



— BUREAU OF —
RECLAMATION

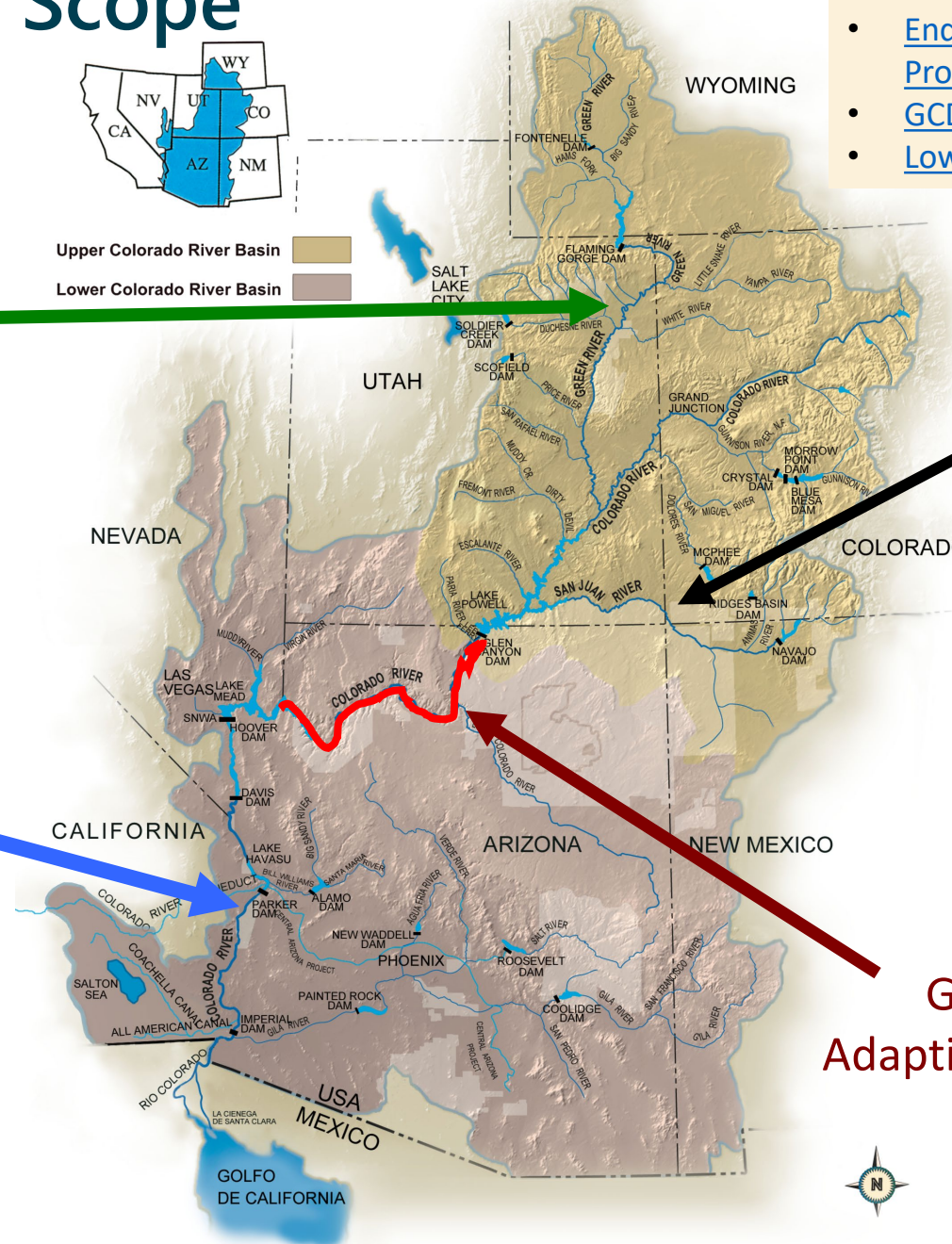
Glen Canyon Dam Adaptive Management Program

AMWG August 13, 2026

Geographic Scope

Upper Colorado
River Endangered
Fish Recovery
Program

Lower Colorado
River Multi-Species
Conservation
Program



References

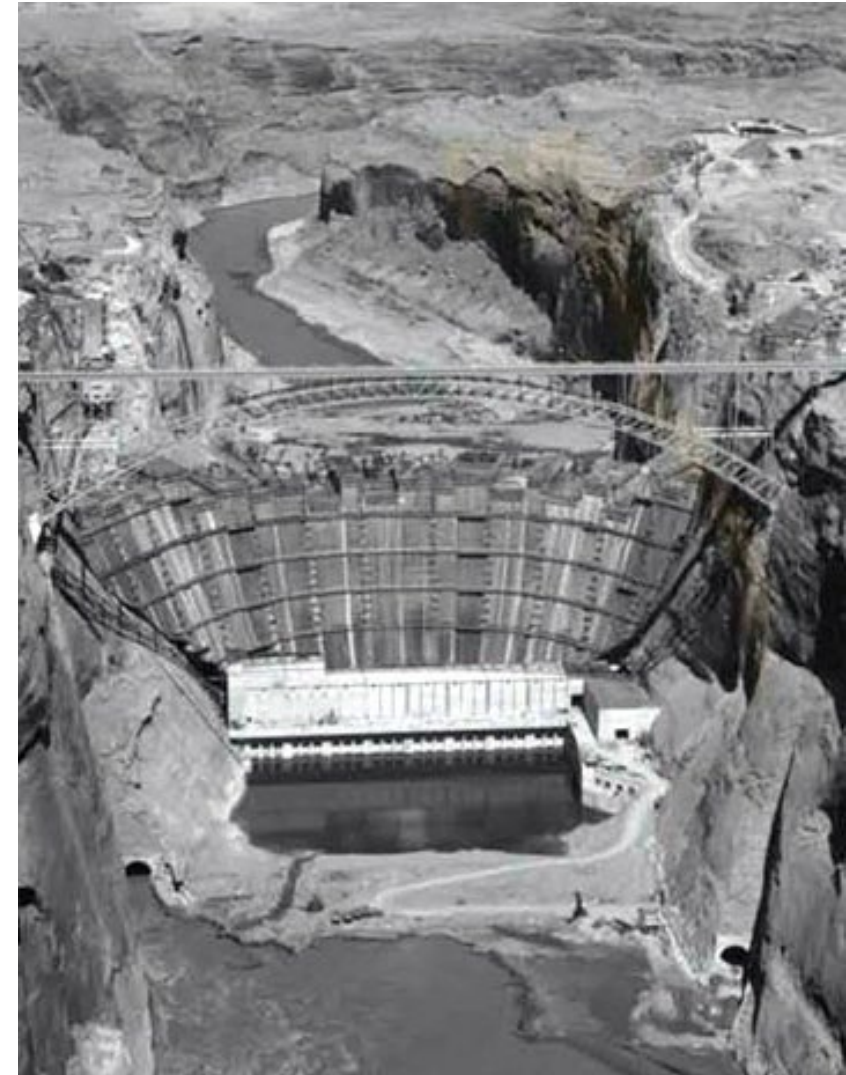
- [Endangered Fish Recovery Programs](#)
- [GCDAMP](#)
- [Lower Basin MSCP](#)

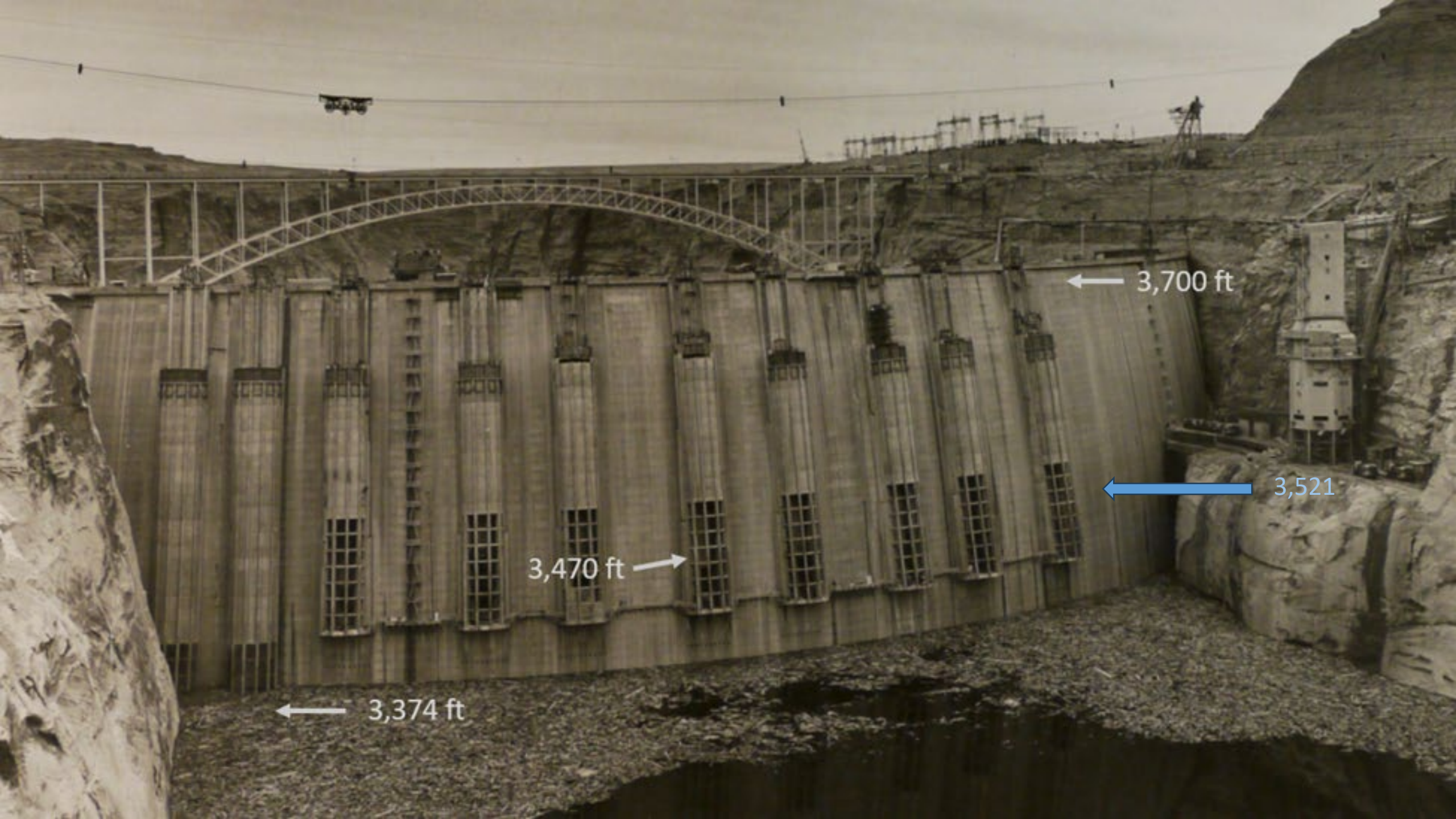
San Juan River
Basin Recovery
Implementation
Program

Glen Canyon Dam
Adaptive Management
Program

History – Glen Canyon Dam

- **Construction authorized in 1956, completed in 1964**
 - Total cost - \$245M (Adjusted for inflation ~\$2.4B)
 - Included construction of the Glen Canyon Bridge, later transferred to AZ
 - First bucket of concrete – 1960
 - Last bucket of concrete – 1963
 - Hydroelectric power first generated in 1964
- **Lake Powell first filled in 1980**
 - Last full in 1999
- **Flooding in 1983 led to damage of the concrete lined spillway tunnels**





← 3,700 ft

← 3,521

3,470 ft →

← 3,374 ft

Background

References

- [How It's Made: The Glen Canyon Dam](#)
- ["Bridge to the Future" – Interior](#)

- 1956 – Colorado River Storage Project Act
- 1964 - Glen Canyon Dam completed
- 1968 – Colorado River Basin Project Act
- 1982 – Glen Canyon Environmental Studies (GCES) began
- 1992 - Grand Canyon Protection Act of 1992



Grand Canyon Protection Act (1992)

- **REQUIRES** the operation of Glen Canyon Dam in a manner to (SEC 1802):
 - Protect, mitigate adverse impacts to, and improve the values for which the Grand Canyon National Park and Glen Canyon National Recreation Area were established including natural and cultural resources and visitor use.
 - Operations must remain in compliance with and subject to federal laws and requirements (Colorado River Storage Project Act – 1956, Colorado River Basin Project Act -1968)
- **REQUIRED** Glen Canyon Dam Environmental Impact Statement (SEC 1804)
- **REQUIRES** long-term scientific monitoring and research (SEC 1805)
- **REQUIRES** the Secretary of Interior consult with certain stakeholders on the operation of Glen Canyon Dam (SEC 1805)



Grand Canyon Protection Act (1992)

106 STAT. 4672

PUBLIC LAW 102-575—OCT. 30, 1992

SEC. 1805. LONG-TERM MONITORING.

