

RESOURCES: On The Colorado Website

- **This page:** all sections hyperlinked to the original website
- **Next page:** all sections combined

24 Month Reports	Agencies	Adaptive Management Part One Part Two
Anthropology	Annual Operating Plans	Archives
Augmentation	Books/Biblios	Conferences
Dam Operations	Dam Safety	Data
Economics	Ecosystem	Energy
Environmental Justice	Events	Federal Research
Federal Energy Regulatory Commission	Fish	Floods
Geology	Graphics	Groundwater
Graphics	Groundwater	History
Hydrology Part One Hydrology Part Two	Institutions	Law of the River 01 Law of the River 02
Maps	Media	Mexico
National Parks	Navigability	News/Blogs
NGOs	Oil Shale and Tar Sands	Photos
Quotes	Reports (A to L) Reports (M-Z)	Reservoirs
Rights of Nature	River Journals	River Trips
Salinity	Satire	Science A-O Science P-Z
Sediment	Solutions	Testimony
Tribes	Upper Colorado River Commission	Uranium/Nuclear
Water Rights		

24-Month Study Reports for Colorado River Operations

MARCH 20, 2025

BY JOHN WEISHEIT

A 24-month report is a document from the Bureau of Reclamation which provides information about the conditions of main reservoirs in the Colorado River basin and projections for the near future. For instance, the report is essential for making a determination about operating criteria for shortage and surplus declarations.

VISIT THIS WEBPAGE For additional information on dam operations,

[Upper Colorado River Basin Water Resources Division](#)

[Lower Colorado River Basin Water Resources Division](#)

NEWS

- 2021, April - [The 24-Month Report was a shocker, but is it too optimistic?](#) Kuhn.
- 2025, January - [The January 2025 24-month study is a major caution sign for the Colorado River Basin.](#) Kuhn, Schmidt and Fleck.
- 2025, March - [The March 24-Month study and the myth of a “Compact Call”.](#) Eric Kuhn for Inkstain.

REPORTS

- [Evaluating the Accuracy of Reclamation’s 24-Month Study Lake Powell Projections.](#) USU, 2022.
- [Leakage/seepage: around/through: Glen Canyon Dam.](#) John Weisheit, 2023.
- [2023 - A survey of the Bureau of Reclamations Decree Accounting Reports in the Lower Colorado River Basin.](#) McCoy for ASCE.

MONTHLY RESERVOIR SUMMARY

- [Lake Powell monthly summary website](#)
- [Lake Mead monthly summary website](#)
- Lake Powell monthly summary - [Water Year 2000 to 2013](#)
- Lake Powell monthly summary - [Water Year 2000 to 2017](#)
- Glen Canyon Dam Updates - [2010 to 2016](#). RRFW RiverWire.

ARCHIVE OF 24-MONTH REPORTS

- [Reports combined from 2003 to 2020](#) (there are gaps)

January 24-Month Reports Only

- [Flaming Gorge Dam 2006 to 2020](#) (January only)

- [Hoover & Glen Canyon dams 2002 to 2023](#). ZIP FILE
- [AOPs combined 2000 to 2024. Only data pertinent to Lake Powell and Lake Mead](#). ZIP FILE.

24-MONTH REPORTS BY THE YEARS

- **The missing years:** Reservoir elevations at Lake Powell are located [HERE](#)
- **Upper Basin** historic reservoir operations are located [HERE](#)
- **Lower Basin** historic reservoir operations are located [HERE](#)

2003

- [July](#); [December](#)

2004

- [January](#); [April](#); [July](#); [September](#); [October](#); [November](#); [December](#)

2005 - Begin the development of Shortage Guidelines (Interim Guidelines)

- [January](#); [February](#); [March](#); [May](#)

2006

- [January](#)

2007 - Conclude the development of Interim Guidelines

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2008

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2009

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November \(lc\)](#); [November \(uc\)](#); [December \(uc\)](#); [December \(lc\)](#)

2010 - Begin the Supply and Demand "Basin Study" (not a NEPA Process)

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2011 - Begin development of Long-Term Experimental and Management Plan for Glen Canyon Dam

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2012 - End Supply and Demand "Basin Study (not a NEPA process)

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2013

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2014 - Begin the development of Drought Contingency Planning (not a NEPA process)

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2015

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2016

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2017

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2018 - Finish Tribal Water Basin Study & Develop 5-year projected future conditions

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2019 - Conclude the development of Drought Contingency Planning (not a NEPA process)

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August \(LB\)](#); [August \(UB\)](#); [USBR Press Release](#); [September](#); [October](#); [November](#); [December](#)

2020 - 7.D. Review of 2007 Interim Guidelines & Five-year projected future conditions

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2021

- [January](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [September Projections](#); [October](#); [November](#); [December](#); [Projected Minimum](#); [Projected Maximum](#).

2022

- [January](#); [February](#); [March](#); [March RiverWire](#); [April](#); [May](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)

2023 - **Begin reconsultation of 2007 Interim Guidelines**

- [January](#); [February](#); [March](#); [April \(including Max and Min\)](#); [May](#); [June](#); [July](#); [August \(press release\)](#); [September](#); [October](#); [November](#); [December](#).

2024

- [January Projected Maximum](#); [January Projected Minimum](#); [January Actual](#); [February](#); [March](#); [April](#); [May](#); [June](#); [July](#); [August & includes Max and Min projections](#); [September](#); [October](#); [November](#); [December](#).

2025

- [January \(including Min and Max projections\)](#); [February](#); [March \(Eric Kuhn commentary\)](#); [April](#); [April Maximum](#); [May](#); [June](#); [June Minimum](#); [July](#); [August](#); [August Maximum](#); [August Minimum](#); [September](#); [October](#); [October Minimum](#); [October Maximum](#); [November](#); [December](#); [December Minimum](#).

2026 - **End Reconsultation of 2007 Interim Guidelines**

- [January](#); [Jan Max](#); [Jan Min](#); [February](#); [Feb. Min.](#); [March](#); [April](#); [April MIN](#); [April MAX](#); [May with Min and Max](#); [June](#); [July](#); [August](#); [September](#); [October](#); [November](#); [December](#)
-

Agencies

International, federal and state agencies are listed below in alphabetical order, along with a brief description of their mission and a link to their home pages.

You will also find links to agency websites that have resource materials for information specifically related to the management of natural resources on the Colorado River.



John Wesley Powell

INTERGOVERNMENTAL AGENCIES

Climate Change Science Program (CCSP) integrates federal research on climate and global change, as sponsored by thirteen federal agencies and overseen by the Office of Science and Technology Policy, the Council on Environmental Quality, the National Economic Council and the Office of Management and Budget.

- [Home page](#)
- [Library](#)

Intergovernmental Panel on Climate Change (IPCC) was established to provide the decision-makers and others interested in climate change with an objective source of information about climate change.

- [Home page](#)
- [Reports](#)

International Boundary and Water Commission (IBWC): Our mission is to provide binational solutions to issues that arise during the application of United States - Mexico treaties regarding boundary demarcation, national ownership of waters, sanitation, water quality, and flood control in the border region.

- [United States](#)
 - [Mexico](#)
-

FEDERAL AGENCIES

Army Corps of Engineers (USACE): Our military and civilian engineers, scientists and other specialists work hand in hand as leaders in engineering and environmental matters.

- [South Pacific Division home page](#)
 - [Albuquerque District home page](#)
 - [Los Angeles District home page](#)
 - [Sacramento District home page](#)
 - [San Francisco District home page](#)
-

Bureau of Indian Affairs (BIA): responsibility is the administration and management of 55.7 million acres of land held in trust by the United States for American Indians, Indian tribes, and Alaska Natives.

- [BIA home page](#)
 - [The tribes](#)
-

Bureau of Land Management (BLM): to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations.

- [BLM home page](#)

Arizona

- [Resources page](#)
- [State Office](#)
- [Arizona Strip Field Office](#)
- [Hassayampa Field Office](#)
- [Grand Canyon-Parashant Field Office](#)
- [Kingman Field Office](#)
- [Lake Havasu Field Office](#)
- [Yuma Field Office](#)

California

- [Resources page](#)
- [State Office](#)
- [Needles Field Office](#)
- [Palm Springs-South Coast Field Office](#)
- [El Centro Field Office](#)

Colorado

- [Resources page](#)
- [State Office](#)
- [Little Snake Field Office](#)
- [Kremmling Field Office](#)
- [White River Field Office](#)
- [Glenwood Springs Field Office](#)
- [Grand Junction Field Office](#)
- [Uncompahgre Field Office](#)
- [Gunnison Field Office](#)
- [San Juan Field Office](#)

Nevada

- [Resources page](#)
- [State Office](#)
- [Ely Field Office](#)
- [Las Vegas Field Office](#)

New Mexico

- [Resources page](#)
- [State Office](#)
- [Farmington Field Office](#)
- [Rio Puerco Field Office](#)
- [Socorro Field Office](#)
- [Las Cruces Field Office](#)

Utah

- [Resources page](#)
- [State Office](#)
- [Vernal Field Office](#)
- [Price Field Office](#)
- [Moab Field Office](#)
- [Richfield Field Office](#)
- [Grand Staircase-Escalante National Monument](#)
- [Monticello Field Office](#)
- [1999 - Maps of Utah BLM Wilderness Inventory \(cache\)](#). GPO.

Wyoming

- [Resources page](#)
- [State Office](#)
- [Pinedale Field Office](#)
- [Rock Springs Field Office](#)

- [Kemmerer Field Office](#)
-

Bureau of Reclamation (BoR or Reclamation): to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

- [Phone book](#)
- [Reclamation home page](#)
- [Lower Colorado home page](#)
- [Upper Colorado home page](#)

Reclamation resource pages:

- [Adaptive Management Program](#)
 - [Annual Operating Plans](#)
 - [Colorado River Basin Natural Flow and Salt Data](#)
 - [Consumptive Uses and Losses Report](#)
 - [Law of the River Library](#)
 - [Lower Colorado Reports and Publications](#)
 - [Reclamation History \(Archive\)](#)
 - [Reclamation Library](#)
 - [Reclamation Dams, Powerplants and Projects](#)
 - [Salinity Control Program](#)
-

Environmental Protection Agency (EPA): to develop and enforce regulations that implement environmental laws enacted by Congress. EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance.

- [EPA home page](#)
- [Region 8 \(Colorado, Utah and Wyoming\)](#)
- [Region 6 \(New Mexico\)](#)
- [Region 9 \(Arizona, California and Nevada\)](#)

EPA resources

- [Search the EPA library](#)
 - [Storet Data Base](#) (water quality)
-

Federal Energy Regulatory Commission (FERC): The Federal Energy Regulatory Commission regulates and oversees energy industries in the economic, environmental, and safety interests of the American public.

- [FERC Home page](#)

FERC resources

- [eLibrary](#)
 - [Docket search engine](#)
 - [eFiling for public comments](#)
-

Government Accountability Office (GAO): supports the Congress in meeting its constitutional responsibilities and helps improve the performance and ensure the accountability of the federal government for the benefit of the American people.

- [GAO home page](#)
 - [GAO document search engine](#)
-

National Academy of Sciences: The National Academy of Sciences (NAS) is an honorific society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare.

- [Home page](#)
- [Proceedings of National Academy of Sciences](#) (PNAS)

National Research Council (NRC): functions under the auspices of the National Academy of Sciences. The mission of the NRC is to improve government decision making and public policy, increase public education and understanding, and promote the dissemination of knowledge.

- [NRC home page](#)
 - [National Academy Press](#)
-

National Oceanic and Atmospheric Administration (NOAA): is an agency that enriches life through science. Our reach goes from the surface of the sun to the depths of the ocean floor as we work to keep citizens informed of the changing environment around them.

- [NOAA home page](#)

NOAA resource pages:

- [Colorado Basin River Forecast Center](#) ([document archive](#))
 - [National Integrated Drought Information System](#)
 - [Paleoclimatology research and data page](#)
 - [Western Water Assessment](#)[Western Regional Climate Center](#)
 - [National Hurricane Center](#)
-

National Park Service (NPS): preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the

benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

- [NPS home page](#)

The Parks, Monuments, and Recreation Areas on the Colorado:

- [Rocky Mountain National Park](#)
- [Colorado National Monument](#)
- [Black Canyon of the Gunnison National Park](#)
- [Curecanti National Recreation Area](#)
- [Dinosaur National Monument](#)
- [Arches National Park](#)
- [Canyonlands National Park](#)
- [Rainbow Bridge National Monument](#)
- [Glen Canyon National Recreation Area](#)
- [Grand Canyon National Park](#)
- [Lake Mead National Recreation Area](#)

NPS resource pages:

- [History](#)
- [Inventory and Monitoring](#)
- [Image Archive](#)
- [National Archeology Data Base](#)
- [National Park Visitation Statistics](#)
- [Nature and Science](#)
- [Northern Colorado Plateau Network](#)
- [Rocky Mountain Network](#)
- [Southern Colorado Plateau Network](#)
- [Water Resources](#)

Natural Resources Conservation Service

- [Colorado Snowpack Data from 1968](#)

Office of Management and Budget

- [Water Information](#)

United States Fish and Wildlife Service (USFWS): to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people.

- [Home page](#)
- [Southwest Region 2](#)
- [Mountain-Prairie Region 6](#)

USFWS resource pages:

- [Search engine](#)
- [Colorado and Green River Temperature Data](#)
- [Colorado River Temperature Data](#)

USFWS National Wildlife Refuges:
Arizona

- [Bill Williams](#)
- [Cibola](#)
- [Imperial](#)

California

- [Havasu](#)
- [Salton Sea](#)

Colorado

- [Brown's Park](#)
- [Arapaho](#)

Nevada

- [Moapa](#)

Utah

- [Ouray](#)

Wyoming

- [Seedskadee](#)

United States Geological Survey (USGS): an unbiased, multi-disciplinary science organization that focuses on biology, geography, geology, geospatial information, and water, we are dedicated to timely, relevant, and impartial study of landscape, our natural resources, and the natural hazards that threaten us.

- [USGS home page](#)

USGS resource pages:

- [Grand Canyon Monitoring and Research Center](#)
- [Grand Canyon Research Library](#)
- [Ground Water Information Pages](#)
- [Lower Colorado River Studies](#)
- [National Stream Water Quality Network](#) (1996 - 2005)

- [Publications Warehouse](#)
 - [Real-Time Water Data for the Nation](#)
 - [Southwest Biological Science Center](#)
 - [Colorado Plateau Research Station](#)
 - [Water Resources of the United States](#)
 - [Water Data for the United States](#)
 - [Congressional presentations](#)[Press releases](#)
 - [Monitoring dust events in the Southwest](#)
-

Water Purveyors

- [Roster of water agencies with contact information](#)
-

Western Area Power Administration (WAPA): markets and delivers reliable, cost-based hydroelectric power and related services within a 15-state region of the central and western U.S. We're one of four power marketing administrations within the U.S. Department of Energy whose role is to market and transmit electricity from multi-use water projects. Our transmission system carries electricity from 57 power plants operated by the Bureau of Reclamation, U.S. Army Corps of Engineers and the International Boundary and Water Commission.

- [WAPA home page](#)
 - [Rocky Mountain Region](#)
 - [Colorado River Storage Project Management Center](#)
 - [Desert Southwest Region](#)
-

STATE AGENCIES

- [Roster of water agencies with contact information](#)

Arizona

- [Department of Environmental Quality](#)
- [Department of Water Resources](#)
- [Game and Fish Department](#)
- [Natural Resources Division](#)

California

- [California Coastal Commission](#)
- [Colorado River Water Board](#)
- [Department of Fish and Game](#)
- [Department of Water Resources](#)

- [Department of Conservation of Natural Resources](#)
- [Metropolitan Water District; Meeting minutes](#)

Colorado

- [Colorado River Water Conservation District](#)
- [Department of Natural Resources](#)
- [Division of Water Resources](#)
- [Division of Wildlife](#)

Nevada

- [Colorado River Commission of Nevada](#)
- [Department of Conservation and Natural Resources](#)
- [Department of Water Resources](#)
- [Division of Environmental Protection](#)
- [Division of Wildlife](#)
- [Las Vegas Valley Water District](#)
- [Southern Nevada Water Authority](#)

New Mexico

- [Energy, Minerals, and Natural Resources Department](#)
- [Environment Department](#)
- [Game and Fish Department](#)
- [State Water Engineer](#)

Utah

- [Department of Environmental Quality](#)
- [Department of Natural Resources](#)
- [Department of Water Resources](#)

Wyoming

- [Department of Environmental Quality](#)
 - [Game and Fish Department](#)
 - [State Water Engineer](#)
-

Adaptive Management Program Part One

UPDATE of 2022: This website: is the only online archive for meeting documents prior to May 1996 for TWG, and prior to September 1997 for AMWG.

- **The official archive:** now available on Reclamation's Website [HERE](#); post 1997.
- **AMWG Archive:** Meetings of Adaptive Management Working Group (AMWG), and since September of 1997, are available [HERE](#)
- **TWG Archive:** Meetings of the Technical Working Group (TWG), and since May of 1996, are available [HERE](#)



Simulating high water

GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM

[Article](#) explaining this archive

[AMP Documents 1995 to first quarter of 1997](#) (prior to the signing of the official Charter)

[AMP Documents 1999 to Present](#) (AMP II)

AMP CORE DOCUMENTS (Archive)

- [1992 - Grand Canyon Protection Act](#)
- [1994 - Biological Opinion](#)
- [1995 - Reclamation response to BiOp](#)
- [1995 - Environmental Impact Statement](#)
- [1996 - Record of Decision](#)

Charter

- [1996 - Draft AMP Charter](#)
- [1997 - Final AMP Charter Signed](#)
- [2006 AMP Charter](#)
- [2008 AMP Charter](#)

US Geological Survey

- [1996 - Guidelines of Grand Canyon Monitoring and Research Center \(USGS\)](#)
- [2000 - Protocols of Science Advisors](#)
- [1999 Draft SCORE Report](#)
- [2005 - SCORE Report](#)
-

Annual Reports

- [1997 - Federal Register Notice for Annual Reports to Congress](#)
- [1998 - First Draft Annual Report](#)
- [2002 - First Annual Report](#)
- [2010 - Second Annual Report](#)

Strategic Plan

- [2001 - Strategic Plan with Appendices](#)

Desired Future Conditions

- [1996 - Objectives](#)
- [2010 - Desired Future Conditions](#)
- [2011 - Desired Future Conditions](#)
- [2012 - Desired Future Conditions](#)

REVIEWS BY NATIONAL ACADEMY OF SCIENCES

- [1990 - Colorado River ecology and dam management](#)
- [1991 - Colorado River Reservoir Operations](#)
- [1994 - Review: Glen Canyon Dam long-term monitoring plan](#)
- [1996 - Review: River Resource Management in the Grand Canyon](#)
- [1999 - Review: Glen Canyon Dam adaptive management program](#)

ADDITIONAL INFORMATION

- [1996 - The Colorado River Workshop](#). Grand Canyon Trust.
- [Recommendations to the Secretary of Interior](#) (combined)
- [2009 - Supplemental Biological Opinion](#)
- Adaptive Management Reviews: Susskind; Camacho; Fellers; Fellers Powerpoint; Lenard; Benenati; Moir;

[Acronym interpretation](#)

[Adaptive Management Program Website](#). Reclamation.

[Grand Canyon Monitoring and Research Center](#). US Geological Survey

[2010 - US Geological Survey Publications](#) & [here](#) (October 2010)

[2010 - Secretarial Order #3305](#) (Scientific Integrity)

[2011 - Analysis of the 2000 low steady flow](#). Ralston.

DOCUMENTS OF THE TRANSITION WORK GROUP

- In time, Transition Work Group will be replaced by the Adaptive Management Work Group and the Technical Work Group
- [Summary of the Transition Work Group](#)

Year 1995

- [Part one](#)
- [Part two](#)
- [Part three](#)
- [Part four](#)

Year 1996

- [Part one](#)
- [Part two](#)
- [Part three](#)
- [Part four](#)
- [Part five](#)
- [Part six](#)
- [Part seven](#)

Year 1997

January

- [Meeting minutes](#)

February

- [01: Attendance](#)
- [02: Long-term M&R strategic plan 01](#)
- [03: Long-term M&R strategic plan 02](#)
- [04: Lake Powell water quality](#)
- [05: Review of sufficient progress](#)
- [06: Summary of 1996 experimental flood](#)
- [List of attachments](#)
- [Meeting agenda](#)
- [Minutes](#)

March

- [Cover letter](#)
- [Notes](#)

AMP DOCUMENTS LISTED BY YEAR (color-coded by work group)

- (AMWG) Adaptive Management Work Group
- (TWG) Technical Work Group

1997 - September 10 (AMWG)

- [Link to AMWG website](#)
- [Agenda](#)
- [Attachments](#)
- [01: AMWG charter \(filed February 4, 1997\)](#)
- [02: List of attendees](#)
- [03: Regulation of federal advisory groups](#)
- [04: Federal Register Notice](#)
- [05: Agenda and sample of operating procedures](#)
- [06: Flow chart of coordination with AOP and annual report under GCPA](#)
- [07: Draft annual report to Congress outline](#)
- [08: AOP work group scenarios for 1998 plan of operation](#)
- [09: Reclamation's budget justification for FY98 budget](#)
- [10: Temperature control device update](#)
- [Minutes](#)

1997 - October (TWG)

- [01: Agenda](#)
- [02: TWG procedure](#)
- [03: 1996-97 report to Congress](#)
- [Final minutes](#)
- [List of attachments](#)

1997 - November (TWG)

- [Agenda](#)
- [01: Minutes](#)
- [02: TWG members](#)
- [03a is missing](#)
- [03b: Program Formulation Process](#)
- [04a: Roles, Responsibilities, Schedules & Integration](#)
- [04b: Figure 1](#)
- [04c: Implementing AMP process](#)
- [05a: ESA reinitiation of consultation](#)
- [05b: Implementation of biological opinion](#)

- [05c: Other work regarding BO](#)
- [05d: Federal Register June 3, 1986](#)
- [05e: Biological assessment of 1996 BHBF](#)
- [05f: Categorical Exclusion Checklist](#)
- [05g: Review of sufficient progress](#)
- [05h: 1995 Final Biological Opinion](#)
- [05i: Reclamation's response to 1995 BO](#)
- [05j: Biological opinion of 1996 BHBF](#)
- [05k: Reclamation's response to review of sufficient progress](#)
- [05l: November 1997 test flow from GCD](#)
- [06: Incorporation of long-term climate variability](#)
- [07: Dam release issues for further study](#)
- [08: Report of spike flow subgroup](#)
- [08a: Table](#)
- [09: Potential spring 1998 experimental flow](#)
- [09a: Matrix table](#)
- [10a: Schedule for FY98 program](#)
- [10b: GCMRC targets](#)
- [10c: GCRM FY98 biological resources program](#)
- [10d: Draft FY97 report to Congress](#)
- [10e: Draft 1998 annual plan of operations](#)
- [11a: The state of natural and cultural resources](#)
- [11b: The state of resources draft outline](#)
- [12: Draft FY99 annual monitoring and research plan](#)
- [13a: Outline of chapter 3 FY99 monitoring and research](#)
- [13b: FY99 conceptual modeling activities](#)
- [14: Information technology program](#)
- [15: Meeting agenda](#)
- [Final minutes](#)
- [List of attachments](#)
- [Web site for meeting](#)

1997 - December (TWG)

- [Agenda](#)
- [01: November 1997 minutes](#)
- [02: TWG operating procedures](#)
- [03a: Report of NEPA/ESA issues to TWG](#)
- [03b: 2nd report of NEPA/ESA issue to TWG](#)
- [03c: Recommendations to TWG for expediting compliance](#)
- [04: Proposed program estimates](#)
- [05: Program schematic](#)
- [06: The state of natural and cultural resources](#)
- [07: Draft FY 97 report to Congress](#)
- [08: Draft discussion of science advisory board](#)
- [09: Draft GCD release issues for further study](#)

- [10: Executive summary BHBF triggering criteria](#)
- [11: Effects on resources from 45,000 cfs releases from GCD](#)
- [12: AMWG/TWG home page](#)
- [Bruce Moore notes](#)
- [Final minutes](#)
- [GCMRC FY98-99 biological resources program](#)
- [List of attachments](#)
- [Web site for meeting](#)

1998 - January 15 (AMWG)

- [Link to AWMG website](#)
- [January 1998 minutes](#)
- [Budget and process](#)
- [Report: ESA/NEPA subgroup](#)
- [Improve coordination](#)
- [Letter from TWG to AMWG](#)
- [Agenda](#)
- [01: Attendees](#)
- [03: NEPA review](#)
- [04: NEPA, ESA, and NHPA compliance](#)
- [06: Hydrology report](#)
- [205: Impacts of Nov. 1997 31,000 cfs test flow](#)
- [206b: GCD releases](#)
- [206c: BHBF triggering criteria](#)
- [206d: 1999 AOP.](#)
- [207a: Draft plan for BHBF in 1998](#)
- [207b: Guidelines for BHBF](#)
- [207c: Compliance timetable for BHBF](#)
- [208: AOP meeting schedule](#)
- [209a: Needs for channel mapping](#)
- [209b: Channel mapping efforts](#)
- [209c: Channel mapping pilot studies](#)
- [210: Assessment of water quality from GCD operations](#)
- [211: Draft report to Congress](#)
- [212: Draft annual monitoring and research plan](#)
- [Web site for meeting](#)
- [List of attachments](#)

1998 - January (TWG)

- [Agenda](#)
- [Attachments](#)
- [January 1998 Final Minutes](#)
- [Email Msgs](#)
- [01: Draft research and monitoring plan for BHBF](#)

- [202: AMP roles, responsibilities, schedules & integrgration](#)
- [203a: Estimated effects of 45,000 cfs release](#)
- [203b: Figures associated with effects matrix](#)
- [203c: Prolems and conserns](#)
- [203d: Recommendations](#)
- [203e: Draft research and monitoring for a BHBF](#)
- [204a: Impacts of November 1997 31,000 cfs test flow](#)
- [204b: Broken link](#)
- [204c: Climate and the Colorado River: The limits of management](#)
- [205a: General planning guidelines for BHBF](#)
- [205b: BHBF compliance timetable](#)
- [205c: Section 7 and NEPA compliance](#)
- [205d: GCMRC contingency monitoring program for BHBF](#)
- [206: Revised discussion paper science advisory board](#)
- [207: WAPA's Email for concern of spike flow](#)
- [208: The endangered Kanab ambersnail studies and actions](#)
- [209a: FY98 technology upgrades for channel mapping](#)
- [209b: FY99 pilot studies of Lidar mapping](#)
- [209c: FY2000 channel mapping Lidar and multi-beam](#)
- [Attachments](#)
- [January 1998 final minutes](#)
- [List of attachments](#)

1998 - February (TWG)

- [Draft agenda](#)
- [Attachment.html](#)
- [Revised discussion paper of science advisory board](#)
- [Hydrology report](#)
- [GCD Temperature Control proposed environmental assessment](#)
- [Agenda](#)
- [Agenda](#)
- [200: Minutes of January 1998](#)
- [201: Minutes of January 1998](#)
- [02: Sponsored projects for year 1998](#)
- [03: Proposed program cost estimates](#)
- [04: GCD spillway gate extensions analysis](#)
- [05: Scoping of impacts of temperature control](#)
- [06: Draft outline for state of natural and cultural resources](#)
- [07: Management objectives ad hoc group](#)
- [08: Analysis of monthly release volumes to a BHBF](#)
- [09: Data from gaging stations for BHBF](#)
- [10: Revised discussion paper science advisory board](#)
- [11: Comparison of BHBF & HMF and sediment conservation flows](#)
- [February 1998 final minutes](#)
- [List of attachments.doc](#)

- [List of attachments.pdf](#)
- [Meeting notice](#)

1998 - March (TWG)

- [Cover Letter](#)
- [Estimated Effect of 45,000 cfs spike flow](#)
- [Meeting.html](#)
- [01: February 1998 TWG minutes](#)
- [02: Proposed program estimates](#)
- [02a: Program organization chart](#)
- [03: Management objectives](#)
- [04: Water quality resources in Lake Powell](#)
- [05: State of natural and cultural resources outline](#)
- [06: Discussion paper of science advisory board](#)
- [07: Memo on effects matrix and resource criteria](#)
- [08: Draft GCMRC contingency plan unanticipated high flows](#)
- [09: Presentation of trust responsibilities to the tribes](#)
- [10: Integration of programmatic agreement with tribes](#)
- [11: Programmatic agreement funding activity](#)
- [12a: Snow conditions](#)
- [12b: River forecast](#)
- [12c: GCD releases](#)
- [13: Presentations for upcoming TWG meeting](#)
- [14: Possible effects of a temperature control device](#)
- [Final minutes](#)
- [List of attachments.doc](#)
- [List of attachments.pdf](#)

1998 - April (TWG)

- [Agenda](#)
- [01: March 1998 proposed program estimate](#)
- [01a: Draft research and monitoring plan BHBF](#)
- [01: Proposed program estimates](#)
- [02: Management objectives](#)
- [03: Fax on science advisory board approach](#)
- [04: Effects matrix process and assumptions](#)
- [05: Proposed research responses of BHBF](#)
- [06: Snow conditions](#)
- [07: Section 7 consultation and AMP](#)
- [08: General planning guidelines for BHBF](#)
- [09: Tour of GCD and river trip to Lee's Ferry](#)
- [10a: Review of GCMRC physical science progress BHBF](#)
- [10b: Sand deposition from Little Colorado River flooding](#)
- [10c: A model of diurnal discharge wave propagation](#)

- [10d: Uncertainty, resource exploitation and conservation](#)
- [10e: Colorado River: How fast does it flow?](#)
- [10f: Modeling of sand movement and storage](#)
- [10g: Modifications to one-dimensional model of unsteady flow](#)
- [10h: BHBF handouts](#)
- [10i: Relation of graded deposits to suspended-sediment](#)
- [Federal Register Notice](#)
- [List of attachments](#)

1998 - May (TWG)

- [03: Presentation of federal agencies and tribal responsibilities](#)
- [06: NPS newsletter of Colorado River Management Plan](#)
- [07: Spillway gate extensions](#)
- [08: Proposal to develop research plan for BHBF](#)
- [List of attachments](#)

1998 - June (TWG)

- [201: Minutes March 1998 meeting](#)
- [202: Minutes of April 1998 meeting](#)
- [205: Position paper for renewal of AMWG charter](#)
- [206b: A protocol for out year program planning](#)
- [14: Announcement from NASA about hyperspectral data](#)
- [15a: Southwest strategy update](#)
- [15b: Southwest Strategy Reporter](#)
- [15c: Southwest strategy organizational structure](#)
- [15d: Southwest strategy collaborative communications](#)
- [15e: Interagency memo on southwest strategy direction](#)
- [16a: GCD releases](#)
- [16b: Inflow forecasts](#)
- [16c: GCD release chart](#)
- [List of attachments](#)
- [List of attachments 02](#)
- [Draft Minutes](#)
- [Final Minutes](#)

1998 - JULY (TWG)

- [List of attachments](#)
- [Final minutes](#)
- [Integration of programmatic agreement](#)

1998 - July 21 (AMWG)

- [Link to AMWG web site](#)
- [Agenda](#)

- [Attach_01: Meeting web site](#)
- [Attach_07: Final discussion paper of science advisory board](#)
- [Draft July 1998 Minutes](#)
- [Index tabs.wpd](#)
- [Memo: Status of planning documents](#)
- [List of attachments](#)
- [Transmittal Letter](#)

1998 - September (TWG)

- [04: Proposed program estimate](#)
- [Attachments.pdf](#)
- [Final minutes](#)

1998 - November (TWG)

- [01: Minutes of July 1998 meeting](#)
- [02: Minutes of September 1998 meeting](#)
- [03: FY2000-2004 budget estimate](#)
- [04a: FY1999 cultural resources](#)
- [04b: FY1999 socio-economic resources](#)
- [04c: FY2000 physical resources](#)
- [04d: FY1999 biological resources](#)
- [05a: Protocol for out year budget planning](#)
- [05b: Budget protocols & federal budget process](#)
- [06: Snow conditions](#)
- [07: Proposal for fall maintenance flows](#)
- [08: Summary of spill avoidance discussions](#)
- [09: Recent developments in Kanab ambersnail](#)
- [10: AGFD monitoring of Kanab ambersnails](#)
- [11: Index to compliance report](#)
- [12: Draft state of natural and cultural resources](#)
- [13: WAPA executive summary replacement resources process](#)
- [14: Integration of programmatic agreement discussion paper](#)
- [15: Lake Powell monitoring and research program](#)
- [16: Adopt a beach program](#)
- [Final minutes](#)
- [List of attachments.pdf](#)

1998 - December (TWG)

- [1997 TWG operating procedures](#)
- [01: November 1998 minutes](#)
- [02: Lake Powell monitoring and research program](#)
- [03: Snow conditions](#)
- [04: Draft research plan response for alternative BHBF](#)

- [05: BHBF resource criteria analysis](#)
- [06: Resource category aquatic resources](#)
- [07: Draft report BHBF resource criteria](#)
- [08: Draft state of natural and cultural resources](#)
- [09: Kanab ambersanil workshop](#)
- [10: Symposium on FY 1998 science results](#)
- [Final minutes](#)
- [List of attachments](#)

1999 - January 11 (TWG)

- [Link to official TWG web site \(still broken\)](#)
- [01a: Draft report on BHBF process](#)
- [01b: Draft report on resource criteria analysis](#)
- [03: Comments on Moody/Cook proposal](#)
- [Final minutes January 11, 1999 meeting](#)
- [Final minutes of January 13, 1999 meeting](#)

Continued at AMP Part II

Adaptive Management Program Part Two

UPDATE of 2022: This website: is the only online archive for meeting documents prior to May 1996 for TWG, and prior to September 1997 for AMWG.

