Survey
WAPA – Western Area Power Administration
WY – Water Year

**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 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>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>May 2021 Update:</u> GCMRC and Reclamation are working to define the scope of the metrics development effort, propose a list of existing and new metrics for consideration, and develop criteria to evaluate the metrics. Will seek Secretary’s Designee input and TWG feedback on proposed plan later in 2021.</p> <p><u>August 2021 Update:</u> A draft project plan, including objectives and timeline, was distributed in early June 2021 for review and input. GCMRC is addressing TWG comments. A status update will be presented during the August AMWG meeting and member feedback requested.</p>	Lee Traynham / ongoing	Open
Item 2020.Dec.22	<p>In accordance with the 2021-2023 Triennial Budget and Work Plan approved by the Secretary of the Interior on December 22, 2020: “Due to uncertainties in future funding levels, prioritization of projects outlined in the FY2021-2023 TWP is necessary and will be undertaken by the GCDAMP during FY2021. Project priorities may change over time based on hydrology, resource conditions, evolving scientific understanding and uncertainties, administration objectives and other factors.”</p> <p><u>August 2021 update:</u> DOI Bureaus are working to identify high priority activities that support compliance with GCPA, NHPA, ESA, and NEPA. October 2021 is targeted for delivery to the Budget Ad Hoc Group.</p>	All / ongoing	Open

ITEM No. / DATE	ACTION ITEM	ASSIGNED TO / DUE DATE	STATUS
Item 2021.Feb.11	<p>Reclamation will present projected temperature data from Lake Powell under minimum probable forecast scenarios at next AMWG meeting.</p> <p>Presentation:</p> <ul style="list-style-type: none"> • Hydrology and Operations Update, May 19, 2021 	Reclamation / May 21	Closed
Item 2021.Feb.11	<p>Reclamation will present more context at the next AMWG meeting about future funding conditions, particularly with respect to the Recovery Programs, drought impacts, and the anticipated reduction in support from power revenues.</p> <p>Recent Presentations:</p> <ul style="list-style-type: none"> • Reclamation Budget Process, Reclamation, Feb 2020 • CRSP Funding Update, WAPA, Feb 2020 • Federal Appropriations Process, May 2021 	Reclamation / May 21	Closed
Item 2021.Feb.11	<p>Reclamation will extend an invitation to Secretary Haaland to join the FY22 stakeholder river trip.</p>	Reclamation / Aug 21	Open

Supplemental Materials

Intentionally left blank

Potential GCDAMP & Other Meetings in 2022

Days	Dates	Meeting	Comments
JANUARY			
W-Th	Jan 5-6	CRAB meeting	
W	Jan 12	UCLT all day	
T-W	Jan 11-12	Annual Reporting Meeting – TBD	
Th	Jan 13	TWG Meeting – TBD	
M	Jan 17	Martin Luther King Holiday	
Tu-Th	Jan 25-27	CRTR meeting	
Tu-Th	Jan 25-27	Upper Basin Mtg (Moab)	
FEBRUARY			
Tu	Feb 8	DOI Federal Family Meeting – TBD	
W-Th	Feb 9-10	AMWG Meeting – TBD	
M	Feb 14	President's Day Holiday	
	Feb	Possible Salinity work group meeting	
Th	Feb 17	MSCP Financial WG mtg	
MARCH			
Sun	Mar 13	Daylight Savings	
M-F	Mar	School Spring Recess in Flagstaff	
Th	Mar	Flaming Gorge WG	
APRIL			
W-Th	Apr 12-13	TWG Meeting – TBD	Request for 5-6 or 19-20
W	Apr 13	UCLT all day	
	Apr	Possible Salinity work group meeting	
Th	Apr	Flaming Gorge WG	
Th	Apr	Fontenelle WG	
W	Apr 27	MSCP Steering Committee meeting	
MAY			
W-Th	May 11-12	MSCP work group	
W	May 18	AMWG Webinar - Virtual	
M	May 30	Memorial Day Holiday	
JUNE			
	June	Possible 100 th Salinity Forum	
W-Th	Jun 15-16	TWG Meeting – TBD	
W	June 22	MSCP Steering Committee meeting	
JULY			
M	Jul 4	Independence Day Holiday	
W	Jul 13	UCLT all day	
AUGUST			
Th	Aug	Flaming Gorge WG	
Tu	Aug 16	DOI Federal Family Meeting – TBD	

Days	Dates	Meeting	Comments
W-Th	Aug 17-18	AMWG Meeting	
Th	Aug	Fontenelle WG	
	Aug	Possible Salinity work group meeting	
M-F	Aug	Fall semester starts at NAU – Flagstaff, AZ	
		SEPTEMBER	
M	Sep 5	Labor Day Holiday	
		OCTOBER	
M	Oct 10	Columbus Day	
W-Th	Oct 12-13	TWG Meeting – TBD	
W	Oct 13	UCLT all day	
	Oct	Possible 101 st Salinity Forum	
W	Oct 26	MSCP Steering Committee meeting	
		NOVEMBER	
Th	Nov 11	Veteran's Day Holiday	
Th	Nov 24	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).

Intentionally Left Blank

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 \leq 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	\leq 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

B-11

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

B-12

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

B-13

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

B-14

^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.