(a) **IN GENERAL.**—The Secretary shall 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.

(b) **RESEARCH.**—Long-term monitoring of Glen Canyon Dam shall include any necessary research and studies to determine the effect of the Secretary's actions under section 1804(c) on the natural, recreational, and cultural resources of Grand Canyon National Park and Glen Canyon National Recreation Area.

(c) **CONSULTATION.**—The monitoring programs and activities conducted under subsection (a) shall be established and implemented in consultation with—

- (1) the Secretary of Energy;
- (2) the Governors of the States of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming;
- (3) Indian tribes; and
- (4) 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.



Grand Canyon Protection Act (1992)

Funding

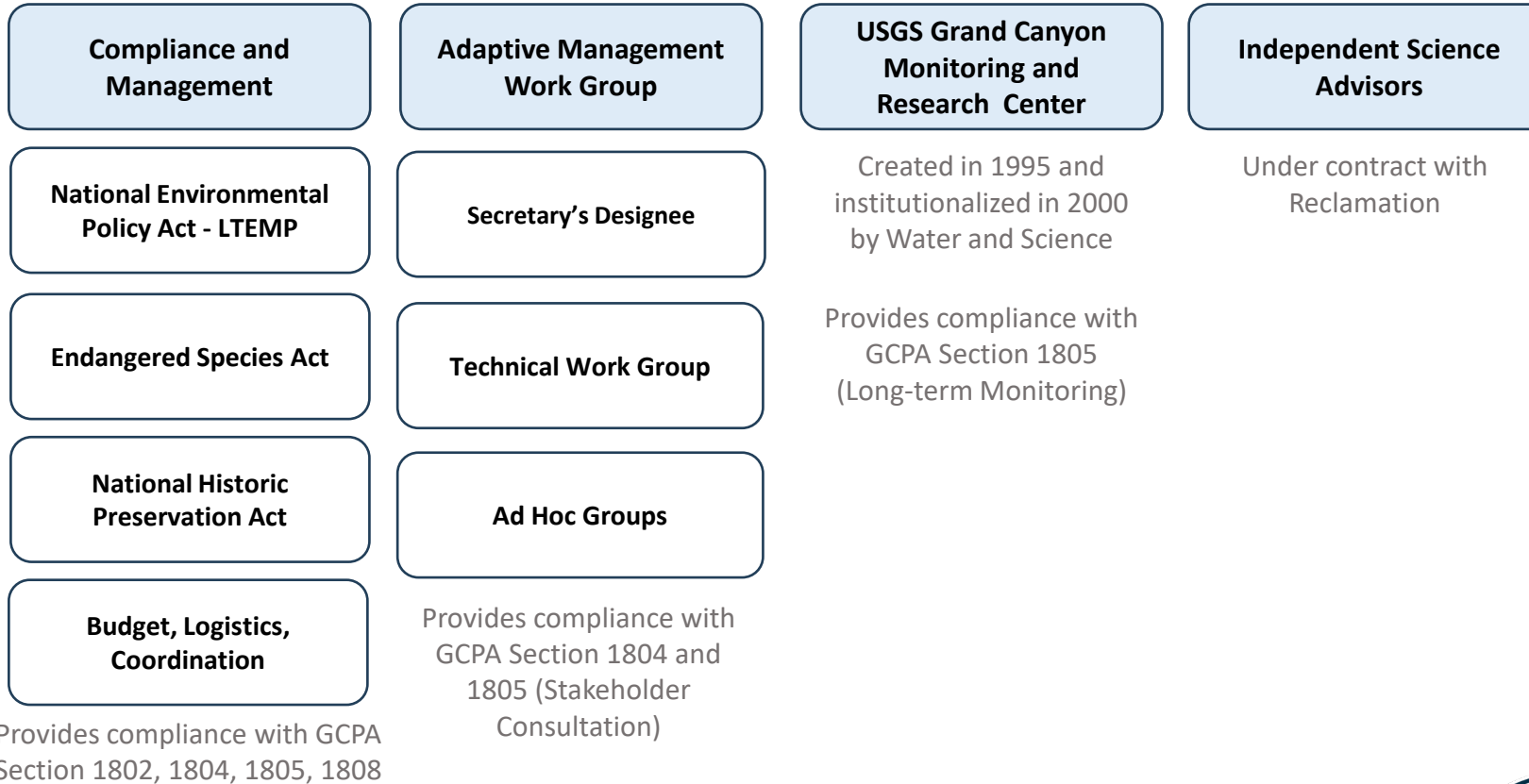
- **Section 1807:** Authorizes the Secretary to use funds generated from the sale of electric power to finance activities. Funds will be treated as having been repaid to the Treasury.
- **Section 1808:** Authorizes use of appropriations.
- **Hydropower Funding:** 1997-2018, 2020-2021.
- **Appropriated Funding:** 2019, 2022-2026 and beyond.



Glen Canyon Dam Adaptive Management Program

Grand Canyon Protection Act

Federal Advisory Committee



The Secretary retains final decision-making authority



Glen Canyon Dam Adaptive Management Program (AMP)

- Initiated following 1996 Record of Decision (ROD) on Operation of Glen Canyon Dam

Organization. The Adaptive Management Program would be administered through a senior Department of the Interior official (designee) and facilitated through an Adaptive Management Work Group organized as a Federal Advisory Committee. The AMWG would be chaired by the designee and supported by a monitoring and research center and technical work group.
(1995 EIS)

References

- [1996 ROD on Operation of GCD](#)
- [2016 ROD on the LTEMP](#)
- [Adaptive Management Tech Guide – Interior](#)



Compliance and Management

- **“Law of the River”**
 - Colorado River Compact of 1922
 - 2007 Interim Guidelines (annual releases)
- **Other Statutory Obligations**
 - Grand Canyon Protection Act (GCPA, 1992): → Consultation, Research, Monitoring
 - National Environmental Policy Act (NEPA, 1969): → LTEMP FEIS and ROD
 - Endangered Species Act (ESA, 1973): → LTEMP Biological Opinion
 - National Historic Preservation Act (NHPA, 1966): → LTEMP Programmatic Agreement and Historic Preservation Plan





RE

Glen Canyon Dam Long-Term Experimental and Management Plan (LTEMP)

- 2016 - LTEMP is a framework for adaptively managing Glen Canyon Dam (20 years)
- Sub annual operations
 - Monthly patterns
 - Minimum flows
 - Max (non-experimental) flows
 - Daily range
 - Ramp rates
- Experimental Flows
 - Planning and Implementation Process
- Continuation of GCDAMP
- Protection, Mitigation, and Monitoring of cultural resources
- Endangered Species Act Compliance (LTEMP BO)

Resource Goals of LTEMP

1. Archeological and cultural
2. Tribal resources
3. ESA listed species
4. Sediment
5. Hydropower and energy
6. Nonnative invasive species
7. Other native fish
8. Rainbow trout fishery
9. Recreational Experience
10. Riparian vegetation
11. Natural processes

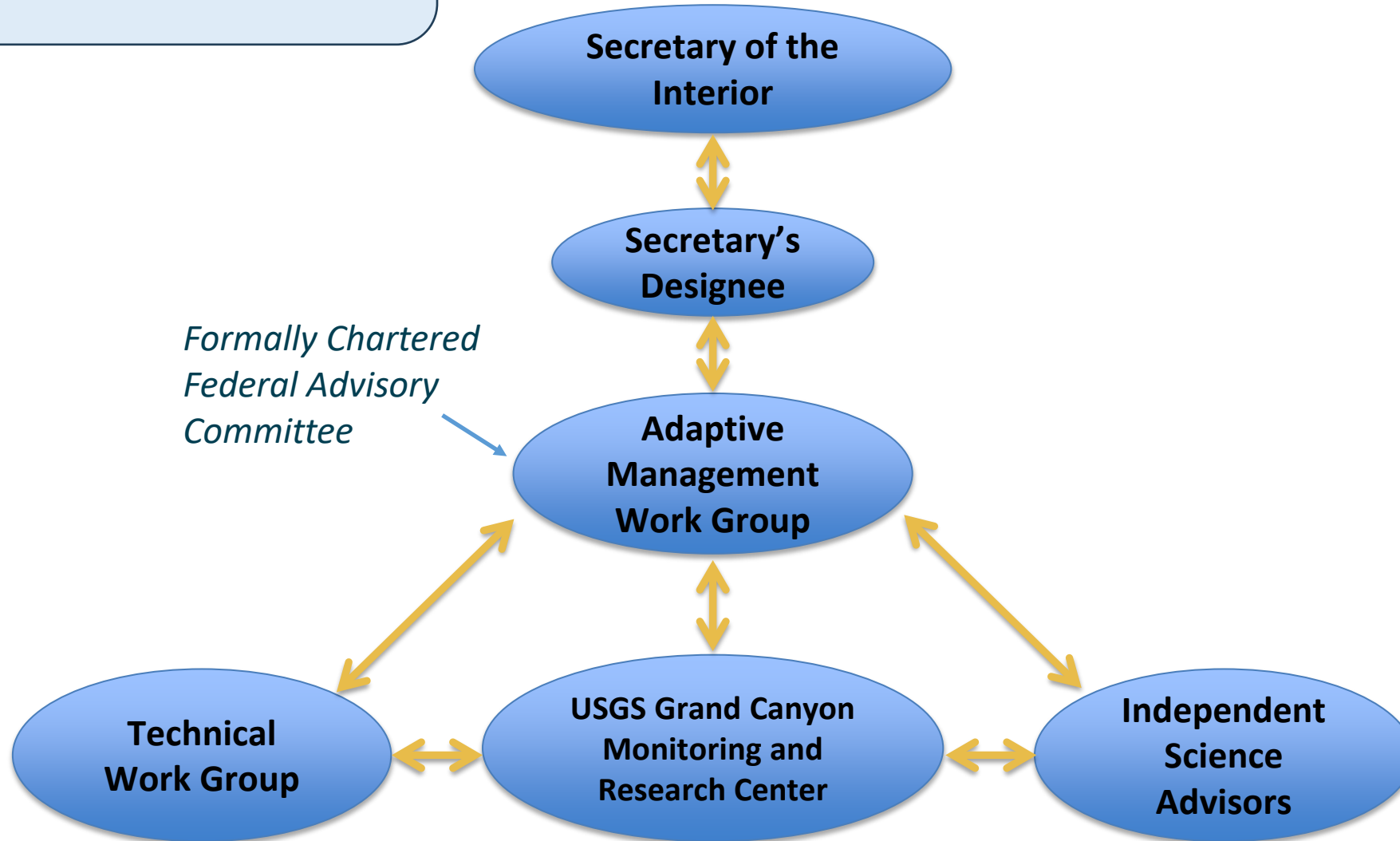


Potential LTEMP Flow Experiments

- Sediment (High Flow Experiments)
 - Spring HFE
 - Fall HFE
- Aquatic Resource
 - Bug Flows
 - Trout Management Flows
 - Low summer flows (2nd ten years of LTEMP)
- LTEMP SEIS
 - Smallmouth Bass Flows
 - HFE protocol revision