- **The official archive:** now available on Reclamation's Website [HERE](#); post 1997.
- **AMWG Archive:** Meetings of Adaptive Management Working Group (AMWG), and since September of 1997, are available [HERE](#)
- **TWG Archive:** Meetings of the Technical Working Group (TWG), and since May of 1996, are available [HERE](#)



Interior Secretary Dirk Kempthorne

GLEN CANYON DAM ADAPTIVE MANAGEMENT PROGRAM Document Archive Part II (1999 to the present)

[AMP Documents Part I](#) (1995 - 98)

[Article](#) explaining this archive

AMP CORE DOCUMENTS ([Archive](#))

- [1992 - Grand Canyon Protection Act](#)
- [1994 - Biological Opinion](#)
- [1995 - Reclamation response to BiOp](#)
- [1995 - Environmental Impact Statement](#)
- [1996 - Record of Decision](#)

Charter

- [1996 AMP Charter](#)
- [2006 AMP Charter](#)
- [2008 AMP Charter](#)

US Geological Survey

- [1996 - Guidelines of Grand Canyon Monitoring and Research Center \(USGS\)](#)
- [2000 - Protocols of Science Advisors](#)
- [1999 Draft SCORE Report](#)
- [2005 - SCORE Report](#)

Annual Reports

- [1997 - Federal Register Notice for Annual Reports to Congress](#)
- [2002 - First Annual Report](#)
- [2010 - Second Annual Report](#)

Strategic Plan

- [2001 - Strategic Plan with Appendices](#)

Desired Future Conditions

- [1996 - Objectives](#)
- [2010 - Desired Future Conditions](#)
- [2011 - Desired Future Conditions](#)
- [2012 - Desired Future Conditions](#)

REVIEWS BY NATIONAL ACADEMY OF SCIENCES

- [1990 - Colorado River ecology and dam management](#)
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- [Recommendations to the Secretary of Interior](#) (combined)
- [2009 - Supplemental Biological Opinion](#)
- Adaptive Management Reviews: [Suskind](#); [Camacho](#); [Fellers](#); [Fellers Powerpoint](#); [Lenard](#); [Benenati](#);

[Acronym interpretation](#)

[Adaptive Management Program Website](#). Reclamation.

[Grand Canyon Monitoring and Research Center](#). US Geological Survey

[2010 - US Geological Survey Publications](#) & [here](#) (October 2010)

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[2011 - Analysis of the 2000 low steady flow](#). Ralston.

Note: Unlike the previous [list of documents](#) (Part One), the following are available from the official web site of the Adaptive Management Program [here](#).

Alternative web archive at On The Colorado

- [1999](#)
 - [2000](#)
 - [2001](#)
 - [2002](#)
 - [2003](#)
 - [2004](#)
 - [2005](#)
 - [2006](#)
 - [2007](#)
 - [2008](#)
 - [2009](#)
-

ARCHAEOLOGY

Table 1 Pecos Time Periods (Plog 1979:314)

Basket Maker II	100 B.C.- A.D. 400
Basket Maker III	A.D. 400 – A.D. 700
Pueblo I	A.D. 700 – A.D. 900
Pueblo II	A.D. 900 – A.D. 1100
Pueblo III	A.D. 1100 – A.D. 1300
Pueblo IV	A.D. 1300 – A.D. 1600
Pueblo V	A.D. 1600 – Present

- [Dolores River Project](#)
- [Grand Canyon Project](#)

GLEN CANYON NATIONAL RECREATION AREA

- [1931 - Colorado Riverbed Case](#)
- [1959 - Outline History of the Glen Canyon Region: 1776 - 1922.](#)
- [1960 - Historical sites in Glen Canyon: Mouth of San Juan River to Lee's Ferry.](#)
- [1961 - Hoskaninni Papers: Mining in Glen Canyon.](#) Crampton.
- [1963 - Salvage archeology preceding reservoir inundation.](#) Sharrock.
- [1964 - History & Historical Sites of Cataract & Narrow Canyons.](#) Crampton.
- [1964 - History & Historical Sites of Southeast Utah & Northern Arizona.](#) Crampton.
- [1970 - Anazazi Communities in the Red Rock Plateau, SE Utah.](#) Lipe.
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- [1979 - A Stratified Random Sample of the Cultural Resources Canyonlands Section of the Moab District](#). Thompson
- [1980 - Cultural Resource Summary East Central Utah Moab District](#). Pierson.
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- [1956 - Archaeological Investigations of the Uncompahgre Plateau](#). Wormington & Lister.
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- [1978 - Late Prehistoric Human Ecology of Lake Cahuilla](#). Wilke.
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- [1987 - Ecological Stability and Community Diversity during Mormon Colonization of the Little Colorado River Basin.](#) Abruzzi.
- [1995 - The Social and Ecological Consequences of Early Cattle Ranching in the Little Colorado River Basin.](#) Abruzzi.
- [2007 - River of Change: An Environmental History of Climate and Water Management in the Upper Little Colorado River.](#) Finger.

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- [2009 - Past, Present and Future Issues in Great Basin Archaeology: Papers in Honor of Don D. Fowler.](#) Hockett.
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- [2017 - The Terminal Pleistocene/Early Holocene Record in the Northwestern Great Basin: What We Know, What We Don't Know, and How We May Be Wrong.](#) Smith.
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[1970](#); [1971](#); [1972](#); [1973](#); [1974](#); [1975](#); [1976](#); [1977](#); [1978](#); [1979](#); [1980](#); [1981](#); [1982](#); [1983](#);
[1984](#); [1985](#); [1986](#); [1987](#); [1988](#); [1989](#); [1990](#); [1991](#); [1992](#); [1993](#); [1994](#); [1995](#); [1996](#); [1997](#);
[1998](#); [1999](#); [2000](#); [2001](#); [2002](#); [2003](#); [2004](#); [2005](#); [2006](#); [2007](#); [2008](#); [2009](#); [2010](#); [2011](#);
[2012](#); [2013](#); [2014](#); [2015](#); [2016](#); [2017](#); [2018](#); [2019](#); [2020](#); [2021](#); [2022](#); [2023](#); [2024](#);
[2025 1st consultation](#); [2025 2nd Consultation](#); [2025](#); [2026 Draft01](#); [2026](#); 2027;

AOPs modified - Lake Powell and Lake Mead operations only; Year 2000 to 2024;
[A ZIP FILE](#).

AOP: 30-year averages of unregulated flow into Lake Powell

- **1961 to 1990** - 11.8 million acre-feet (maf)
- **1971 to 2000** - 12.06 million acre-feet (maf) ([2008 AOP](#))
- **1971 to 2000** - 12.04 maf (revised in [2010 AOP](#))
- **1981 to 2010** - 10.83 maf ([2013 AOP](#))
- **1991 to 2020** - 9.6 maf ([24-month Report](#))

AOP CONSULTATION WORK GROUP MEETINGS

- **September meeting of:** [2016](#); [2017](#); [2018](#); [2019](#); 2020; [2021](#);

ANNUAL REPORTS: FLAMING GORGE DAM

- Biological Opinion [Click here](#)
- [2006](#); [2007](#); [2008](#); [2009](#); [2010](#); [2011](#); [2012](#); [2013](#); [2014](#); [2015](#); [2016](#); 2017; 2018; 2019; 2020;
- Mid-Year Reports: [2021](#);

Archives

COLORADO RIVER SCIENCE. (a wiki website)

- <http://coloradoriverscience.org>
- Admin: Julie Vano, Jeff Lukas and Brad Udall.

SPECIAL COLLECTIONS

- [Archive.org](#)
- [Arizona Memory Project](#)
- [Arizona State University digital collections](#)
- [University of Arizona digital collections & Special Collections](#)
- [Arizona v California](#)
- [Colorado River Compact Collection](#). Utah.
- [Colorado River Governance Initiative](#)
- [Colorado River Information Portal](#)
- [Colorado Water Institute](#)
- [David H. Getches Collection](#)
- [Digital Collections of Colorado](#)
- [eScholarship](#). University of California.
- [Federal science archive](#)
- [GPO Federal Digital System](#)
- [GPO MetaLib](#)
- [Hathi Trust](#)
- [Hydrology and Earth Sciences \(HESS\)](#)
- [Lobo Vault University of New Mexico](#)
- [Multidisciplinary Digital Publishing Institute](#)
- [Research Gate](#)
- [Social Science Research Network](#)
- [Western Water Policy Review Advisory Commission](#)
- [Western Waters Digital Library](#)
- [Huntington Digital Library](#)
- [Utah Government Digital Library](#)
- [Utah Division of State History](#)



Northcutt Ely in 1929, Department of the Interior and co-author of the Hoover Dam Documents

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- [Library of Congress](#)
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- [The Open Society Foundation](#)

CONGRESSIONAL RESEARCH SERVICE

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-

Augmentation

The development of augmentation programs in the Colorado River Basin were authorized by the Colorado River Basin Project Act of 1968. A 10-year moratorium was declared, from the date of the act (September 30, 1968), against making any studies or plans for the importation of water into the Colorado River Basin from any river drainage basin lying outside the natural drainage basin of the Colorado River. This moratorium was then extended to 1992 ([USBR reference](#)).

Forms of augmentation can range from seeding the clouds with chemicals (geo-engineering) to towing polar icebergs over great distances to the coastal communities of warmer climes. Considering sea level rise and energy intensive applications, which are also exceedingly expensive, augmentation programs are a complete waste of time and a distraction from implementing simple and reasonable solutions, which include scaling down our demands from a planet that has a fixed and finite capacity to preserve the systems of life.

The most important consideration is the amount of time necessary to complete an augmentation program which, at best, requires a 30 year time-frame. For example, the flood event that triggered the need for the construction of Hoover Dam occurred in 1905, and the initial filling of Lake Mead began in 1934. The most current example would be the Lake Powell Pipeline Project, which was conceptualized in 1996 and the rolling completion schedule for this project is projected for completions by 2030. However, considering the scale of this small project, compared to the enormous scale of the Hoover Dam Project, illustrates that the time-span for the planning process has indeed increased and, more importantly, the return on investment has significantly decreased.

Cloud-seeding might be the exception, when considering project time-scales and returns on investment. However, the pace of evaporation, snowpack sublimation and dry soil conditions, due to a warming atmosphere, definitely exceed the returns.

We would argue that any and all augmentation projects are acts of desperation, embedded with futility. Whatever surplus water that may be generated, it will eventually be consumed and the pressing issue of water scarcity returns. And then, the original infrastructure succumbs to old age and the reservoirs fill up with sediment and compromise the primary objectives of water storage and flood control.

NEWS

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- [2025 - Cloud seeding to boost rain, snow hasn't proven effectiveness federal report says](#). By Tony Davis For The Arizona Daily Star.

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- [2003 - Critical Issues in Weather Modification Research](#). National Research Council.
- [2008 - Desalination: A National Perspective](#). National Research Council.
- [2008 - Augmentation Study](#). Southern Nevada Water Authority.
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- [2008 - Diving in the Deep End: Help Water Agencies Address Climate Change](#). Patricia Mulroy. Southern Nevada Water Authority.
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- [2008 - Diving in the Deep End: Help Water Agencies Address Climate Change](#). Patricia Mulroy. Southern Nevada Water Authority.
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Note: desal quantities are usually measured in gallons per day

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- [Canyonlands](#)
- Canyon Country. Topping and Leake.
- [Getches/Wilkinson Center - Books, Reports & Studies](#)
- David Getches (law professor)
- [Endangered Fish](#)
- [Hoover Dam](#)
- [NonNative Fish](#)
- [Economic Benefits of Conserved Rivers](#)
- [Grand and Glen Canyons](#) (economics related)
- [Humpback Chub in Grand Canyon](#). Gould.
- [Luna Leopold Bibliography](#) (hydrologist)
- [Rainbow Bridge National Monument](#)
- [Reclamation Bibliography](#)
- [Salton Sea Basin and Colorado River Delta](#)
- Tyronia (comprehensive Grand Canyon bibliography)
- [Upper Colorado River](#) (aquatic resources)
- [US Geological Survey Publications related to Grand Canyon Adaptive Management](#)
- [Walter B. Langbein Bibliography](#) (hydrologist)
- [Westwater Canyon & Uncompahgre Plateau](#)



Wallace Stegner

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- [Glen Canyon](#)
- [Grand Canyon](#)

BOOKS ABOUT THE FIRST NATIONS

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RECOMMENDED READING

[To add a book, send us an email](#)

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Conferences

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Twelfth Annual Symposium – 2007

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Stegner Center at the University of Utah

27th Symposium about the 100th Anniversary of the Colorado River Compact

- [All video presentations](#)
- Day 1.1 - [Jason Robison, Tanya Trujillo & Larry MacDonnell](#)
- Day 1.2 - [Anne Castle, Margaret Vick, Bidtah Becker & Jason Hauter](#)
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GETCHES - WILKINSON CENTER FOR NATURAL RESOURCES, ENERGY, AND THE ENVIRONMENT AT COLORADO LAW

2019 - 40th Annual GWC Summer Conference: Charting a Better Course for the Colorado River: Identifying the Data and Concepts to Shape the Interim Guidelines Renegotiation

- [Video Archive](#) (You Tube)

Presentation Powerpoints

- [GWC Program and Speaker Presentations](#)
 - [California, the DCPs, the Salton Sea, and the Next Interim Guidelines](#). Harris.
 - [Colorado River Indian Tribes: A New Partner DCP](#). Vick.
 - [Considering Alternative Management Paradigms: Opportunities and Challenges](#). Schmidt.
 - [Development: The Systematic Construction of the Structural Deficit](#). Berggren.
 - [Fill Mead First: Different Approach to the Managing of the Colorado River](#). Balken.
 - [Incorporating Hydrologic Uncertainty into Colorado River Basin Planning](#). Prairie.
 - [The Colorado River Future: The Full Suite of Assumptions](#). Overpeck.
 - [Prospects and Options For Building a Real Demand Management Program in Upper Basin](#). Haas.
 - [Reviewing the Mistake in the Colorado River Compact](#). Fleck.
 - [Finally, a Role for the Tribes](#). Becker.
 - [US and Mexico Cooperation: What Next](#). Pitt.
 - [What Does the Road Forward Look Like in Arizona?](#) Buschatzke.
 - [Stepping Outside of the Box: Upper Basin Demand Cap \(Grand Bargain\)](#). Wheeler.
 - [When Hydrology and Management Collide](#). Udall.
 - [When the River Meets the Salton Sea](#). Cohen.
-



Glen Canyon Dam during initial filling in 1963

Dam Operations

The Bureau of Reclamation has 5,000 employees who help maintain 475 dams and 337 reservoirs in the 17 Western states. This includes the maintenance of 53 hydroelectric power plants. [List of dams in Colorado River Basin](#). Wikipedia.

See also the following sections:

- [Hydropower](#)
- [Sediment](#)
- [Floods](#)
- [Biological Opinions](#)

DAMS AND VALUES

- [2002 - What Goes Up, May Come Down](#). Babbitt.
- [2016- The Future Role Of Dams in the USA](#). Ho et al.

DAM AND FLOODPLAIN SAFETY

- See: [Dam Safety Resource Page](#). On the Colorado (OTC).

BUREAU OF RECLAMATION WEB PAGES

- [Lower Colorado Reports and Publications](#)
- [Upper Colorado Reports and Publications](#)

24-MONTH REPORTS (present and projected reservoir conditions)

- [CLICK HERE](#)

ANNUAL OPERATING PLANS (AOP)

Bureau of Reclamation

[1970](#); [1971](#); [1972](#); [1973](#); [1974](#); [1975](#); [1976](#); [1977](#); [1978](#); [1979](#); [1980](#); [1981](#); [1982](#); [1983](#); [1984](#); [1985](#); [1986](#); [1987](#); [1988](#); [1989](#); [1990](#); [1991](#); [1992](#); [1993](#); [1994](#); [1995](#); [1996](#); [1997](#); [1998](#); [1999](#); [2000](#); [2001](#); [2002](#); [2003](#); [2004](#); [2005](#); [2006](#); [2007](#); [2008](#); [2009](#); [2010](#); [2011](#); [2012](#); [2013](#); [2014](#); [2015](#); [2016](#); [2017](#); [2018](#); [2019](#); [2020](#); [2021](#); [2022](#); [2023](#); [2024](#); [2025 1st consultation](#); [2025 2nd Consultation](#); 2026; 2027;

AOPs modified - Lake Powell and Lake Mead operations only; Year 2000 to 2024; [A ZIP FILE](#).

AOP: 30-year averages of unregulated flow into Lake Powell

- **1961 to 1990** - 11.8 million acre-feet (maf)
- **1971 to 2000** - 12.06 million acre-feet (maf) ([2008 AOP](#))
- **1971 to 2000** - 12.04 maf (revised in [2010 AOP](#))
- **1981 to 2010** - 10.83 maf ([2013 AOP](#))
- **1991 to 2020** - 9.6 maf ([24-month Report](#))

AOP CONSULTATION WORK GROUP MEETINGS

- **September meeting of:** [2016](#); [2017](#); [2018](#); [2019](#); 2020; [2021](#);

ANNUAL REPORTS: FLAMING GORGE DAM

- Biological Opinion [Click here](#)
- [2006](#); [2007](#); [2008](#); [2009](#); [2010](#); [2011](#); [2012](#); [2013](#); [2014](#); [2015](#); [2016](#); 2017; 2018; 2019; 2020;
- Mid-Year Reports: [2021](#);

NATURAL FLOW DATA

- [Natural Flow Data 1906 to 2017](#). Updated: March, 2019. Reclamation.

CONSUMPTIVE USES AND LOSSES REPORTS

- [2023 - A survey of the Bureau of Reclamations Decree Accounting Reports in the Lower Colorado River Basin](#). McCoy for ASCE.
- [2023 - An historical perspective on the accounting for evaporation and system losses in the Lower Colorado River Basin](#). Kuhn.

Colorado River System (both basins)

1971-1975; 1976-1980; 1981-1985; 1986-1990; 1991-1995; 1996-2000; 2001 - 2005;

Pending reports (both basins): 2006 -2010; 2011 - 2015; 2016 - 2020.

Upper Basin Only

2006 -2010; 2011 - 2015; 2016 - 2020;

Other Consumptive Use/loss Reports

- [1971-1995 Upper Basin Consumptive Use/Loss](#). A 25-year peer review.
- [Arizona's Upper Basin Consumption/Loss 1996 to 2017](#)
- [Consumptive Use Determination](#)
- [2004 - Report of the Upper Colorado River Commission](#)
- [2005 - Report of the Upper Colorado River Commission](#)
- [2007 - Hydrologic Determination for Upper Basin](#). Bureau of Reclamation.
- [2009 - Estimated use of water in the United States in 2005](#). USGS.

LOWER BASIN CONSUMPTIVE USE REPORTS; [Reclamation Archive](#)

- 1964; 1965; 1966; 1967; 1968; 1969; 1970; 1971; 1972; 1973; 1974; 1975; 1976; 1977; 1978; 1979; 1980; 1981; 1982; 1983; 1984; 1985; 1986; 1987; 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021; 2022; 2023; 2024; 2025; 2026;
- [Annual summary page only from 2001 to 2016](#)
- Annual summary from **1906 to 2005**; Spreadsheet no longer posted by Reclamation.

OPERATING CRITERIA

[Click here](#) to read article about the history of operations at Glen Canyon Dam.

[Click here](#) to determine your own analysis of what the Colorado River system of reservoirs will look like in a future.

- [1950 - CRSP and Participating Projects](#)
- [1960 - Reservoir priorities explained](#). USGS.
- [1962 - General Principles to Govern, and Operating Criteria for, Glen Canyon Reservoir \(Lake Powell\) and Lake Mead During the Lake Powell Filling Period](#).
- [1962 - Release of Colorado River Water Impounded in Lake Mead for Sluicing](#). Congressional Testimony.

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- [1969 - Probabilities and Test Studies on Operating Criteria for the Colorado River Reclamation.](#)
- [1970 - Operating Criteria for Colorado System Reservoirs](#)
- 1996 - ROD. Glen Canyon Dam.
- [1997 - Glen Canyon Dam operations.](#) Federal Register.
- 2001 - ROD. Surplus Guidelines.
- [2001 - Surplus Guidelines.](#) Federal Register.
- [2001 - Interim Surplus Guidelines](#)
- [2002 - Surplus Guidelines.](#) Federal Register.
- [2003 - Colorado River Water Delivery Agreement \(QSA\)](#)
- [2004 - 602a Storage Environmental Assessment](#) and [FONSI](#) (Sixth Review of LROC. ([fact sheet](#)))
- [2005 - Long-Range Operating Criteria \(LROC\).](#)
- [2005 - Amended Operating Criteria](#)
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[Visit](#) our graphics section

[Write us to report a problem or add data sources.](#)



USGS hydrologists at Grand Canyon

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United States Geologic Survey

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Department of Energy

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Dictionary

- [Datasegment](#)

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Uses of this power is dedicated to mechanically lift Colorado River water to higher elevations for consumption by industrial agriculture and ever-expanding municipalities. The Colorado River basin has some of the coldest (Gunnison, CO) and the hottest temperatures (Yuma, AZ) in the United States, and climate control in homes and buildings is a dominant use of this energy consumption.

Unfortunately, the development of energy resources from unconventional oil and gas, hard rock oil shale (kerogen) and tar sands (bitumen) is currently under consideration (mostly in eastern Utah and western Colorado) and if these dirty fuels are fully exploited, the Colorado River's water will be seriously challenged both in quantity and in quality, as well the planetary hydrocycle from the emission of greenhouse gases. This form of energy development was promulgated by the 2005 Energy Policy Act, which is probably the most damaging legislation to air, water and land resources ever devised. Here is the [voting roster](#) of this legislation.

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- [2023 - Management of Colorado River: Water Allocations, Drought and the Federal Role](#). CRS update.
- [2023 - Long-term Drought and Glen Canyon Dam Potential Effects on Water Deliveries and Hydropower](#). CRS.

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- [1986 - Detecting the climatic effects of increasing carbon dioxide](#).

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- [1977 - Bibliography of Natural Resource Information for Southern Utah](#). 1977; FWS.

GOVERNMENT ACCOUNTABILITY OFFICE

- [1960 - Audit of the Colorado River Storage Project](#). GAO.
- [1977 - The Drought of 1977](#). GAO.
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- [2008 - Water Scarcity in the Colorado River basin](#). GAO.
- [2010 - Energy Water Nexus: Oil Shale](#). GAO.
- [2018- Oil and Gas Wells: BLM needs to improve its data and oversight of its potential liabilities](#). GAO.

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- [1968 - Water and Choice in the Colorado River Basin](#)
- [1977 - Climate, Climate Change, and Water Supply](#)
- [1977 - Energy and Climate: Studies in Geophysics](#)
- [1978 - National Academy Sciences: First Hundred Years](#)
- [1979 - Carbon Dioxide and Climate: A Scientific Assessment](#)
- [1983 - Changing Climate: Report of the Carbon Dioxide Assessment Committee](#)
- [1985 - Safety Of Dams: Flood Earthquake Criteria](#)
- [1988 - Estimating Probabilities of Extreme Floods](#)
- [1990 - Colorado River ecology and dam management](#)
- [1991 - Colorado River Reservoir Operations](#)
- [1991 - Managing Water Resources in the West Under Conditions of Climate Uncertainty](#)
- [1992 - Water Transfers in the West: Efficiency, Equity, and Environment](#)
- [1994 - Review: Glen Canyon Dam long-term monitoring plan](#)
- [1996 - Review: River Resource Management in the Grand Canyon](#)
- [1999 - Review: Glen Canyon Dam adaptive management program](#)
- [2002 - Moab's uranium waste: Remedial action at Moab site now and long term.](#)
- [2003 - Critical Issues in Weather Modification Research](#)
- [2003 - Understanding Climate Change Feedbacks](#)
- [2004 - Confronting the Nations Water Problems: The Role of Research](#)
- [2007 - Colorado River Basin Water Management](#)
- [2008 - Prospects for Managed Underground Storage of Recoverable Water](#)
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- [2008 - Desalination: A National Perspective](#)
- [2009 - Irreversible Climate Change](#)
- [2009 - America's Energy Future Technology Transformation](#)
- [2010 - Adapting to Impacts Climate Change](#)
- [2012 - Water Reuse Potential Expanding Nation Water Supply](#)
- [2012 - Sustainable Water Environmental Management: California Bay Delta](#)
- [2012 - Preparing for the Third Decade: National Water Quality Assessment](#)
- [2012 - Disaster Resilience: A National Imperative](#)
- [2012 - Dam Levee Safety: Community Resilience and Vision of Future Practice](#)

- [2014 - Lessons Learned from the Fukushima Nuclear Accident](#)
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 - [2010 - Advancing Science of Climate Change.](#) NAS.
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 - [2013 - Climate and Social Stress: Implications for Security Analysis.](#) NAS.
 - [2016 - From Maps to Models: Augmenting the Nations Geospatial Intelligence Capabilities.](#) NAS.
 - [2019 - Decadal Survey of Social Behavioral Sciences: Research and Agenda for Advancing Intelligence Analysis.](#) NAS.
 - [2021 - Global Change Research Needs and Opportunities For- 2022 to 2031.](#) NAS.
 - **All documents above combined.** Combined documents are useful for harvesting information by subject.
-

Federal Register

About the Federal Register

Published by the Office of the Federal Register, National Archives and Records Administration (NARA), the Federal Register is the official daily publication for rules, proposed rules, and notices of Federal agencies and organizations, as well as executive orders and other presidential documents. The Federal Register is updated daily by 6 a.m. and is published Monday through Friday, except Federal holidays.

[THE ARCHIVE](#) (starting in 1936)

[HOMEPAGE](#) of the Federal Register

Search engine by [AGENCY](#)

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Formerly the Federal Power Commission

- [Homepage](#)
- [Federal Notices from FERC](#)

River Management Society

- [Resource website for understanding the process for permitting hydropower](#)

Hydropower Reform Coalition

- [Resource website for reforming hydropower production](#)
-



Fish

Humpback chub.
Photo by Randall D. Babb.

If you want to know where you would have stood on slavery before the Civil War, don't look at where you stand on slavery today. Look at where you stand on animal rights.
Paul Watson.

The following is a document archive for the native fish of the Colorado River, which have the highest rate of jeopardy toward extinction in the nation. Read article [here](#).

Historically, the native fish fauna of the Colorado River Basin was dominated by the minnow (cyprinids) and sucker (catostomids) families. Of the 34 known native species to the Colorado River basin, 74% are found nowhere else in the world, or endemic.

Threats to these species include streamflow regulation and habitat modification, altered food web, predation by nonnative fish species, parasitism, hybridization with other native fish species, and pesticides, toxins and pollutants. These changes to the river environment have occurred so quickly that the species have been unable to adapt, so pro-active human intervention is the only hope they have. Since the river is truncated by 83 dams in the upper basin and 10 dams in the lower basin, this loss of genetic diversity will also impede their recovery.

2018 - SUMMARY OF CURRENT STATUS OF ENDANGERED FISH

- [Has the downlisting criteria changed between 2002 and 2018?](#). On The Colorado Staff (OTC).
- [Summary of USFWS Sufficient Progress Reports as of 2018](#). OTC.
- [Additional summary of endangered fish in the Colorado River Basin](#). OTC.

RESOURCES

- [DIGITIZED LIBRARY](#) of Dr. W. L. Minckley. Native Fish Lab. (Most excellent resource library)
- [ARIZONA ECOLOGICAL SERVICES](#) Document Library
- [SEARCH ENGINE](#) of US Fish and Wildlife Service
- [DOCUMENTS AND PUBLICATIONS](#). Upper Colorado River Endangered Fish Recovery Program
- Click [here](#) to view bibliographies of endangered fish research
- [Citizen's Guide to NEPA](#)
- [Section 7 Consultation Handbook](#)
- [Regulations for implementing the procedural provisions of NEPA](#)
- [NEPA 101](#). Dinah Bear.
- [Climate Change Effects Proposed Actions Effects On Proposed Actions Under NEPA](#). Dinah Bear.

MAP OF COLORADO RIVER BASIN

- [Map of Colorado River Basin: Mountains to Sea; Babbitt Center & Lincoln Institute.](#)

THE RECOVERY PROGRAMS

Official Websites of USFWS Programs

- [Upper Colorado River](#) (above Lake Powell)
- [San Juan River](#) (above Lake Powell)
- **Grand Canyon** (below Lake Powell):
- [Reclamation website](#);
- [Stakeholder website](#);
- [GCMRC/USGS website](#);
- [USGS Biology website](#);
- [Lower Colorado River](#) (below Hoover/Davis Dam)
- [Gila River](#)

BIOLOGICAL OPINIONS

UPPER COLORADO RIVER & ITS TRIBUTARIES

Upper Colorado River Main Stem

- [1999 - Biological Opinion of the Upper Colorado](#)
- [2004 - Biological Opinion, Moab Uranium Mill](#)

Gunnison River (Aspinal Unit); tributary of Colorado River; Colorado.

- [1997 - Instream Flow Recommendations Lower Gunnison](#). Burdick.
- [2008 - Biological Assessment, Aspinal Unit \(Gunnison River\)](#). Reclamation.
- [2009 - Gunnison River Biological Opinion](#)

Dolores River; McPhee Dam; tributary of Colorado River; Colorado and Utah.

