

Glen Canyon Dam

Long-Term Experimental and Management Plan
Environmental Impact Statement



PUBLIC DRAFT

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U.S. Department of the Interior
Bureau of Reclamation,
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Intermountain Region

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1 **GLEN CANYON DAM LONG-TERM EXPERIMENTAL AND MANAGEMENT PLAN**
2 **DRAFT ENVIRONMENTAL IMPACT STATEMENT**
3
4

5 **Joint-Lead Agencies**

6 Bureau of Reclamation
7 National Park Service
8

9 **Cooperating Agencies**

Department of the Interior	Havasupai Tribe
Bureau of Indian Affairs	Hopi Tribe
U.S. Fish and Wildlife Service	Hualapai Tribe
U.S. Department of Energy	Kaibab Band of Paiute Indians
Western Area Power Administration	Navajo Nation
Arizona Game and Fish Department	Pueblo of Zuni
Colorado River Board of California	Salt River Project
Colorado River Commission of Nevada	Utah Associated Municipal Power Systems
Upper Colorado River Commission	

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11
12 **ABSTRACT**
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14

15 The U.S. Department of the Interior (DOI), through the Bureau of Reclamation and
16 National Park Service (NPS), proposes to develop and implement a Long-Term Experimental
17 and Management Plan (LTEMP) for operations of Glen Canyon Dam. The LTEMP would
18 provide a framework for adaptively managing Glen Canyon Dam operations over the next
19 20 years, consistent with the Grand Canyon Protection Act of 1992 (GCPA) and other provisions
20 of applicable federal law. The LTEMP would determine specific options for dam operations,
21 non-flow actions, and appropriate experimental and management actions that will meet the
22 GCPA's requirements and minimize impacts on resources within the area impacted by dam
23 operations, including those of importance to American Indian Tribes.
24

25 The Draft Environmental Impact Statement (DEIS) draws on the scientific information
26 that has been collected under the Glen Canyon Dam Adaptive Management Program over the
27 last 20 years to identify the potential environmental effects associated with taking no action, as
28 well as a reasonable range of alternatives to no action for implementing the proposed federal
29 action. The alternatives addressed in this DEIS include a broad range of operations and actions
30 that would meet the purpose, need, and objectives of the proposed federal action. The primary
31 resources that could be affected by the proposed action include sediment resources, aquatic and
32 terrestrial ecological resources, recreational resources, socioeconomic resources, hydropower
33 resources, resources of importance to American Indian Tribes, and historic and cultural resources
34 in the vicinity of the Glen and Grand Canyons. The DEIS has been developed in accordance with
35 the National Environmental Policy Act of 1969, as amended (NEPA), and follows the
36 implementing regulations developed by the President's Council on Environmental Quality in
37 Title 40 *Code of Federal Regulations* (CFR) Parts 1500 to 1508 and DOI regulations

1 implementing NEPA in 43 CFR Part 46. Based on the impact analyses conducted, DOI has
2 chosen Alternative D as the preferred alternative.

3
4 The review period for this DEIS will end 90 days after publication of the
5 U.S. Environmental Protection Agency Notice of Availability in the *Federal Register*. During
6 the 90-day comment period, comments will be accepted electronically through the NPS
7 Planning, Environment, and Public Comment website (<http://parkplanning.nps.gov/LTEMPEIS>)
8 and in hard copy delivered by the U.S. Postal Service or other mail delivery service. Written
9 comments will also be accepted during public meetings on the DEIS. Comments will not be
10 accepted by fax, by e-mail, or in any format other than those specified above. Bulk comments in
11 any format (hard copy or electronic) submitted on behalf of others will also not be accepted.