Adaptive Management Work Group



Federal Advisory Committee Act (FACA)

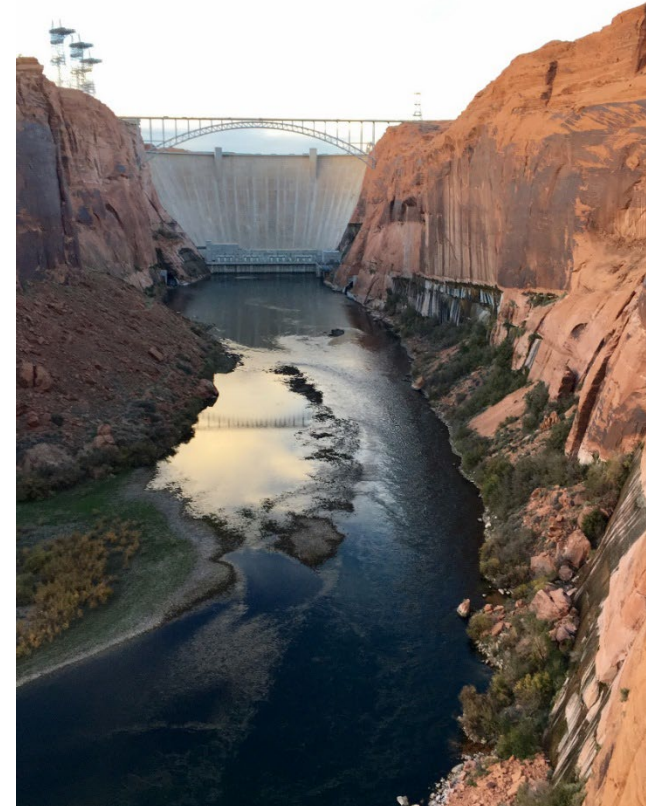
- FACA - is any committee, board, council, or group established or utilized by the President or a federal agency to obtain advice or recommendations.
 - FACA committees must operate transparently: open meetings, public involvement, charters, and accessible records.
 - Types include statutory (mandated by law), presidential, and discretionary (authorized but created at agency discretion).
 - AMWG is a discretionary FACA committee.
 - AMWG is authorized by the Grand Canyon Protection Act, but its formation and structure were left to the Secretary of the Interior, making it discretionary under FACA.

Organization. The Adaptive Management Program would be administered through a senior Department of the Interior official (designee) and facilitated through an Adaptive Management Work Group organized as a Federal Advisory Committee. The AMWG would be chaired by the designee and supported by a monitoring and research center and technical work group.
(1995 EIS)



Adaptive Management Work Group

- Primary purpose: make recommendations to the Secretary of the Interior on operation of Glen Canyon Dam and other research and management actions to protect resources downstream of Glen Canyon Dam
- Fulfills the consultation requirements of Grand Canyon Protection Act
- Forum for cooperative integration of diverse viewpoints
- Includes subcommittee & ad hoc groups
- Charter renewed every 2 years



AMWG Charter

U.S. Department of the Interior
Bureau of Reclamation

Glen Canyon Dam Adaptive Management Work Group

RENEWAL CHARTER

1. **Advisory Committee's Official Designation.** Glen Canyon Dam Adaptive Management Work Group (AMWG).
2. **Authority.** The AMWG is a discretionary advisory committee established by the Grand Canyon Protection Act (Act) of October 30, 1992, Public Law 102-575. The AMWG is operated pursuant to the Federal Advisory Committee Act (FACA), as amended (5 U.S.C. Ch. 10) and the Federal Advisory Committee Management regulations found at 41 CFR Part 102-3.
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 or an alternate designee 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 and all tasking shall be directed by the Designated Federal Officer (DFO).

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 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.

AMWG Membership

References

- [Member Status & Nominations](#)

Federal Agencies

Bureau of Indian Affairs
Bureau of Reclamation
National Park Service
Fish and Wildlife Service
Western Area Power Administration

Tribes

Hopi Tribe
Hualapai Tribe
Navajo Nation
Southern Paiute consortium
Pueblo of Zuni
San Juan Southern Paiute

State Agencies

Arizona
California
Colorado
New Mexico
Nevada
Utah
Wyoming
Arizona Game and Fish

Federal Power Contractors

Colorado River Energy Distributors Association
Utah Association of Municipal Power Systems

Recreation Interests

Trout Unlimited/Fly Fishers International
Grand Canyon River Guides

Environmental Interests

Grand Canyon Wildlands Council
American Rivers



Technical Work Group

TWG is a subcommittee that provides technical assistance to the Adaptive Management Work Group

- **Meetings**

- Quarterly – Jan (Annual Reporting), April, June, Oct
- Chairperson elected by TWG
 - TWG Vice-Chairperson
 - Reclamation Vice-Chairperson

- **Membership is similar to AMWG**

- **Ad Hoc Groups (Past and Present)**

- | | |
|--------------------------|---------------------------------|
| • Administrative History | • Socioeconomics |
| • Budget | • Smallmouth bass |
| • Core Monitoring | • Species of Management Concern |
| • Cultural Resources | • Steering Committee |
| • Flow | • Trout |
| • Operating Procedures | |

References

- [TWG Operating Procedures](#) (Feb 2011)

USGS Grand Canyon Monitoring and Research Center (GCMRC)



1. *Monitoring and Research Center:* To support the designee and the AMWG, it is recommended that the Secretary establish a research center within the U.S. Geological Survey (USGS) and/or National Biological Service with a small permanent staff in Flagstaff, Arizona. The center would be responsible for developing the annual monitoring and research plan, managing all adaptive management research programs, and managing all data collected as part of those programs. All adaptive management research programs would be coordinated through the center.

*1995 EIS

- Provides the research and monitoring necessary for AMP and AMWG to make informed recommendations to the Secretary
- Fulfills research and monitoring requirements of GCPA (SEC 1805 Long-Term Monitoring)



Prepared in cooperation
with the Glen Canyon Dam
Adaptive Management Program

Glen Canyon Dam Adaptive Management Program Triennial Budget and Work Plan— Fiscal Years 2025–2027

Prepared by
Bureau of Reclamation
Upper Colorado Regional Office
and
U.S. Geological Survey
Grand Canyon Monitoring and
Research Center

Final: October 25, 2024

U.S. Department of the Interior
U.S. Geological Survey

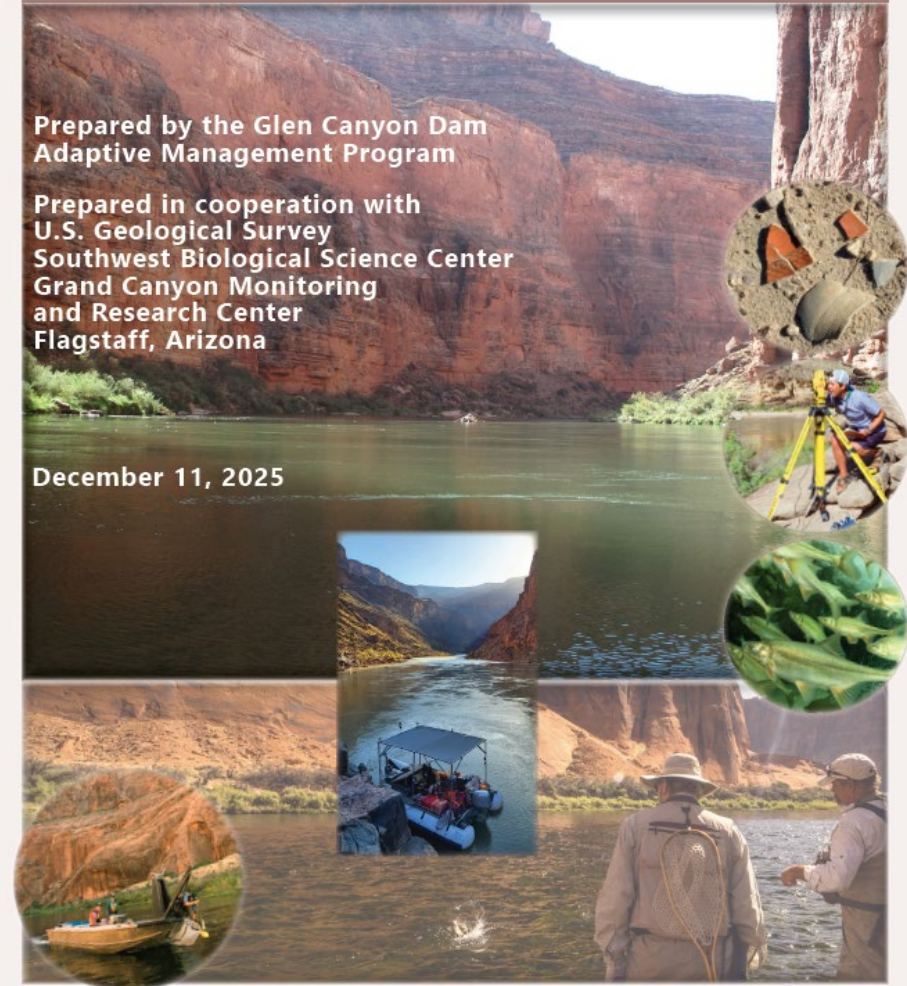


STATUS REPORT ON THE LONG-TERM EXPERIMENTAL & MANAGEMENT PLAN (LTEMP) METRICS FOR THE GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM

Prepared by the Glen Canyon Dam
Adaptive Management Program

Prepared in cooperation with
U.S. Geological Survey
Southwest Biological Science Center
Grand Canyon Monitoring
and Research Center
Flagstaff, Arizona