- [1980 - Biological Opinion, Dolores River Project](#)

GREEN RIVER AND ITS TRIBUTARIES

Flaming Gorge Dam; Green River; Wyoming and Utah

- [1992 - Biological Opinion, Flaming Gorge Dam](#)
- [2005 - Biological Opinion Technical Appendix, Flaming Gorge Dam](#)
- [2005 - Biological Opinion; Flaming Gorge Dam](#)
- [2008 - Record Of Decision Lower Duchesne Wetlands Mitigation Project](#)
- [2010 - Biological Assessment, Green River Pumping Project](#). Reclamation.
- [2010 - Biological Opinion of Green River Pumping Project](#). USFWS.

Yampa River; tributary of Green River; Colorado and Utah.

- [2005 - Biological Opinion, Yampa River](#)

Duchesne River; tributary of Green River; Utah.

- 1998 - Biological Opinion ?
- [2005 - Update of Biological Opinion](#)

SAN JUAN RIVER

Navajo Dam; above Lake Powell; Colorado, New Mexico and Utah.

- [1999 - Flow Recommendations for San Juan River](#)
- [2006 - Biological Opinion, Navajo Dam](#)
- [2009 - BiOp for Desert Rock Energy Project](#)

MAIN STEM COLORADO RIVER

BELOW GLEN CANYON DAM

Glen Canyon Dam; Colorado River; Utah and Arizona

- [1994 - Biological Opinion, Glen Canyon Dam](#)
- [1995 - Memo in response to 1994 BiOp. Reclamation.](#)
- [1997 - Biological Opinion, Glen Canyon Dam](#)
- [1997 - Biological Opinion Fall GCD Test Flow](#)
- [2002 - Biological Opinion, Glen Canyon Dam](#)
- [2004 - Biological Opinion, Glen Canyon Dam](#)
- [2005 - Biological Assessment, Grand Canyon National Park](#)
- [2006 - Experimental Flow Options, Glen Canyon Dam](#)
- [2008 - Biological Opinion, Glen Canyon Dam](#)
- [2008 - Abundance Trends & Status of LCR Population of HBC with data from 1989 to 2006. Coggins.](#)
- [2009 - Abundance Trends & Status of LCR Population of HBC with data from 1989 to 2008. Coggins.](#)
- [2009 - Supplemental Biological Opinion Glen Canyon Dam](#)
- [2010 - Biological Opinion Glen Canyon Dam](#)
- [2011 - Biological Opinion Glen Canyon Dam \(HFE & NNFC\)](#)
- [2016 - Biological Opinion Glen Canyon Dam](#)

Hoover Dam; Colorado River; Nevada and Arizona

- [2001 - Biological Opinion, Surplus Criteria](#) (affects Glen Canyon Dam operations)
- [2007 - Biological Opinion, "Shortage Criteria" \(Interim Guidelines\)](#) (combines Surplus and Shortage criteria & affects Glen Canyon Dam operations)

Lower Colorado River (below Hoover & Davis dam complex)

- [2002 Biological Opinion Mead to Southern International Boundary](#)
- [2002 - Biological Opinion, Lower Colorado River](#)
- [2005 -Biological Conference Opinion LCR MSCP](#)
- [2005 - Biological Opinion, Multiple-Species Conservation Program](#)

BELOW HOOVER DAM AND DAVIS DAM

Arizona and Californis

- [1997 - Biological Opinion, Lower Colorado River](#)

Gila River and Salt River; New Mexico and Arizona

- [1994 Biological Opinion CAP Water in Gila River Basin](#)
- [1996 - Biological Opinion of Modified Roosevelt Dam](#)
- [1999 - Draft Biological Opinion Gila Topminnow Santa Cruz River Basin](#)

SIGNIFICANT PROGRESS REPORTS

- [1992 - SP Memo](#)
- [1995 - SP Memo](#)
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- [2015 - Revised Stocking Plan For RS & BTC](#)
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- [2018 - Colorado River Sufficient Progress Memo](#)

FLOW RECOMMENDATIONS

- [Official USFWS Website\](#)

Green River (Flaming Gorge Dam to confluence with Colorado River)

- [2000 - Flow and Temperature Recommendations for the Endangered Fishes of Green River Downstream of Flaming Gorge Dam.](#)
- [2007 - Green River Study Plan](#)
- [2011 - Aspinall Study Plan](#)

Yampa River (major tributary of Green River)

- [1988 - Yampa River flow study](#)
- [1990 - Yampa River streamflow needs](#)
- [1995 - Yampa River Flow Recommendation](#)
- [1999 - Yampa River Study](#)
- [2000 - Flaming Gorge Dam Flow Recommendations](#)

White River (major tributary of Gree River below Yampa River)

- [2000 - White River Study](#)
- [2002 - White River Flow Recommendations.](#) Schmidt.
- [2004 - White River Base Flow Study & Appendices](#)

Duchene River (major tributary below White River)

- [2003 - Duchesne River Final Report](#)
- [2003 - Duchesne High Flow Report](#)
- [2013 - Duchesne Progress Report](#)

Price River (major tributary below White River)

- [2012 - Price RiverFlow Recommendation](#)

San Rafael River (last major tributary and below Price River)

COLORADO RIVER (above Lake Powell)

Gunnison River (major tributary of the Upper Colorado River)

- [1995 - Colorado River 15 mile reach study](#)
- [1997 - Instream Flow Recommendations Lower Gunnison](#)
- [2001 - Colorado River Rifle to Palisade Recommendation](#)
- [2003 - Gunnison and Colorado River Flow Recommendation](#)
- [2011 - Aspinall Study Plan](#)

San Juan River (terminates into Lake Powell)

- [1999 - San Juan River flow reccomendation](#)
- [2003 to 2012: Principles for Implementation of Recommendations for San Juan River Operations and Administration. Navajo Nation et al.](#)

FIVE YEAR REVIEWS

- [2011 - Humpback chub 5-year review](#)
- [2011 - Colorado pikeminnow 5-year review](#)
- [2012 - Bonytail chub 5-year review](#)
- [2012 - Razorback sucker 5-year review](#)

RECOVERY GOALS

- [1990 - Humpback Chub](#)
- [2002 - Colorado pikeminnow](#)
- [2002 - Humpback chub](#)

- [2002 - Bonytail chub](#)
- [2002 - Razorback sucker](#)

DESIGNATED CRITICAL HABITATS

- [Federal Register](#)
- [Overview by Maddux et al.](#) 1993.
- Green River from Gates of Lodore (Dinosaur National Monument) to the Colorado River confluence, Colorado and Utah.
- Yampa River in Dinosaur National Monument, Colorado.
- White River from Rio Blanco Lake Dam to the Green River confluence, Colorado and Utah.
- Duchesne River from river mile 2.5 to Green River Confluence, Utah.
- Colorado River from Colorado River Bridge (I-70, exit 90 in Rifle) to North Wash (Lake Powell), Colorado and Utah.
- Gunnison River from the confluence of the Uncompahgre River to the Colorado River confluence, Colorado.
- San Juan River from State Route 371 Bridge (Farmington) to Neskahai Canyon (Lake Powell), New Mexico, Colorado and Utah.
- Colorado River from confluence of Paria River to Imperial Dam, Arizona, Nevada and California.
- Little Colorado River from river mile 8 to Colorado River confluence.
- Gila River from New Mexico border to Coolidge Dam, Arizona.
- Salt River from Highway 60 Bridge to Roosevelt Diversion Dam.
- Verde River from boundary of Prescott National Forest to Horseshoe Dam.

Note: Includes 100-year river floodplain and full pool elevation of reservoirs. Lake Powell is not critical habitat except for the uppermost arms of San Juan and Colorado rivers. Total river mileage is 1,980.

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- [2003 - A Conservation Plan for Native Fishes of the Lower Colorado River.](#)
[Minckley et al.](#)

Gila River Basin

- [2003 - Part One: Status Report of Listed Arizona Fishes in Gila River Basin With Recommendations for Recovery.](#) Desert Fishes Team.
- [2003 - Part Two: Status Report of Listed Arizona Fishes in Gila River Basin With Recommendations for Recovery.](#) Desert Fishes Team.
- [2003 - Part Three: Analysis of Recovery Plan and Implementation for Threatened and Endangered Fish in the Gila River Basin.](#) Desert Fishes Team.

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- [1994 - Designation of critical habitat in Colorado River Basin](#)
- Colorado pikeminnow - March 11, 1967 (32 FR 4001)
- humpback chub - March 11, 1967 (32 FR 4001)
- bonytail chub - April 23, 1980 (45 FR 27713)
- razorback sucker - October 23, 1991 (56 FR 54957)

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- [1998 - Geomorphology and endangered fish habitats of the upper Colorado River.](#) Vanstetter.
- [1998 - Status and Trends of Colorado Pikeminnow.](#) Osmundson et al.
- [2001 - An Evaluation of the Role of Tributaries for the Recovery of Endangered Fishes in the Upper Colorado River and Recommendations for Future Recovery Actions.](#) Tyus and Saunders.
- [2001 - Comments on the recovery goals for endangered fish.](#) Coggins and Gloss; GCMRC.
- [2003 - Populations Estimates for Chubs in Westwater Canyon.](#) Utah Division of Wildlife.
- [2006 - Upper Colorado River Endangered Fish Populations.](#) UCR Recovery Program.
- [2007 - Utah conservation plan for threatened fish species.](#) Utah Division of Wildlife.

Colorado River Mainstem

- 2005 - [Predatory Fish Removal and Native Fish Recovery in the Colorado River Mainstem.](#) Mueller.

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Gunnison River

- [1997 - Instream Flow Recommendations Lower Gunnison](#). Burdick.
- [2007 - Analysis of Dissolved Selenium](#). Thomas, et al.

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- [1992 - Dolores River Native Fish Habitat Study](#). Valdez, et al.

Green River

- 1962 - The Rotenone Project (native fish genocide). Halverson.
- [2000 - Effects of Tusher Wash Diversion Dam on Native Fish](#). Utah Division of Wildlife.
- [2002 - Status of Wild Razorback Sucker in Green River](#). Bestgen.
- [2006 - Annual report of operations at Flaming Gorge Dam](#)
- [2007 - Green River Study Plan](#)
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- [2010 - Analysis of Tusher Wash Diversion Dam](#)
- 2018 - Humpback Chub 5-year Review (extirpation in Dinosaur NM). USFWS.

Yampa River

Canyonlands (Southeast Utah Group)

- [1990 - Endangered Fish of Cataract Canyon](#). Valdez.
- [1999 - Driftwood: an alternative habitat for macroinvertebrates in a large desert river](#). Haden et al.
- [1999 - Movement patterns, behavior, and habitat use of razorback sucker stocking into the Green River at Canyonlands National Park, Utah](#). Foster et al.
- [2000 - Spatiotemporal Variation in Length-Weight Relationships of Endangered Humpback Chub for Conservation and Management](#). Meretsky et al.
- [2003 - Benthic Community of Colorado River in Canyonlands](#). Haden.
- [2008 - Population Estimates for Humpback Chub in Cataract Canyon 2003-2005](#). Badame.

Glen Canyon National Recreation Area (Lake Powell)

San Juan River

- [1996 - Colorado Pikeminnow Distribution and Movement](#). Ryden.

Grand Canyon

- [1994 - Management of Discharge, Temperature, and Sediment in Grand Canyon for Native Fish](#). Clarkson et al.
- [1996 - Organic Drift In Regulated Desert Rivers](#). Shannon.
- [1997 - Habitat Relationships of Subadult Humpback Chub in the Colorado River through Grand Canyon](#). Converse et al.
- [1998 - Algal Ecology Tailwater below GC Dam](#). Blinn.
- [1999 - Response Benthose Organic Drift to Controlled Flood](#). Blinn.
- [2000 - Spatiotemporal Variation in Length-Weight Relationships of Endangered Humpback Chub for Conservation and Management](#). Meretsky et al.
- [2000 - Reservoir River Linkages Colorado River below GC Dam](#). Benenati.
- [2000 - Leaf Breakdown Regulated Colorado River](#). Pomeroy.
- [2001 - Drifting Particulate Matter Below GC Dam](#). Benenati.
- [2002 - Monitoring and Research: The Aquatic Food Base in the Colorado River, Arizona During 1991-2001](#). Benenati et al.
- [2004- Evidence for the failure of the modified low fluctuating flow](#). Korman et al.
- [2005 - State of the Colorado River in Grand Canyon](#). US Geological Survey.
- [2007 - Abundance Trends and Status of the Little Colorado River Population of Humpback Chub: An update Considering 1989 - 2006 Data](#). Coggins.
- [2009 - List of extirpated species in Grand Canyon](#)
- [2010 - Colorado River Fish Monitoring in Grand Canyon 2000 - 2009](#). USGS.
- [2011 - Analysis of the 2000 low steady flow](#). Ralston.
- [2013 - Grand Canyon & Glen Canyon Comprehensive Fisheries Plan Environmental Assessment & FONSI, Lower Colorado River](#)
- [1999 - First Meeting of Lower Colorado Recovery Implementation Plan by the Scientific Work Group \(RIP SWG\)](#).
- [2003 - Salton Sea Study Status Report](#)
- [2002 - Lost, a desert river and its native fishes: A historical perspective](#). Mueller and Marsh. US Geological Survey.
- [2000 - Summary Salton Sea Restoration Project Draft EIS EIR](#)

Multiple Species Conservation Program

- 2006 - [LCR MSCP Final Fish Augmentation Plan](#)
- 2006 - [LCR MSCP Draft Guidelines Potential Conservation Area](#)
- 2005 - [LCR MSCP Section 10 Permit](#)
- 2005 - [LCR MSCP Implementing Agreement](#)
- 2005 - [LCR MSCP Funding Management Agreement](#)
- 2004 - [LCR MSCP Habitat Conservation Plan](#)
- 2004 - [LCR MSCP Final BA](#)
- 1997 - [MSCP Joint Participation Agreement](#)
- 1997 - [Modification of LCR MSCP Agreement](#)
- 1996 - [LCR MSCP Agreement](#)
- 1996 - [Amendment 2 LCR MSCP Agreement](#)
- 1996 - [Amendment 1 to LCR MSCP Agreement](#)
- 1995 - [MOU for Development of LCR MSCP](#)

Salton Sea

- [2000 - Salton Sea FEIS. USBR.](#)
- [2005 - Salton Sea Pilot Project EA & FONSI. USBR.](#)

Gulf of California, Delta and Limitrophe

- [Vaquita Porpoise](#)
- [Totoaba](#)
- [2005 - Yuma Desalting Plant Cienega De Santa Clara Workgroup Report](#)
- [2001 - Colorado River Delta Binational Symposium](#)

GRAPHICS

- [Pie chart of fish communities in Grand Canyon. USGS.](#)

INVENTORY

- [1975 - At confluence of major tributaries in Grand Canyon](#)
- [1982 - Colorado River Fishery Project](#)

PHOTOS

- Colorado squawfish (*Ptychocheilus lucius*) ([photo](#))
- humpback chub (*Gila cypha*) ([photo](#)) ([close-up](#) not public domain)
- bonytail chub (*Gila elegans*) ([photo](#))
- razorback sucker (*Xyrauchen texanus*) ([photo](#))

Photos for detailed identification

- [Bluehead sucker](#)
- [Flannelmouth sucker](#)
- [Colorado Pikeminnow](#)
- [Razorback sucker](#)
- [Roundtail chub](#)
- [Young humpback chub](#)

PRESS

- [2010 - One tough sucker](#). High Country News.

UPPER COLORADO RIVER RECOVERY & IMPLEMENTATION PROGRAM (RIP)

- [HOME PAGE](#)
- [1987 - Environmental Assessment](#)
- [1988 - Cooperative Agreement Recovery Implementation Program Upper Colorado River Basin](#)
- [2001 - Extension Upper Colorado River Basin Cooperative Agreement](#)
- [2009 - CoOp Agreement Extension](#)
- [Revised Sufficient Progress Process Format](#)

SAN JUAN RIVER BASIN RECOVERY & IMPLEMENTATION PROGRAM

- [HOME PAGE](#)
- [1992 - Cooperative Agreement San Juan River Basin Recovery Implementation Program](#)
- [2006 - Extension San Juan River Cooperative Agreement](#)

FISH SPECIES

Razorback Sucker

- [2018 -Species Status Assessment Report for the Razoback Sucker](#). USFWS.
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- 2008 - [Active Adaptive Management for Conservation of Native Fish in Grand Canyon](#). Coggins.
- 2007 - [Water availibility from Flaming Gorge Reservoir](#). Reclamation.
- 2006 - [LCR MSCP Final Fish Augmentation Plan](#)
- 2006 - [LCR MSCP Draft Guidelines Potential Conservation Area](#)
- 2005 - [Yuma Desalting Plant Cienega De Santa Clara Workgroup Report](#)
- 2005 - [LCR MSCP Section 10 Permit](#)
- 2005 - [LCR MSCP Implementing Agreement](#)
- 2005 - [LCR MSCP Funding Management Agreement](#)
- 2004 - [LCR MSCP Habitat Conservation Plan](#)
- 2004 - [LCR MSCP Final BA](#)
- 2003 - [Salton Sea Study Status Report](#)
- 2001 - [Colorado River Delta Binational Symposium](#)
- 2000 - [Summary Salton Sea Restoration Project Draft EIS EIR](#)
- 1997 - [MSCP Joint Participation Agreement](#)
- 1997 - [Modification of LCR MSCP Agreement](#)
- 1996 - [LCR MSCP Agreement](#)
- 1996 - [Amendment 2 LCR MSCP Agreement](#)
- 1996 - [Amendment 1 to LCR MSCP Agreement](#)
- 1995 - [MOU for Development of LCR MSCP](#)
- 1994 - [Substantiating Report of Glen Canyon Dam with Fish and Wildlife Coordination Act](#)

A CHRONOLOGY OF PUBLIC COMMENTS (under construction)

- [2000 - Scoping Comments on EIS for Flaming Gorge Dam](#). Living Rivers.

- [2001 - Comments on Recovery Goals for the Colorado River Endangered Fish.](#) GCMRC.
- [2001 - Comments on Recovery Goals for Colorado River Endangered Fish.](#) Living Rivers et al.
- [2002 - Letter to department of Interior demanding action on restoration of Grand Canyon.](#) Living Rivers.
- [2002 - DEIS: Navajo Dam.](#) Living Rivers
- [2003 - Concerns regarding Glen Canyon Dam Adaptive Management Program.](#) Living Rivers.
- [2004 - Scoping Comments for Environmental Impact Statement for the Aspinall Unit of the Gunnison River.](#) Living Rivers.
- [2004 - Calling for SEIS on Glen Canyon Dam.](#) Living Rivers.
- [2004 - Demanding BuRec action to correct failing federal program to recover Grand Canyon native fish.](#) Living Rivers.
- [2004 - DEIS: Flaming Gorge Dam.](#) Living Rivers.
- [2007 - EIS: Long-Term Experimental Plan.](#) Living Rivers.
- [2008 - LR comments on EA for operations at Glen Canyon Dam 2008-2012.](#) Living Rivers.
- [2009 - DEIS: Aspinall Unit.](#) Living Rivers.

Additional reading

- [1962 - The Rotenone Project](#) (native fish genocide). Halverson.
- Click [here](#) to view bibliographies of endangered fish research
- [List of extirpated species in Grand Canyon.](#) 2009.
- Gulf of California endangered species:
Vaquita Porpoise
Totoaba
- Case Study of the Endangered Fish Recovery Program of the Upper Colorado River. Karen Hopgl; John Hamill;
- [Collaborative Management of Glen Canyon Dam: The Elevation of Social Engineering over Law.](#) Joseph M. Feller.
- [Desert Fishes Council](#)
- [Resolutions](#) (including ESA reform). Colorado River Water Users Association (CRWUA).
- [Selenium Effects on Endangered Fish in the Colorado River Basin](#)
- [Southwest Hydrology: Endangered Species Act](#)

- [2008 testimony from Reclamation Commissioner](#)
 - [Undamming Glen Canyon: Lunacy, Rationality, or Prophecy](#). Scott Miller.
-



USGS photo, circa 1925. Drilling crew examining bedrock at constricted Boulder Canyon. Note high water scour line 80 feet above low water level.

Floods

"Reservoir management is how to mitigate a flood, not a spillway."

Paraphrasing a report authored by Elwood Mead, Commissioner of Reclamation

"Do what we will, the Colorado will one day find an unimpeded way to the sea."

Donald Worster

FLOODING: studies and observations about the frequency and magnitude of paleo and historic regional floods (snow melts, atmospheric rivers and cloudbursts), and the catastrophic impact to the engineered hydraulic works of the Colorado River Basin that is inevitable as flood control capacities are compromised by sediment fill in reservoirs and the aging of infrastructure.

- [2008 - Paleoflood Hydrology: Origin, Progress, Prospects](#). Baker.
- [2020 - Quantitative Paleoflood Hydrology](#). Benito, Harden & O'Conner.

- [2020 - Bibliography: Paleoflood Hydrology](#). Benito. Benito, Harden & O'Conner.
- [2021 - Historical Paleoflood Analyses for Probabilistic Flood-Hazard Assessments: Approaches and Review Guidelines](#). Harden.

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- [2023 - The Trillion Gallon Question: What If Californias Dams Fail?](#) By Christopher Cox for The New York Times.

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- [Magnitude of paleofloods \(Paleoflood reserach & documents\)](#)
- [Photo of slackwater deposits with legend. Moab site.](#)
- [Photo of slackwater deposits with legend of flow in cubic meters per second. Moab site.](#)
- [Graphics of slackwater deposits; 3 pages: OSL dates, cross-sections and river profile. Moab site.](#)
- [Timescale of Atmospheric River Events in Central Valley, CA](#)
- [Minimum Required Colorado River System Storage Space](#)
- [Minimum Flood Control Releases at Hoover Dam](#)
- [Notable Floods above Hoover Dam](#)
- [Contents of major dams \(including dead pool capacity\) above Hoover](#)
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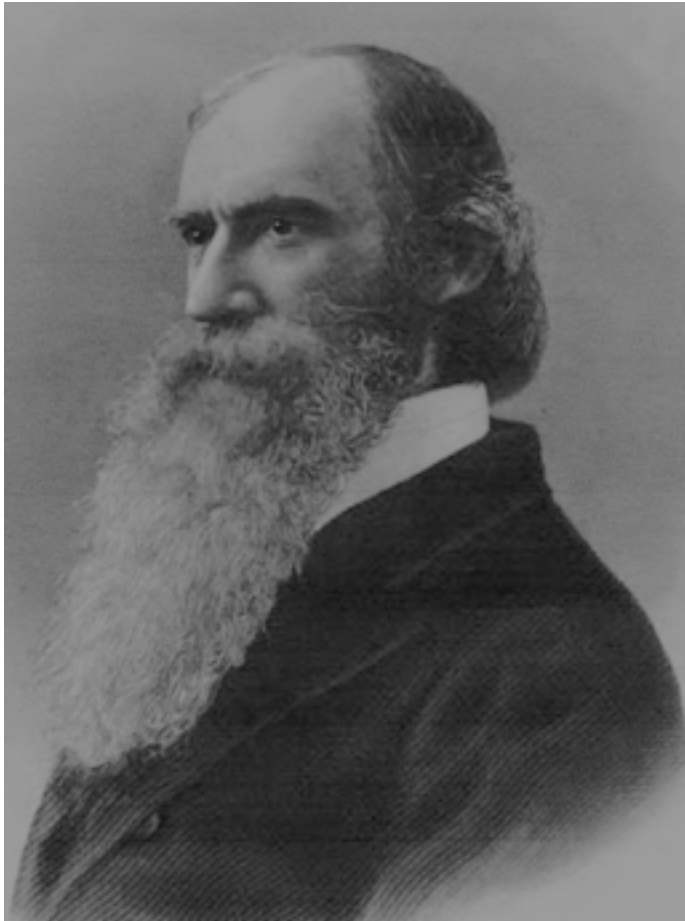
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Geology



Many of the pioneering geologists of the 19th Century made their mark in the Colorado River Basin. For example, John Wesley Powell, Grove K. Gilbert, Clarence Dutton, and Charles Walcott. Two of these scientists would become directors of the US Geological Survey. However, John Strong Newberry was the first to describe the Grand Canyon geologically in 1858 and the first to intentionally, though unsuccessfully in 1859, acquire the latitude and longitude of the confluence for the Colorado and Green rivers, which is a feature in Canyonlands National Park. In fact, the name "Colorado Plateau" is attributed to Newberry. Other achievements for Newberry include becoming a charter member of the National Academy of Sciences and a president at Columbia University.

John Strong Newberry

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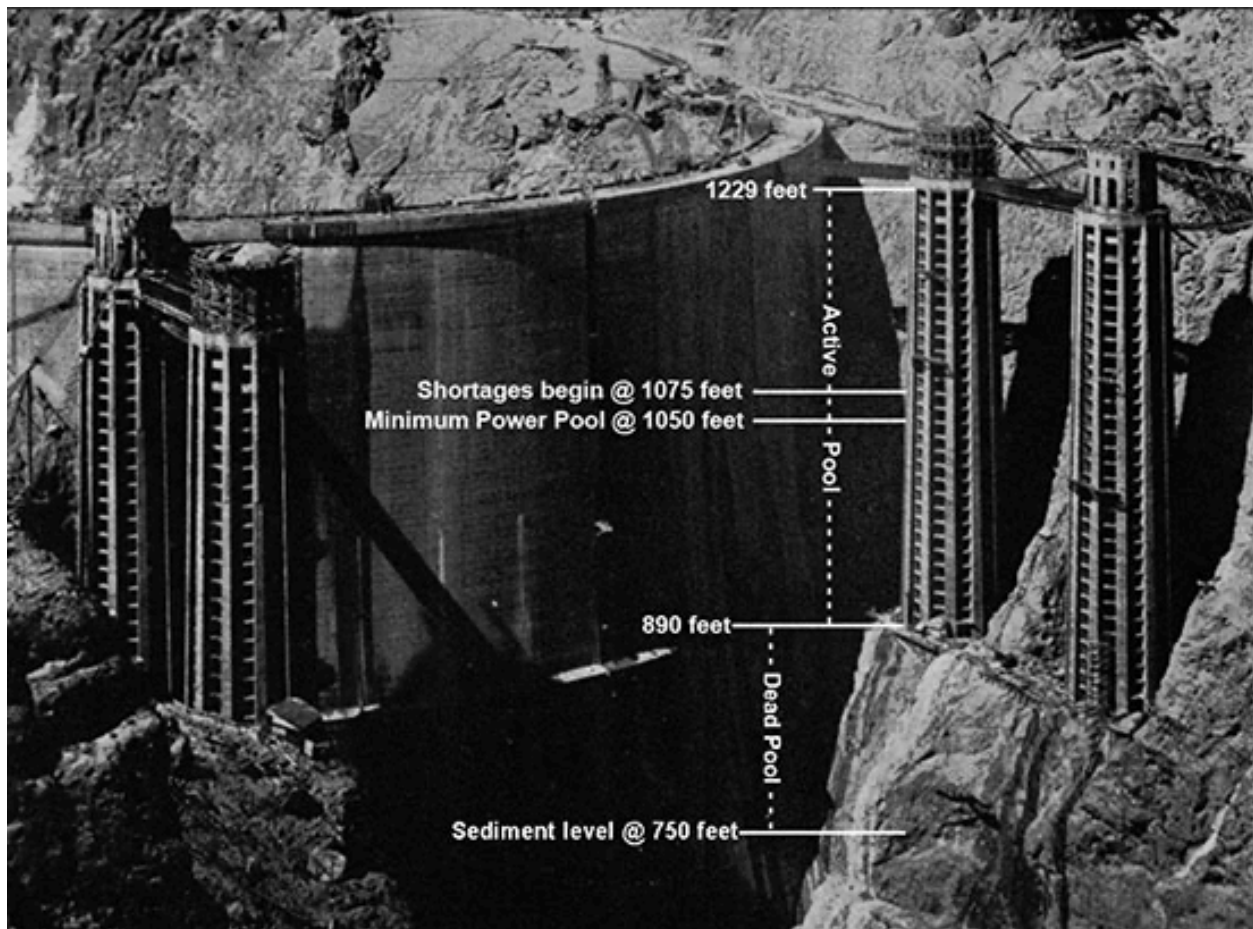
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See also [Hydrology section](#)

Graphics



Hoover Dam: important elevations as of December 2007.

The following are visual graphics to aid our understanding of managing the Colorado River Basin.

-
- [Aerial photo of Lake Mead @ Hoover Dam at low reservoir level in 2018.](#) Reclamation.
 - [Aerial photo of Lake Mead @ Hoover Dam in 2015 when the reservoir elevation was about 1075 feet.](#) Reclamation.
 - For photos, see our [gallery](#)
 - [USGS photo library](#)
-

- [How Bad is it?](#) A look at the conditions of Lakes Mead and Powell as of January 1, 2019
- Reclamation's [Five-year Projection of Reservoir Conditions](#)
- Drought Contingency Planning: [Trigger elevations at Lake Mead and corresponding water shortage amounts](#)
- Congressional Research Service: Drought Contingency Planning (May, 2019)
 - [Figure 1: Areas That Import Colorado River Water](#)
 - [Figure 1.10: Tribal Water Rights and Diversions](#)
 - [Figure 2: Colorado River Basin Allocations](#)
 - [Figure 3: Lake Powell Mead Storage Inflows](#)
 - [Figure 4: Lower Basin States ICS balance 2010 to 2017](#)
 - [Table 2: Basin Water Curtailment Volumes By Agreement](#)
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- [Past Climates Inform Our Future Graphic & Article](#)
- [Cenozoic Global Reference Benthic Foraminifer Carbon and Oxygen Isotope Dataset & Article](#)

ON THE COLORADO

Transbasin Diversions

- [Transbasin Diversion Assessment 1994 to 2015](#)

Consumptive Uses

- [Supply & Demand Comparison of Colorado River Basin](#). 1923 to 2016.
- [Upper Basin consumptive use percentages](#)
- [Upper Basin percentages adjusted for 20% reduction in supply](#)

Leakage below Glen Canyon Dam

- [Tally: leakage/seepage; around/through; Glen Canyon Dam](#). John Weisheit, 2023.

Streamflow

- Reservoir capacity from 1980 to 2018 ([graph](#)); ([spreadsheet](#))
- [Decline of the 30-year Mean of Unregulated Flows into Lake Powell](#)
- [Unregulated FLOW Into Lake Powell](#) (2000 to 2016)
- [Annual yield summary of Colorado River](#)
- [Lake Powell Inflow and Glen Canyon Dam Outflow, 2000 to 2016](#)
- [Lake Powell Inflow 1964 to 2009](#)
- [Natural flow in various watersheds of the Colorado River Basin in MAF](#).
- [Comparing "Critical Periods:" 1953 - 1964 & 2000 - 2013](#)
- [Natural flow @ strategic USGS gages](#)
- [100-year trend of Colorado River annual flow](#)
- [Instrument data \(1906-2008\) of natural flow @ Lee's Ferry](#)
- [Natural flow last 50 years](#)
- Tree-ring record by century & in million acre-feet from David Meko ([data](#)): 8th (partial); 9th; 10th; 11th; 12th (MegaDrought); 13th; 14th; 15th; 16th; 17th; 18th; 19th; 20th;

Flooding

- [Converting cfs to acre-feet by hour, day, week and month](#)
- [Estimated Year and Maximum Flow at Moab Paleoflood Research Site](#)
- [Flood peaks for 100-yr, 500-yr, 1000-yr & probable maximum in CFS](#)
- [Historic and Paleo Flood Peaks by Century](#)
- [Magnitude of paleofloods \(Paleoflood reserach & documents\)](#)
- [Photo of slackwater deposits with legend](#). Moab site.
- [Photo of slackwater deposits with legend of flow in cubic meters per second](#). Moab site.
- [Graphics of slackwater deposits; 3 pages: OSL dates, cross-sections and river profile](#). Moab site.
- [Timescale of Atmospheric River Events in Central Valley, CA](#)

- [Graphic designer's conceptual image of 1 million cubic feet per second flowing over the crest of Hoover Dam after Glen Canyon Dam failure.](#)

Hydropower

- [Reservoir Elevation and Efficiency at Hoover Dam and Glen Canyon Dam](#)

Sediment

- [Annual sediment inventory of Colorado River](#)
- [Colorado River sediment fill at Hite Marina, Lake Powell](#)
- [Lake Powell delta: river mobilization of sediment amounts 2002-2004](#)

Evaporation

- [Colorado River Basin Evaporation](#). 1971 to 2007 averaged.

