

Parts One, Two and Three Combined: Citizen and Professional Science in Glen Canyon National Recreation Area

NOVEMBER 01, 2022

BY JOHN S. WEISHEIT

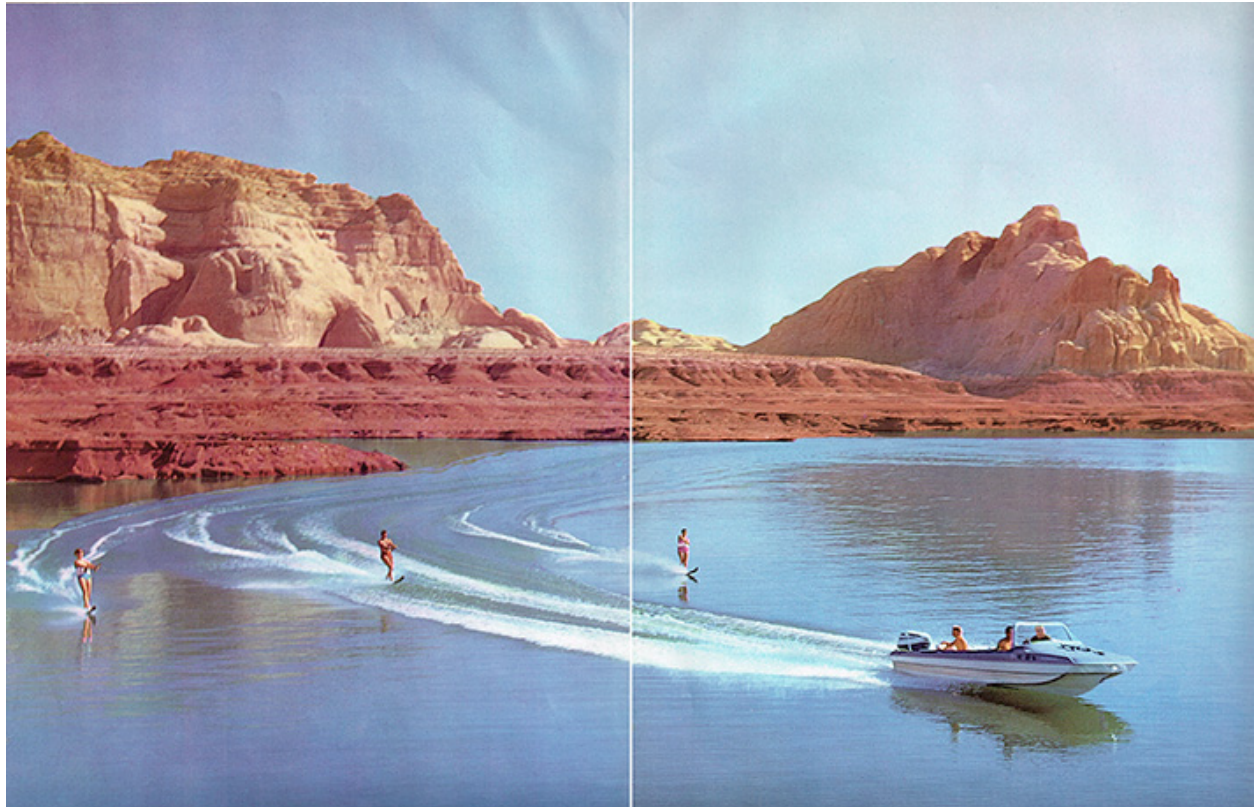


Photo above from [*Lake Powell: Jewel of the Colorado*](#). Floyd Dominy; DOI, 1965.

THIS IS PART ONE OF A THREE PART SERIES

- To visit Part Two - [CLICK HERE](#)
- To visit Part Three - [CLICK HERE](#)

Note: this webpage is designed for a browser called Safari and a modified UNIX operating system developed by Apple Inc.; it is a browser that automatically opens files and provides responsive streaming services. We also recommend high speed internet services to avoid lengthy download times. The target for our imagery is to provide the best possible resolution. The browser called Firefox is also a recommended browser for this website.