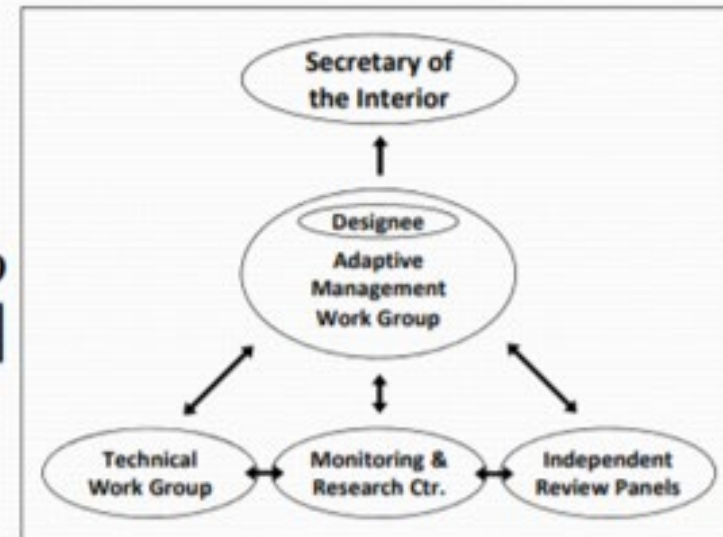
December 11, 2025



Independent Review Panel

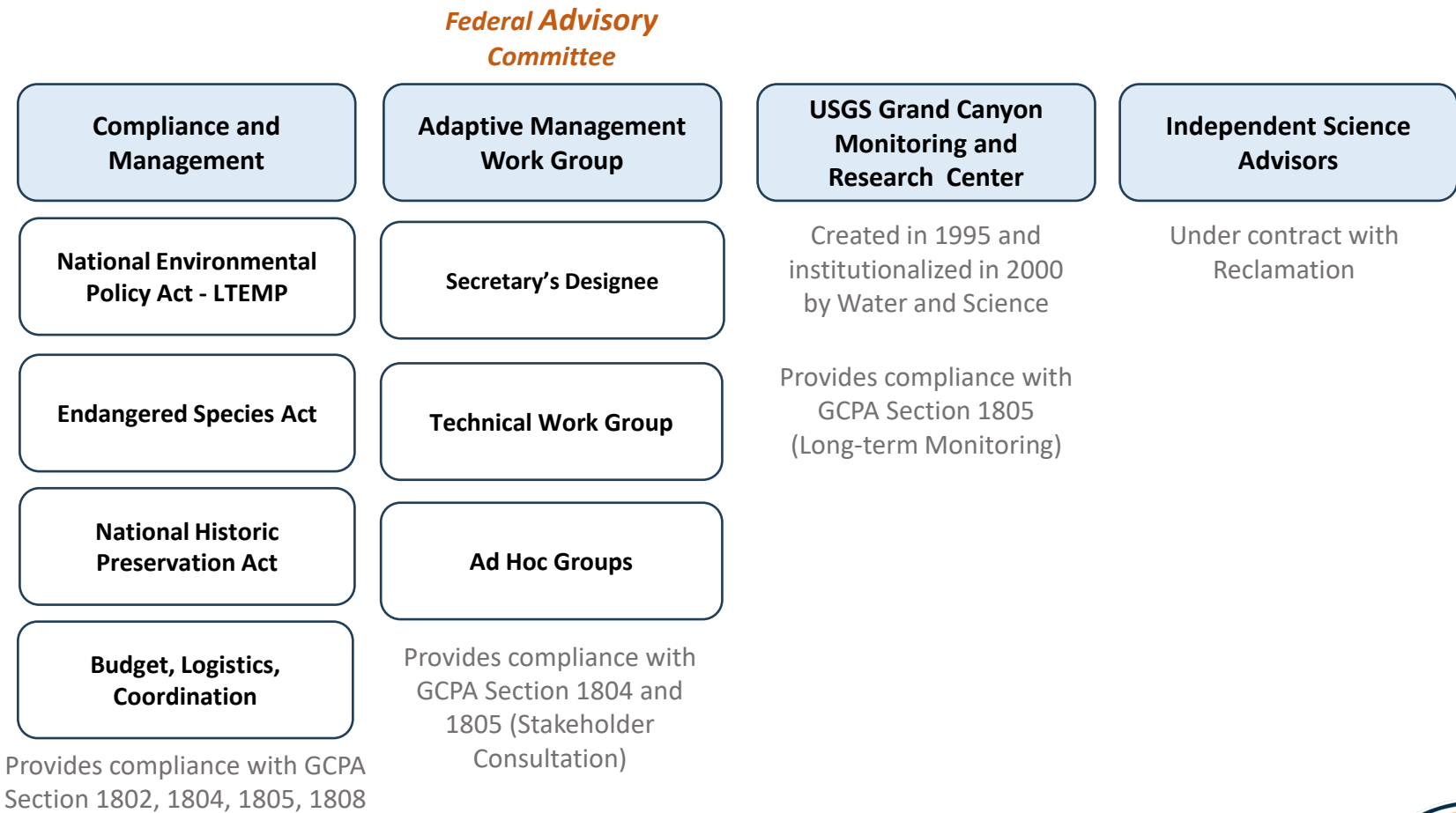
- SA program established 2000 as one component of “Independent Review Panels” established by 1995 FEIS & 1996 ROD, coequal with TWG and GCMRC

IRPs “... responsible for periodically reviewing resource specific monitoring and research programs and for making recommendations to the AMWG and the center [GCMRC] regarding monitoring, priorities, integration, and management” (1995 FEIS)



Glen Canyon Dam Adaptive Management Program

Grand Canyon Protection Act



The Secretary retains final decision-making authority



Questions



— BUREAU OF —
RECLAMATION

Current Issues

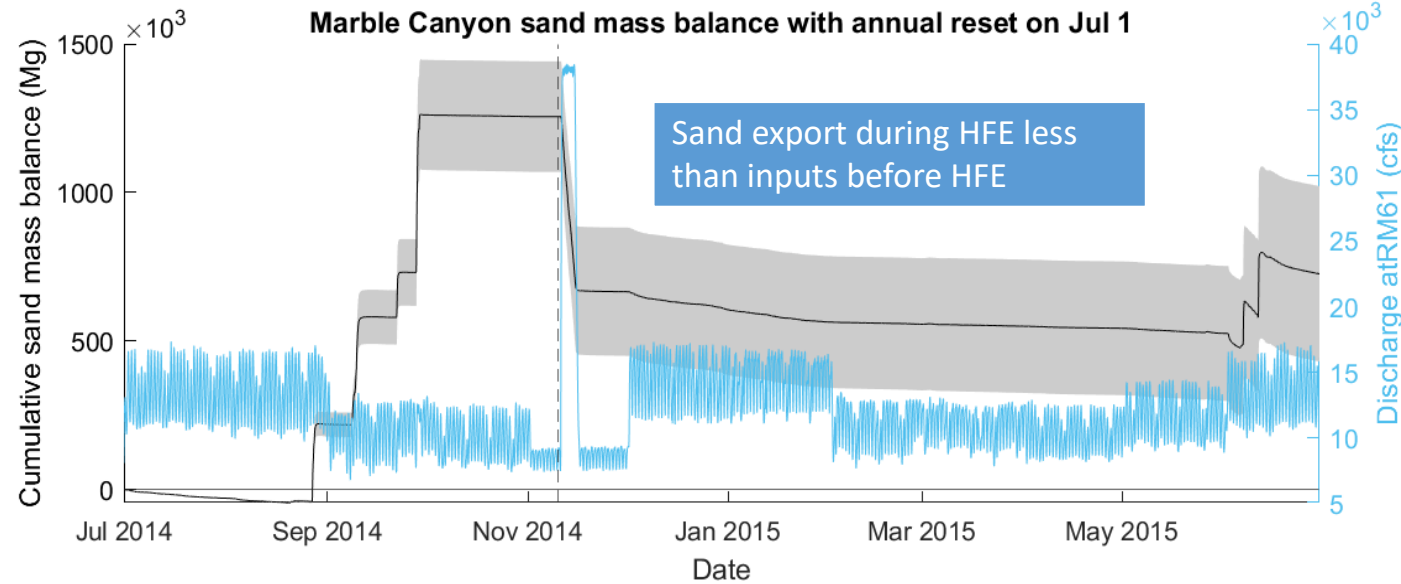


High Flow Experiments



[Glen Canyon Dam Experimental High Flow 2012](#)

How the HFE Protocol works



Eroded sandbar before HFE



HFE inundates sandbar



Sandbar following HFE



Paria River during flood



Sediment sampling on Colorado River



Acoustic sensor for continuous data on Colorado River (calibrated by conventional samples)

USGS

Historical HFEs

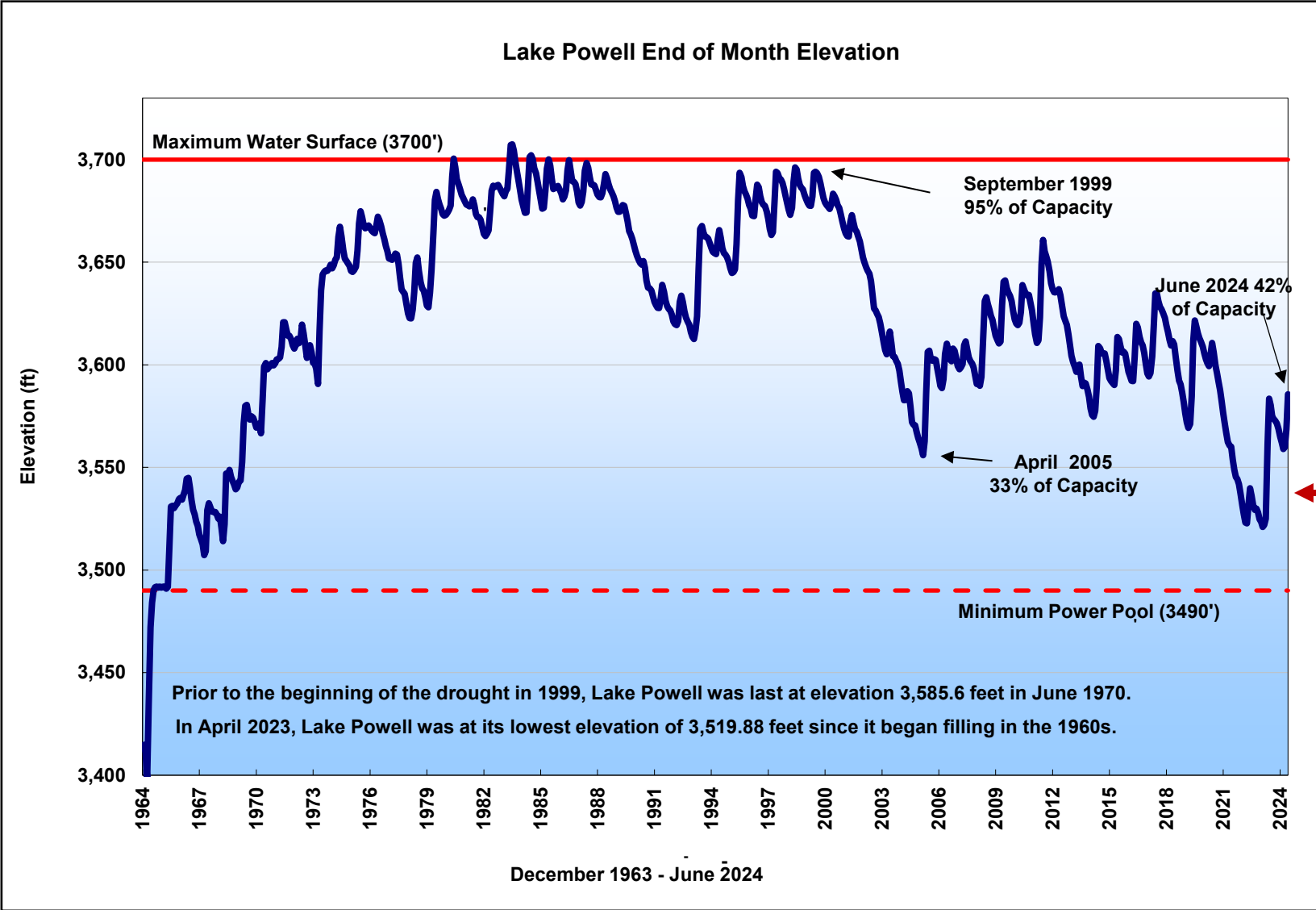
TABLE 1 | High-flow experiments (HFEs) implemented from March 1996 to April 2023.