Glen Canyon Dam Operations

- [Annual Average Release From Glen Canyon Dam](#)
- [Grand Canyon beach erosion from Glen Canyon Dam operations](#)
- [Flow regime in Grand Canyon 1964-1965](#) (sediment scour event)
- [Leakage At Glen Canyon Dam](#)

Lake Powell Elevations

- [Glen Canyon Dam @ dead pool](#)
- [Glen Canyon Dam @ minimum power pool](#)
- [Lake Powell Reservoir Contents By Percentage](#)

Hoover Dam Operations

- [Historic flow at Hoover Dam Site 1906 to 2013](#)
- [Comparing Reclamation modeling for Lake Mead with actuals](#)

Lake Mead Elevations

- [Strategic reservoir elevations @ Hoover Dam intake towers](#)
- [Lake Mead sediment storage according to pool](#)

Colorado River Augmentation

- [World desalination capacity compared to Colorado River flow](#)

Hydropower

- [Glen Canyon Dam powerplant capacity and output by reservoir elevation. Argonne.](#)
- [Annual hydropower production of Colorado River](#)
- [Electricity use per capita, per state](#)

Other

- [Beetle stress on tamarisk along river corridor near Moab, Utah](#)
- [Rivers, dams, reservoirs & hydropower](#)
- [Free-flowing river miles between dams](#)
- [Evaporation Lakes Powell & Mead by second, minute, day and year.](#)

Photos

- [Photo below Glen Canyon Dam.](#) Credit John Weisheit.
- [Photo Hoover Dam & Lake Mead at elev. 1100.](#) Credit John Weisheit.
- [Photo Hoover Dam & Lake Mead at elev. 1073.](#) Credit John Weisheit.

ARIZONA DEPARTMENT OF WATER RESOURCES OR CAP

- [Shortage sharing in percent for lower basin](#)
 - [Arizona & Nevads shortage budget](#)
 - [CAP Delivery Priorities](#)
 - [Projected Lake Mead Elevation by 2019 at 8.23 Release.](#) CAP.
 - [Lake Mead Budget.](#) CAP.
 - [Arizona's Annual Water Budget](#)
-

BUREAU OF RECLAMATION

Temperature and Precipitation

- [The most useful graphic from the Final EIS of 2007 Interim Guidelines](#). Lake Mead scenarios that challenge water delivery and hydropower operations; Colorado River System Simulation (CRSS); baseline data is the hydrologic record of the 20th century; three traces juxtaposed with the 10th, 50th and 90th percentiles, under No Action Alternative (business-as-usual) and to Year 2060. And here is the [Lake Powell graphic](#) which indicates scenarios of serious flood control challenges and hydropower curtailments.
- [CR basin temperatures 1895 - 2006](#)
- [UB Precipitation 1895 - 2006](#)
- [Temperature departures from 1895 - 2000 average](#)
- [Inflow of Lake Powell: breakdown by tributary](#)
- [Lake Powell Volume to Elevation Comparison](#)
- [Reservoir physical and biochemical processes](#)

Water Yield of Colorado River

- [Lower Basin Inflows from Glen Canyon to Hoover Dams](#)
- [Best available data as of 1922 Compact](#). Leopold and Prairie.
- [Natural flow @ Lee's Ferry 1896 to 1956](#). Leopold.
- [Instrument data \(1906-2008\) of natural flow @ Lee's Ferry](#). Prairie.
- [Natural flow @ Lee's Ferry 1906 to 2010](#)
- [Basin hydrology](#)
- [Upper Basin Depletion Schedule of 2007](#)
- [Upper Basin Depletion Schedule Revised in 2016 and 2017 Resolution](#). UCRC.
- [Lake Powell inflow since 2000](#)
- [Eleven-year inflow into Lake Powell](#)
- [Thirteen-year inflow into Lake Powell](#)

Flood Control

- [Minimum Required Colorado River System Storage Space](#)
- [Minimum Flood Control Releases at Hoover Dam](#)
- [Notable Floods above Hoover Dam](#)
- [Contents of major dams \(including dead pool capacity\) above Hoover](#)

Green River and Yampa River

- [Yampa River Historic Flow from 1922 to 2020](#)
- [Flaming Gorge Reservoir Historic Unregulated Inflow from 1963 to 2020](#)

Lake Powell or Glen Canyon Dam

- [54-year record of April to July unregulated flows into Lake Powell](#) (the mean is 7.16 maf)
- ["Trace 96" - Modeling persistent drought to 2020](#)
- [Trace 1, Trace 21 & Trace 48. Shortage Criteria FEIS.](#)
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- [GCD Annual Releases 1963 to 2011](#)
- [GCD Monthly and Annual Release Volumes 1970 to 1981](#)
- [Glen Canyon Dam important elevations](#)
- [Lake Powell operational tiers \(2007 ROD\)](#)
- [Lake Powell tier elevations in feet above sea level](#)
- [Lake Powell equalization tiers through 2026](#)
- [Lake Powell tiers in detail](#)
- [Important Elevations @ Glen Canyon Dam](#)
- [Schematic of penstock section @ Glen Canyon Dam](#)
- [Schematic of river outlets @ Glen Canyon Dam](#)
- [Schematic of spillway tunnel @ Glen Canyon Dam](#)
- [Schematic of the powerplant @ Glen Canyon Dam](#)
- [1982 - Range of powerplant efficiency with reservoir elevation](#)
- [1982 - Probabilities of Lake Powell Elevations \(to 2040\)](#)
- [1983 - Photo of "river left" spillway damage](#)
- [Photo of GC Dam penstock intakes](#)
- [Photo 01 of Penstocks & River Outlets before reservoir filling](#)
- [Photo 02 of Penstocks & River Outlets before reservoir filling](#)

Lake Mead or Hoover Dam

- [Tributary inflow Lake Mead](#) (below Glen Canyon Dam)
- [Hoover Dam important elevations](#)
- [Lake Mead surplus trigger elevations](#)

- [Lake Mead tier elevations in feet above sea level](#)
- [Longitudinal profile of sediment storage](#)
- [Shortage/surplus tiers @ Lake Mead](#)
- [Lake Mead elevation archive 1935-2010](#)
- [Water budget at Lake Mead](#)
- [Photo of Hoover Dam intakes](#)

Lakes Powell and Mead

- [State of Colorado River system 1999 - 2008](#)
- [State of Storage 1999-2009](#)
- [Lake Mead & Powell operations: trigger elevations](#)
- [April 2010 - State of the system](#)

Basin State Allocations & Consumption

- [Acre-foot description](#)
- [Hydrological assumptions of 1922 Compact](#). CRWCD.
- [Apportionments for USA and Mexico](#). SNWA.
- [Pie Chart of seven state allocations](#)
- [Upper Basin Depletion schedule](#)
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- [1906 to 2005 - Consumptive Use of Colorado River Basin](#)
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- [Apportions according to various flow scenarios](#)
- [Colorado River flow at Gulf of California](#)
- [Upper Basin consumptive use](#). CADWES.

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- [Historical Supply and Demand to 2005](#)
- [Supply & Demand Projection to 2060](#)
- [Historic consumption by basin](#)
- [Historic consumption by category](#)
- [Consumption for both basins and Mexico, 1906 to 2005](#) (no evaporation)

Lower Basin

- [Map: dams and diversions](#)

Project Inventory

- [Contents of major dams \(including dead pool capacity\) above Hoover](#)
- [Statement of Commissioner Connor](#)

Western Region Projects and Power Transmission Lines

- [1977 - Map: Reclamation Power Facilities](#)
 - [1977 - Map: River Basins and Reservoirs](#)
-

CALIFORNIA'S COLORADO RIVER BOARD

- [Monthly total Colorado River basin storage](#)

METROPOLITAN WATER DISTRICT of Southern California

- [MWD reservoir storage](#)
 - [MWD's 2014 Estimate of Colorado River Diversions](#)
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- [Colorado State Total Depletions](#). CRWCD (2019).
- [Colorado's Transbasin Diversions](#)
- [Colorado River annual yield at Lee's Ferry](#)
- [Lake Powell inflow & release](#)
- [Powell storage](#)
- [Salinity chart](#)
- [Lake Mead storage](#)
- [Hoover flows](#)
- [Estimated virgin flow at Lee's Ferry 1896 to 2004](#)
- [Tree ring inflow at Lee's Ferry](#)
- [Map of trans-mountain diversions and amounts](#)
- [Map of tran-basin diversions and amounts](#)

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- [Colorado temperature projections](#). Western Water Assessment.
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- [Oceanic Nino Index 1950 - 2015](#)
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- [1950 to 2018 - Cold and Warm Episodes](#)

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- [Map: Boundary that defines the Upper and Lower Divisions](#). Reclamation.
- [Map: Colorado River Service Areas \(high resolution\)](#). Reclamation.
- [Map of Colorado River Indian Tribes](#). Pontius.
- [Colorado River basin map](#). Pacific Institute.
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 - [Upper Colorado River \(Yampa & White\)](#) (17 dams)
 - [Gunnison & Dolores rivers](#) (11 dams)
 - [San Juan River](#) (5 dams)
 - [Central Utah](#) (11 dams)
 - [Central Utah Project](#)
 - [Nevada, SW Utah and NW Arizona](#)
 - [Salt River Project Service Area](#)
-

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- [Snowpack GIS](#)
 - [Snowpack of western region](#)
 - [Snowpack of Colorado River Basin](#)
 - [FTP site](#)
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- [Ten year average flow 2000 - 2009 \(Reclamation graphic\)](#)
 - [Fact sheet of basin](#)
-

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- [Colorado River basin fact sheet](#)
 - [Lake Mead dead pool sediment thickness \(cache\)](#)
 - [Colorado River flow trend @ Lee's Ferry](#)
 - [Lake Powell stratification profile and temperature](#)
 - [Lake Powell dissolved oxygen concentrations](#)
 - [1997 to 2008 power generation@ Glen Canyon Dam](#)
 - [Water per capita use in the Intermountain West](#)
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Groundwater

The Colorado River Basin drains parts of (Arizona, California, Colorado, New Mexico, Nevada, Utah, and Wyoming and is vital to (the economy, culture, and ecology of the region. Aquifers underlying the Colorado River basin provide, in addition to other uses, about 875,000 acre-ft per year of fresh water to the nearly 40 million inhabitants of the region and about 2 million acre-ft per year of fresh water to agriculture for irrigation. The U.S. Geological Survey, in cooperation with 12 stakeholders, monitors routine groundwater levels in about 110 wells and project-focused groundwater levels in another 330 wells throughout the Colorado River Basin to inform short and long-term water resource planning decisions.

- 431 wells with current water-level information
- 72 wells monitored continuously and data available online
- 25 wells monitored continuously, but data are not available online
- Longevity of Records, are as follows:
 - 213 - Number of wells with 10+ years of data
 - 16 - Number of wells with 50+ years of data
- 2018 Groundwater Levels are as follows:
 - 22 - Number of wells with record high levels
 - 102 - Number of wells with record low levels *based on 5+ years or more of data,

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- [A storied land: Tiyo and the epic journey down the Colorado River](#). Hopkins. **Professor Donald Worster**

BOATMAN'S QUARTERLY REVIEW

- [Kent Frost](#)
- [Ken Sleight](#)

CANYON LEGACY; MOAB MUSEUM

[#01-Survival Through Time in Canyonlands](#); [#02-Movie-Making 1949 to 1989](#); [#03-Movie-Making 1949 to 1989](#); [#04-Canyonlands National Park](#); [#05-River History of the Colorado Plateau](#); [#06-Extinct Species of Canyon Country](#); [#07-Recent Archeological Discoveries](#); [#08-Trains, Planes and Automobiles](#); [#09-Exploreres and Expeditions](#); [#10-Riches from the Lands](#); [#11-Ranching and Cowboys](#); [#12-Dreams and Schemes](#); [#13-Geology of Canyonlands](#); [#14-Days of Discovery](#); [#15-The Law and the Lawless](#); [#16 - Canyon Country Rock Art](#); [#17-Controversies](#); [#18-Place Names](#); [#19-Civil Conservation Corps](#); [#20-Prehistory](#); [#21- Historic Buildings](#); [#22-INDEX.01](#); [#23-Desert Ecology](#); [#24-Geologists of the Colorado Plateau](#); [#25-Literature of the Canyons](#); [#26-La Sal Mountains](#); [#27-Matheson Wetland/Preserve](#); [#28-Myth Legend & Folklore](#); [#29-](#)

Book Cliffs; #30-Wings Over Canyonlands; #31-Building a Community; #32-Cataract Canyon; #33-Childhood Memories; #34-Ever-Changing Landscapes: Arches NP; #35-The San Rafael Swell; #36-A Tribute to Bridges; #37-The River: Lifeblood or Barrier; #38-Medical History; #39-Birds of Canyon Country; #40-INDEX.02; #41-Mountain Memoirs; #42-Uncompahgre Plateau; #43-Murder and Mayhem; #44-The River: Lifeblood or Barrier?; #45-Trails to Town: Cattlemen and Women; #46-Growing Up in Grand County; #47-Rugged Roads; #48-Native American Neighbors; #49-Our Visual Artists; #50-Ghosts of Grand County Northwest; #51-Ghosts of Grand County Northeast; #52-Ghosts of Grand County Southeast; #53-Old Spanish Trail; #54-Secrets of Navajo Sandstone; #55-Yesterday's Dinosaurs; #56-Uranium Part One; #57-Uranium Part Two; #58-Part Three; #59-Designs on the river; #60-Star Hall; #61-The old Mormon Church; #62-School to City Hall; #63-Grand Canyon Painting; #64-50th Anniversary; #65-The Daughters of Pioneers; #66-Seeking the Summits; #67-Moab Fire Department-; #68-Helen M. Knight; Canyon Legacy 69; Canyon Legacy 70; Canyon Legacy 71; #72-Biographies; #73-Living Legends; #74-Unique Histories; #75-Uranium Revisited; #76-Moab: Then and Now;

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The Confluence

- [Volumes 1 to 28 combined](#)
 - [Volume 29](#)
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Desert Magazine Archives

- [History of the magazine](#). Wikipedia
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By Title: Our total collection of Desert Magazine articles

- [19-Days on Utah Trails 1949, Oct](#)
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- [Dolores Rocks Where the River's Meet; 1950](#)
- [Down Utah's San Juan River; 1969](#)
- [Escalante When the Boats Would'nt Float; 1950](#)
- [Forgotten Trail of the Old West; 1950](#)
- [Glyph Hunters in Indian Country; 1946](#)
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- [Over the Top of Landscape Arch; 1958](#)
- [Porcupine Rim; 1977](#)
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By Subject: Our Collection of Desert Magazine articles
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- 1947 - [Zeke Johnson's Natural Bridges](#)
- 1949a - [19 days on Utah trails](#)
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- 1967 - [Utah's Canyonlands](#)
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Escalante Grand Staircase National Monument, Capitol Reef National Park, San Rafael Swell, Dirty Devil river and Robber's Roost

- 1943 - [Dirty Devil River](#)
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- 1948 - [Utah's incredible arch of stone](#)
- 1950 - [Dolores River: Rocks where the rivers meet](#)
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- [1931 - The Decree and Utah State Objections](#)
- [1930 - Riverbed Case Brief USA](#)
- [1929 - Riverbed Case Brief Utah](#)
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- [Testimony Abridged: Volume Two with Table of Contents](#) (searchable)
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- [Woolley Report](#)
- [F. L. Page Report](#)

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- [Back issues](#). CPRG Website.
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- [History of Duchesne County](#). Barton.
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- [History of Garfield County](#). Newell & Talbot.
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- [History of Morgan County](#). Smith.
- [History of Piute County](#). Newell.
- [History of Rich County](#). Parson.
- [History of Salt Lake County](#). Sillitoe.
- [History of Sanpete County](#). Antrei & Roberts.
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- [1933 - Rapids and Riffles by Harold Leich: A solo river trip from Grand Lake to Hite Crossing](#). **Note:** Only Chapters 15 to 22
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HYDROLOGY PART ONE

HYDROLOGY: the science dealing with continental waters, their occurrence, distribution and movements through the entire cycle of precipitation, evapotranspiration, atmospheric circulation, surface flow, and subsurface flow.

###

This section offers a broad analysis of sea level fluctuations, streamflow, drought, pluvials, atmospheric rivers, floods, sediment transport, historic and prehistoric climate, natural- and human-caused climate change, changes in sea-surface temperature (Pacific Decadal Oscillation (PDO), Atlantic Multi-decadal Oscillation (AMO), and El Niño & La Niña (ENSO).



E.C. LaRue measuring Deer Creek flow

- Please also visit sections entitled [Floods](#) and [Groundwater](#)
- [CLICK HERE](#) - to use Colorado River Open Source Simulator (CROSS) and determine your own analysis of what the Colorado River system of reservoirs will look like in a future.

THE URGENCY OF THE CLIMATE CRISIS

- [2024 - Earth at risk: An urgent call to end the age of destruction and forge a just and sustainable future.](#) PNAS.
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STUDENTS FOR RESEARCH

- [Home Page](#)
- [How Data Science Can Help Fight Climate Change](#)
- [Data Science Programs](#)
- [Tips about conserving our precious water resources.](#) California Degrees.

CENTER FOR CLIMATE INTEGRITY

- [Website](#)
- [A binder of documents about corporate deception toward climate change](#)

TRIBUTE TO ROGER R. D. REVELLE

- [1997 - Tribute to Roger Revelle and his contribution to studies of carbon dioxide and climate change](#). Munk.
- [Documentary about Roger Revelle](#). mp4.

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- The Last 2,000 years - [Global Average Temperatures](#); includes duration of "Medieval Warm Period" and "Little Ice Age"
- [1800 - Time lapse of temperature data filtered since 1800](#). Berkeley Physics Lab.
- [1807 - Humboldt's Tableau Physique Revisited](#). PNAS: Moret et al., 2019.
- [1823 - Isothermal Map](#). Humboldt. [More on Humboldt](#).
- [1896 - On the Influence of Carbonic Acid and Ground Temperature](#). Arrhenius.
- [1957 - Carbon Dioxide Exchange Between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO₂ during the Past Decades](#). Revelle.
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- [2023 - Global warming in figures and the question of its treatment: some historical and epistemological](#). Parrochia.

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- [2021 - Scripps Institute's Mauna Loa Observatory: Carbon Dioxide Peaks Near 420 Parts Per Million \(and still rising\)](#). NOAA.

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- National Academy of Sciences: [1977](#); [1979](#); [1983](#); [1991](#);
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- University of Arizona: [1979 - Stockton & Boggess](#)
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- The water cycle. NASA.
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- [Milankovitch Cycle \(orbital\)](#). NASA.
- Atmospher layers.
- Ocean layers.

SEA LEVEL RISE

- At the beginning of the 19th century, sea level was on a slow, downward trend. In the decade of the 1880s, the trend began to rise. At the beginning of the 21st century, the total rise in sea level was about 7 inches. As of 2024, the total rise in sea level since 1880 is about 10 inches. The projection for sea level rise at the beginning of the 22nd century is an additional 24 inches.
- If it takes 3 centuries to elevate the ocean 34 inches, than it will take 3 centures to lower the ocean by 34 inches.

THE PHILOSOPHY OF HYDROLOGY

Luna B. Leopold

- [Water and the Conservation Movement](#). Leopold.
- [A Reverence for Rivers](#). Leopold.
- [Ethos, Equity and the WaterResource](#). Leopold.
- [Luna Leopold: A bibliography](#)

Victor R. Baker

- [2017 - Debates--Hypothesis testing in hydrology: Pursuing certainty versus pursuing uberty](#). Victor R. Baker.
- Video - [Scientific Thinking to Remedy "Black Swans," "Wicked Problems," and Assorted Science / Policy Failures](#). Baker, 2017.

- [Powerpoint](#) & [archived here](#). Baker, 2017.

RECOMMENDED WEB SITES

- [Climate Change Effects: Proposed Actions Effects On Proposed Actions Under NEPA](#). Dinah Bear.
- [Climate Change: Statement of Geological Society of London](#)
- [Climate Change: Position of Geologic Society of America](#)
- [Climate Change: Position of American Geophysical Union](#)
- [Hydrology and Earth Sciences](#) (HESS)
- [U.S. Drought Portal](#); [Archive of Palmer Drought Severity Index](#).
- [NOAA Climate Services](#); [Upper Basin RISA](#); [Lower Basin RISA](#) & [here](#)
- [United States Global Change Research Program](#)
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- [Monitoring dust events in the Southwest](#)

OCEAN OSCILLATIONS

Atlantic Multidecadal Oscillation ([AMO](#))

Pacific El Nino Southern Oscillation ([ENSO](#))

- [International Research Institute for Climate and Society](#)
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- [2006 - Enfield](#)
- [2007 - Zhang](#)
- [2007 - Goodrich](#)

- [2007 - Timmerman](#)
- [2008 - HuFeng](#)
- [2008 - TeRaa](#)
- [2008 - Lu](#)
- [2009 - Guam & Nigam](#)
- [2010 - Ellis](#)
- [2010 - Feng](#)
- [2011 - Kucharski](#)
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- [1997 - North American Monsoon](#). Adams.
- [2004 - Low level circulation of the North American Monsoon as revealed by QuikSCAT](#). Bordoni.
- [2007 - Seasonal shifts in North American Monsoon](#). Grantz.
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- [Institutional Options ColoradoRiver](#)
- [Managing Colorado River Severe Sustained Drought](#)
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To Visit Hydrology Part Two [click here](#)

HYDROLOGY PART TWO

[Click here](#) to visit **HYDROLOGY PART I** (and for documents published before 2014)

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###

See also [Hydrology Part One](#)

Flood documents can be found [HERE](#)

HYDROPOWER (WAPA)

Hydropower Revenues and Funding Colorado River Basin Activities

Lower Basin

Hydropower revenues are used to finance a number of activities throughout the Colorado River Basin. In the Lower Basin, the Lower Colorado River Basin Development Fund collects revenues from the Central Arizona Project (CAP), as well as certain revenues from the Boulder Canyon and Parker-Davis Projects. These revenues are available without further appropriation toward defraying CAP operation and maintenance costs, salinity control efforts, and funding for Indian water rights settlements identified under the Arizona Water Settlements Act of 2004 (i.e., funding for water systems of the Gila River Indian Community and the Tohono O'odham Nation, among others). The Colorado River Dam fund utilizes power revenues generated by the Boulder Canyon Project (i.e., Hoover Dam) to fund operational and construction costs associated with that facility.

Upper Basin

In the Upper Basin, the Upper Colorado River Basin Fund collects revenues from the initial units of CRSP and funds operation and maintenance expenses, salinity control, the Glen Canyon Dam Adaptive Management Program, and endangered fish studies on the Colorado and San Juan rivers.

On The Colorado articles about hydropower: [click here](#) and [here](#)

HYDROPOWER REPORTS FROM WESTERN AREA POWER ADMINISTRATION (WAPA)

- [2013 - Combined](#)
- [2014 - Combined](#)
- [2015 - Combined](#)
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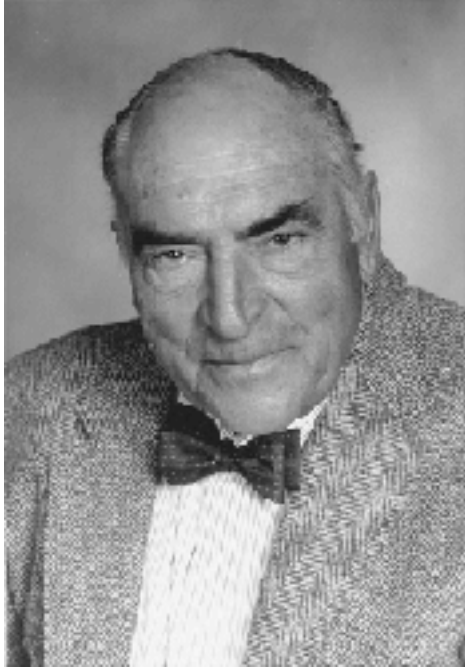
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Luna Leopold

INSTITUTIONS

The Colorado River basin is one of the most studied landscapes in the entire world. In addition to the work done by government agencies, there are public, private and quasi-governmental organizations that conduct research and/or archive this work, and in the many disciplines of physical and social sciences. These institutions are listed alphabetically by state.

[Click here](#) to learn more about Luna Leopold.

[To add an institution, please write to OTC](#)

FEDERAL

National Academy of Sciences: The National Academy of Sciences (NAS) is an honorific society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare.

- [Home page](#)
- [Proceedings of National Academy of Sciences](#) (PNAS)

National Research Council (NRC): functions under the auspices of the National Academy of Sciences. The mission of the NRC is to improve government decision making and public policy, increase public education and understanding, and promote the dissemination of knowledge.

- [NRC home page](#)
- [National Academy Press](#)

STATES

ARIZONA

[Arizona Power Authority](#)

The Arizona Power Authority, a body corporate and politic of Arizona, was formed as a result of federal legislation that allocated a portion of power produced from Hoover Dam and Power Plant.

[Arizona Water Institute](#)

Arizona State University, Northern Arizona University, and The University of Arizona have formed a partnership that will position the state as a world leader in water resources management and technology.

[Center for Climate Adaption Science and Solutions](#)

The Center for Climate Adaptation Science and Solutions brings together a wealth of expertise at the University of Arizona to support sound management choices in the context of this change, linking science, information needs of managers, and decision-making.

[Climate Assessment of the Southwest \(CLIMAS\)](#)

University of Arizona at Tucson. Established to assess the impacts of climate variability and longer-term climate change on human and natural systems in the Southwest. Our mission is to improve the ability of the region to respond sufficiently and appropriately to climatic events and climate changes.

[Colorado Plateau Digital Archive](#)

University of Northern Arizona at Flagstaff. The Cline Library provides a rich array of archival and published material which documents the history and development of the Colorado Plateau in a variety of disciplines.

- [Link to search engine](#)

[Colorado River Central Arizona Project Collection](#)

Arizona State University at Tempe. Records of the Central Arizona and Boulder Canyon Project, comprised of selections from the Carl T. Hayden Papers and other sources.

[Colorado River Energy Distributors Association](#) (CREDA) is a non-profit organization representing consumer-owned electric systems that purchase federal hydropower and resources of the Colorado River Storage Project (CRSP).

[Land Use History of the Colorado Plateau](#)

Northern Arizona University at Flagstaff. This bibliographic database helps natural resource managers, researchers, policy makers, students, and interested members of the public find more information about the land-use and land cover history of the Colorado Plateau.

[Nature, Culture and History at the Grand Canyon](#)

A Project of Arizona State University.

[Moving Waters](#)

Arizona Humanities Council. From December 2001 through July 2002, seven western humanities councils from seven states that share the Colorado River presented Moving Waters: The Colorado River and the West . The aim of the project was to generate regional consciousness of the river.

SHARA is at the University of Arizona at Tucson. To identify critical stakeholder-relevant knowledge gaps and conduct basin-focused multidisciplinary research to fill them; and to convey what is known and what is being learned to improve water management and policy.

- [Sustainability of semi-Arid Hydrology and Riparian Areas \(SAHRA\)](#)
- [Southwest Hydrology \(SAHRA publication\)](#)

Water Resources Research Center (WRRC)

University of Arizona. WRRC promotes understanding of critical state and regional water management and policy issues through research, community outreach and public education.

CALIFORNIA

[Water Resources Center Archives](#)

(WRCA) University of California at Riverside. Collects, preserves and provides access to historical and contemporary water-related materials that support the instructional and research programs of the University of California and the needs of the people of the State.

- [Clearing house for dam removal](#)

Water Education Foundation's Colorado River Project

(WEF) is an impartial non-profit organization to create a better understanding of water issues and help resolve water resource problems through educational programs.

- [WEF Blog Aquaformia](#)
- [Research and Publications](#)

COLORADO

[Center for Advancement Decision Support for Water and Environmental Systems](#)

(CADSWES) University of Colorado at Boulder. An interdisciplinary Center for the research and development of decision support tools for management of water and environmental resources.

[Colorado River Governance Initiative](#)

The purpose of the Colorado River Governance Initiative (CRGI) is to identify institutional reforms that can address the current and emerging concerns over water scarcity on the Colorado River. Publications of the Colorado River Governance Initiative are available in [Colorado River Information Portal](#) as well as in the [Getches-Wilkinson Center Collection](#).

[Colorado River Research Group](#)

The CRRG is a self-directed team of ten veteran Colorado River scholars. Each member has led a research program concerning water resources management, river science, or water law and public policy, or has written widely on these topics. The purpose of the CRRG is to provide a non-partisan, basin-wide perspective on matters pertaining to the Colorado River, helping all those with a stake in the river identify, justify and implement actions that sustainably meet society's demands for water while maintaining the distinct attributes of the Colorado River ecosystem. ([Publications](#))

[Water Resources Archive](#)

Colorado State University at Fort Collins. The Archive consists of collections from individuals and organizations that have been instrumental in the development of water resources in Colorado and the West.

[Western Water Assessment](#)

WWA) University of Colorado at Boulder. To identify and characterize regional vulnerabilities to climate variability and change, and to develop information, products and processes to assist water-resource decision-makers throughout the Intermountain West.

NEVADA

[Western Regional Climate Center](#) is one of six regional climate centers in the United States. The regional climate center program is administered by the National Oceanic and Atmospheric Administration. Specific oversight is provided by the National Climatic Data Center (NCDC) of the National Environmental Satellite, Data, and Information Service (NESDIS).

NEW MEXICO

[The Center for Southwest Research](#) (CSWR) supports the teaching and research missions of the University, as well as serving the citizens of New Mexico and scholars from throughout the world. Specializing in subjects relating to New Mexico, the Southwestern U.S., Mexico and Latin America, as well as rare books from around the world, our holdings are made up of the following collections:

UTAH

[Marriott Library](#) at University of Utah

- [Soundscape archive](#)

[Utah Water Users Association](#) is the largest active association in Utah which represents all water user entities including irrigators, municipal users, industry, federal, state, county and local agencies and private entities. The purpose of the Association is to protect water rights administered under state law, promote the conservation and efficient use of water, provide legislative support, sponsor workshops and seminars related to water issues, provide technical advice to members regarding all water matters and represent members on national water issues through the NWRA and other national

associations. The Association will be actively involved in future state and local water issues which benefit its members.

[Utah Associated Municipal Power Systems](#) (UAMPS) is a governmental agency that provides comprehensive wholesale electric energy, on a nonprofit basis, to community-owned power systems throughout the Intermountain West.

[Utah Libraries: Online Government Digital Photo Archives](#)

[Utah State History](#) helps people with historical research, building and community preservation issues, cultural resource management, archaeology, and teaching and learning history.

[Western Waters](#)

University of Utah at Salt Lake City. This regional program has digitized key materials from participating libraries to lay the foundation for continued development of a comprehensive digital information resource about water in the western United States.