PRIMARY RESEARCH DOCUMENTS

- [1971 to 1978 - The Lake Powell Research Project](#). National Science Foundation.
-

PROJECT PROGRAMMING 2002

Progradation of sediment deposits at Lake Powell

- 2002, March 28 - [Concept letter from Professor John C. Dohrenwend](#)
 - 2004, May 2 - [Drought Settles In, Lake Shrinks and West's Worries Grow](#). Kirk Johnson and Dean Murphy for New York Times.
 - 2013 - [Obituary of John C. Dohrenwend](#)
 - Portrait - [The late John C. Dohrenwend](#)
-

STREAM GAGE: above the Dirty Devil River

Colorado River Bridge by US Geological Survey

Measures daily flow volume and river elevation. A river flowing on reservoir sediment (Lake Powell)

- <https://waterdata.usgs.gov/monitoring-location/09328990/#parameterCode=00065&period=P7D>
- January 1, 1963 - River bed elevation was about 3,450 feet (before the filling of Lake Powell).
- January 1, 2003 - Reservoir sediment elevation was about 3,620 feet.
- March 29, 2023 - River elevation at 3,580 feet.
- **Note:** The weight of reservoir sediment and water does compress the matrix of sand, silt, clay and organic drift (leaf litter). When reservoir water evacuates (evaporation and human consumption), the exposed sediment will begin to dewater, fracture, subside, and will be covered by native and non-native vegetation very quickly. As the river begins to incise into the sediment, there are lateral slump features that launch into the river without warning; these slump blocks become islands of mud, until the velocity currents dissolve them. This remobilized sediment will sink to the bottom when the river reaches the stilled water of Lake Powell (currently uppermost Good Hope Bay). We have witnessed the delta advance into Lake Powell at a rate of 100-feet per day. This natural remobilization of reservoir sediment is happening in every side canyon and river tributary at various magnitudes throughout Glen Canyon National Recreation Area.
- [2022 - Sedimentary record of annual-decadal timescale reservoir dynamics: Anthropogenic stratigraphy Lake Powell, Utah, USA](#). Johnson.
- [Returning Rapids Project](#). Dehoff.
- [2023 - Spring Report](#). Returning Rapids Project; Dehoff.

RESERVOIR ELEVATIONS

Bureau of Reclamation

- [24-month report](#)
-

NEWS, ANNOUNCEMENTS AND SPECIAL FEATURES

Moab Sun News

- January 28, 2026 - [After a decade of delays Utah moves forward with North Wash boat ramp improvements.](#)

Atmos

- June 4, 2025 - [Decades after Glen Canyon Dam, the Colorado River reclaims its path.](#) By Ash Sanders for Atmos.

Salt Lake Tribune

- May 11, 2022 - [Deltas of sediment are pushing into Glen Canyon as Lake Powell disappears: Researchers at the University of Utah and the U.S. Geological Survey are studying how the sediment is impacting the reservoir.](#) Zak Podmore for Salt Lake Tribune.

National Park Service

- February 2023 - [Latest Boat Ramp Conditions](#)

High Country News

- [The 26,000 tons of radioactive waste under Lake Powell.](#) Jonathan Thompson.
- [What does the Nation's commitment to tribal co-stewardship mean for Public Land?](#) By Anna Smith.
- [Lake Powell: What is it good for?](#) By Jonathan Thompson.
- [Glen Canyon revealed.](#) By Craig Childs.

Returning Rapids Project

- February 2023 - [Park Service announces no work will be done at North Wash \(Dirty Devil\) boat ramp.](#) Mike Dehoff.

Utah Guides and Outfitters

- February 2023 - [Letter from Utah Guides and Outfitters to National Park Service about Cataract Canyon take-out.](#) UGO.

Colorado Plateau River Guides

- [The Confluence: Issue #31](#)

Glen Canyon Institute

- [Newsletter of Fall 2024](#)
-

ARCHIVES

- [University of Utah](#)
 - [Utah Historical Society](#)
 - [Museum of Northern Arizona](#)
 - [National Park Service](#)
 - [Northern Arizona University](#)
-

Soon to arrive

- The 1871 photos of Powell Expedition
 - The 1872 photos of Wheeler Expedition
-

THE DIRTY DEVIL RIVER

From the diary of John Wesley Powell at the beginning of Glen Canyon: July 28, 1869...*we discover the mouth of a stream which enters from the right. Into this our little boat is turned. The water is exceedingly muddy and has an unpleasant odor. One of the men in the boat following, seeing what we have done, shouts to Dunn and asks whether it is a trout stream. Dunn replies, much disgusted, that it is "a dirty devil"...*

- [Photo of the mouth of the Dirty Devil in 1939](#). Charles Butler Hunt, USGS.
 - [Aerial photo of the Dirty Devil Confluence in 1945](#). Photographer unknown.
 - [Aerial Photo of the mouth of the Dirty Devil in 1962](#). Bud Rusho, USBR.
 - [Photo at mouth of Dirty Devil in 1921](#). Emery Kolb.
 - [Dirty Devil confluence from airplane; downstream view](#). Unknown photographer.
-

BOAT RAMP CONDITIONS AT DIRTY DEVIL RIVER TAKE-OUT Glen Canyon National Recreation Area (GCNRA)

- [Official web site](#)

Dirty Devil River Primitive Boat Ramp (sometimes called North Wash) and near (opposite shore) the defunct Hite Marina facility (defunct as of 2003).