Start date of HFE peak at Lees Ferry	Peak discharge ^a (ft ³ /s)	Duration ^a (h)	Marble Canyon sand mass balance ^b (Mg)			Paria River sand input ^b (Mg)
March 26, 1996	45,000	182	—	—	—	3,80,000
November 4, 1997	30,800	40	—	—	—	1,700,000
May 2, 2000	30,500	72	—	—	—	920,000
September 5, 2000	31,000	72	—	—	—	3700
November 21, 2004	41,700	79	570,000	±	130,000	620,000
March 6, 2008	42,800	80	480,000	±	170,000	860,000
November 19, 2012	44,500	85	710,000	±	120,000	690,000
November 11, 2013	37,000	99	2,000,000	±	320,000	1,900,000
November 10, 2014	38,000	104	1,300,000	±	200,000	1,200,000
November 7, 2016	36,500	99	640,000	±	160,000	840,000
November 5, 2018	39,500	65	560,000	±	150,000	750,000
April 24, 2023	40,000	78	1,700,000	±	290,000	1,700,000

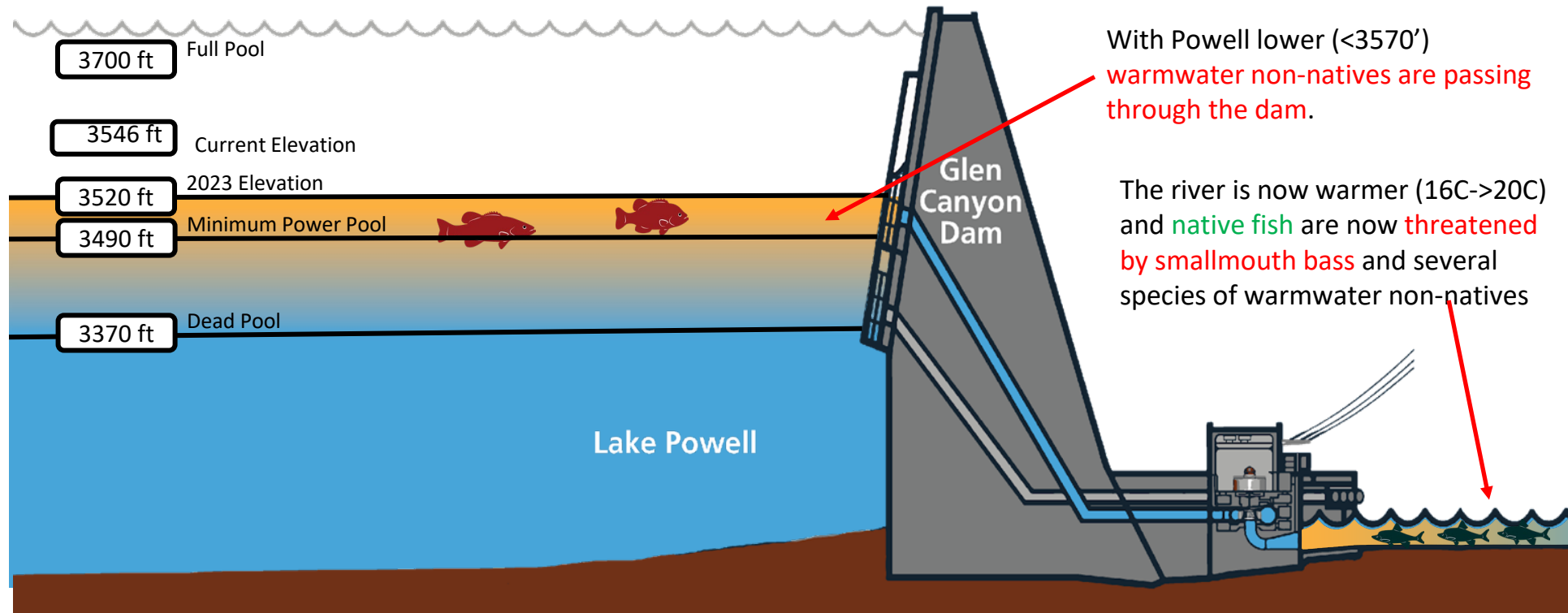
^aDuration computed as period of discharge at or above power plant capacity (this is the period at the indicated peak discharge for the 1997 and 2000 events and the period above 892 m³/s for all other events). Peak discharge and duration for Lees Ferry gage from U.S. Geological Survey (2024a).

^bThe mass balance and Paria River sand inputs reflect the sand supplied to Marble Canyon during the preceding thunderstorm season and are computed for the period from July 1 to the beginning of the ramp up to the HFE peak (1–2 days before the start of the HFE peak at Lees Ferry). Marble Canyon sand mass balance and Paria River sand input from U.S. Geological Survey (2024a) and for 1996 only, from Topping et al. (2010).

Grams, Paul E., et al. "Implementation of controlled floods for sediment management on the Colorado River in Grand Canyon under aridification." *River Research and Applications* 41.2 (2025): 334-348.



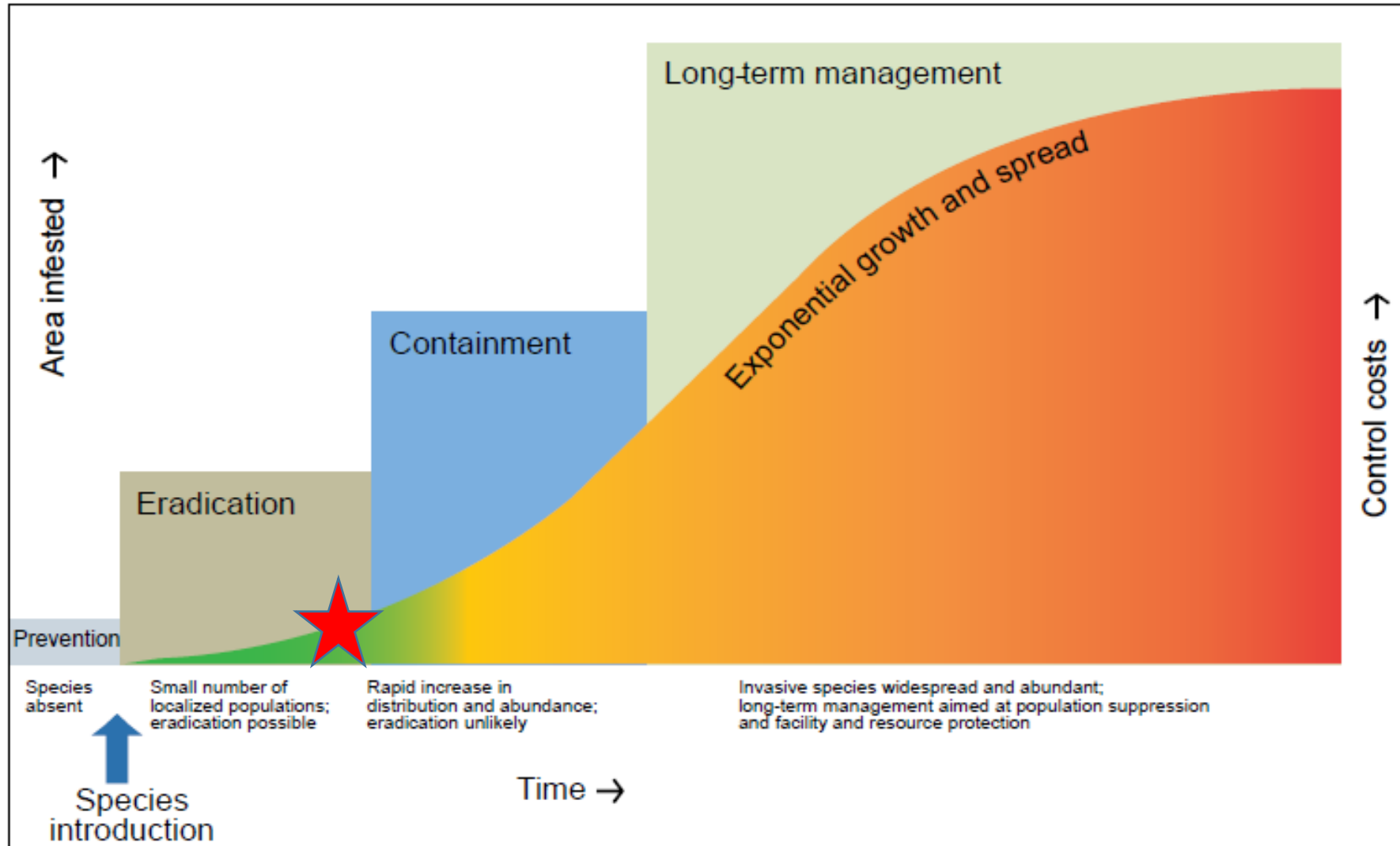
LOWER POWELL WATER ELEVATIONS PASS THROUGH INVASIVE FISH



With Powell lower (<3570')
warmwater non-natives are passing
through the dam.

The river is now warmer (16C->20C)
and native fish are now threatened
by smallmouth bass and several
species of warmwater non-natives

The Invasion Curve from DOI Invasive Species Strategic Plan (2021-2025)





- Short-term
 - Increased monitoring
 - Mechanical/Chemical Removal
- Mid-term
 - Flow options at Glen Canyon Dam
 - Slough Modification
- Long-term (non-operational)
 - Fish exclusion
 - Temperature Control Device

Invasive Fish Species Below Glen Canyon Dam: A Strategic Plan to Prevent, Detect and Respond

Developed by the Smallmouth Bass Ad Hoc Group, through the Technical Work Group of the Glen Canyon Dam Adaptive Management Program in partnership with the Grand Canyon Monitoring and Research Center and the Bureau of Reclamation