OTHER

[Colorado River Research Group](#)

- The purpose of the CRRG is to provide a non-partisan, basin-wide perspective on matters pertaining to the Colorado River, helping all those with a stake in the river identify, justify and implement actions that sustainably meet society's demands for water while maintaining the distinct attributes of the Colorado River ecosystem.

[Colorado River Water Users Association](#)

Colorado River Water Users Association (CRWUA) is a non-profit, non-partisan organization, formed to plan, study, formulate and advise on ways to protect and safeguard the interests of all who use the Colorado River.

[Lamont-Doherty Earth Observatory](#)

Columbia University. Drought research in North America: a climate modeling and paleoclimate perspective.

[Making of America Books](#)

MOA is a digital library of primary sources in American social history primarily from the antebellum period through reconstruction. The collection is particularly strong in the subject areas of education, psychology, American history, sociology, religion, and science and technology. The book collection currently contains approximately 10,000 books with 19th century imprints.

[New York Public Library](#)

Archive for the [photos](#) and [papers](#) of Robert Brewster Stanton. The library also houses a digital collection of papers and photographs from [Frederick Dellenbaugh](#), among others.

Prism Group

University of Oregon. PRISM is a unique knowledge-based system that uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital grid estimates of monthly, yearly, and event-based climatic parameters.

Water Information Program of Southwest Colorado

The Water Information Program (WIP) is a public information program sponsored by the water districts, organizations and agencies in the San Juan and Dolores watersheds of Southwestern Colorado.

Western Progress

Western Progress envisions a West that honors the ideal of a more just society through opportunity, equity, freedom, independence and our shared love of place. Our mission is to advance progressive policy solutions across the eight-state Rocky Mountain Region.

Law of the River Part One

RESOURCES FOR JUDGES

- [The National Judicial College](#)
- [Dividing the Waters](#)

CLIMATE CHANGE LITIGATION DATABASES

- [Columbia Law School](#)



Commissioners of the Colorado River Compact

LEGAL FOUNDATIONS

[1848 - Treaty of Guadalupe Hildalgo](#)

[1922 - The Colorado River Compact](#). Dissertation by Reuel L. Olson, 1926.

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Also visit the excellent chronology posted at <https://www.varuna.io>

- [Varuna's chronology as a pdf](#)

THE DOCTRINES: Prior Appropriation and Riparian

- [Evolution of Water Rights](#)
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[1944 - Flood Control Act](#)

[1948 - Upper Colorado River Basin Compact](#)

- [1949 - House Hearings for the UCRB Compact](#)
- [1988 - Upper Basin Hydrologic Determination](#) (6.0 million acre-feet)
- [2007 - Upper Basin Hydrologic Determination](#) (5.76 million acre-feet)

[1956 - Colorado River Storage Project Act](#)

ARIZONA v CALIFORNIA

The ruling was 5 to 3 with Chief Justice Warren abstaining; dissent from Justices Harlan, Douglas & Stewart.

- [1962 - Recommended Decree and Dissent & Dissenting Opinion only](#)
- [1963 & 1964 - Arizona v. California](#)
- [1979 - Supplemental Decree](#)
- Spreadsheet: [Lower Basin Present Perfected Rights](#) (senior water rights)
- Estimate: [Upper Basin Present Perfected Rights](#). Kuhn, 2012.
- [2006 - Consolidated Decree](#)

[1968 - Colorado River Basin Project Act](#)

- [1970 - Operating Criteria for Colorado System Reservoirs](#)
- [2001 - Interim Surplus Guidelines](#)
- [2003 - Colorado River Water Delivery Agreement \(QSA\)](#)
- [2004 - 602a Criteria](#)
- [2005 - Amended Operating Criteria](#)
- [2006 - Federal Register: implement interim guidelines for shortage criteria](#)
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[1974 - Colorado River Basin Salinity Control Act](#)

[1986 - Colorado River Floodway Protection Act](#)

[1992 - Grand Canyon Protection Act](#)

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[1999 - Offstream Storage Colorado River Water Rule](#)

[2017 - Agua Caliente Tribe Vs Coachella Valley Water District](#) (Tribal Rights to Groundwater Affirmed).

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- [Regulations for implementing the procedural provisions of NEPA](#)
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- [1933 - Hoover Dam Documents](#) (Part One)
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Law of the River Part Two

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Maps

USGS: ON DEMAND TOPOGRAPHIC MAPS

Follow any river in the United States from cloud to ocean with Sam Learner

Map of Colorado River Basin: Mountains to Sea; Babbitt Center & Lincoln Institute.

MAPS: BUREAU OF LAND MANAGEMENT (BLM)

- LEGEND FOR THE MAPS

**Utah BLM: Ownership Maps Circa 1998 to 2007
Green River Corridor**

- Vernal
- Seep Ridge, Price & Huntington
- Huntington
- San Rafael Desert
- Moab, San Rafael & Hanksville
- 2009 - Grand County & Moab Area

White River Corridor

- Vernal
- Rangely

Yampa River Corridor

- Yampa & Cross Mountain

UTAH BLM: Ownership and Natural Resource Maps; Circa 1975.

Canyonlands (SE Utah)

- Blanding
- Cataract Canyon
- Mexican Hat
- Monticello
- Natural Bridges National Monument

Glen Canyon National Recreation Area (Lake Powell)

- Crossing of the Fathers
- Monitor Butte (San Juan River Arm)

Color Country (SW Utah)

- [Boulder](#)
- [Escalante](#)
- [Escalante River](#)
- [Loa](#)
- [Paria River](#)
- [Tropic](#)

West Desert (Basin and Range)

- [Wah Wah Valley](#)

Highways 50 & 6 and Interstate 70 (Northern Utah)

- [Bitter Creek](#)
- [Emery](#)
- [Provo](#)
- [Salina](#)
- [Strawberry Reservoir](#)
- [Sunnyside](#)

MAPS: COLORADO RIVER

1960 - US BUREAU OF RECLAMATION

- Maps of Glen Canyon National Recreation Area (Lake Powell) below elevation 3700 feet

1921 - US Geological Survey and Southern California Edison Company; a reconnaissance for dam sites

- [Description of 1921 USGS Surveys](#). William Chenoweth; Principal Investigator.
- [1921 - River profile of bed gravels and bedrock in Cataract Canyon](#). Sidney Paige; geologist.
- [1921 Camera stations and field note locations in Cataract Canyon](#). Sidney Paige; geologist.
- [1921 - Cataract Canyon map of camera stations, camps, rapids & dam sites](#). Eugene C. LaRue.
- [1923 - Damming Grand Canyon: The 1923 USGS Colorado River Expedition](#). Boyer & Webb, 2007.

Going Upstream; Lee's Ferry To Green River Confluence

- [Plate A - Lee's Ferry](#)
- [Plate B - Wahweap Canyon](#)
- [Plate C - Navajo Creek](#)

- [Plate D - Crossing Of Fathers](#)
- [Plate E - Last Chance](#)
- [Plate F - Rainbow Bridge](#)
- [Plate G - Escalante](#)
- [Plate H - Bullfrog](#)
- [Plate I - Halls Crossing](#)
- [Plate J - Red Canyon](#)
- [Plate K - White Canyon](#)
- [Plate L - Narrow Canyon](#)
- [Plate M - Cataract Canyon](#)

MAPS: SAN JUAN RIVER

Going upstream from Confluence to Chinle Creek

- [Plate N - San Juan River; Piute Creek](#)
- [Plate O - San Juan River; Clay Hills Crossing](#)
- [Plate P - San Juan River; Mexican Hat](#)

PROFILES: COLORADO RIVER

Going Upstream from Lee's Ferry to Green River Confluence

- [Plate Q - Profile of Colorado River; Aztec To Lees Ferry](#)
- [Plate R - Profile of Colorado River; Lake Creek To Oak Creek](#)
- [Plate S - Profile of Colorado River; Dark Canyon To Ticaboo](#)
- [Plate T - Profile of Colorado River; Confluence To Gypsum](#)

PROFILES: SAN JUAN RIVER

Going Upstream from Confluence to Chinle Creek

- [Plate U - Profile of San Juan River; 64 Mile To Confluence](#)
- [Plate V - Profile of San Juan River; Chinle Creek To 64 Mile](#)

1950 to 1993: Kent Frost; professional land and river guide.

- **MAPS:** Cataract Canyon; USGS 15 Minute Quads; 1952; baseline data before reservoir inundation.
- [Upper Cataract: Confluence of Green and Colorado Rivers](#); Canyonlands National Park (CANY). jpg.
- [Middle Cataract Canyon: Mile Long Rapids and Big Drops.](#); CANY & GCNRA. jpg.
- [Lower Cataract Canyon](#); GCNRA. jpg.
- **MAPS:** Glen Canyon; USGS 15 Minute Quads; 1952; baseline data before reservoir inundation.
- [01 Hite \(includes Narrow Canyon\)](#). jpg.
- [02 Mancos Mesa](#). jpg.

- [03 Mt. Ellsworth. jpg.](#)
- [04 Lake Canyon. jpg.](#)
- [05 Rincon. jpg.](#)
- [06 Navajo Mountain. jpg.](#)
- [07 Cummings Mesa. jpg.](#)
- [08 Gunsight Butte. jpg.](#)
- [09 Leche-E Rock. jpg.](#)
- [10 Lee's Ferry. jpg.](#)

San Juan River in San Juan County, Utah

- [01 - Bluff 15 min Quad; 1962](#)
- [02 - Boundary Butte 15 min Quad; 1962](#)
- [03 - Mexican Hat 15 min Quad; 1963](#)
- [04 - Gouldings 15 min Quad; 1963](#)
- [05 - Grand Gulch 15 min Quad; 1963](#)
- [06 - Clay Hills 15 min Quad; 1954.](#)
- [07 - Lake Canyon 15 min Quad; 1952](#)
- [08 - No Mans Land 15 min Quad; 1953](#)
- [09 - Navajo Mountain 15 min Quad; 1952](#)

FIELD MAPS of GEORGE SIMMONS

Prints of the topographic maps produced by the USGS dam surveys from 1921 to 1923.

Colorado River

- [Sheet A - Lee's Ferry](#)
- [Sheet B - Wahweap Canyon](#)
- [Sheet D - Kane Creek](#)
- [Sheet E - Rock Creek](#)
- [Sheet F - Music Temple](#)
- [Sheet G - Rincon](#)
- [Sheet H - Hansen Creek](#)
- [Sheet I - Smith Fork](#)
- [Sheet J.- Red Canyon](#)
- [Sheet K - White Canyon](#)
- [Sheet L - Dark Canyon to North Wash](#)
- [Sheet M - Confluence to Dark Canyon](#)

Dolores River

- [Sheet 4 - Beaver Canyon](#)
- [Sheet 10 - Confluence](#)

Green River

- [Sheet A - Price River](#)

- [Sheet B - Three Canyon](#)
- [Sheet C - Sand Wash](#)
- [Sheet D - Ouray](#)
- [Sheet E - Dinosaur NM](#)

San Juan River

- [Sheet N - Confluence](#)
- [Sheet O - Paiute Farms](#)

Yampa River

- [Sheet A - Confluence](#)
- [Sheet B - Little Snake River](#)
- [Sheet C - Maybell](#)

Grand Ganyon Plan and Profiles, USGS (not Simmons Collection).

- [1923 - Damming Grand Canyon: The 1923 USGS Colorado River Expedition.](#)
Boyer & Webb, 2007.
 - [Sheet U](#)
 - [Sheet T](#)
 - [Sheet S](#)
 - [Sheet R](#)
 - [Sheet Q](#)
 - [Sheet P](#)
 - [Sheet O](#)
 - [Sheet N](#)
 - [Sheet M](#)
 - [Sheet L](#)
 - [Sheet K](#)
 - [Sheet J](#)
 - [Sheet I](#)
 - [Sheet H](#)
 - [Sheet G](#)
 - [Sheet F](#)
 - [Sheet E](#)
 - [Sheet D](#)
 - [Sheet C](#)
 - [Sheet B](#)
 - [Sheet A](#)
-

Media

See also: [Conferences](#)

See also: [Testimony](#)



Lady Bird Johnson dedicating Glen Canyon Dam on 9/22/66

COMMUNICATION TOOLS

- [The Message Box](#). SeaWeb.
- [Media Training Powerpoint](#). SeaWeb.
- [The Message Box](#). Gap2.

MAGAZINES

- [Click here](#) to read these high-quality back issues of *DESERT REPORT: News of the Desert from Sierra Club California & Nevada Desert Committee*.
- [Click here](#) to read a 1958 *Arizona Highways* magazine feature called "Flying the Colorado River."

- [Click here](#) to read a 1983 *Sunset Magazine* article called the "Mighty and Troubled Colorado."

BLOGS

- [Desert Water Grab: Conservation and Capitalism](#)
- [David Zetland](#)
- [Water Deeply](#)
- [Coyote Gulch](#)
- [John Fleck](#)
- [George Sibley](#)

AUDIO

- [1980s - Ken Sleight presentation](#). Canyonlands Field Institute.
- [2006 - Stewart Udall on the expansion of Canyonlands National Park](#).
- [2017 - Robert Wyss interview about David Brower](#). Doug Fabrizio, KUER.

VIDEOS

- [1947 - Colorado River](#)
- [1959 - Salvage archeology in Glen Canyon](#)
- [1963 - Glen Canyon river trip with Ken Sleight](#)
- [1983 - Glen Canyon Dam spillway compromise](#)
- [1984 - High water in Cataract Canyon at Big Drop Two](#)
- [1997 - Cadillac Desert](#)
- [2006 - Stewart Udall on expansion of Canyonlands NP](#)
- [2008 - Time lapse of eroding beaches in Grand Canyon](#)
- [2009 - Native fish spawning in Havasu Creek](#)
- [2009 - Ken Salazar speech to CRWUA](#)
- [2011 - Salton Sea](#)
- [2011 - Condit Dam removal](#)
- [2011 - Time lapse of temperature data filtered since 1800](#). Berkeley Physics Lab.
- [2012 - Roderick Nash and Rights of Nature](#)
- [2018 - Vic Baker and Paleoflood Hydrology of Colorado River](#)
- [2018 - Jack Schmidt - Future of the Colorado River](#)
- [2019 - Doug Kenney and the "Grand Bargain."](#)
- [Video - Global Warming: Is it True?](#) James L. Powell
- [Monitoring dust events in the southwest](#)

PODCASTS

- [Crisis on the Colorado River in two parts: Tribal issues with Daryl Vigil; mismanagement issues by John Weisheit](#). Waterkeeper Alliance.

RADIO

- [2011 - A river trip with Tim DeChristopher by Alex Chadwick](#)

COURT HEARINGS

HEAL Utah et al v Kane County et al (September 23 - 27, 2013). A water rights case for Blue Castle Holdings' application to build the Green River Nuclear Power Plant.

Day One (Monday)

- [Aaron Tilton](#). CEO of BCH.
- [Jerry Olds](#). Expert witness for BCH on issues of water depletions.
- [Thom Hardy](#). Expert witness for BCH on issues of endangered fish.

Day Two (Tuesday)

- [Robert Evans](#). Nuclear power plant licensing for EnerCon Services Inc.
- [Tom Retson](#). CCO of BCH.
- [Reed Searl](#). VP of BCH.
- [Glenn George](#). Expert witness for BCH on issues of policy and economics.
- [Robert Graber](#). BCH staff for energy economics.
- Kent Jones. State Engineer for Utah Division of Water Rights.

Day Three (Wednesday)

- [Kent Jones](#) (Continued)
 - [Neils Diaz](#). CSO of BCH. Former Chairman of Nuclear Regulatory Commission.
 - [Arnie Gunderson](#). Public Safety expert for plaintiffs.
-

Mexico

MEXICO & USA TREATY

- [1944 - Mexico Treaty](#)
- [1946 - Light on the Mexican Water Treaty from the Ratification Proceedings in Mexico](#). Northcutt Ely.
- [Minute 242](#)
- [2000 - Minute 306](#)
- [All minutes](#)

Delta and Limitrophe

- [Tijuana Aqueduct and Water Supply](#)
 - [2001 - Water Balance at Colorado River Delta](#). Cohen et al. Pacific Institute.
 - [2005 - Understanding Streamflow through Colorado River Delta](#). Cohen. Pacific Institute.
 - [2010 - Yuma Clapper Rail Recovery Plan](#). US Fish and Wildlife Service.
-

National Parks



Needles District of Canyonlands

RESOURCE MANAGEMENT

- [Portal for Integrated Resource Management Applications and Data Base](#)

ECONOMICS

- [2009 - Economic influence of Southeast Utah National Parks](#). National Parks Conservation Association.

RECREATION

- [1950 - A Survey of the Recreational Resources of the Colorado River Basin](#). National Park Service.

ARCHES NP & CANYONLANDS NP

- [2013 - Foundation Overview](#)
- [2008 - Administrative History](#). Schmieding.
- [2006 - Fire Plan Appendix](#)
- [2005 - Fire Plan](#)
- [2004 - Survey of Springs](#)
- [2002 - Salt Creek Access Review](#)
- [2001 - Modeling Green River Floodplain](#)
- [2001 - Drinking Water Protection Plan](#)
- [1999 - Water Resources](#)
- [1997 - Water Resources for SEUG](#)
- [1996 - Cultural Resources Island District](#)
- [1995 - Backcountry Plan Canyonlands Bibliography](#)

- [1988 - Statement For Management](#)
- [1986 - Canyonlands History](#). Meils.
- [1984 - Vol. 1: Water Resources](#)
- [1981 - River Management Plan for Canyonlands](#)
- [1979 - Groundwater Development Feasibility](#)
- [1978 - General Management Plan](#)
- [1975 - River Management Plan for Canyonlands](#)
- [1974 - Geologic Story](#). Lohman.

DINOSAUR NATIONAL MONUMENT

- [1976 - Water Resources of Dinosaur NM](#). USGS.

GLEN CANYON NATIONAL RECREATION AREA

- [Lake Powell Research Project](#)
- [1987 - Glen Canyon Water Resources Management Plan](#)

GRAND CANYON NATIONAL PARK

- Riverwire: [Economic data about river trip fees for commercial and non-commercial users](#) & [Spreadsheet and Analysis](#). River Runners of Wilderness
- [Archive of Colorado River Management Plans](#). Grand Canyon NP.
- [The Colorado River Research Program](#). Grand Canyon NP.
- [1967 - Congressional testimony of Sierra Club \(David Brower, Hugh Nash, Jeffrey Ingram\) and Stephen Jett of the Navajo Nation](#).
- [1974 - Colorado River Research Program](#). National Park Service.
- [1977 - Grand Canyon synthesis and management implications](#). National Park Service.
- [1995 - 1998 - Adaptive Management Program documents](#) not posted on Reclamation's web page.
- [1999 - 2008 - Adaptive Management Program documents](#). Bureau of Reclamation.
A [cache](#) is currently under construction here at [On The Colorado](#).
- [1998 - Report to Congress \(draft\): Grand Canyon Protection Act](#). Secretary, Department of the Interior.
- [2002 - Report to Congress: Grand Canyon Protection Act](#). Secretary, Department of the Interior.
- [2005 - State of the Colorado River in Grand Canyon](#). US Geological Survey.
- [2008 - Dysfunction in the Adaptive Management Program](#)
- [2009 - List of extirpated species in Grand Canyon](#)
- [2009 - NPS Memo: Impairment from operations of Glen Canyon Dam](#).
- [2010 - List of US Geological Survey Publications for Adaptive Management Program](#)
- [2010 - Report to Congress](#). Glen Canyon Dam Adaptive Management Program.

- [2010 - 2008 Coming Together: Coordination of Science and Restoration Activities for the Colorado River Ecosystem Symposium.](#) USGS.
- [2010 - State of the Grand Canyon.](#) NPCA.
- [2010 - Balancing a Complex Set of Interests: Glen Canyon Dam and Adaptive Management.](#) Water Education Fund.

GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT

- [The Proto National Monument: a history of the first proposal](#)

RAINBOW BRIDGE NATIONAL MONUMENT

- [Rainbow Bridge NM & Navajo Mountain](#)
 - [1993 - Rainbow Bridge Management Plan](#)
 - [2001 - Administrative History: Rainbow Bridge](#)
 - [2005 - Vascular Plant Checklist](#)
-

Navigability

NEVADA: Nevada Supreme Court Water Law Commission The Outline for The Collection of Charles Albright

The Navigable Waters in Nevada and the hyperlinks for downloading these documents.

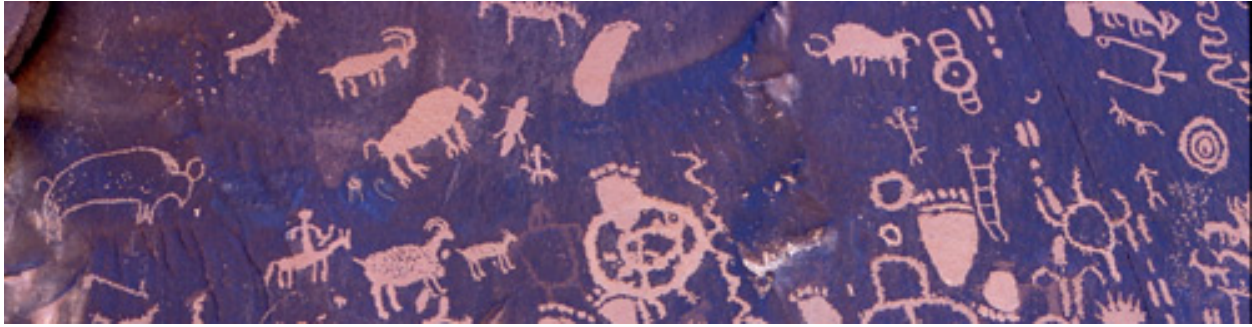
- Letter from Supreme Court of Nevada Justice Lidia Stiglich
- Letter sent to Justice Lidia Stiglich in response.
- Letter to the Honorable Nevada Supreme Court Water Commission
- Letter of response from Nevada Division of State Lands
- Letter from State of Nevada Department of Wildlife
- Letter sent to the Nevada Supreme Court Justices
- Letter dated December 17, 2020 to Aaron Ford, Nevada Attorney General
- Letter to numerous State Offices Dated January 14th, 2021
- Public Trust Doctrine paper
- Definition of Navigable Waters of the United States
- State vs Bunkowski Carson River ruling 503 Nev. 623 1972
- Other rulings related to State vs Bunkowski
- Mineral County vs Lyon County rulings Brief
- Mineral County vs Lyon County 136 Nev. Advanced Opinion 58 2020
- US v Walker River Irr. Dist., 104 F. 2d 334 1939
- New Mexico Supreme Court Ruling on Navigation of New Mexico's Waters 2022
- American Whitewater: New Mexico Supreme Court Ruling 2022
- Utah Supreme Court Ruling allows Public Waters Access Act to Stand 2023
- Public Rights on Rivers
- Title 33 Navigation and Navigable Waters
- American Whitewater Nevada, California, Arizona, Idaho, Oregon, Utah Navigability Report
- Citation from US 9th District Court on Walker River Navigability and another 104 F.2d 334
- 1939 other cases related
- 401 Certification Clean Water Act
- Environmental opinions of Clean Water Act Rollback 2020
- State Land Office Guide
- Nevada Rivers Information
- List of Rivers of Nevada
- Letter regarding Paddling the Reese River David C Fiore MD
- Letter from Rusty Bowman on several rivers and creeks paddled in Nevada

- Letter from Michael Setlock of BLM on paddling Nevada Waters
- Letter from Nasman Horn of USFS on various locations for paddling in Nevada
- Letter from Martin Kramer of USFS on the Reese River
- Letter from Michael McCampbell onto Humboldt and Quinn Rivers
- Letter from Tipton Power on the Owyhee River
- Letter from Seth Tonsmeire Regarding Commercial rafting and boating on the Owyhee River
- Letter from Alan Reynolds regarding paddling the Owyhee, Jarbidge and Bruneau Rivers
- Letter from Jason Gipson of Army Corps of Engineers on Rivers and Harbors Act and Clean Water Act
- Salmon Falls Creek Paddling Overview
- Letter from Fred Hill Atcheson regarding River Recreation in Nevada
- Letter to Governor Sisolak et al
- Another Navigable Waters Paper
- Another Letter to Governor Sisolak
- Letter from Charles Albright
- Nevada's Outdoor Recreation Economy Impact
- 33 CFR Part 328 EPA Revised Definition of "Waters of the United States" Rulings
- Request for Legal Opinion to Verify All Nevada Waters as Navigable.
- 2021.02.03 - Response From Nevada State Lands and Department of Wildlife.
- 2022.06.09 - CA letter to Nevada Supreme Court Justices.
- 2022.08.10 - Letter From Supreme Court Nevada Justice Lidia Stiglich.
- 2022.08.10 - Response Letter to Justice Lidia Stiglich.
- 2025 - Navigable Rivers Nevada. Albright.

DOCUMENT SCANS FOR DOWNLOADING

- <http://www.riversimulator.org/Resources/NavigableNV/Binder0.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/Binder1.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/Binder2.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/Binder3.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA01.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA02.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA03.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA04.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA05.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA06.pdf>
- <http://www.riversimulator.org/Resources/NavigableNV/CA07.pdf>

- <http://www.riversimulator.org/Resources/NavigableNV/CA08.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA09.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA10.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA11.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA12.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA13a.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA13b.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA14.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA15.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA16.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA17.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA18.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA19.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA20.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA21.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/CA22.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Presentation1.1.pptx>
 - <http://www.riversimulator.org/Resources/NavigableNV/PreviousScanByCharles.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/RevisedDefinitionWatersOfTheUnitedStates18January2023ACOE.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment001.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment002.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment003.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment004.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment005.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment006.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment007.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment008.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment009.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment010.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment011.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment012.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment013.pdf>
 - <http://www.riversimulator.org/Resources/NavigableNV/Segment014.pdf>
-



Newspaper Rock near Canyonlands National Park

[News/Blogs](#)

RADIO PROGRAMING

[Water in the West: Powell's Vision](#) - Discussion of Powell's watershed approach to planning with Powell's biographer, Dr. Donald Worster.

PROGRAMMING ON THE WEB

[Quenching Las Vegas' Thirst](#). Las Vegas Sun.

NEWS AND BLOGS

[Aquafornia](#)

[Aquanomics \(David Zetland\)](#)

[California Water Blog](#)

[Celebrating the Grand Canyon](#)

[Celebrating Grand Canyon](#)

[Circle of Blue](#)

[Climate Science Watch](#)

[Colorado Trout Unlimited](#)

[Colorado Water Examiner](#)

[Colorado Watershed Assembly](#)

[Coyote Gulch](#)

[Headwaters News](#)

[John Fleck Inkstain](#)

[George Sibley's Rivers](#)

[Southwest Hydrology](#) (UofA)

[Water Deeply](#)

[Water Efficiency](#)

[Water Wired](#)

[Waterblogged](#)

[Water Information Program](#)

[Water Resources Research Center](#) (ASU)

[Water Webster](#)

[Watering the Desert](#)

[Western Water](#)

[Western Water Blog](#)

NGOs

Here you will find links to connect with Non-Governmental Organizations (NGOs) working to improve management and environmental problems on the Colorado and its tributaries. Below is a list of NGO publications

[Write to us to add an organization](#)

###

[Environmental Protection Network](#)

Former employees of the Environmental Protection Agency who want to assist community organizers

[Animas & LaPlata River Central](#)

[Animas Riverkeeper](#)

[Black Mesa Water Coalition](#)

[Center for Biological Diversity](#)

[Colorado Plateau River Guides](#)

[Colorado Riverkeeper](#)

[Defenders of Wildlife](#)

[Diné Citizens Against Ruining Our Environment](#)

[Environmental Defense](#)

[Glen Canyon Institute](#)

[Grand Canyon Private Boaters Association](#)

[Grand Canyon River Guides](#)

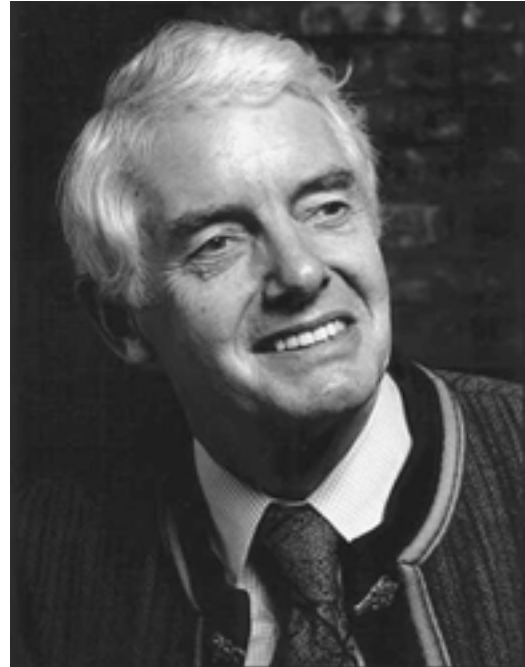
[Grand Canyon Trust](#)

[Grand Canyon Wildlands Council](#)

[High Country Citizens Alliance](#)

[Living Rivers](#)

[Pacific Institute](#)



David Brower

[Protect the Flows](#)

[Resource Renewal Institute](#)

[River Runners for Wilderness](#)

[Rivers Foundation of the Americas](#)

[Sierra Club Arizona Chapter](#)

[Sierra Club Glen Canyon Group](#)

[Sonoran Institute](#)

[Trout Unlimited](#)

[The Nature Conservancy](#)

[Uranium Watch](#)

[Water Alternatives](#)

[Western Resource Advocates](#)

PUBLICATIONS

Colorado Plateau River Guides

[The Confluence; The Stinky Desert Gazette;](#)

Environmental Defense Fund

[Colorado River Delta](#)

Glen Canyon Group of Sierra Club

Glen Canyon Advocate: [v1n1; v1n2; v2n1; v2n2;](#)

Pacific Institute

[Publications; Resources;](#)

Water Alternatives

[Publications](#)

Water Education Fund

[Balancing a Complex Set of Interests: Glen Canyon Dam and Adaptive Management.](#)

Western Resource Advocates

[Reports and Papers](#)

Oil Shale and Tar Sands

UPDATE as of September 2023

- All federal leasing for oil shale development in Utah and Colorado have expired or have been relinquished.
- Activities for tar sand development in Utah have ceased.
- [2009 - What Every Westerner Should Know About Oil Shale](#). Hanson and Limerick.



Oil shale and tar sands remains a speculative industry in the arid lands of the Colorado Plateau. A general lack of water is why the industry will never be viable. If the oil corporations buy the water from farmers, that would create food insecurity and increase dependance on transportation fuels to import food from other watersheds; ever-expanding metropolises covet that same water too.

Even if alternative chemical washes are used to separate bitumen from sand, for example, it still requires 2 barrels of water to refine a single barrel of synthetic crude. What this extraction will accomplish is physical damage to the Colorado River watershed, which supplies culinary water to nearly 30 million people. It will also create more CO₂ in the atmosphere, which is the #1 killer of the Rocky Mountain snowpack, which provides 85% of the Colorado River's total annual water supply. Our watershed needs investors to create a reliable energy supply that will heal the water supply of the Colorado River, not destroy it.

[CLICK HERE](#) to read information about the Programmatic EIS for oil shale and tar sands in Wyoming, Colorado and Utah

[CLICK HERE](#) to watch the first documentary about Utah unconventional fuel called Last Rush for the Wild West: Tar Sands. Oil Shale and the American Frontier.