- [August, 2021 - Drawing of Dirty Devil Boat Ramp](#).
- **Note:** The park service does not give reports on conditions at the Dirty Devil River Primitive Boat Ramp.
- **Note:** the creep of the lateral slumping toward the river is increasing; we think this boat ramp is compromised and will cause serious injuries.
- As of June 19, 2022 the upstream ramp slumped into the river, leaving a 10-foot escarpment of reservoir sediment. The ramp has since been modified a bit downstream, which has some bedrock features for stability. [Video](#). mov.
- As of March 2023, the Colorado River has removed about 40 feet of sediment since 2019 and this rate of removal continues. We expect the ramp to be totally unusable by the summer of 2023, and it is also possible that this sediment removal may encounter bedrock features and create either a bedrock rapid or a bedrock waterfall.

Citizen Monitoring @ Dirty Devil Take-out

- [July 5, 2019 - Group photo at Dirty Devil Take-out](#): The Powell 150th river trip; USGS & Univ. of Wyo. **Note:** Approximately 40 feet of sediment has been excavated by the Colorado River since this photo was captured.
 - [June 31, 2022 - Dirty Devil Take-out using roller tubes](#). Photos by J. Weisheit
 - [June 31, 2022 - Part One: Dirty Devil Take-out using roller tubes](#). Movie by J. Weisheit.
 - [June 31, 2022 - Part Two: Dirty Devil Take-out using roller tubes](#). Movie by J. Weisheit.
 - **Photos:** October 6, 2022. John Weisheit.
 - **Movie:** October 6, 2022. John Weisheit.
-

RESERVOIR CONDITIONS NEAR 3520 FEET: Dam and facilities

View or download photo portfolios (these pdf photo compilations are large files)

Courtesy of John Weisheit

March of 2022

- [March 11, 2022 - Glen Canyon Dam and reservoir at 3525 feet](#)
- [March 9 & 10, 2022 - Area near Hite Marina](#)
- [March 10, 2022 - Area near Bullfrog Marina](#)
- [March 11, 2022 - Area near Wahweap Marina](#)
- [March 11, 2022 - Area near State Line Launch Ramp](#)
- [March 11, 2022 - sunken garbage and boat carcass near Stateline Marina](#)
- [March 11, 2022 - Area near Antelope Point Marina](#)

March of 2023

- [March 6, 2023 - Dirty Devil take-out](#). Photo pdf portfolio.
 - [March 6, 2023 - Dirty Devil take-out](#). mov.
 - **Note:** the actual drop from ramp edge to river is seven feet.
 - [March 6, 2023 - Preferred route for boats at Dirty Devil take-out](#). mov.
 - **Note:** this route avoids the steep drop off.
-

THE "MUD RAPIDS" AND THE "DELTA"

At reservoir elevation 3530 feet

- **Current conditions as of October 2022 between Dirty Devil Take-out and Farley Canyon:** There is a knick point one mile above Farley Canyon, and eroding headwardly (the opposite direction of river flow) at a rate of about 25 feet per day. The river incision into the mud and detritus layers of Powell Reservoir creates islands that dewater and then eventually slump and/or slide into the deepening incision.
- The magnitude of these slump features can resemble an Arctic glacier crumbling into the ocean, or consist of large sections (typically 25 feet by

100 feet) that launch themselves sideways into the Colorado River at random moments (can be dangerous).

- When the gains of entrained sediment reach the still waters of Reservoir Powell, the load drops into the deep water column of the reservoir, and presently located at The Horn, a couple miles above Good Hope Bay. This "delta" feature advances into the reservoir at an average annual rate of about 100 feet per day; especially during a vigorous monsoon season, as occurred in the summer/fall of 2022.
- Movie 01: [Navigating dewatered mud island rapids](#). mov.
- Movie 02: [Cascading, dewatered mud flows](#). mov.
- Movie 03: [Navigating islands, dewatered slump features & dunes](#). mov.

Matching photos from the Nielsen Collection near Farley, White and Trachyte canyons

- **Note:** Locating the exact camera stations was very difficult and sometimes unsafe. The perched sediment here is about 200 feet thick and choked with massive thickets of weeds. The sediment features include deep mud cracks, subsidence, slump fractures and slope failures.
- [Moki Fort at White Canyon View; October 2022](#). jpg.
- [Airstrip above Farley Canyon; Upstream View; October 2022](#). jpg.
- [Airstrip above Farley Canyon; Downstream View; October 2022](#). jpg.
- [Airplane parked at airstrip; October 2022](#). jpg.