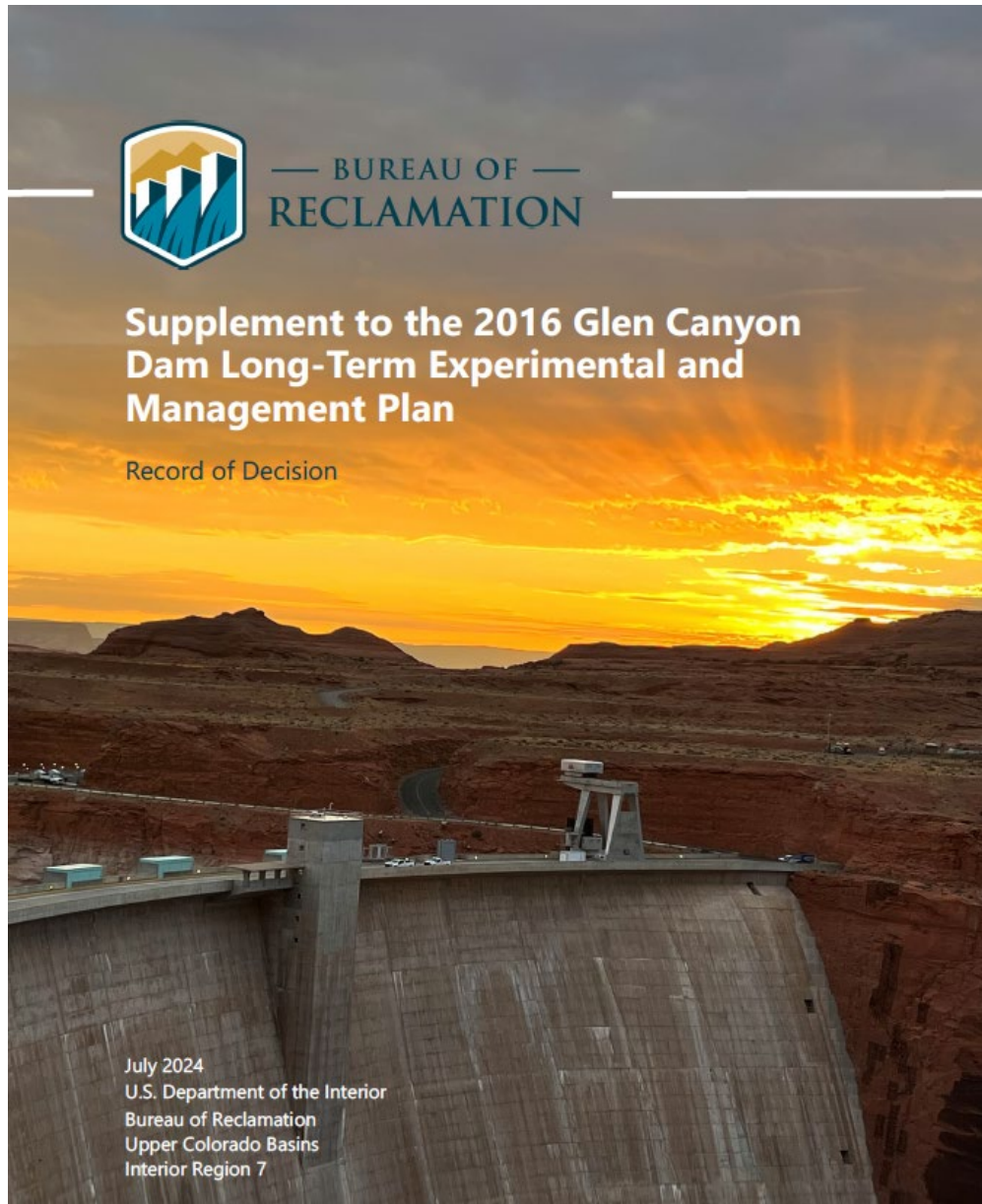
*Presented to the Glen Canyon Dam Adaptive Management Group
Technical Work Group on January 26, 2023, and accepted by the Adaptive Management Work Group on
February 16, 2023.*

Executive Summary

This Strategic Plan (Plan) was written in response to the May 2022 Secretary of the Interior's Designee's (Designee) [Directive](#) to the Adaptive Management Work Group to provide a plan to '...prevent, detect, and respond to cool- and warmwater invasive fish establishment below Glen Canyon Dam'. The Smallmouth Bass Ad Hoc Group was then convened to develop the Plan, as well as discuss the immediate concerns related to smallmouth bass which have been identified as the invasive fish species of most concern to humpback chub recovery and the health of the trout fishery as of fall 2022. To prevent the establishment of invasive fish species in the Colorado River ecosystem (CRE), a combination of long-term, mid-term, and short-term actions will be required. Entrainment through Glen Canyon Dam (GCD) is considered a primary source of invasion. The Lees Ferry reach is expected to be an initial point of establishment. Ultimately, the two approaches to prevent establishment within the Colorado River below GCD are (1) preventing fish passage through GCD, and (2) preventing establishment below the dam.

Long-term actions should include the installation of a fish exclusion device at GCD, while mid-term actions identified in the Plan include targeted flow and temperature changes at GCD. Short-term rapid response actions are meant to be used in the interim to prevent widespread dispersal and establishment, while planning and implementation of mid- and long-term actions are underway. Actions should be implemented as experiments to allow for proper assessment and evaluation. Research and monitoring before, during, and after actions will provide data to evaluate the effectiveness. For example, monitoring for fish entrainment *before* and *after* installation of a fish exclusion device to assess passage through the dam will provide information on the effectiveness of the fish exclusionary device(s). The Glen Canyon Dam Adaptive Management Program (GCDAMP) should maintain the ability to discontinue actions, as the likelihood of success, cost-effectiveness, changing environmental conditions, and the ability to carry out actions may change. Discontinuation of measures (e.g., off-ramping) will require coordination amongst agencies and stakeholders.





- Cool Mix
- Cool Mix with Flow Spike
- Cold Shock
- Cold Shock with Flow Spike
- Non-Bypass
- Common to all Alternatives – HFE Protocol

Planning and Implementation



Hour System Time (MST)	Bypass Release (cfs)	Penstock Release (cfs)	Total Release (cfs)
0:00	5,000	4,480	9,480
1:00	5,000	4,480	9,480
2:00	5,000	4,480	9,480
3:00	5,000	4,480	9,480
4:00	5,000	4,480	9,480
5:00	5,000	4,480	9,480
6:00	5,000	4,480	9,480
7:00	5,000	4,480	9,480
8:00	5,000	4,480	9,480
9:00	5,000	4,480	9,480
10:00	5,000	4,480	9,480
11:00	5,000	4,480	9,480
12:00	5,000	6,086	11,086
13:00	5,000	10,086	15,086
14:00	0	15,086	15,086
15:00	0	15,086	15,086
16:00	0	15,086	15,086
17:00	0	15,086	15,086
18:00	0	15,086	15,086
19:00	0	15,086	15,086
20:00	0	15,086	15,086
21:00	0	14,480	14,480
22:00	5,000	6,980	11,980
23:00	5,000	4,480	9,480

Smallmouth Bass Flows 2024

- 15.5 C down to River Mile 61
- 133 days of bypass (7/9-11/18)
- Avoided bypass during peak hydropower demand hours
- 29 days temps exceed 15.5 C (14 occurred after cool mix started)
- Estimated hydropower cost = ~\$18.9 million
- No Young of year smallmouth bass observed



2025 Smallmouth Bass Flow Timeline

- MARCH-APRIL: Technical team met weekly
 - Considered a range of flow options
 - GCMRC developed screening tool
- MAY: PI leadership team recommended (92% support) “cool mix” with RM30 as the target location ending no later than October 20.
- JULY 3,2025 - DOI Decision to Implement

Completed project



Slough



Planning and Implementation for HFEs

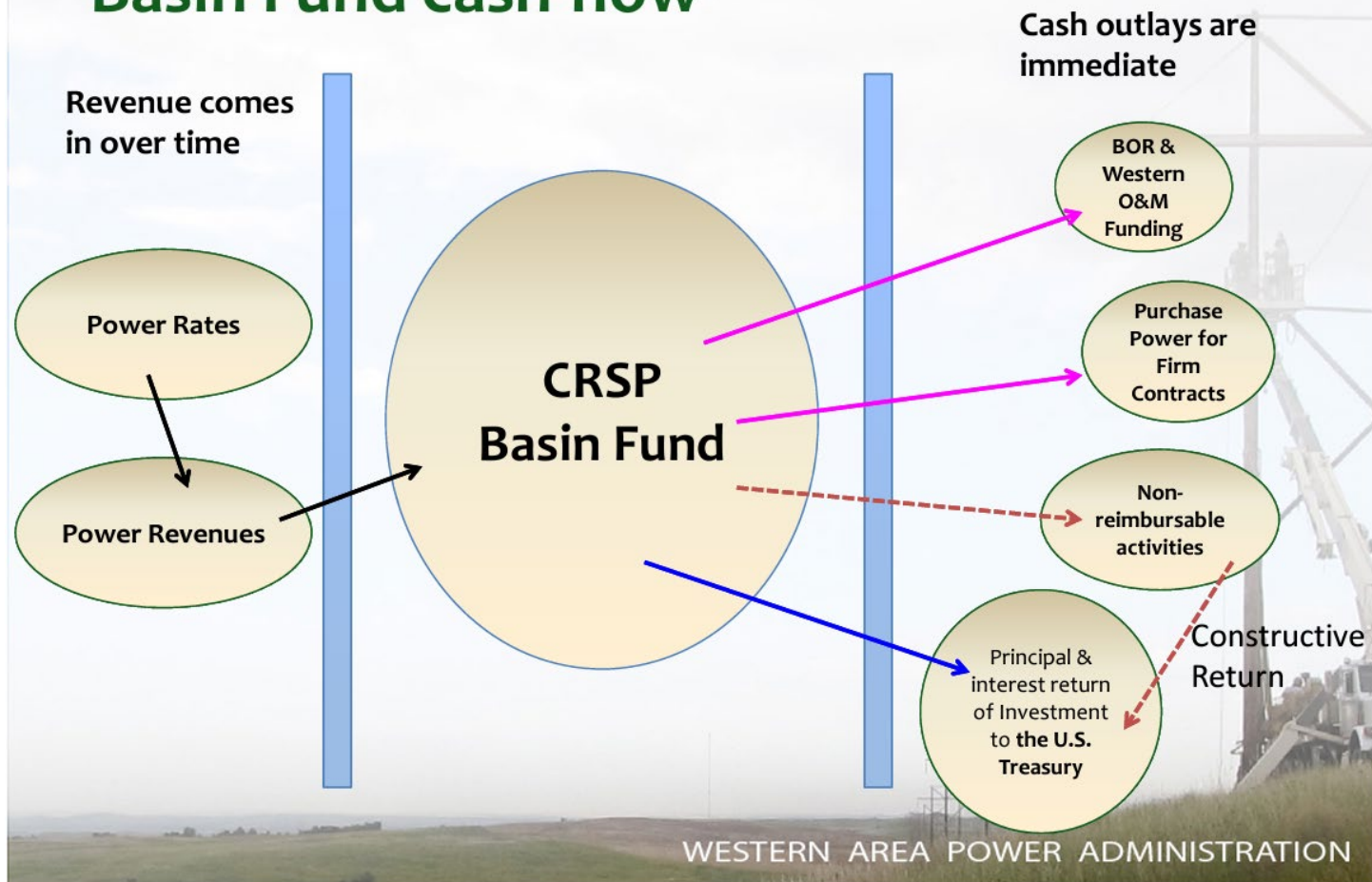
Resource Considerations

1. Archeological and cultural
2. Tribal resources
3. ESA listed species
4. Sediment
5. Hydropower and energy
6. Nonnative invasive species
7. Other native fish
8. Rainbow trout fishery
9. Recreational Experience
10. Riparian vegetation
11. Natural processes

Maintenance Schedule



Basin Fund cash flow



Forecast modeled cost estimates of SMB flows

				Optimized Bypass Estimated Costs		Post-hoc Analysis
"Week"	Dates	Number of Days	Purchased (MW)	Argus Forward Curve* (\$)	Median of Price Vectors (\$)	MCG Weighted Avg hourly* (\$)
1	Tue Jul 9 - Sat Jul 13	5	13,701	1,031,806	624,550	794,926
2	Sun Jul 14 - Fri Jul 19	6	18,855	1,224,129	822,112	912,171
3	Sat Jul 20 - Fri Jul 26	7	20,698	1,325,943	899,064	1,033,776
4	Sat Jul 27 - Fri Aug 2	7	24,171	1,675,267	1,076,833	1,285,250
5	Sat Aug 3 - Fri Aug 9	7	21,038	1,584,859	971,140	1,099,109
6	Sat Aug 10 - Wed Aug 14	5	15,300	1,076,115	696,585	765,375
7	Thu Aug 15 - Fri Aug 23	9	35,329	2,522,482	1,613,214	
8	Sat Aug 24 - Fri Aug 30	7	25,894	1,953,219	1,195,615	
	Est. Total through week 4:		77,425	\$ 5,257,144	\$ 3,422,560	\$ 4,026,123
	Est. Total through Week 8:		174,985	\$ 12,393,819	\$ 7,899,115	
*Argus Forward Curve (FWD Curve) based on the Palo Verde Index						
# Preliminary MCG Values are weighted average of prescheduled and real-time energy transaction prices						