[Independent Technical Memorandum](#): Greenhouse Gas & Water Footprints of Oil Shale & Tar Sands Resources & Projects in the Upper Colorado River Basin. 2018, EcoShift. The Executive Summary of this report is [HERE](#).

TAR SANDS

Inventory of Tar Sand Deposits in Utah
Federal Lands ([BLM](#))

- NOTE: there are no tar sands in Colorado or Wyoming.
- 2008 - Total identified is 430,686 acres
- 2012 - The proposed preferred alternative identifies 91,045 acres
- **RECORD OF DECISION** (Issued March 22, 2013)

State Land (**SITLA**)

- 141,020 State Trust acres on which tar sands are known or expected.
- 52,887 State Trust acres under lease for tar sands
- A typical lease lasts 10-years
- Only a very small part of the above acres could be surface mined
- [US Oil Sands Lease with SITLA](#)
- [US Oil Sands Contract Report](#). SITLA.

BUREAU OF LAND MANAGEMENT

- 1983 - Uinta Basin Synfuels Development, Final Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMsynfuelsFEIS1983.pdf
- 1983 - Utah Combined Hydrocarbon, Regional Draft Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMregionalDEIS1983a.pdf
- 1984 - Utah Combined Hydrocarbon, Regional Final Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMregionalFEIS1984.pdf
- 1984 - Book Cliffs Resource Management Plan, Final Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMveranalRMP1984.pdf
- 1984 - Air quality assessment for the Environmental Impact Statement on the Federal Oil Shale Management Program. www.riversimulator.org/Pubs/OSTS/Ref/BLMAirQualityOSTS1984.pdf
- 1985 - PR Spring Combined Hydrocarbon Lease Conversion Draft Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMprSpringsDEIS1985.pdf
- 1985 - PR Spring Hydrocarbon Lease Conversion Final Environmental Impact Statement. www.riversimulator.org/Pubs/OSTS/Ref/BLMprSpringsFEIS1985.pdf
- 1990 - Winter Ridge Wilderness Study Area. www.riversimulator.org/Pubs/OSTS/Ref/BLMwinterRidgeWSA1990.pdf
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Quotes

GROVE K. GILBERT (geologist and linguist)

- "It's not what you see, it's what's missing."
- "Successes are achieved through series of failures."

WALTER PRESCOTT WEBB (historian)

- Civilization shouts, gives orders, writes rules, puts man in institutions, and intimidates him with a thousand irritating directives. In return it offers him protections, soul salvation, and a living if he can find it. Nature looks down on him and broods in silence. The noises of running streams and wind in the trees are its own, not directed at but soothing to him because he heard them before he heard the noises of civilization.
- In their efforts to provide a sufficiency of water where there was not one, men have resorted to every expedient from prayer to dynamite. The story of their efforts is, on the whole, one of pathos and tragedy, of a few successes and many failures."



Bernard DeVoto, who never wrote a boring sentence.

STUART UDALL (Interior Secretary)

- "We live in a land of vanishing beauty, of increasing ugliness, and of an overall environment that is diminishing daily by pollution and noise and blight." *The Quiet Crisis*, 1963.
- "Plans to protect air and water, wilderness and wildlife, are in fact plans to protect man."
- "We've got to rethink the use of water. But if you think it's [the drought] going to go away, the people that think well, we're going to go back to a wet cycle, don't bet on it." December, 2003.

DANIEL B. LUTEN, JR. (geography professor)

- "I suggest to you that moving water is more to be admired than used, that the primary purpose of water is to beautify the earth."
- With kind permission from Guilford Press, two chapters are here presented:
Energy & Water

RODERICK FRAZIER NASH (historian)

- "The arc of justice bends toward intrinsic valuation and the rights of nature."

PATTY LIMERICK (historian)

- "The Bureau of Reclamation can only manage little droughts and little floods. When the big ones arrive, the system will fail."

WILLIAM M. LEWIS (limnology professor)

- "Water in the West, although under intensive development for more than a century, is far from being a settled matter."

HUNTER S. THOMPSON (journalist)

- "When the going gets weird, the weird turn pro."

JOHN TRUDELL (Indian activist)

- "When one lives in a society where people can no longer rely on the institutions to tell them the truth, the truth must come from culture and art."

SAM STEIGER (Arizona politician)

- "What is clearly not in place is the willingness of politicians and public structures to confess error. Until they agree that they have made one of the most monumental blunders of this nation's reclamation history and that this emperor is indeed stark naked, we are locked into a guaranteed failure." March 6, 1983, *Kingman Daily Miner*.

HENRY DAVID THOREAU (philosopher)

- "There are a thousand hacking at the branches of evil to one who is striking at the root."

RACHEL CARSON (biologist)

- "The most alarming of all man's assaults upon the environment is the contamination of air, earth, rivers, and sea with dangerous and even lethal materials. This pollution is for the most part irrecoverable; the chain of evil it initiates not only in the world that must support life but in living tissues is for the most part irreversible. In this now universal contamination of the environment, chemicals are the sinister and little-recognized partners of radiation in changing the very nature of the world-the very nature of its life."

RAY LYMAN WILBUR (Secretary of Interior)

- "Go to the sickbed; that's where the germs are."

CHARLIE MUNGER (Investor)

- "The world is not driven by greed. It's driven by envy.

OLIVER WENDELL HOLMES, JR. (U.S. Supreme Court)

- "A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it."

LUNA LEOPOLD (hydrologist)

- "Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land."
- [1977 - A Reverence for Rivers](#). Leopold.

ALDO LEOPOLD (ecologist)

- "A river or stream is a cycle of energy from sun to plants to insects to fish. It is a continuum broken only by humans."
- "Having to squeeze the last drop of utility out of the land has the same desperate finality as having to chop up the furniture to keep warm."

WENDELL BARRY (writer)

- "We don't have a right to ask whether we're going to succeed or not. The only question we have a right to ask is what's the right thing to do? What does this earth require of us if we want to continue to live on it?"

MARK TWAIN (writer)

- "The trouble with the world is not that people know too little; it's that they know so many things that just aren't so."
- "Don't go around saying the world owes you a living. The world owes you nothing. It was here first."
- "Travel is fatal to prejudice, bigotry, and narrow-mindedness."

WILLIAM JENNINGS BRYAN (populist politician)

- "Never be afraid to stand with the minority when the minority is right, for the minority which is right will one day be the majority."

JOHN WESLEY POWELL (scientist)

- "When all the rivers are used, when all the creeks in the ravines, when all the brooks, when all the springs are used, when all the reservoirs along the streams are used, when all the canyon waters are taken up, when all the wells are sunk,

or dug that can be dug in all this arid region there is still not sufficient water to irrigate all this arid region.”

- "What matters it whether I am popular or not? I tell you, gentlemen, you are piling up a heritage of conflict and litigation over water rights, for there is not sufficient water to supply these lands.”
- [Congressional testimony, 1891: Ceding the Arid Lands to States & Territories.](#) Powell & Dutton.

DONALD WORSTER (historian)

- "Whatever terrain the environmental historian chooses to investigate, he has to address the age-old predicament of how humankind can feed itself without degrading the primal source of life. Today as ever, that problem is the fundamental challenge in human ecology, and meeting it will require knowing the earth well--knowing its history and knowing its limits.”
- "Let us assume that the next stage in the West will not be a mere continuation of the present. What then might we expect? What should we work for? Now no one could reliably prepare a detailed blueprint for a posthydraulic society. To do so would be to indulge in fantasy or utopianism, neither of which is much to be trusted. And it would be to substitute for the combined searchings of millions of people, generation following generation, the schemes and predictions of a single individual, which is not the way history is made. But one can confidently say that there are certain general strategies the West is going to have to pursue if it wants to find its way toward a more open, free, and democratic society. Those strategies must begin with a new relation to nature and a new technics.”
- "Reclamation ... is a technological stunt that, as the experience of other irrigation societies shows, cannot be indefinitely sustained. As the irrigation system approaches maximum efficiency, as rivers get moved around with more and more thorough, consummate skill, the system begins to grow increasingly vulnerable, subject to a thousand ills that eventually bring about its decline. Despite all efforts to save the system, it breaks down here, then there, then everywhere.”
- [Epilogue](#) (a vision statement). [Book Review](#). Strohane, 1988.

BERNARD DEVOTO (historian)

- (In reference to John Wesley Powell's *Report on the Lands of The Arid Region of the United States*) "...astonishing book, a book which of itself opened a new era in Western and in national thinking. It is one of the most remarkable books ever written by an American. In the whole range of American experience from Jamestown on there is no book more prophetic. It is a scientific prophecy and has been fulfilled--experimentally proved. Unhappily the experimental proof has

consisted of human and social failure and the destruction of land. It is a document as basic as The Federalist but it is a tragic document. For it was published in 1878 and if we could have acted on it in full, incalculable loss would have been prevented and the United States would be happier and wealthier than it is. We did not even make an effective effort to act on it till 1902. Half a century after that beginning, we are still far short of catching up with it. The twist of the knife is that meanwhile irreversible actions went on out west and what we did in error will forever prevent us from catching up with it altogether.”

PHILIP L. FRADKIN (journalist and historian)

- "We ignore Stegner at our peril."

WALLACE STEGNER (creative writing professor)

- "The West cannot carry what it has lifted. It will make heroic efforts, always in the direction of more grandiose engineering works, and in the end it will subside back to what it was meant to be, an oasis civilization with one great deficiency and all the advantages that would flow from it if we would scale down our demands on our resources." (LA Times OpEd, 1985)
- "We need a Redeemer. We need a Congress that will say no to any more water boondoggles in the West. We need a moratorium on boosters and developers and raiders who can't or won't see the consequences of their acts. We need to scale down our expectations and advise a lot of hopeful immigrants that what they seek is not here." (LA Times OpEd, 1985).
- [Stegner's LA Times complete Op Ed.](#)
- [Stegner's Wilderness Letter](#) (Geography of Hope).

WILL DURANT (historian)

- "Civilization exists by geologic consent, subject to change without notice."

JOHN MCPHEE (science writer)

- "If by some fiat I had to restrict all this writing to one sentence, this is the one I would choose: The summit of Mt. Everest is marine limestone."

HENRY "SCOOP" JACKSON (Washington senator)

- "The Colorado River basin doesn't have a water scarcity problem, it has a planning and zoning problem."

BARRY GOLDWATER (Arizona senator)

- "What have we done to this beautiful desert, to our wild rivers? All that dam building on the Colorado, across the West, was a big mistake. What in the world were we thinking?"

MARC REISNER (journalist)

- "We set out to tame the rivers and ended up killing them. We set out to make the future of the American West secure; what we really did was make ourselves rich and our descendants insecure."

GARRETT HARDIN (ecologist)

- "When an estuary that has served as a nursery for marine life and a haven for migratory birds for a million years is filled to serve as a site for factories, the resulting destruction is labeled "reclamation." If it were honestly named, the Bureau of Reclamation would be called the Bureau of Unprecedented and Unexamined Claims."
- [The Tragedy of the Commons](#). Hardin.

ROGER REVELLE (oceanographer & geophysicist)

- "Planning and construction of major water-resource systems have a time constant of 30 to 50 years. ...the consequences of climate change within the next 50 to 100 years warrant careful consideration by planners of ways to create more robust and resilient water-resource systems."

HOLMES RALSTON III (philosopher)

- "Humans neither can nor ought to de-nature their planet. ... On larger planetary scales it is better to build our cultures in intelligent harmony with the way the world is already built, rather than take control and rebuild this promising planet by ourselves and for ourselves. ... We do not want a de-natured life on a de-natured planet."

GEORGE SANTAYANA

- "We must welcome the future, remembering that soon it will be the past; and we must respect the past, remembering that it was once all that was humanly possible."

BABA DIOUM

- In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught.

DAVID ZETLAND

- The only way ahead is to recognize the need for change and agree to promote the community over partisan tactical sabotage that delivers short-term gain at the expense of the long-term cooperation that protects ecosystems, delivers economic value, and supports communities.
- [Living with Water Scacity](#). David Zetland.

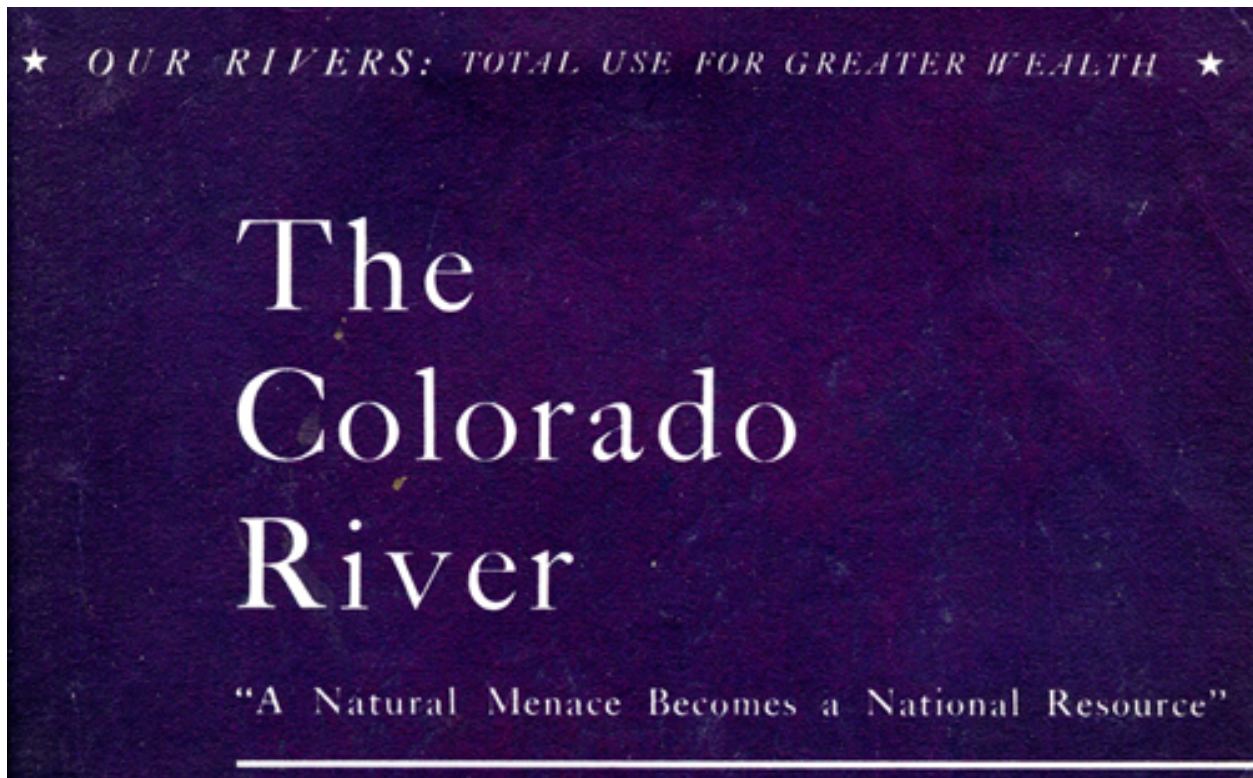
THOMAS MINCKLEY

- Climate change in the arid lands means the moisture from the clouds will be going into the soils and back into the sky, rather than into aquifers and rivers.

New York Times Quote of the Day for June 12, 2023

- “You know how you feel like when you go to the cemetery? That’s how I feel. John Weisheit who helps lead the conservation group Living Rivers, on seeing how much the Grand Canyon has changed because of the low waters of the Colorado River. [The West’s Kingdom of Stone Is Losing Its River](#). By Raymond Zhong for The New York Times.
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Reports (A to L)



1946 report by Reclamation

NOTE: Reports are found in all sections of this website. This webpage is more broad and less specific.

- [Return to Resource Page to see all sections](#)

This section is divided into two sections

- [Reports A to L](#)
- [Reports M to Z](#)

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ENVIRONMENTAL IMPACT STATEMENTS & ENVIRONMENTAL ASSESSMENTS

Ongoing Assessments

- [Lake Powell Pipeline](#)

- [Regional Watershed Supply Project](#) (Million Pipeline). Army Corps.

Green River Pumping Project

- [Green River Pumping Project EA](#). Reclamation.

Long Term Experimental Plan (LTEP)

- [\(cached before suspension of EIS\)](#)

Glen Canyon Dam Adaptive Management Program

- [1995 FEIS](#); [GAO Audit](#); [LTEP Scoping](#); [Experimental Plan 2008-2012](#);
- [2007 - Sediment Augmentation Feasibility Report](#). Randle. Bureau of Reclamation.
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- [2007 - LTEP workshop](#). US Geological Survey.
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- [2009 - Development of high test flow protocols](#). Federal Notice.
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- [2011 - High Flow Experiment EA](#)
- [2011 - Non-native Fish Control EA](#)

Lower Colorado

- [Lower Colorado Reports and Publications](#)
- [SNWA Lake Mead Intake EA & FONSI](#)

Upper Colorado

- [Upper Colorado Reports and Publications](#)
- [NGS Intake EA & FONSI](#). Navajo Generation Station @ Lake Powell
- [Navajo Gallup Pipeline documents](#)

Multiple-Species Conservation Program

- [Volume 1](#); [Volume II](#); [Volume III](#); [Volume IV](#); [ROD](#);

Shortage Criteria

- [Scoping](#); [DEIS](#); [DEIS Comments](#); [FEIS](#); [RoD](#); [Federal Register](#);
 - [Appendix N](#); [Appendix U](#);
 - [Shortage Criteria chronology of events](#)
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ECONOMY

- [2009 - Prosperity without growth](#). Sustainable Development Commission.
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ENERGY & WATER NEXUS

- [1977 - Report of Western Energy Expansion Study](#). Reclamation.
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 - [2010 - Lifeline: How climate and clean energy can safeguard water](#). WRA & EDF.
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 - [2010 - Hydropower Resource Assessment](#). USBR.
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 - [2011 - Nuclear Power: still not viable without subsidies](#). UCS.
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- [1983 - Colorado River Flooding in 1983](#). GAO.
- [1996 - Audit of the Glen Canyon Dam Enviromental Impact Statement](#). GAO.
- [2008 - Water Scarcity in the Colorado River basin](#). GAO.
- [2010 - Energy Water Nexus: Oil Shale](#). GAO.

- [2018- Oil and Gas Wells: BLM needs to improve its data and oversight of its potential liabilities.](#) GAO.

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Continue at [Reports M to Z](#)

Reports (M-Z)

NOTE: Reports are found in all sections of this website. This webpage is more broad and less specific.

- [Return to Resource Page to see all sections](#)

This section is divided into two sections

- [Reports A to L](#)
- [Reports M to Z](#)

NATIONAL ACADEMY OF SCIENCE (National Resource Council)

- [1968 - Water and Choice in the Colorado River Basin](#)
- [1977 - Climate, Climate Change, and Water Supply](#)
- [1977 - Energy and Climate: Studies in Geophysics](#)
- [1978 - National Academy Sciences: First Hundred Years](#)
- [1985 - Safety Of Dams: Flood Earthquake Criteria](#)
- [1988 - Estimating Probabilities of Extreme Floods](#)
- [1990 - Colorado River ecology and dam management](#)
- [1991 - Colorado River Reservoir Operations](#)
- [1991 - Managing Water Resources in the West Under Conditions of Climate Uncertainty](#)
- [1002 - Water Transfers in the West: Efficiency, Equity, and Environment](#)
- [1994 - Review: Glen Canyon Dam long-term monitoring plan](#)
- [1996 - Review: River Resource Management in the Grand Canyon](#)
- [1999 - Review: Glen Canyon Dam adaptive management program](#)
- [2003 - Critical Issues in Weather Modification Research](#)
- [2004 - Confronting the Nations Water Problems: The Role of Research](#)
- [2007 - Colorado River Basin Water Management](#)
- [2008 - Prospects for Managed Underground Storage of Recoverable Water](#)
- [2008 - Hydrology, Ecology and Fishes of Klamath River Basin](#)
- [2008 - Desalination: A National Perspective](#)
- [2009 - Irreversible Climate Change](#)
- [2009 - America's Energy Future Technology Transformation](#)

- [2010 - Adapting to Impacts Climate Change](#)
- [2012 - Water Reuse Potential Expanding Nation Water Supply](#)
- [2012 - Sustainable Water Environmental Management: California Bay Delta](#)
- [2012 - Preparing for the Third Decade: National Water Quality Assessment](#)
- [2012 - Disaster Resilience: A National Imperative](#)
- [2012 - Dam Levee Safety: Community Resilience and Vision of Future Practice](#)
- [2014 - Lessons Learned from the Fukushima Nuclear Accident](#)

A suite of materials provided to the public by NAS on June 8, 2021

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- [2010 - Informing an Effective Response to Climate Change](#). NAS.
- [2010 - Advancing Science of Climate Change](#). NAS.
- [2011 - National Security Implications of Climate Change For U.S. Naval Forces](#). NAS.
- [2011 - America's Climate Choices](#). NAS.
- [2013 - Climate and Social Stress: Implications for Security Analysis](#). NAS.
- [2016 - From Maps to Models: Augmenting the Nations Geospatial Intelligence Capabilities](#). NAS.
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NATIONAL PARKS (see "National Parks")

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 - [1974 - Review of the National Water Commission Report](#).
 - [2009 - 35-Years After: The National Water Commission Report](#). Congressional Research Service.
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OIL SHALE AND TAR SANDS

- [2005 - RAND Report](#).
 - [2008 - Oil Shale Report](#). Congressional Research Service.
 - [2008 - Water Rights and Oil Shale](#). Congressional Research Service.
 - [2009 - Oil Shale Report](#). University of Colorado at Boulder.
 - [2009 - Dirty Oil](#). Greenpeace.
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 - [2010 - Oil shale update](#). National Oil Shale Association.
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- 2020 - [Annual Report](#)
- 2019 - [Annual Report](#)
- 2018 - [Annual Report](#)
- 2018 - [Final Report: Three-year System Conservation Pilot Program](#) (six documents combined).
- 2017 - [Depletion Schedule Revised in 2016 and 2017 Resolution](#)
- 2017 - [Annual Report](#)
- 2016 - [Annual Report](#)
- 2016 - [Assessing Agricultural Use Including Remote Sensing and Evapotranspiration](#)
- 2015 - [Annual Report](#)
- 2014 - [Annual Report](#)
- 2013 - [Annual Report](#)
- 2013 - [Assessing Agricultural Consumptive Use in Upper Colorado River Basin](#)
- 2012 - [Annual Report](#)
- 2011 - [Annual Report](#)
- 2014 - [Resolution to adopt contingency planning for shortages](#)
- 2009 - [Annual Report](#)
- 2008 - [UCRC letter to Kempthorne about HFEs and fall steady flows](#)
- 2007 - [UCRC Resolution Upper Basin Depletion Estimates](#)
- 2007 - [Depletion Schedules Upper Basin](#)
- 2007 - [Approved \(revised\) Depletion Schedules](#)
- 2006 - [UCRC Letter to Secretary Kempthorne](#)
- 2006 - [Potential Use of Winter Cloud Seeding to Augment Flow of Colorado River](#)
- 2006 - [UCRC Resolution Availability Water Navajo Reservoir](#)
- 2005 - [Annual Report](#)
- 2005 - [UCRC Resolution Retention Water Upper Basin Reservoirs](#)
- 2004 - [UCRC Letter about Lake Powell minimum power pool](#)
- 2004 - [Annual Report](#)
- 2003a - [UCRC Resolution Use Accounting Water Lake Powell Pipeline](#)

- 2003b - [UCRC Resolution Use Accounting Water Navajo Gallup Water Supply Project](#)
 - 2002 - [UCRC letter about Long-range Operating Criteria](#)
 - 1994 - [UCRC Resolution Upper States Depletion Tables](#)
 - 1989 - [UCRC Resolution Funding Weather Modification Research](#)
 - 1988 - [UCRC Resolution Funding Weather Modification Research](#)
 - 1987 - [UCRC Resolution Proposed Hydrologic Determination](#)
 - 1986 - [UCRC Resolution Construction of Animas-LaPlata Project](#)
 - 1985 - [UCRC Resolution Cooperative Snow Survey Water Supply Forecasting Program](#)
 - 1984 - [UCRC Resolution Proposal Galloway Group](#)
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 - 1980 - [UCRC Resolution Appropriation Funds Farm Salinity Control](#)
 - 1979a - [UCRC Resolution Releases Colorado River Reservoirs](#)
 - 1979b - [UCRC Resolution Cooperative Snow Survey Water Supply Forecasting Program](#)
 - 1979c - [UCRC Resolution Gaging Stations](#)
 - 1979d - [UCRC Resolution Adjustment Power Rates](#)
 - 1950 - [First Annual Report](#)
 - 1949 - [Minutes of the first meeting](#)
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Center for Colorado River Studies at USU Logan

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- 2019 - [Summary of White Paper 02 & Full White Paper 02](#); Water Resource Modeling of the Colorado River: Present and Future Strategies.
- 2020 - [Summary of White Paper 03 & Full White Paper 03](#); Strategies for Managing the Colorado River in an Uncertain Future.
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Note: desal quantities are usually measured in gallons per day

- [Convert gallons to acre-feet and cubic feet per second](#)
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 - [Arizona Priority Two & Three](#)
 - [Arizona Priority Four](#)
 - [Arizona Priority Five & Six](#)
 - [California \(graphic\)](#)
 - [Nevada \(graphic\)](#)
 - [Shoshone Power Plant \(Glenwood Canyon\)](#)
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- [Basin Study Program Overview](#)
- [Basin Study Proposal](#)
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Arizona

- [Water Planning Division](#)
- [Drought Plan](#)
- [Arizona Drought Plan](#)

California

- [Issues Affecting California's Long-Term Water Policy.](#) Hubbard.
- [Colorado River Use Plan](#)
- [Drought Plan](#)
- [California Water Supply & Demand: Technical Report.](#) SEI.
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- [California's Colorado River Water Use Plan](#)

Colorado

- [2016 - Colorado's Water Plan](#)
- [Colorado Climate Preparedness](#)

- [Colorado River Water Availability Draft Report](#)
- [Colorado River Water Availability Study web page](#)
- [Water Study Supporting Documentation](#)
- [Drought Plan](#)
- [Upper Colorado Framework](#)
- [Gunnison Framework](#)
- [San Juan & Dolores Framework](#)
- [Yampa & White Framework](#)
- [Colorado Drought Plan](#)
- [Colorado Gunnison River Basic Information](#)
- [Colorado Preparedness Project. WWA.](#)
- [Colorado San Juan Dolores Basic Information](#)
- [Colorado Upper Colorado Basic Information](#)
- [Colorado White River Basic Information](#)
- [Colorado Yampa Basic Information](#)

Nevada

- [Water Plan](#)
- [Drought Plan](#)
- [Water Plan. Southern Nevada Water Authority](#)
- [Nevada Drought Plan](#)
- [Southern Nevada Water Authority Plan](#)

New Mexico

- [State Water Plans](#)
- [Drought Plans](#)

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- [State Water Plan](#)
- [Uinta Basin Water Plan](#)
- [West Colorado River Plan](#)
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- [Drought Plan](#)
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- [News: Pitkin County Commissioners LeeryOf Cloud Seeding Project](#). Hugh Carey of Summit Daily.
- [2014 - Executive Summary: Wyoming Weather Modification Pilot Program](#)
- [1999 - Review of Cloud Seeding Experiments to Enhance Precipitation and New Prospects](#). Bruintjes.
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WESTERN WATER POLICY REVIEW ADVISORY COMMISSION

- [ARCHIVE: Western Water Policy Review Advisory Commission](#). University of New Mexico; 1997.

Go back to [Reports A to L](#)

Reservoirs

Studies on the efficiency and functionality of reservoir storage related to the supply of Colorado River water.

See also the following sections:

- [Hydropower](#)
- [Sediment](#)
- [Floods](#)
- [Click here](#) to read articles from the Lake Powell Research Project of the National Science Foundation
- [Click here](#) to determine your own analysis of what the Colorado River system of reservoirs will look like in a future.
- [Click here](#) to read about reservoir sediment.
- [Click here](#) to visit journals and theses of CADWES
- [Calculate total surface area](#) by reservoir elevation at Lakes Mead and Powell. Reclamation.
- [Calculate evaporative loss](#) for Lakes Mead and Powell. Reclamation.
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- [1978 - Sedimentation in Lake Powell](#). Lake Powell Research Project Bulletin, #64.
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- [2006 - Can Reservoir Storage Be Uneconomically Large?](#) Booker and O'Neil. Journal of Water Resources Planning and Management.
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- [2016 - Fill Mead First: A Technical Assessment](#). Schmidt.

UPPER BASIN RESERVOIRS

Green River (Upper)

- Big Sandy
- Flaming Gorge
- Fontenelle
- Meeks Cabin
- Stateline

Gunnison / Uncompahgre River

- Blue Mesa
- Crystal
- Morrow Point
- Paonia
- Ridgeway
- Silver Jack

- Taylor Park

Price / San Rafael Rivers

- Huntington North
- Joes Valley
- Scofield

San Juan / Dolores Rivers

- Jackson Gulch
- Lemon
- McPhee
- Navajo
- Vallecito

Uinta / Duchesne Rivers

- Currant Creek
- Moon Lake
- Red Fleet
- Soldier Creek
- Starvation
- Steinaker
- Upper Stillwater

Mainstem Dams on the Colorado River

- Glen Canyon(Lake Powell)
- Hoover (Lake Mead)
- Davis (Lake Mojave)
- Parker (Lake Havasu)
- Headgate (diversion)
- Palo Verde (diverson)
- Imperial (diversion)
- Laguna

Off-River Storage Reservoirs

- Senator Wash
 - Brock Reservoir
-

Rights of Nature

It could be said that movements to create sustainable communities and ecosystems in the United States is considered by many to be misinformed. Whereas Professor Roderick Nash has intellectually argued that long-standing and foundational governance has indeed changed, and these changes have perfected the general welfare for humans and wildlife. Examples include the struggle to end slavery and securing basic human rights for women, indigenous peoples, and ethnic and religious minorities. This would include the right to even exist, which is the foundation principle for the Endangered Species Act of 1973. This process has taken many centuries to evolve and the transformation is far from completion. We think this is the most important issue of our times, especially so as the retention of heat continues to rise in the oceans of this planet.

ORGANIZATIONS ATTRACTED TO RIGHTS FOR NATURE

Websites

- [Center for Democratic and Environmental Rights](#)
- [Community Environmental Legal Defense Fund](#)
- [Earth Law Center](#)
- [Global Alliance for the Rights of Nature](#)
- [Living Rivers & Colorado Riverkeeper](#)
- [Save The Colorado](#)
- Waterkeeper Alliance

OVERVIEW

There is a growing awareness that the current construct of US environmental laws is not sufficient to address the ecological realities of today and tomorrow. The reasons for this are many but two central tenets to why this is the case:

- The environmental laws themselves were never designed to protect the environment as many thought they were intended to do.
- The deeper superstructure of US law, governance, and the economic system that it spawned and continues to protect exists in order to control and exploit the natural world. The overall mission is the endless production of more and federal and state environmental laws are not a counter force but integrated into the system itself.

With awareness has come the desire to imagine and move into play a new system of law and behavior that reorients our relationship to the natural world. The law today in the United States sees nature as property. The counter being developed now for the last 15+ years views nature as rights bearing. The growth in rights of nature law-making has come primarily from small communities in the United States whereas in other parts of the world many of the instances have rights of nature legal assertions have come

through national level legislation or high court decisions.

Law Reviews

- [2018 - The Right To Flourish Regenerate and Evolve: Towards Juridical Personhood For An Ecosystem](#). Bilof.
- [2019 - Environmental Personhood and Standing for Nature: Examining the Colorado River Case](#). Miller.

Reports

- [2020 - Rights of Rivers Report](#). ELC.