12
13 For additional information, visit <http://ltempeis.anl.gov> or contact:

14
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ACRONYMS AND ABBREVIATIONS

1		
2		
3		
4	ac	acre(s)
5	ac-ft	acre-foot (feet)
6	ACHP	Advisory Council on Historic Preservation
7	AML	abandoned mine land
8	AMSL	above mean sea level
9	AMWG	Adaptive Management Work Group
10	AOP	Annual Operation Plan for Colorado River Reservoirs
11	APE	Area of Potential Effect
12	Argonne	Argonne National Laboratory
13	ASMR	Age-Structured Mark Recapture Model
14	AZGFD	Arizona Game and Fish Department
15	AZ-SGCN	Arizona Species of Greatest Conservation Need
16		
17	BA	Balancing Authority (in Chapter 3 only)
18		Biological Assessment (in all other sections)
19	BGEPA	Bald and Golden Eagle Protection Act of 1940
20	BIA	Bureau of Indian Affairs
21	BO	Biological Opinion
22		
23	C	Celsius
24	CAA	Clean Air Act
25	CAAA	Clean Air Act Amendments
26	CAEDYM	Computational Aquatic Ecosystem Dynamics Model
27	CCC	Civilian Conservation Corps
28	CEQ	Council on Environmental Quality
29	CFMP	<i>Comprehensive Fisheries Management Plan</i>
30	CFR	<i>Code of Federal Regulations</i>
31	cfs	cubic feet per second
32	CH ₄	methane
33	CO	carbon monoxide
34	CO ₂	carbon dioxide
35	CO ₂ e	carbon dioxide equivalent
36	CPUE	catch per unit effort
37	CRBC	Colorado River Board of California
38	CRCN	Colorado River Commission of Nevada
39	CRD	Colorado River Discovery
40	CREDA	Colorado River Energy Distributors Association
41	CRMP	Colorado River Management Plan
42	CRSP	Colorado River Storage Project
43	CRSPA	Colorado River Storage Project Act of 1956
44	CRSS	Colorado River Simulation System
45	CSU	Colorado Springs Utilities
46		

1	DEIS	Draft Environmental Impact Statement
2	Deseret	Deseret Generation and Transmission Cooperative
3	DFC	desired future condition
4	DO	dissolved oxygen
5	DOE	U.S. Department of Energy
6	DOI	U.S. Department of the Interior
7	DPS	Distinct Population Segment
8		
9	EA	Environmental Assessment
10	eGRID	Emissions & Generation Resource Integrated Database
11	EIA	Energy Information Administration
12	EIR	Environmental Impact Report
13	EIS	Environmental Impact Statement
14	ELCOM	Estuary, Lake and Coastal Ocean Model
15	EMS	emergency medical services
16	E.O.	Executive Order
17	EPA	U.S. Environmental Protection Agency
18	EPT	Ephemeroptera, Plecoptera, and Trichoptera
19	ESA	Endangered Species Act of 1973, as amended
20		
21	F	Fahrenheit
22	FCPP	Four Corners Power Plant
23	FES	Firm Electric Service
24	FONSI	Finding of No Significant Impact
25	FR	<i>Federal Register</i>
26	ft	foot (feet)
27	FWS	U.S. Fish and Wildlife Service
28	FY	fiscal year
29		
30	GCDAMP	Glen Canyon Dam Adaptive Management Program
31	GCM	general circulation model
32	GCMRC	Grand Canyon Monitoring and Research Center
33	GCNP	Grand Canyon National Park
34	GCNRA	Glen Canyon National Recreation Area
35	GCPA	Grand Canyon Protection Act of 1992
36	GHG	greenhouse gas
37	GMP	General Management Plan
38	GW	gigawatt(s)
39	GWh	gigawatt-hour(s)
40	GWP	global warming potential
41		
42	H ₂ S	hydrogen sulfide
43	HBC	humpback chub
44	HFC	hydrofluorocarbon
45	HFE	high-flow experiment
46	hr	hour(s)