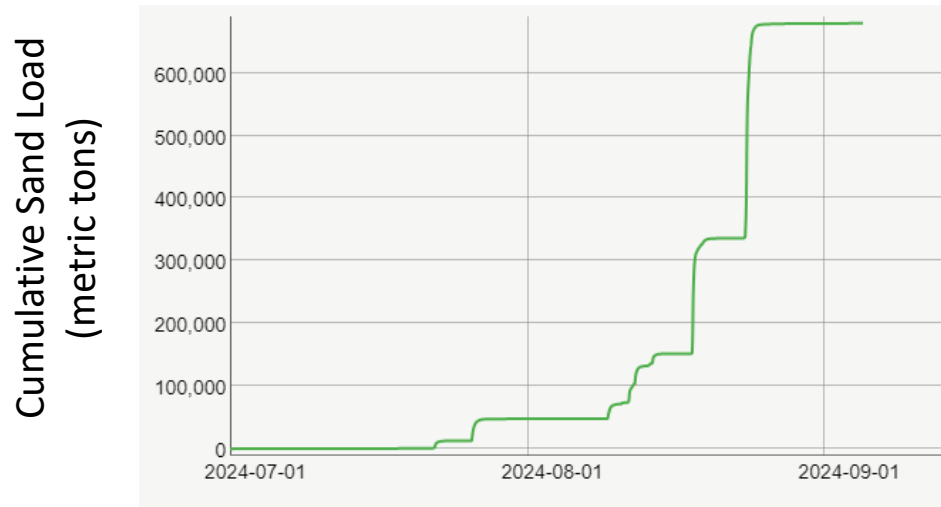
Initial estimates do not cite, draft only

Basin Fund Status and Projection

- Oct 1, 2023 Basin Fund Balance: \$203M
 - Includes \$85 of BIL funds from FY22/23 that needs to be returned (likely prior to 2032).
- Projected September 30, 2024 balance: \$170M
 - Includes projected SMB experiment through Sep 30.
- FY25 Basin Fund Requirements:
 - GCD Experiments (SMB/HFE/other)
 - Capital Expenditures in FY25 (WAPA and BOR): \$48M
 - Unexpected requirements
 - Phase Shifting Transformers: \$20-\$30M - must replace pair.
 - Not included in FY25 capital expenditure number above



Potential fall 2024 or spring 2025 HFE



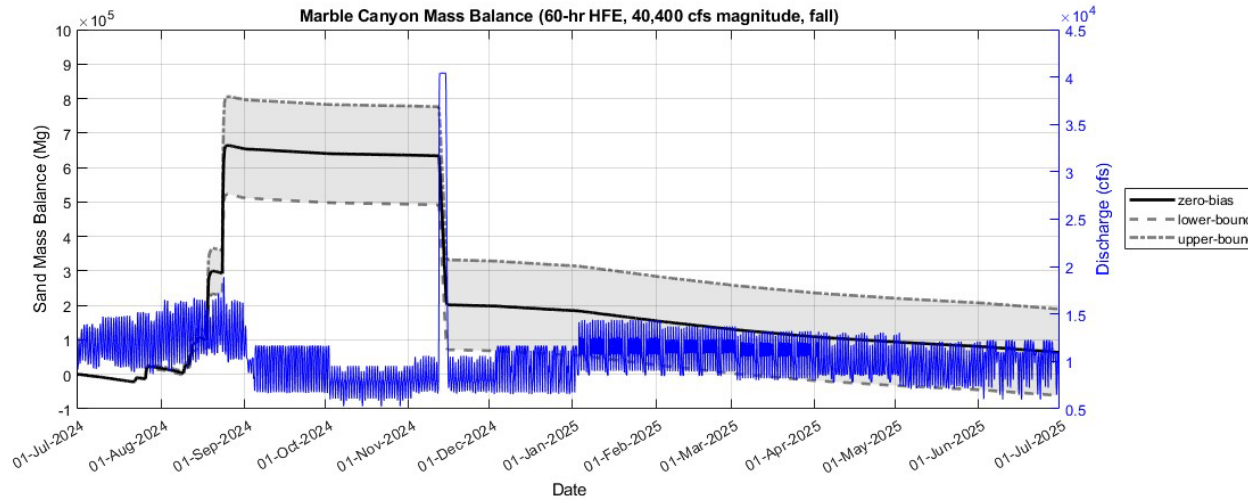
- *Paria River has supplied ~680,000 metric tons of sand between 7/12/2024 and 9/13/2024*
- *Enough to trigger HFE in fall 2024 or spring 2025*

Start Date	Max Penstock Release (cfs)	Max ROW Release (cfs)	HFE Magnitude (cfs)	Duration (hrs)	Modeled sandbar increase*
11/11/2024	26,900	13,500	40,400	60	19%
5/12/2025	26,900	13,500	40,400	48	14%

- *Both options result in sandbar building*
- *Best “bang for buck” for sandbars is 60-hr fall HFE at 40,400 cfs*
- *Other resources will be considered when evaluating whether to recommend implementation in fall 2024 or spring 2025*

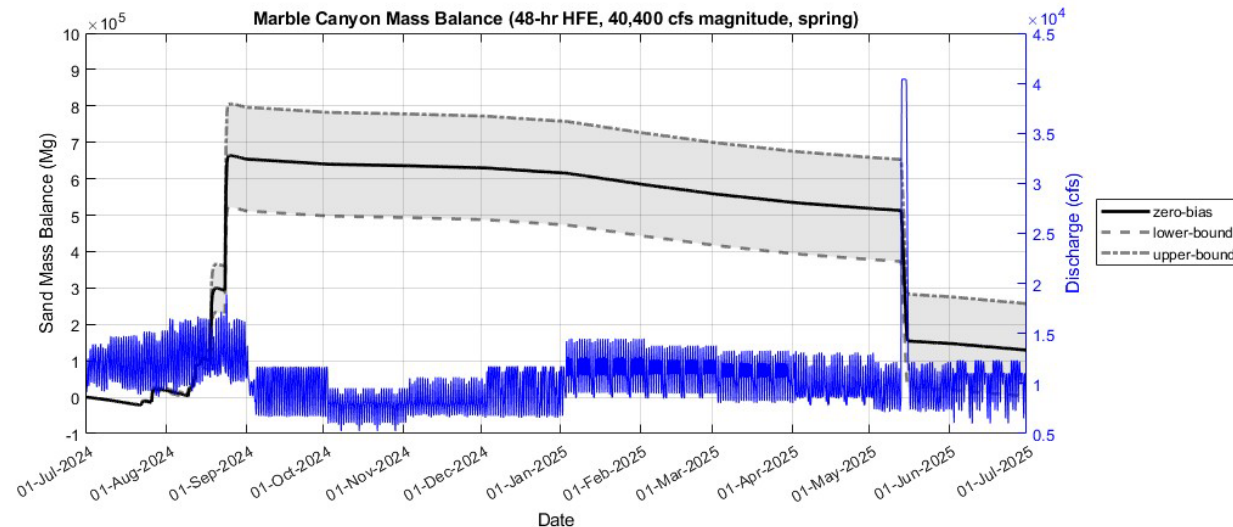
*Estimated sandbar size on 6/30/2025 relative to no HFE based on empirical model for 9 long-term monitoring sites (Mueller and Grams, 2021).

Potential fall 2024 or spring 2025 HFE



Modeled potential fall 2024 HFE

- 40,400 cfs (max available)
- 60-hr duration supported by current sand supply (assumes no additional inputs between now and November)