Videos

- [2012 - Roderick Nash and Rights of Nature](#)
- [Kelsey Leonard on Rights of Nature](#). TED Talk.
- [Rights of Nature 101](#). Thomas Linzey.
- [The Rights of Nature: A Global Movement - Feature Documentary](#)

Books

- [1989 - The Rights of Nature: A History of Environmental Ethics](#). Roderick F. Nash.
- [2017 - The Rights of Nature: A Legal Revolution That Could Save the World](#). David R. Boyd.

News

- [May 1, 2023 - How a tribal rights lawyer is winning back Rights of Nature](#). Aric Sleeper for CounterPunch

Press Release

- [2021 - First Rights of Nature enforcement case filed in Tribal Court to enforce Treaty Guarantees](#). White Earth Reservation.

Resolutions

- [2021- Resolution of Tohono O'odham Nation for sacred saguaro cactus tree](#).
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River Journals

[Letter asking Grand Canyon River Guides to decommission Glen Canyon Dam](#)
From David Brower, Martin Litton and Ken Sleight.

THE CONFLUENCE: Journal of Colorado Plateau River Guides

ALL ISSUES COMBINED (searchable & very large file)

Confluence #01 (1.1), Winter 1994 [2.8mb PDF File]

- [Don Hatch by Roy Webb](#)
- [First CPRG meeting by Dimock, Thomas and Weisheit](#)
- [Canyonlands Colorado River Management Plan by Jim Braggs](#)
- [Commercial Outfitting Regulations by Tony White](#)
- [Navajo Origins by Red Wolfe](#)
- [Frank Wright by Tom Rice](#)
- [Canyonlands Natural History Association by Sharon Brussell](#)
- [San Juan River Waterfall by Gene Stevenson](#)
- [Endangered Fish by Tamara Wiggans](#)
- [Cataract Canyon Survey of 1921 by John Weisheit](#)
- [Canyonlands Field Institute by Rebecca Martin](#)
- [Current Events](#)

Confluence #02 (1.2), Spring 1994 [3mb PDF File]

- [Steve Arrowsmith by Tim Thomas](#)
- [Announce and Opinions](#)
- [Clay Hills Boat Ramp by Bill Bishop](#)
- [Animas-La Plata Project by Tamara Wiggans](#)
- [Best Expedition of 1891 by John Weisheit](#)
- [Lost Inscriptions Found by James Knipmeyer](#)
- [Biological Soil Crusts by Jayne Belnap](#)
- [Recovery Implementation Project by Tamara Wiggans](#)
- [Southern Utah Wilderness Alliance by Scott Groene](#)
- [Dolores River by Bill Dvorak](#)

- [Endangered Fish of the Colorado River by Connie Young](#)

Confluence #03 (1.3), Summer 1994 [3.1mb PDF File]

- [Announcements and Opinion](#)
- [Georgie by Richard Westwood](#)
- [Laccoliths of the Colorado Plateau by John Weisheit](#)
- [CPRG Bylaws](#)

Confluence #04 (1.4), Fall 1994 [2.7mb PDF File]

- [Announcements and Opinion](#)
- [Animas River by Michael Black](#)
- [Captain H. T. Yokey by John Weisheit](#)
- [Resource Management Plan San Juan River by Tom Rice](#)
- [Tamarisk by David Williams](#)
- [Uncompahgre Plateau and Unaweep Canyon by John Weisheit](#)
- [Recycling by Susette DeCoster](#)
- [Books & Poetry](#)

Confluence #05 (2.1), Winter 1995 [2.5mb PDF File]

- I Can Fix That!
- Where the Hell Am I?
- A Fish Out of Water
- Fitz-Bew
- R.I.P. Denis Julien
- Whiskers
- Quartzite Falls
- Atlas DEIS
- Southern Utah Wilderness Alliance
- And other things...

Confluence #06 (2.2), Spring 1995 [2.5mb PDF File]

- Avoiding Conflicts
- Frank Dodge Saga
- CNP Backcountry Management Plan
- Injuries
- Papua New Guinea
- The River Mild
- Climate
- Eon, Era, Period, Epoch
- And other things...

Confluence #07 (2.3), Summer 1995 [2.9mb PDF File]

- Action Alerts: Wilderness, ALP and Uranium Waste
- Overflights
- Droughts
- Stories and Poetry
- USGS Stateline Gauge
- The Cutler Group
- Climate
- And other things...

Confluence #08 (3.1), Winter 1996 [4.7mb PDF File]

- Frank Dodge continued
- Piedra River
- Icebergs in Cataract
- Atlas Tailings
- Affordable Housing
- Mr. Fix It
- Cataract Canyon Flow Regime
- Microplate

- Dolores River
- Paradox Basin
- Big Bottom Pictographs
- High Water Redux
- Endangered Fish
- And other things...

Confluence #09 (3.2), Spring 1996 [3.7mb PDF File]

- Jet Skis
- CNP River Management
- John Sumner
- Grove K. Gilbert
- Jewel of the Colorado
- Westwater Canyon
- US Reclamation Service in 1914
- People Use in the River Canyons
- And other things...

Confluence #10 (3.3), Summer 1996 [4.4mb PDF File]

- [Bert Loper](#). John Weisheit.
- [Charles Silver Russell](#). John Weisheit.
- [Samuel Adams](#). Michele Reaume and John Weisheit
- [Abbey's Boots](#). Douglas Carithers
- [Animas La Plata Project](#). Michael Black.
- [Glen Canyon Dam is Broken](#). John Weisheit.
- [Drug Testing](#). Steve T-Berry Young.
- [Confessions of a Jet Boat Driver](#). Dirk Vaughan.
- [News, Views & Announcements](#).

Confluence #11 (4.1), Spring 1997 [4.9mb PDF File]

- George Flavell

- Nathaniel Galloway
- William Richmond
- Harry Aleson & Georgie
- Humber Chubs
- Defending Constitutional Rights
- River Register Inscriptions
- Canyonlands RMP
- Crossword Puzzle
- And other things...

Confluence #12 (4.2) Summer 1997 [4.7mb PDF File]

- Bob Degles
- Harry McDonald
- Spillway Enhancement
- High Water 1997
- History of Rubber Boats
- Charles Ray Sherrill
- Crossword Puzzle
- And other things...
- Poetry and more...

Confluence #13, (4.3), Winter 1997 [3.8mb PDF File]

- Mule Ear Diatreme
- Steamer "Major Powell"
- William Hiram Edwards
- Westwater Canyon
- Guide Training
- International Boating
- Wicked Winds
- Never ask a geologist...
- Crossword Puzzle

- Poetry and more...

Confluence #14 (5.1), Spring 1998 [3.9mb PDF File]

- Where Am I?
- Law of the River
- Who's Who? (Agencies)
- Stress
- Managing Conflict
- Information Plus (A book report)
- Upper Animas River
- Animas La Plate Project
- Educational Psychology
- Personal Watercraft
- Les Jones
- U.S. Board of Geographical Names
- Anazazi Symposium
- Restore Hiking to your Repertoire
- Calling and Conjuring Creativity

Confluence #15 (5.2), Summer 1998 [3.2mb PDF File]

- Charles Butler Hunt
- Recipe for Dilemma
- Rubber Rafting Redux
- Hetch Hetchy and Glen Canyon
- Why I Left Outfitting
- Confluence Inscription
- David Dexter Rust
- Buzz Holmstrom
- Problematic Dams
- Crossword Puzzle
- The Prez Sezs and more...

Confluence #16 (5.3), Fall 1998 [3.9mb PDF File]

- River Guide Poll
- River Guide Interpretation
- River Guide Information
- River Guide Interviews
- River Guide Feedback
- White Bison Mural
- Uranium
- And more...

Confluence #17 (6.1), Spring 1999 [4.2mb PDF File]

- Rethinking Western Water
- 1998 Desert Waters Rendezvous
- Life on the Rocks
- Clarence King
- Westwater Canyon
- A. G. Turner
- Frenchy
- And more...

Confluence #18 (6.2), Fall 1999 [4.4mb PDF File]

- Hunta Virus
- Peregrine Falcon
- Kent Frost
- Rock Shelters
- Name Changes
- Lost Inscription?
- River Bed Case: The Decree
- Weeds
- San Juan Diary: 1952
- Britt Ready and the Cadillacs
- Sand Waves

- Poetry and more...

Confluence #19 (6.3), Winter 1999 [3.6mb PDF File]

- [General Announcements](#)
- [1872 Diary of Grove Karl Gilbert](#). George Simmons (Black George)
- [Friend Grant Faatz Inscription](#). James Knipmeyer.
- [Neverland](#). Earl Perry.
- [Westwater Canyon Geology](#). Will Bussard.

Confluence #20 (7.1), Spring 2000 [3.6mb PDF File]

- [100-years of Moab Happenings](#).
- [Fruita Refinery](#)
- [General Information](#)
- [Geology: How The Southwest Began](#)
- [Gunnison River](#)
- [Insects & Endangered Fish](#)
- [Know Your Federal Agencies & Policies](#)
- [Opposition to Glen Canyon Dam](#)
- [Park Service Zodiac](#)
- [Pilling Figurines](#)
- [Westwater Canyon Mining](#)

Confluence #21 (7.2), Fall 2000 [3.6mb PDF File]

- River Education
- Letters
- Neverland
- Diary: Grove K. Gilbert
- F. G. Faatz
- Westwater Canyon Geology
- And more...

Confluence #22 (8.1), Spring 2001 [3.6mb PDF File]

- [News, Views & Announce](#)
- [David Brower by John Weisheit](#)
- [Beginners Luck by Daniel Anderson](#)
- [Dave Rust: Glen Canyon 1923 by Frederick Swanson](#)
- [Echo Park Controvers by Herm Hoops](#)
- [Kolb & Loper: Westwater 1916. GJ Sentinel.](#)
- [Richard Jones by Annie Tueller-Payne](#)
- [Spanish Stairs by Silliman in 1952](#)
- [Weeds by Kara Dohrenwend](#)
- [Wright Inscriptions by James Knipmeyer](#)

Confluence #23 (8.3) Fall 2001 [7mb PDF File]

- [Anasazi Cannibalism](#). Sarah Clinger.
- [Changing Rapids at Hell to Pay Rapid](#). Robert Webb.
- [GJ-Moab River Runners](#). Herm Hoops.
- [More about Bert Loper from testimony](#). John Weisheit.
- [News, Views and Poetry](#).

Confluence #24 (8.2), Summer 2001 [3 mb PDF File]

- [Black George Simmons Science Trips](#). Dave Focardi.
- James W. Black. James Knipmeyer
- [Interpretive Trip Reports; Boatmen Can See in the Dark; Poetry and more...](#)

Confluence #25 (9.1), Spring 2002 [2.0mb PDF File]

- [Changing Rapids of Cataract](#). Robert Webb, Jayne Belnap & John Weisheit.
- AJ Tadge. James Knipmeyer.
- [James Best Expedition of 1891](#). John Weisheit.
- [Bert Loper Riverbed Testimony](#). John Weisheit.
- [News, Views, Poetry, Humor & Board Comments](#)

Confluence #26 (9.2), Fall 2002 [1.3mb PDF File]

- [Early Trip Down Green/Colorado? James Knipmeyer.](#)
- [Harry T. Yokey by John Weisheit](#)
- [Charles Spencer by Bob Sorgenfrei](#)
- [Labyrinth Canyon Management by Dawson et al](#)
- [Otis Marston and Sportyaks in the Grand by John Weisheit](#)
- [News, Views, Opinion, Announcements and Poetry by CPRG members](#)

Confluence #27 (10.1), Fall 2003 [2.1mb PDF File]

- [News, events and Opinion](#)
- [Inscriptions: Howland & Wheeler; Dinosaur NM](#) by James Knipmeyer; Herm Hoops
- [Coal Creek Dam Site](#) by Roy Webb.
- [Sediment Happens](#) by John Weisheit.
- [Persistent Drought](#) by John Weisheit.
- [SOCOTWA](#) by Roy Webb
- [Glen Canyon Dam Failure](#) by John Weisheit
- [Southwest Rock Art](#) by Steve Anderson.

Confluence #28

- [Hank Stewart and Sand Wash](#) by James Aton.
- [Boatmen stories of Arthur Wheeler](#) by James Knipmeyer.
- [John and Parley Galloway](#) by John Weisheit.
- [Glen Canyon Diary: 1955](#) by Gus Scott.
- [Sportyaks: Moab to Hite in 1964](#) by John Weisheit.
- [News, Views, Poetry and Announcements](#) by CPRG members.

Confluence # 29, Spring 2020

Confluence # 30, Fall 2020

Confluence #31, Spring 2021

Confluence #32, Fall 2021

Confluence #33, Spring 2022

River Trips

See also: [Colorado Plateau River Guides](#)

Cataract Canyon

Mainstem Colorado River in Utah; below the confluence of the Green River and above Lake Powell

- [1956 - The diaries of George Simmons.](#)

Dolores River

Tributary of the Colorado River in western Colorado and eastern Utah

Colorado River Mainstem

Colorado and Utah

- [1933 - Rapids and Riffles.](#) Harold Leich.
-

Desolation and Gray Canyons

Green River Mainstem in eastern Utah

- [1966 - Felix E. Mutschler for the Powell Society.](#)
- [1979 - River Management Plan](#)

Dolores River

Tributary of the Colorado River in western Colorado and eastern Utah

- [1956 - The diaries of George Simmons.](#)

San Juan River

A tributary of the Colorado River

- [1921 - Diary of USGS dam survey expedition.](#) H. D. Miser.
- [2000 - River Flowing from the Sunrise: An Environmental History of the Lower San Juan.](#) Aton and McPherson.

Westwater Canyon

Mainstem Colorado River below the Utah/Colorado border

- [2004 - Westwater Lost and Found.](#) Mike Milligan.

Western Grand Canyon

Above Lake Mead

- [1946 - Harry Aleson and Georgie Clark-White](#)

White River: western Colorado and eastern Utah

A tributary of the Green River in the Colorado River Basin

- [Photo: the tributaries of the White River in the Uinta Basin](#) (Utah). tiff.
 - [2004 - A boating guide of the White River](#). Parsons.
 - [White River Guide and Map](#). BLM.
-

Salinity

Photo: Mancos Shale at the base of the Book Cliffs in Utah.



When the Colorado River and its tributaries flow through the Colorado Plateau, which is dominated by sedimentary rocks formed in a marine environment, the increased concentration of salt degrades the water quality of the river dramatically. Saline springs flow directly into the Roaring Fork, the Dolores, Cataract Canyon, and the Little Colorado River. The situation is compounded even further by all the reservoir evaporation in these desert climes, especially in Lake Powell and Lake Mead. By the time it gets to end-users like San Diego and Tucson, the water is typically blended with alternative water sources to lower the concentration of total dissolved solids.

The Colorado River Salinity Control Program

- [Reclamation's Salinity Control Program](#)
- [1993 - Salinity Control Report](#)
- [1993 - Report to Congress](#)
- [1999 - Salinity Control Report](#)
- 2003 - Progress Report. Department of the Interior.
- [2004 Progress Report](#). DOI.
- [2005 - Salinity Control Forum Report](#)
- [2008 - Salinity Control Forum Report](#)
- [2011 - Salinity Control Forum Draft Report](#)
- [2011- Salinity Control Forum Final Report](#)

- [2014 - Salinity Control Forum Final Report](#)
- [2017 - Salinity Control Forum Final Report](#)
- [2019 - Salinity Control Forum Briefing Document](#)

Paradox Valley Environmental Impact Study

Read the article about public scoping for an EIS

Read this article about the published Draft EIS

- [Paradox Salinity Scoping Document](#)
- [Paradox Scoping Letter Nov 2011](#)
- [Salinity Scoping Map](#)
- [Salinity Paradox Valley USBR press release](#)
- [Reclamation's Paradox Valley Project](#)

Additional Information

- [Map - Salinity Monitoring Stations](#)
- [1978 - Paradox Valley Unit: Definite Plan Report](#). Reclamation.
- [1979 - Environmental Impact Statement](#). Reclamation.
- [1985 - Economic Review of Salinity Control Program](#). Gardner et al.
- [1986 - Evaporation data for Lake Powell](#). Reclamation.
- [1999 - The Politics of Place: Domestic and Diplomatic Priorities of Colorado River Salinity Control Act](#). Ward.
- [Salinity Control Story UCRB](#). Danzer.
- [History of the Salinity Control Project](#). Reclamation.

Websites

- [Salinity Control Forum](#)
 - [Reclamation's Salinity Control Program](#)
 - [Reclamation's Paradox Valley Project](#)
-

Satire

THE STINKING DESERT GAZETTE

- 1986 - 1.1 [August, 1986](#); 1.2 [September, 1986](#); 1.3 [October, 1986](#); 1.4 [November, 1986](#); 1.5 [December, 1986](#).
- 1987 - 1.6 [January, 1987](#); 1.7 [February, 1987](#); 1.8 [March, 1987](#); 1.9 [April, 1987](#); 1.10 [May, 1987](#); 1.11 [June, 1987](#); 1.12 [July, 1987](#); [2.1 August, 1987](#); [2.2 September, 1987](#); 2.3 [October, 1987](#); [2.4 November, 1987](#); [2.5 December, 1987](#).
- 1988 - 2.6 [January, 1988](#); 2.7 [February, 1988](#); 2.8 [March, 1988](#); 2.9 [April, 1988](#); 2.10 [May, 1988](#); 2.11 [June, 1988](#); 2.12 [July, 1988](#); 3.1 [August, 1988](#); 3.2 [September, 1988](#); 3.3 [October, 1988](#); [3.4 November, 1988](#); 3.5 [December, 1988](#);
- 1989 - 3.6 [January, 1989](#); 3.7 [February, 1989](#); 3.8 [March, 1989](#); 3.9 [April, 1989](#) (last issue).

SLINKING DESSERT GLAC'E

- [Collectors Edition: 1.11 August 1988](#).

THE BEST OF NIK HOGAN

- [Collector's Edition](#)

THE WILD ONION

- [Wild Onion 1.1](#) & [Wild Onion 1.2](#)

THE UTAH UTARDIAN

- [Issue 01](#); [Issue 02](#); [Issue 03](#); [Issue 04](#); [Issue 05](#); [Issue 06](#); [Issue 07](#); [Issue 08](#); [Issue 09](#); [Issue 10](#); [Issue 11](#)
-

Science Part One (A-O)

Many scientists consider the Colorado River to be the most scientifically studied river in the world. We certainly agree. However, for all the science that has been completed on the Colorado, it still remains the most endangered river in North America.

We also understand that the Rio Grande and the Sacramento/San Jouquin river basins are just as degraded as the Colorado. At least, for now, the Rio Grande and the Sacramento are given the decency to flow, though meagerly, into the ocean.

It remains to be seen if policy makers will actually use the best available science to save our many troubled waters.

2003 - Making the Most of Science in the American West. Limerick.

Note about the photo: Charles Dolittle Walcott studied the Precambrian rock types of the Grand Canyon and succeeded John Wesley Powell as the director of the USGS.



Charles D. Walcott - studied the Precambrian rock types of the Grand Canyon and succeeded John Wesley Powell as the director of the USGS.

SCIENCE DOCUMENTS HYPERLINKED ONLY BY LEAD AUTHOR & YEAR PUBLISHED (as of 2011)

- [Adaptive Management](#)
- [Aquatic Ecology](#) (some crossover with aquatic food base documents).
- [Cultural and Historic Properties](#)
- [Food Base](#) (some crossover with aquatic ecology documents).
- [Glen Canyon Environmental Studies \(1982 - 1996\)](#)
- [Grand Canyon](#)
- [Hydrology Resources](#)
- [Lake Powell](#)
- [Recreation](#)

- [Sediment Resources](#) (some crossover with other physical resources).

ADAPTIVE MANAGEMENT

- [1984a - Management of the Colorado River at GCD: A Case Study for the Future?](#) Wegner.
- [1993 - How Adaptive is Adaptive Management? Implementing A.M. in Washington and British Columbia.](#) Halbert.
- [1996 - Second Science Review Committee Report of Long Term Resource Management \(Upper Mississippi River\).](#) USGS.
- [1996b - Grand Canyon Trust briefing paper.](#)
- [1997 - Garrett](#)
- [1997b - Garrett](#)
- [1997d1 - Garrett](#)
- [1997d2 - Garrett](#)
- [1997 - GCTrust](#)
- [1997b - GCTrust](#)
- [1997b - GCMRC](#)
- [1997c - GCMRC](#)
- [1997e - GCMRC](#)
- [1997 - Walters](#)
- [1997b - Walters](#)
- [1998 - GCAMWG](#)
- [1998 - Korman](#)
- [1999 - Resilience, Flexibility and Adaptive Management: Antidotes for Spurious Certitude?](#) Gunderson.
- [1999 - Final Report of the Physical Resources Monitoring Peer Review Panel.](#) Wohl et al.
- [1999 - NRC](#)
- [2000a - Meretsky](#)
- [2000 - GCMRC](#)
- [200b - GCMRC](#)
- [2000 - Mas](#)
- [2001 - GCTrust](#)
- [2001 - Brower](#)

- [2002 - GCMRC](#)
- [2002 - Hayes](#)
- [2002 - Jacobs](#)
- [2002 - GCDAMWG](#)
- [2005 - State of the Colorado River. USGS.](#)
- [2005 - Melis](#)
- [2006 - Final Report of the Physical Resources Monitoring Peer Review Panel. Wohl et al.](#)
- [2007 - Lovich](#)

AQUATIC RESOURCES

- [2001 - Aquatic Protocol Evaluation Program Panel. Anders.](#)
- [1993 - AZ Game & Fish 1993 Draft Annual Report](#)
- [1993 - 1992 AZ Game & Fish Annual Report](#)
- [1999 - Draft EA: GCD Modifications to Control Downstream Temperatures. BOR.](#)
- [1998 - Little Colorado River Native Fish Report. Brouder.](#)
- [1999 - Paria River Native Fish Report. Brouder.](#)
- [1981 - A survey of the Aquatic Flora and Fauna of the Grand Canyon. Carothers.](#)
- [2002 - Evaluation of Tagging Mortality and Retention in Juvenile HBC. Childs.](#)
- [2003 - Parasites of native and non-native fishes of the Little Colorado River, Grand Canyon, Arizona. Choudhury.](#)
- [1994 - Management of Discharge, Temperature, and Sediment in Grand Canyon for Native Fishes. Clarkson.](#)
- [2000 - Temperature Effects of Hypolimnial-Release Dams on Early Life Stages of Colorado River Basin Big-River Fishes. Clarkson.](#)
- [2001 - Fisheries Monitoring Activities in the Little Colorado River within Grand Canyon During 2000. Coggins.](#)
- [2002 - Piscivory by Non-Native Salmonids in the Colorado River and an Evaluation of the Efficacy of Mechanical Removal of Non-Native Salmonids. Coggins.](#)
- [2003 - An Overview of Status and Trend Info for Grand Canyon Population of HBC. Coggins.](#)
- [2002 - Cole](#)
- [2004 - Endangered Fish Threatened by Asian Fish Tapeworm. Cole.](#)
- [2002 - Colorado pikeminnow recovery goals. USFWS.](#)

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- 1992 - GCD Tailwater: Rainbow Trout Strain Literature Review and Evaluation. Davis.
- 2003 - Stranding of Rainbow Trout during Experimental Fluctuating Releases from Glen Canyon Dam on the Colorado River. Batham & Davis.
- 1993a - AZ Game and Fish 1993a Trip Report. Doster.
- 1993b - AZ Game and Fish 1993b Trip Report. Doster.
- 1996 - Ecology and Conservation Biology of HBC in the Little Colorado River. Douglas.
- 1987 - Colorado River water temperature modeling below Glen Canyon Dam. Ferrari.
- 1994 - Fish & Wildlife
- 2003 - Science Advisors Evaluating a Temperature Control Device for Glen Canyon Dam. Garrett.
- 1994 - Habitat use by HBC in the Little Colorado River and other tributaries of the Colorado River. Gorman.
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- 1997a - Recommendations for Research, Monitoring, and Conservation of Endangered and Native Fishes in GCNP. Gorman.
- 1999b - Monitoring and Studies of Native Fishes of the Colorado River Ecosystems in GCNP. Gorman.
- 2000b - Temporal and Spatial Distribution and Abundance of Juvenile HBC and Adult RT in the Colorado River in GCNP, 1998 to 2000. Gorman.
- 2000c - Status and trends of native and non-native fishes of the Colorado River in GCNP. Gorman.
- 2000d - Experimental growth of four native Colorado River fishes at temperatures of 12, 18 and 24 C. Gorman.
- 2005 - Distribution and Abundance of Native and Non-native Fishes of the Colorado River Ecosystem in Grand Canyon, Arizona. Gorman.
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- [1999 - Paria River Native Fish Monitoring 1998 Annual Report](#). Hoffnagle.
- [2000a - Parasites of Native and Non-native Fishes of Lower Little Colorado River](#). Hoffnagle.
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- [1995d - Video and Thermal Infrared Mosaics for the Little Colorado River, Miles 13-18](#). Holroyd.
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- [2006 - Nearshore Water Temperature Data: August to November 2005](#). Kaplinski.
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- [2000 - Meretsky](#)
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- [1991 - Pinney](#)
- [2002 - Razorback sucker](#)
- [2002 - Razorback Sucker Recovery Goals](#)
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- [2003a - Rogers](#)
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- [2001 - Rowell](#)
- [1995 - Ryel](#)
- [2003 - Speas](#)
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- [1996 - Tyus](#)
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- [1982 - Life History and Prospects for Recovery HBC and BTC. Valdez.](#)
- [1990 - The Endangered Fish of Cataract Canyon. Valdez.](#)

- [1990a - Characterization of the Life History and Ecology of HBC in GCNP: Data Collection. Valdez.](#)
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TROUT

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Science Part Two (P-Z)

Many scientists consider the Colorado River to be the most scientifically studied river in the world. We certainly agree. However, for all the science that has been completed on the Colorado, it still remains the most endangered river in North America.

We also understand that the Rio Grande and the Sacramento/San Jouquin river basins are just as degraded as the Colorado. At least, for now, the Rio Grande and the Sacramento are given the decency to flow, though meagerly, into the ocean.

It remains to be seen if policy makers will actually use the best available science to save our many troubled waters.

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Sediment



USGS survey in lower Cataract Canyon in 1921 (Palmer Canyon), which is now buried in Lake Powell sediment.

The Colorado River is a story more about sediment than water. There is a saying on the Colorado about its sediment load: "Too thin to plow, too thick to drink." By volume, the Colorado River is the most sandy and silty river in North America. By volume of water, the Colorado ranks 25th in the 50 states of the USA. However, this tiny river has eroded half of the Colorado Plateau in as little as 6 - 10 million years. Indeed, quite an accomplishment and a testament to the power of grits both fine and coarse. Once you read some of the key documents ([example](#)) in this section, you will understand that sediment will interrupt water supplies and flood control to the water users of the Colorado River in as little as 250 years. However, should reservoir levels consistently hover above the outlet works (penstocks and river outlet tubes), the reservoir sediment that is remobilized by the flowing Colorado River will fill the inactive pool (dead pool) of the reservoir in this century.

"The water goes, the sand remains." Armenian Proverb

"Our rivers run silt, although we could better think of them as running the telltale blood of cancer." Alan Gregg

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- [Bacteriology & BioChemistry of the Sediments](#)
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- [Turbidity Currents](#)
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SOLUTION PRINCIPLES

1. GRASSROOTS DEMOCRACY

Every human being deserves a say in the decisions that affect their lives and not be subject to the will of another. Therefore, we will work to increase public participation at every level of government and to ensure that our public representatives are fully accountable to the people who elect them. We will also work to create new types of political organizations which expand the process of participatory democracy by directly including citizens in the decision-making process.

2. SOCIAL JUSTICE AND EQUAL OPPORTUNITY

All persons should have the rights and opportunity to benefit equally from the resources afforded us by society and the environment. We must consciously confront in ourselves, our organizations, and society at large, barriers such as racism and class oppression, sexism and homophobia, ageism and disability, which act to deny fair treatment and equal justice under the law.

3. ECOLOGICAL WISDOM

Human societies must operate with the understanding that we are part of nature, not separate from nature. We must maintain an ecological balance and live within the ecological and resource limits of our communities and our planet. We support a sustainable society which utilizes resources in such a way that future generations will benefit and not suffer from the practices of our generation. To this end we must practice agriculture which replenishes the soil; move to an energy efficient economy; and live in ways that respect the integrity of natural systems.

4. NON-VIOLENCE

It is essential that we develop effective alternatives to society's current patterns of violence. We will work to demilitarize, and eliminate weapons of mass destruction, without being naive about the intentions of other governments. We recognize the need for self-defense and the defense of others who are in helpless situations. We promote non-violent methods to oppose practices and policies with which we disagree, and will guide our actions toward lasting personal, community and global peace.

5. DECENTRALIZATION

Centralization of wealth and power contributes to social and economic injustice, environmental destruction, and militarization. Therefore, we support a restructuring of social, political and economic institutions away from a system which is controlled by and mostly benefits the powerful few, to a democratic, less bureaucratic system. Decision-making should, as much as possible, remain at the individual and local level, while assuring that civil rights are protected for all citizens.

6. COMMUNITY-BASED ECONOMICS AND ECONOMIC JUSTICE

We recognize it is essential to create a vibrant and sustainable economic system, one that can create jobs and provide a decent standard of living for all people while maintaining a healthy ecological balance. A successful economic system will offer meaningful work with dignity, while paying a living wage which reflects the real value of a persons work.

Local communities must look to economic development that assures protection of the environment and workers rights; broad citizen participation in planning; and enhancement of our quality of life. We support independently owned and operated companies which are socially responsible, as well as co-operatives and public enterprises that distribute resources and control to more people through democratic participation.

7. FEMINISM AND GENDER EQUITY

We have inherited a social system based on male domination of politics and economics. We call for the replacement of the cultural ethics of domination and control with more cooperative ways of interacting that respect differences of opinion and gender. Human values such as equity between the sexes, interpersonal responsibility, and honesty must be developed with moral conscience. We should remember that the process that determines our decisions and actions is just as important as achieving the outcome we want.

8. RESPECT FOR DIVERSITY

We believe it is important to value cultural, ethnic, racial, sexual, religious and spiritual diversity, and to promote the development of respectful relationships across these lines.

We believe that the many diverse elements of society should be reflected in our organizations and decision-making bodies, and we support the leadership of people who have been traditionally closed out of leadership roles. We acknowledge and encourage respect for other life forms than our own and the preservation of biodiversity.

9. PERSONAL AND GLOBAL RESPONSIBILITY

We encourage individuals to act to improve their personal well-being and, at the same time, to enhance ecological balance and social harmony. We seek to join with people and organizations around the world to foster peace, economic justice, and

the health of the planet.

10. FUTURE FOCUS AND SUSTAINABILITY

Our actions and policies should be motivated by long-term goals. We seek to protect valuable natural resources, safely disposing of or unmaking all waste we create, while developing a sustainable economics that does not depend on continual expansion for survival. We must counterbalance the drive for short-term profits by assuring that economic development, new technologies, and fiscal policies are responsible to future generations who will inherit the results of our actions.

Testimony

Quotes from the documents listed in this section

1946 - "No sound planning can be done for new projects until the water budget is balanced again in some way." Northcutt Ely, former Deputy Secretary of Interior. Mr. Ely made this comment in a [U.S. Senate Document](#) after the Mexican Treaty of 1944 was ratified.