1	HRR	Hualapai River Runners
2		
3	in.	inch(es)
4	IPM	Integrated Pest Management
5	IRP	integrated resource plan
6	ISM	Indexed Sequential Method
7		
8	kaf	thousand acre-feet
9	kWh	kilowatt-hour(s)
10		
11	lb	pound(s)
12	LCRMSCP	Lower Colorado River Multi-Species Conservation Program
13	LMM	Lake Mead Model
14	LMNRA	Lake Mead National Recreation Area
15	LROC	Long-Range Operating Criteria
16	LTEMP	Long-Term Experimental and Management Plan
17	LTEP	Long Term Experimental Plan
18	LTF	long-term firm
19		
20	maf	million acre-feet
21	MAMB	miscellaneous algae, macrophytes, and bryophytes
22	MBTA	Migratory Bird Treaty Act
23	MCL	maximum contaminant level
24	mi	mile(s)
25	MLFF	Modified Low Fluctuating Flow
26	MMt	million metric tons
27	MOA	Memorandum of Agreement
28	MT	metric ton(s)
29	MW	megawatt(s)
30	MWh	megawatt-hour(s)
31		
32	N ₂ O	nitrous oxide
33	NAAQS	National Ambient Air Quality Standards
34	NAU	Northern Arizona University
35	NC	no change
36	NEPA	National Environmental Policy Act of 1969, as amended
37	NERC	North American Electric Reliability Corporation
38	NEV	net economic use value
39	NGO	nongovernmental organization
40	NHPA	National Historic Preservation Act
41	NM	national monument
42	NO ₂	nitrogen dioxide
43	NO ₃	nitrate-nitrogen
44	NOI	Notice of Intent
45	NO _x	nitrogen oxides
46	NPS	National Park Service

1	NPV	net present value
2	NRHP	<i>National Register of Historic Places</i>
3	NTUA	Navajo Tribal Unit Authority
4		
5	O&M	operation and maintenance
6	O ₃	ozone
7	OPAC	Office of Planning and Compliance
8	OSMRE	Office of Surface Mining Reclamation and Enforcement
9		
10	PA	Programmatic Agreement
11	Pb	lead
12	PEPC	Planning, Environment, and Public Comment
13	PFC	perfluorocarbon
14	P.L.	Public Law
15	PM	particulate matter
16	PM _{2.5}	particulate matter ≤ 2.5 μm in aerodynamic diameter
17	PM ₁₀	particulate matter ≤ 10 μm in aerodynamic diameter
18	POM	particulate organic matter
19	PSAR	preventative search and rescue
20	PSD	Prevention of Significant Deterioration
21		
22	RA	resource available
23	Reclamation	Bureau of Reclamation
24	RM	river mile
25	RMP	Resource Management Plan
26	ROD	Record of Decision
27	RSG	Reserve Sharing Group
28		
29	SAAQS	State Ambient Air Quality Standards
30	SBM	Sand Budget Model
31	SCP	Salinity Control Project
32	SD	standard deviation
33	SDA	Structured Design Analysis
34	SE	standard error
35	Secretary, the	Secretary of the Interior
36	SF ₆	sulfur hexafluoride
37	SHPO	State Historic Preservation Officer
38	SLCA/IP	Salt Lake City Area Integrated Projects
39	SO	Secretarial Order
40	SO ₂	sulfur dioxide
41	SPC	Southern Paiute Consortium
42	SRP	Salt River Project
43	SRSG	Southwest Reserve Sharing Group
44		
45	TCD	temperature control device
46	TCP	traditional cultural property

1	TDS	total dissolved solids
2	THPO	Tribal Historic Preservation Officer
3	TL	total length
4	TMF	trout management flow
5	Tri-State	Tri-State Generation and Transmission Association
6	TWG	Technical Working Group
7		
8	UAMPS	Utah Associated Municipal Power Systems
9	UBWR	Utah Board of Water Resources
10	UCRC	Upper Colorado River Commission
11	UMPA	Utah Municipal Power Agency
12	USC	<i>United States Code</i>
13	USFS	U.S. Forest Service
14	USGS	U.S. Geological Survey
15		
16	VOC	volatile organic compound
17		
18	WACM	Western Area Colorado-Missouri Region
19	WALC	Western Area Lower Colorado Region
20	WAUW	Western Area Upper Great Plains West Region
21	WECC	Western Electricity Coordinating Council
22	Western	Western Area Power Administration
23		
24	YOY	young-of-year
25	yr	year(s)
26		
27	ZHHPO	Zuni Heritage and Historic Preservation Office
28		

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