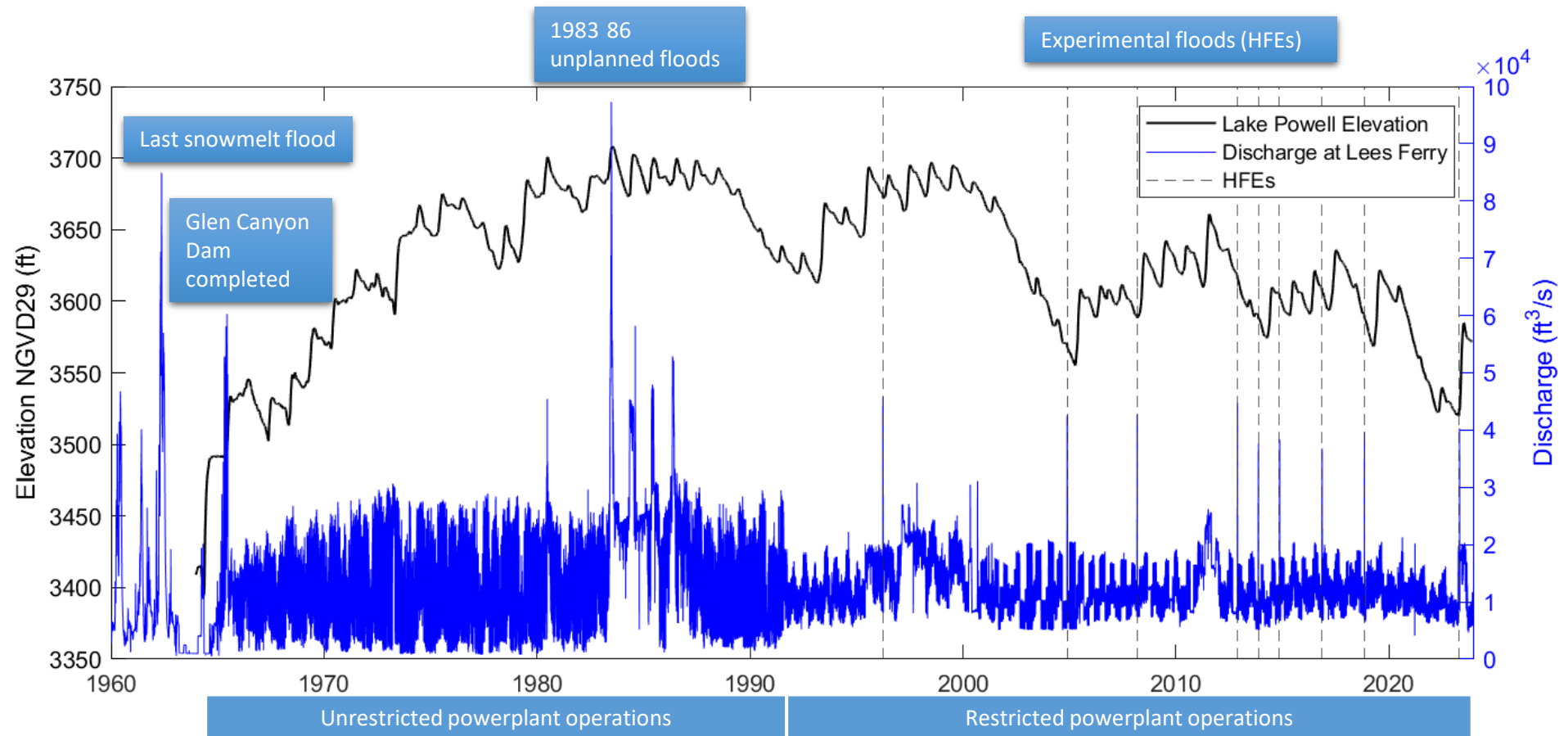


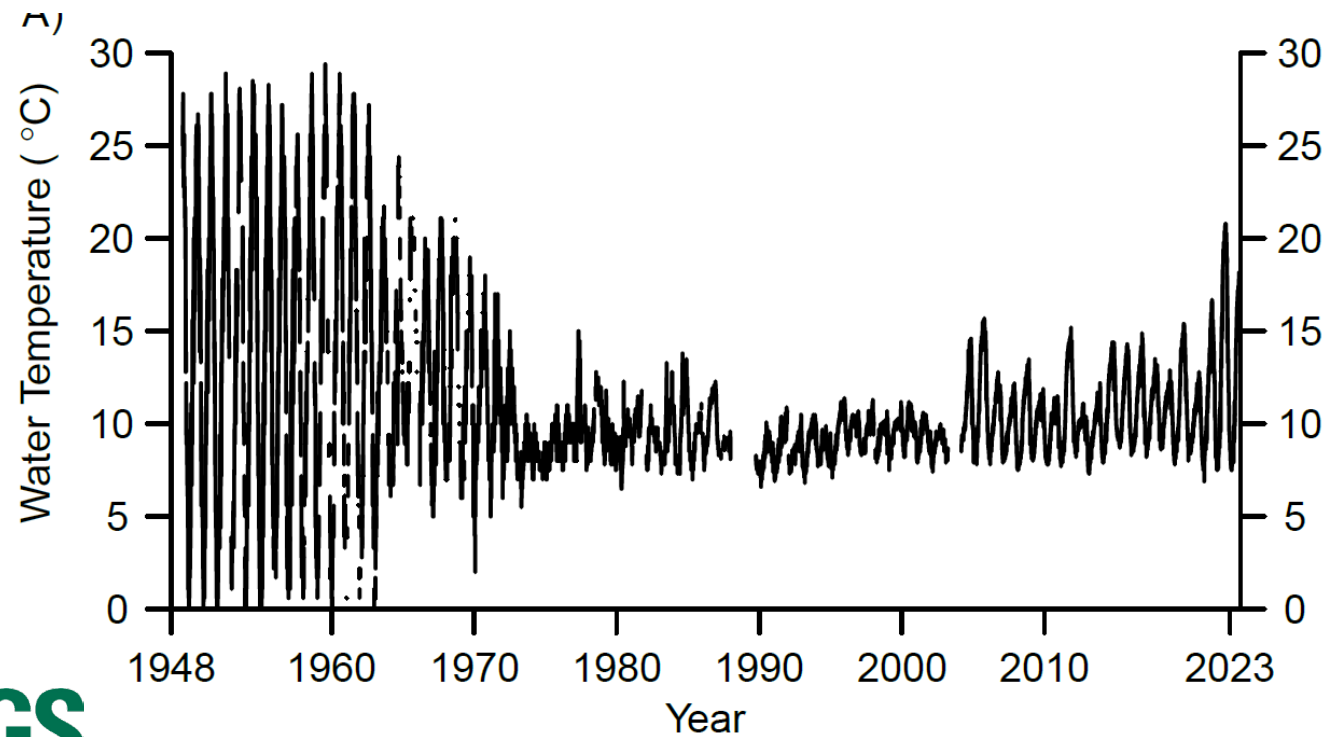
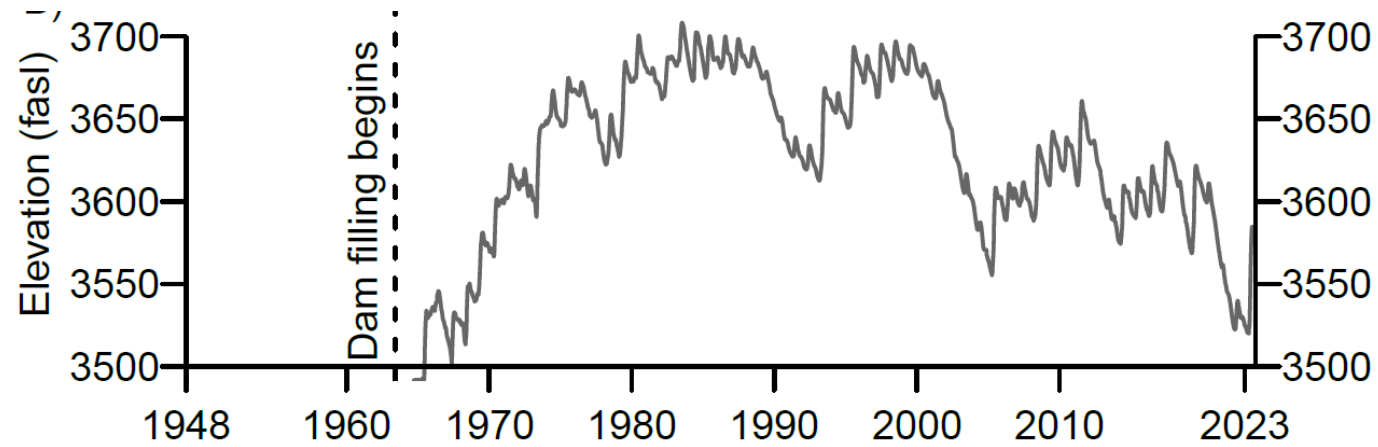
Modeled potential spring 2025 HFE

- 40,400 cfs (max available)
- 48-hr duration supported by current sand supply (assumes no additional inputs between now and next June)

GCDAMP Accomplishments

- Tribal workshop at Grand Canyon
- FY25-27 Triennial Work Plan
- Proposal to update the HFE protocol
- Nonnative Fish Strategic Plan
- Rapid Response Charter
- LTEMP SEIS/ROD



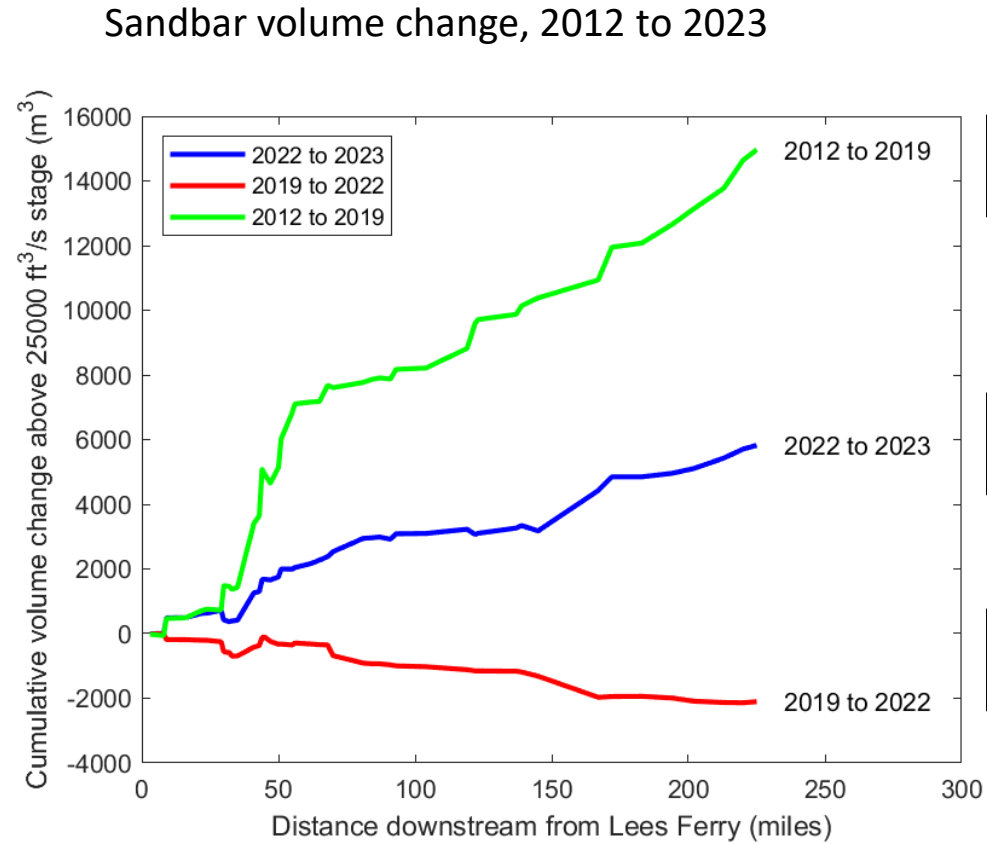


Glen Canyon Dam

- 2nd largest reservoir in the U.S.
 - 24 million acre-feet
- 4th tallest dam
 - Structure: 710 feet
- 12 largest hydropower facility
 - 8 generator units
 - Nameplate: 1,320 MW
 - Current capacity ~800 MW
- Full pool = 3,700 ft



Sandbar response to HFEs



Period with 5
fall HFEs

Period with 1
spring HFE

Period with
no HFEs

USGS

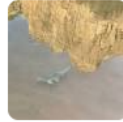
The Grand Canyon Smallmouth Bass Issue

KNAU

USBR begins experimental water releases to control smallmouth bass in Grand Canyon

The U.S. Bureau of Reclamation has begun water releases from Glen Canyon Dam to cool the temperature of the Colorado River and slow the...

Jul 18, 2024



The Arizona Republic

Feds will jolt invasive bass with cold water in a bid to help native Grand Canyon fish

Glen Canyon Dam managers will flush cold water from deep in Lake Powell into the Colorado River to help prevent invasive smallmouth bass from colonizing the...

Jul 3, 2024



Newsweek

Grand Canyon Fish Invasion Prevented

The smallmouth bass's expansion further along the Colorado River threatens the humpback chub population in the Grand Canyon.

1 month ago



Post Independent

The Runoff: Releasing cool water to disrupt smallmouth bass sounds fishy to these scientists

The report says the nearest population center of humpback chub is 76 river miles downstream in Grand Canyon water that is too turbid for smallmouth bass to...

1 month ago



U.S. News & World Report

US Agency to Fight Invasive Bass Threatening Humpback Chub, Other Protected Fish in Grand Canyon

PAGE, Ariz. (AP) — The U.S. Bureau of Reclamation has wrapped up its environmental review of a plan to help the humpback chub and other...

Jul 3, 2024



The Arizona Republic

A smallmouth bass invasion of Grand Canyon's Colorado River is chilled by cold water

A shot of cold water appears to have stalled a smallmouth bass invasion of the Grand Canyon, federal officials say.

1 month ago



KNAU

USBR announces plan for smallmouth bass

The U.S. Bureau of Reclamation announced its plan for dealing with nonnative smallmouth bass in the Colorado River. The agency wants to...

May 30, 2024



KLAS 8 News Now

Glen Canyon Dam ground zero for war on invasive smallmouth bass in Colorado River

LAS VEGAS (KLAS) — For people who love freshwater fishing, a smallmouth bass is one of the hardest fighters out there.

Oct 4, 2023



The Arizona Republic

Feds could alter dam flows to halt invasive bass in the Grand Canyon, protect native fish

Invasive bass are spawning perilously close to native Colorado River chubs. Cold blasts from Glen Canyon Dam's bypasses could help...

Oct 5, 2023



National Park Service (.gov)

Invasive smallmouth bass found in Colorado River below Glen Canyon Dam

Contact: IMR_news@nps.gov. PAGE, Ariz. —On July 1, 2022, juvenile smallmouth bass were found in the Colorado River below the Glen Canyon Dam.

Jul 12, 2022



14.0 deg C (57.2 deg F) - Sep 15, 2025 10:00:00 PM MST