Note: (a) The Mexican Treaty guarantees 1,500,000 acre-feet per year to the Republic. (b) Prior to this Treaty, Mexico consumed about 750,000 acre-feet per year. (c) Mexico has arable lands to receive water greater than 1,500,000 acre-feet. (d) Mexico's agricultural waste water flows north into California's Salton Sea (a structural depression below sea level). (e) The need and purpose of Lake Mojave includes storage of water for Mexico. (f) Sea level rise from the melting of continental ice will eventually fill the Salton Depression with ocean water

1954 - "The notion that Glen Canyon [Dam] is to be built to accommodate the lower basin and that the lower basin should bear the evaporation losses there, is a little far-fetched." Northcutt Ely, during [testimony](#) for the authorization of dams and diversions in the Upper Basin (CRSP Act of 1956).

1954 - "It is known that the Office of Indian Affairs construes article VII of the compact as meaning that (1) the Indian claims come ahead of the compact, are not chargeable to any State and the compacting States simply divided the residue after the Indian claims; (2) Indian claims relate back to the date of establishment of the reservation, even though not put to use, and take priority over uses by non-Indians even though the uses by non-Indians may in fact long antedate the actual putting of water to use by the Indians." Northcutt Ely, during [testimony](#) for the authorization of dams and diversions in the Upper Basin (CRSP Act of 1956).

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- [1954 - CRSP testimony from the State of California about authorizing Glen Canyon Dam. Northcutt Ely. \(searchable pdf\)](#)
- [1997 - Congressional hearing on Sierra Club's proposal to drain Lake Powell](#)
- [1998 - Joint hearing on the Sierra Club's proposal to drain Lake Powell or reduce its water storage capability.](#)

Hoover Dam

- [1962 - Release of Colorado River Water Impounded in Lake Mead for Sluicing. Congressional Testimony.](#)

Upper Colorado River Compact of 1948

- [1949 - US House Hearings of the Upper Basin Compact of 1948](#)

Arizona v California

- [1965 - Statement of attorney Northcutt Ely regarding Arizona v California](#)
-

TRIBES: Ancestral Water Since Time Immemorial

The Colorado River Compact (1922) and the Upper Colorado River Basin Compact (1948) do not affect obligations to Native American interests. Article VII and Article XIX, respectively, of the 1922 and 1948 compacts provide that: Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian Tribes. The Colorado River Storage Project Act of 1956, the Colorado River Basin Project Act of 1968, and the associated Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs (Long-Range Operating Criteria) did not alter these compact provisions.



There are 29 Indian tribes within the Colorado River Basin with vested water rights of 2,900,000 acre-feet. There are 22 tribes recognized by the federal government. Ten of the Colorado River tribes are organized as a coalition called the [Ten Tribe Partnership](#) (also [here](#)) and advocate for a greater tribal voice in management of the Colorado River Basin.

The tribes hold senior water rights due to a legal decision made in 1908 called the [Winters Doctrine](#), or sometimes called the Federal Reserved Rights Doctrine. The priority date for such water rights are typically based on when the reservation was established, which usually pre-dates all other water rights by the dominant hydrosociety. Many tribes have quantified their water rights, sometimes through litigation or settlement, and others hold claims to water that have yet to be quantified and perfected.

- In 2017 the 9th District Court of Appeals affirmed Tribal rights to Groundwater: [Agua Caliente Tribe Vs Coachella Valley Water District](#).
- In 2021 the decision of the 9th Circuit Court of Appeals mandates the federal government to meet its treaty obligations to the Navajo Nation. [Navajo Nation vs USA](#). This case has advanced to the US Supreme Court as of November, 2022.

[Please write to us to add additional tribal resources](#)

DIGITAL LIBRARIES

- [National Indian Law Library \(NILL\)](#)
- [1942 - Handbook of Federal Indian Law](#). Felix Cohen.
- [Tribal Water Rights](#): The University of Arizona Library Digital Collections

ADVANCING WATER JUSTICE FOR THE TRIBES (Literature Summary)

- [1908 - Winters Doctrine](#)
- [1924 - Indian Citizens Act](#) (Indian voting rights, in full, did not occur until 1957)
- [1963 - Arizona vs. California](#) (Consolidated Decree, 2005)
- [1975 - Indian Self-Determination Act](#)
- [1976 - Colorado River Water Conservation District vs. USA](#)
- [2008 - Declaration on the Rights of Indigenous Peoples](#). United Nations.
- [2015 - Recognized Indian Entities](#). Federal Register.
- [2015 - Tribal Leadership Directory](#). Bureau of Indian Affairs.
- [2018 - Indigenous Water Justice](#). Robison et al.

TRADITIONAL WATER KNOWLEDGE AND WISDOM

- Website: [Guidelines for Considering Traditional Knowledges in Climate Change Initiatives](#)
- Paper: [Guidelines for Considering Traditional Knowledges in Climate Change Initiatives](#)
- [1987 - Cultural Perspectives on Indian Education: Comparative Analysis of Ute Anglo Cultures](#). Cuch.
- [2001 - Historical Memory and Ethnographic Perspectives of Southern Paiute Homeland](#). Stoffle.
- [2014 - Tribal Trustees In Climate Change](#). Wood.

TRIBAL WATER STUDY OF 2018

- [2018 - Tribal Water Study of the Ten-Tribe Partnership](#) (documents combined and starting with the press release). This study is a new feature of the 2012 Basin Study.

INITIATIVES: Organized opportunities to advance water justice

- [Water and Tribes Initiative of the Colorado River Basin](#). Center for Natural Resources and Environmental Policy. University of Montana at Missoula.
- [Colorado River Conversations](#). Center for Climate Adaptation Science and Solutions. University of Arizona.
- Website - [Universal Access to Clean Water for Tribal Communities](#)

Tribal Water Study Summary: Twenty-two federally recognized tribes in the Colorado River Basin have quantified water diversion rights that have been confirmed by court decree or final settlement. These tribes collectively possess rights to 2.9 MAF per year of Colorado River water. However, as of 2015, these tribes typically were using just over half of their quantified rights. Additionally, 13 other basin tribes that have reserved water rights claims are yet to be resolved. Increased water use by tribes with existing water rights, and/or future settlement of claims and additional consumptive use of basin waters by other tribes, is likely to exacerbate the competition for basin water resources.

- The potential for increased use of tribal water rights (which, once ratified, are counted toward state-specific allocations where the tribal reservation is located). The Tribal Study of 2018 estimated that, cumulatively, the 10 tribes could have reserved water rights (including unresolved claims) to divert nearly 2.8 MAF per year. Of these water rights approximately 2 MAF per year were decreed and an additional 785,273 AF (mostly in the Upper Basin) remain unresolved. The report estimated overall, the 10 tribes are diverting (making use of) almost 1.5 MAF of their 2.8 MAF in resolved and unresolved claims. According to the study, the majority of unresolved claims in the Upper Basin are associated with the Ute Tribe in Utah (370,370 AF per year), the Navajo Nation in Utah (314,926 AF), and the Navajo Nation in the Upper Basin in Arizona (77,049 AF).
- [Figure 1.10: Tribal Water Rights and Diversions](#)

TRIBAL LAISONS

- **Environmental Protection Agency:** Nanthaniel Delano <Delano.nathaniel@Epa.gov>
- **US Geological Survey:** Jessica Driscoll <jdriscoll@usgs.gov>

TRIBES OF THE COLORADO RIVER BASIN

- [MAP: tribal lands in the Colorado River Basin](#). Pontius.
- [Ak-Chin Indian Community](#)
- [Camp Verde Yavapai Apache Nation](#)
- [Chemehuevi Indian Tribe](#)
- [Cocopah Indian Tribe](#)
- [Colorado River Indian Tribes](#)
- [Fort Mojave Indian Tribe](#)
- [Fort McDowell Yavapai Nation](#)
- [Gila River Indian Community](#)
- [Hualapai Indian Tribe](#)

- [Havasupai Indian Tribe](#)
- [Hopi Tribe](#)
- [Jicarilla Apache Tribe](#)
- [Navajo Nation](#)
- [Pascua Yaqui Tribe](#)
- [Quechan Indian Tribe](#)
- [Salt River Pima-Maricopa Community](#)
- [San Carlos Apache Tribe](#)
- [Southern Ute Indian Tribe](#)
- [Tohono O'odham Nation](#)
- [Tonto Apache Tribe](#)
- [Ute Indian Tribe Uintah Ouray](#)
- [Ute Mountain Ute Indian Tribe](#)
- [White Mesa Ute Tribe](#)
- [White Mountain Apache Nation](#)
- [Yavapai Prescott Indian Tribe](#)
- [Zuni Pueblo](#)

BANDS OF THE SOUTHERN PAIUTE NATIONS (NUWUVI)

- Cedar Band
- Chemehuevi Band (See above)
- Chemehuevi Valley Band
- Indian Peak Band
- [Kaibab Band](#)
- Konosh Band
- Koosharem Band
- Las Vegas Band
- [Moapa Band](#)
- Pahrump Band
- [San Juan Band](#)
- [Shivwits Band](#)
- Twenty Nine Palms Band

- Kawaiisu Band

BANDS IN CALIFORNIA (receive water deliveries from Colorado River)

- La Jolla Band of Luiseño Indians
- Pala Band of Mission Indians
- Pauma Band of Mission Indians
- Rincon Band of Luiseño Indians
- San Pasqual Band of Mission Indian

COLORADO RIVER BASIN SUPPLY AND DEMAND STUDY

- [Ten Tribe Agreement with DOI Regarding Secure Water Act and Basin Study](#)
- [2013 - Plan of Study for Colorado River Basin Ten Tribes Partnership](#)
- [2013 - Testimony of Ten Tribe Partnership. Vigil.](#)
- [2012 - Summary of Tribal Water Rights in the Lower Basin](#)

DOCUMENTS

- [1980 - Navajo Water Rights: Pulling the Plug in the Colorado River. Back.](#)
- [1988 - Management and Marketing of Indian Water: From Conflict to Pragmatism. Getches.](#)
- [1997 - Colorado River Governance: Sharing Federal Authority as an Incentive to Create a New Institution. Getches.](#)
- [2003 to 2012: Principles for Implementation of Recommendations for San Juan River Operations and Administration. Navajo Nation et al.](#)
- [2012 - Tribal Water Demand Appendix. Basin Study, USBR.](#)
- [2013 - Cross Jurisdictional Water Marketing. CRGI.](#)
- [2013 - Unique Challenges Facing Southwestern Tribes. Bemis.](#)
- [2014 - Indian Water Rights: How Arizona v California Left an Unwanted Cloud Over the Colorado River Basin. Cordalis.](#)
- [2014 - Restoring Sacred Waters. Nania and Guarino](#)
- [2014 - How the Curse of Trust Land Impedes Tribal Economic Self-sustainability. Clarkson.](#)
- [2016 - Tribes and Water in the Colorado River Basin. Colorado River Research Group.](#)
- [2017 - Fact Sheet on Escalade Project at Mouth of Little Colorado River](#)

FUNDING OPPORTUNITIES

- [Colorado Plateau Foundation](#)

LEGAL

- [Outline of United States Federal Indian Law and Policy](#).Wikipedia.
- [1908 - Winters Doctrine](#)
- [1952 - McCarran Amendment](#)
- [1975 - Indian Self-Determination And Education Assistance Act, Amended](#)
- [1976 - Colorado River Water Conservancy District v United States](#) (424 U.S. 800)
- [1979 - Supplemental Decree](#)

LEGISLATION

- [1996 - Navajo/Hopi Land Dispute Settlement Act](#)

EXECUTIVE ORDERS

- [1996 - Executive Order 13007](#). Indian Sacred Sites.
- [2009 - Secretarial Order 3285](#). Renewable Energy Development.
- [2009 - Secretarial Order 3292](#). Individual Indian Trust Management.
- [2014 - Department of the Interior Order 3335](#): Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries.

RESOURCES

Diversity Outreach Programs

- [Summer Research Apprenticeship Program](#). University of Wyoming.
- [University of Utah](#)
- [Northern Arizona University](#)

SYMPOSIA

- [2014 - Big Horn Symposium Program](#)
- [2016 - Indigenous Water Justice Symposium](#)
- [2016 - Martz Summer Conference Program](#)

WATER PROJECTS

Bureau of Indian Affairs with Bureau of Reclamation

- Coolidge Dam, Gila River; San Carlos Apache. [Wikipedia](#).
- Headgate Rock Dam, Lower Colorado River; Colorado River Indian Tribes
- Navajo Indian Irrigation Project, San Juan River. [Wikipedia](#).
- Navajo-Gallup Water Supply Project, San Juan River. [Reclamation](#).

WATER RIGHTS

- [Tribal Water Rights & Uses in the Colorado River Basin](#). Ten Tribe Partnership.
- [Tribal Water Use in the Colorado River Basin](#). University of Colorado Law School.
- [1979 - Supplemental Decree](#) (federal reserve rights)
- Spreadsheet: [Lower Basin Present Perfected Rights](#) (senior water rights)
- Estimate: [Upper Basin Present Perfected Rights](#). Kuhn, 2012.
- [McCarran Amendment and the Administration of Tribal Reserved Water Rights](#). Stein.

WATER SETTLEMENTS

- [Native American Water Rights Settlement Project](#). UNM.
- [2004 - Arizona Water Settlements Act](#)
- [2011 - Tribes Without Water Settlements](#). Reclamation.
- [2015 - Settlements Approved by Congress](#). WSWC.

TRIBAL RESOURCES:

- [American Indian Cultural Support \(AICS\)](#)
The American Indian Cultural Support organization is dedicated to preserving our various Nations sovereignty, legal rights, lands, and cultures.
- [American Indian Movement \(AIM\)](#)
- [Harvard Project on American Indian Economic Development](#)
Through applied research and service, the Harvard Project aims to understand and foster the conditions under which sustained, self-determined social and economic development is achieved among American Indian nations. The Harvard Project's core activities include research, advisory services, education and the administration of a tribal governance awards program.
- [Institute for Tribal Environmental Professionals \(ITEP\)](#)
Established in 1992 with a vision to assist Indian Tribes in the management of their environmental resources through effective training and education programs.

- [Inter Tribal Council of Arizona](#) (21 tribes). The Inter Tribal Council of Arizona was established in 1952 to provide a united voice for tribal governments located in the State of Arizona to address common issues of concerns. On July 9, 1975, the council established a private, non-profit corporation, Inter Tribal Council of Arizona, Inc.(ITCA), under the laws of the State of Arizona to promote Indian self-reliance through public policy development.
- [National Congress of American Indians](#). (NCAI) was founded in response to termination and assimilation policies that the United States forced upon the tribal governments in contradiction of their treaty rights and status as sovereigns. NCAI stressed the need for unity and cooperation among tribal governments for the protection of their treaty and sovereign rights. Since 1944, the National Congress of American Indians has been working to inform the public and Congress on the governmental rights of American Indians and Alaska Natives.
- [Native American Legal Materials](#). Washburn University.
- [Native Nations Institute for Leadership, Management, and Policy \(NNI\)](#) NNI was founded in 2001 by the [Morris K. Udall Foundation](#) and The University of Arizona as a self-determination, self-governance, and development resource for Native nations.
- [University of Colorado at Boulder](#) Colorado Law's American Indian Law Program and [Law Clinic](#) provides students with comprehensive opportunities to acquire specialized knowledge of American Indian law, through curriculum and resources.
- [Utah American Indian Digital Archive](#). The Utah American Indian Digital Archive (UAIDA) is a gateway to the best resources regarding Utahs Indian tribes.

INDIGENOUS WATER JUSTICE & ETHICS

- [Water-Culture Institute](#)
- [Water Law and Indigenous Rights](#)

BOOKS ABOUT THE FIRST NATIONS

- [All Our Relations: Native Struggles for Life and Land](#). Laduke.
- [Custer Died for Your Sins: An Indian Manifesto](#). Deloria.
- A History of Utah's American Indians. Edited by Forrest Cuch. Utah State University Press, 2003.
- Command of the Waters: Iron Triangles, Federal Water Development, and Indian Water. Daniel McCool. Berkeley: University of California Press, 1987.

WEBSITES

- [Bears Ears Coalition](#)
- [U.S. Commission on Human Rights](#)
- [Clean Up The Mines](#)
- [Dine CARE](#)
- [Black Mesa Water Coalition](#)
- [Save the Confluence Coalition](#)

CONFERENCE VIDEOS ABOUT TRIBAL WATER ISSUES

Martz Summer Conference, 2016

- [Session 1](#)
- [Session 2](#)
- [Session 3](#)
- [Session 4](#)

Martz Summer Conference, 2019

- [Day One](#)
- [Day Two](#)

OTHER INFORMATION

The Bluff Principles

The principles were finalized in 2016 in the Town of Bluff, Utah, along the San Juan River, during an informal two-day gathering of Ute, Hopi and Paiute tribal members. These principles were first published in this [professional paper](#).

1. Clean water for all peoples.
2. Honoring sacred sites and the religious beliefs of all peoples.
3. A holistic approach to water management that focuses on the ecosystem.
4. Educating the public on the value of water: water is life.
5. Using science to improve our understanding of water quality and quantity.
6. A focus on collaborative, inclusive policy-making.
7. A water regime free of racism and prejudice.
8. An ethic that emphasizes concern and caring for everyone, downstream and upstream.
9. A goal of stewardship; leave the Earth and its water systems better than we found them.

A draft document of these principles were prepared: [Bluff Declaration For Water Justice in the Colorado River Basin](#).

The Jemez Principles

- [Jemez Principles for Democratic Organizing](#)

###

UPPER COLORADO RIVER COMMISSION (UCRC)

- [Website of the Commission](#)

Hydrologic Determinations of the Upper Basin

- [1988 - Hydrologic Determination](#); 6.0 million acre-feet (maf).
- [2007 - Hydrologic Determination](#); 5.76 maf; reduction of 240,000 acre-feet.
- 2025 - Hydrologic Determination; a projection of 4.6 maf; based on decrease of 30-year average since 2001.

Depletion Schedules of the Upper Basin

- [2007 - Depletion Schedule of Shortage Criteria EIS \(App C\)](#); 886,000 acre-feet increase to Year 2060.
- [Deceber 12, 2007 - Depletion Schedule](#); 1.186 million acre-feet to Year 2050+
- [December 31, 2016 - Revised Depletion Schedule](#); 2016 (5.056 maf) to 2070 (5.962 maf); 906,000 acre-feet.
- 2025 - OTC projection (editors of this website) of Depletion Schedule: zero; river and reservoir water will be transferred downstream to stabilize Lake Powell.
- Reference: [Wheeler et al, 2021](#)

Flaming Gorge Reservoir Release & Diversions

- [2007 - Flaming Gorge Water Availability](#). Reclamation; 165,000 acre-feet annually.
- 2025 - OTC projection for Flaming Gorge Water Availability: zero; reservoir water will be transferred downstream to stabilize Lake Powell.

Records and Reports

- 2025 - [Hydrologic Shortage Report of the Upper Division States](#). Presentation by Chuck Cullom.
- 2024 - Annual Report
- 2023 - [Annual Report](#)
- 2022 - [Annual Report](#)
- 2021 - [Annual Report](#)
- 2020 - [Annual Report](#)
- 2019 - [Annual Report](#)
- 2018a - [Annual Report](#)

- 2018b - [Final Report: Three-year System Conservation Pilot Program](#) (six documents combined).
- 2017a - [Depletion Schedule Revised in 2016 and 2017 Resolution](#)
- 2017b - [Annual Report](#)
- 2016a - [Annual Report](#)
- 2016b - [Assessing Agricultural Use Including Remote Sensing and Evapotranspiration](#)
- 2015 - [Annual Report](#)
- 2014a - [Annual Report](#)
- 2014b - [Resolution to adopt contingency planning for shortages](#)
- 2013a - [Annual Report](#)
- 2013b - [Assessing Agricultural Consumptive Use in Upper Colorado River Basin](#)
- 2012 - [Annual Report](#)
- 2011 - [Annual Report](#)
- 2009 - [Annual Report](#)
- 2008 - [UCRC letter to Kempthorne about HFEs and fall steady flows](#)
- 2007a - [UCRC Resolution Upper Basin Depletion Estimates](#)
- 2007b - [Depletion Schedules Upper Basin](#)
- 2007c - [Approved \(revised\) Depletion Schedules](#)
- 2006a - [UCRC Letter to Secretary Kempthorne](#)
- 2006b - [Potential Use of Winter Cloud Seeding to Augment Flow of Colorado River](#)
- 2006c - [UCRC Resolution Availability Water Navajo Reservoir](#)
- 2005a - [Annual Report](#)
- 2005b - [UCRC Resolution Retention Water Upper Basin Reservoirs](#)
- 2004a - [UCRC Letter about Lake Powell minimum power pool](#)
- 2004b - [Annual Report](#)
- 2003a - [UCRC Resolution Use Accounting Water Lake Powell Pipeline](#)
- 2003b - [UCRC Resolution Use Accounting Water Navajo Gallup Water Supply Project](#)
- 2002 - [UCRC letter about Long-range Operating Criteria](#)
- 1998 - [Annual Report](#)
- 1996 - [Annual Report](#)

- 1995 - [Annual Report](#)
- 1994 - [UCRC Resolution Upper States Depletion Tables](#)
- 1991 - [Annual Report](#)
- 1990 - [Annual Report](#)
- 1989 - [UCRC Resolution Funding Weather Modification Research](#)
- 1988 - [UCRC Resolution Funding Weather Modification Research](#)
- 1987a - [Annual Report](#)
- 1987b - [UCRC Resolution Proposed Hydrologic Determination](#)
- 1986 - [UCRC Resolution Construction of Animas-LaPlata Project](#)
- 1985 - [UCRC Resolution Cooperative Snow Survey Water Supply Forecasting Program](#)
- 1984 - [UCRC Resolution Proposal Galloway Group](#)
- 1983 - [UCRC Resolution CRSP Power Rate Adjustment](#)
- 1982 - [UCRC Resolution Enhanced Snowpack Test](#)
- 1980 - [UCRC Resolution Appropriation Funds Farm Salinity Control](#)
- 1979a - [UCRC Resolution Releases Colorado River Reservoirs](#)
- 1979b - [UCRC Resolution Cooperative Snow Survey Water Supply Forecasting Program](#)
- 1979c - [UCRC Resolution Gaging Stations](#)
- 1979d - [UCRC Resolution Adjustment Power Rates](#)
- 1978 - [Annual Report](#)
- 1977 - [Annual Report](#)
- 1976 - [Annual Report](#)
- 1972 - [Annual Report](#)
- 1971 - [Annual Report](#)
- 1970 - [Annual Report](#)
- 1963 - [Annual Report](#)
- 1962 - [Annual Report](#)
- 1961 - [Annual Report](#)
- 1959 - [Annual Report](#)
- 1958 - [Annual Report](#)
- 1957 - [Annual Report](#)
- 1956 - [Annual Report](#)

- 1955 - [Annual Report](#)
- 1954 - [Annual Report](#)
- 1953 - [Annual Report](#)
- 1952 - [Annual Report](#)
- 1951 - [Annual Report](#)
- 1950 - [First Annual Report](#)
- 1949 - [Minutes of the first meeting](#)

ARCHIVE OF UCRC ANNUAL REPORTS (not complete)

- [Colorado State Publication Library](#)
-

Uranium/Nuclear



1957 photo of a federal uranium mill at Monticello, Utah

EBOOK

- [2024 - Dirty Secrets of Nuclear Power in an Era of Climate Change](#). Brugge.

URANIUM MINING AND MILLING

- [2005 - A Technical Report Toward Reclaiming Uranium Mill Tailings](#). Dohrenwend and Greenbaum.
- [2006 - White Mesa Uranium Mill Archeological Sites Report](#). Fields.
- [2008 - Uranium Mining](#). Southwest Hydrology.
- [2011 - Conflict at the Canyon](#). Environmental Working Group.
- [2019 - Uranium Mining in Grand Canyon Region](#). Grand Canyon Trust.
- [2019 - Analyzing the Cost of Small Modular Reactors and Alternative Power Portfolios](#). HEAL Utah.

GREEN RIVER NUCLEAR POWER PLANT

NEWS CLIPS

- [Click here](#) to read the story by Judy Fahys of the Salt Lake Tribune announcing Utah's positive decision by the state engineer to approve the water transfer for the proposed nuclear power plant near Green River, Utah.
- [Utah's First Proposed Nuclear Plant Goes On Trial](#)
- [Salt Lake Weekly](#)

Securities Corruption by Financial Partner of Blue Castle Holdings

- [Click here](#) to read this story by Judy Fahys and Steven Oberbeck in the Salt Lake Tribune about a fraud case involving a financial partner of Blue Castle Holdings, LeadDog Capital.
- [Click here](#) for the archived press release of Blue Castle Holdings' partnership agreement with LeadDog Capital that has since been removed from the web page of Blue Castle Holdings.
- [Click here](#) to read this story by Judy Fahys and Steven Oberbeck in the Salt Lake Tribune, which includes the administrative record of the State Engineer's review.

Emery County Economic Development Director Resigns

- [Utah State Auditor Releases Report On Alleged Impropriety in Emery County Economic Development Department](#). Emery County Progress.

Willow Creek Pipeline Company and Acquisition by Blue Castle Holdings

- [2010- BCH press release announces 100% acquisition of Willow Creek Pipeline Company](#)
- [2015 - Nuclear Intelligence Weekly mentions BCH sold this pipeline company](#) (this article was posted on the BCH website and later scrubbed)

Dominant utility in Utah not interested in developing nuclear power

- [2013 - Salt Lake Tribune news feature by Judy Fahys](#)
- [2015- Intergrated Resource Plan](#). Rocky Mountain Power.

Op Eds About Nuclear Power

- [Nuclear Power: Dead in the Water it Poisoned](#). John LaForge.
- [Dr. Cooper in Forbes](#)
- [Harvey Wasserman](#)
- [Union of Concerned Scientists](#)

Other News

- Scientific American has published a 100% wind, water & solar energy proposal for the entire world by 2030 [here](#).
- [Letter from scientists who support nuclear energy](#)

Legal (Administrative)

- [2010 - Transcript of protest hearing](#). Utah Division of Water Rights.
- [2010 - Press release by Utah State Engineer](#)
- [2010 - Decision of Kane County water transfer](#)
- [2010 - decision of San Juan County water transfer](#)
- [2010 - Request for reconsideration by Uranium Watch et al](#)
- [2010 - request for reconsideration by HEAL et al](#)
- [2010 - Engineer's denial to reconsider](#)

Legal (Judicial)

- [2013 - Transcript of the five-day trial](#)
- [2013 - Utah District Court Decision](#)

Water Rights

Since the water rights are bifurcated, and nearly half of the combined water supply has a junior water right, the operations of the proposed nuclear powerplant are likely to be curtailed during a water shortage in the Colorado River basin. The Bureau of Reclamation is anticipating a 50/50 chance of shortages occurring in the lower basin by the end of the current decade, and the Department of Energy anticipates power generation at Glen Canyon Dam to be curtailed.

- Kane County Water Right Transfer. The year of priority is 1965 and, according to Judge Harmon's [Court Order](#), is now subordinate to the Central Utah Project). SEE: [Archive from Utah Division of Water Rights](#)
- San Juan County Water Right Transfer. The year of priority became 2000 after the water right was reinstated; the water right was granted extensions in 2006 and 2011; the next extension is due in 2017. SEE: [Archive from Utah Division of Water Rights](#)
- Water diversions in Eastern Utah are dependent on federal contracts from a water right called Ultimate Phase. Read this article called: [Ultimate Phase Water Rights Stored in Flaming Gorge Reservoir](#)

National Academy of Sciences

- [2012 - Dangers of living near nuclear facilities](#)
- [2014 - 50 Reasons to Fear the Worst from Fukushima](#) (timeline of nuclear proliferation)

Description of Green River Nuclear Power Plant (as of 2010)

- The developer is **Blue Castle Holdings** (BCH)
- The CEO of BCH is **Aaron Tilton**; energy **lobbyist**.
- The electricity from the nuclear facility is **targeted** for the Wasatch Front (Salt Lake City) with surplus for Wyoming, California, Nevada and Arizona.
- Electricity may be targeted to develop **oil shale** and **tar sands** in the Uinta Basin of the Colorado Plateau.
- The **total low ball cost** is projected to be 16 billion dollars (decommissioning costs not included).
- Original projected completion date of Unit One was 2020.
- Green River has zero housing available **staff and construction workers**
- Green River City does not have a hospital.
- **Located** on 1,627 acres of School Institutional Trust Lands (SITLA) near the Intersection of Hwy 6 and Interstate 70 (**photo**).
- Water **intake** would be near the I-70 bridge crossing of the Green River with a high-security pipeline corridor to the power plant (**layout**).
- Total annual amount of water consumption is 54,000 acre-feet; there are no return flows to the Green River.
- There is no contract with the federal government to supply water from Flaming Gorge Reservoir to the project in times of shortages
- The decision before Utah Division of Water Rights is about approving the **transfer of two water rights** to Emery County, one from San Juan County and the other from Kane County (**lease agreement**).
- The original points of diversion (POD) are the San Juan River and Lake Powell. The two counties would lease their water rights to Blue Castle Holdings and then use those funds to develop surface water projects in their perspective counties. For example, Kane County would develop the Lake Powell Pipeline.
- This proposed transfer will increase the overall consumption of surface water in three Utah counties.
- The problems are two-fold: **Surplus water does not exist** in the Colorado River basin and the **endangered species problem** does.
- The water agencies are not thrilled about the proposal of Blue Castle Holdings. The **Bureau of Reclamation** is concerned that water for the **Central Utah Project** is at risk. The **US Fish and Wildlife Service** is concerned about the recovery of endangered fish, as is **Utah Division of Water Resources**. See also **Dr. Holden's comments** on this proposed project.

There is compelling information for the State Engineer of the Utah Division of Water Rights to deny this water transfer application, but Blue Castle Holdings has the ear of the state legislature, which finds the time to pass dubious resolutions like **denying climate change (cached)**, scolding **professors** at Brigham Young University, and

challenging the [public ownership](#) of federal lands in the court system with the legal fees paid for by the SITLA sleaze fund.

Additional Information

- [Uranium Watch](#)
- [Water Transfer Application Documents](#)
- [You Tube](#)
- [High Country News](#)

Read letter by [Heal Utah](#) about speculation by BCH [here](#).

Read letter by Utah Division of Water Rights that denies application by Mancos Resources for a uranium mill at proposed Green River Industrial Park [here](#).

USGS daily stream data for Green River gage: [Plots](#); [Raw data](#);

Water Rights

UTAH DIVISION OF WATER RIGHTS

- [Home page](#)
- [eMail notifications](#)
- [Water right applications in advertising for Utah](#)
- [Tracker of water right applications \(a list\)](#)
- [Water Right Diversion; depletion priorities perfected by November 24, 1922 \(archived here\)](#)
- [Water rights information and queries](#)
- [Minutes, Information, and Presentations from Public Meetings and Trainings](#)
- [Protest Application Form](#)
- [Search locations with Google Earth](#)
- [Well log search engine](#)
- [Water Rights Area Map with Policy by Area](#)
- [Utah Code 73-3-8: Water and Irrigation](#)
- [Studies by Utah Division of Water Rights](#)
- [Water Right Violations](#)

COLORADO STATE

Decision Support System

- [Home Page](#) (includes water rights)

PROTEST LETTERS OF INTEREST

- [2023 - Reclamation's protest letter for groundwater application in Duchesne County.](#)
 - [2010 - Reclamation's protest for application by City of Green River in Emery County.](#)
 - [2025 - Central Utah Project protest for application by San Juan County for use in Grand County.](#)
 - [2015 - Reclamation's protest for application by Wilson Arch Water & Sewer District in San Juan County.](#)
-