NEWS: RESERVOIR FACILITIES AT GLEN CANYON NATIONAL RECREATION AREA (GCNRA)

- January 27, 2022 - [Glen Canyon NRA Updates Plans For Lake Facilities](#). *Lake Powell Chronicle*.
- February 6, 2022 - [Gregory Natural Bridge resurfaces as long-term drought hammers Lake Powell](#). Sean Golightly for *Arizona Daily Star*.
- March 23, 2022 - [Lake Powell's Losing Streak: Will the Odds Ever Change?](#) John Hollenhorst for KSL.
- March 25, 2022 - [Colorado hits a "Hard Pause" on water demand management as it waits for the other states](#). Chris Outcalt for *The Colorado Sun*.

SATELLITE IMAGERY & MAPS

Glen Canyon National Recreation Area (GCNRA)

- Google Maps: [Lake Powell](#)
- Sentinel Hub: [Lake Powell](#)
- [01 Glen Canyon National Recreation Area](#)
- [02 GCNRA](#)
- [03 GCNRA Foundation and Map](#)
- [Reservoir elevation fluctuations since 1988](#). Center for Colorado River Studies; USU @ Logan.

- [2012 - Geologic Map of the Hite Crossing, Dirty Devil River Area; Glen Canyon NRA and Garfield and San Juan Counties](#). UGS.
-

A HISTORY: Citizen and professional science related to significant low reservoir levels at Glen Canyon National Recreation Area (Lake Powell).

Glen Canyon National Recreation Area (GCNRA) includes:

- (1) The lower half of Cataract Canyon below Big Drop Two, which is also the end of Canyonlands National Park (CANY).
- (2) All of Narrow Canyon beginning at the end of Mille Crag Bend, or when you can see the Henry Mountains.
- (3) All of Glen Canyon beginning at the mouth of the Dirty Devil River and ending at the mouth of the Paria River near Lee's Ferry, Arizona.
- (4) The NRA was established by Congress in 1972.

- 1968 - [Glen Canyon National Recreation Area Hearings](#)
- 1970 - [Canyonlands NP & Glen Canyon NRA Hearings](#)
- 1972 - [National Recreation Area Hearings](#)
- 1972 - [Public Law 92-593](#)
- 2005 - [Strategic Plan for NRA and Rainbow Bridge NM](#).
- 2023 - [Foundation Document](#) (Superintendent's Compendium).

The Filling Criteria for Glen Canyon Reservoir (Lake Powell)

- [July, 1962 - Federal Register Notice](#). Stewart Udall, Secretary of Interior.

Publications during the filling criteria for Lake Powell

- [1963 - The outlook for boating and other recreation in GCNRA](#). Anonymous.
- [1967 - Lake Powell, Waterway to Desert Wonders](#). National Geographic.
- [Circa 1972 - Meet Lake Powell](#). NPS.

Geographic Details:

- (1) The northern boundary of Glen Canyon National Recreation Area (GCNRA) begins at elevation 3715 feet on the Colorado River in the middle of Cataract Canyon. This elevation corresponds with the height of the concrete parapets on the crest of Glen Canyon Dam. This elevation occurs at a rapid known as Big Drop 2. The southern boundary of GCNRA occurs below Glen Canyon Dam at the mouth of the Paria River in northern Arizona (Lee's Ferry).
- (2) The NRA boundary on the San Juan River begins after the river meanders called the "Goosenecks" and near Mexican Hat, Utah. The right side of the river is the NRA and the left side of the river is Navajo Nation. Visitation on Navajo lands requires a special use permit.
- (3) When Lake Powell reaches maximum pool elevation at 3700 feet (design specifications), Big Drop 3 is the last natural rapid in Cataract Canyon. The next rapid, which is Rapid #24, was underwater after various snow melts in 1980s.

(4) Lee's Ferry is also the northern boundary of Grand Canyon National Park and the beginning of Marble Canyon. The Grand Canyon Sub-province begins at the mouth of the Little Colorado River. The lands on the east side (river left and pointed downstream) of the Colorado River (or reservoir), between the mouth of the San Juan River to the mouth of the Little Colorado River, are the lands of the Navajo Nation.

(5) All of this country, including Marble Canyon, is in the Canyonlands Sub-province of the Greater Colorado Plateau (Hunt, 1956).

RESERVOIR MANAGEMENT

After observing 60-years of reservoir management at Lake Powell, we present the following contradictions that have emerged:

(1) The original name was Glen Canyon Reservoir and the filling criteria began in March of 1963. The name was formally changed to Lake Powell when Lady Bird Johnson dedicated the facility for the people of the 50 United States in 1966. It required 17-years to finally fill Lake Powell, which occurred in Year 1980. The decades of the 1980s and 1990s were significantly wetter than previous decades, and interrupted by a four-year dry cycle between 1989 and 1992. By 1992 the reservoir capacity had dropped to 50%. This condition occurred again in 2002 and, by March of 2005, the capacity dropped to 35%, which then launched the development of an Environmental Impact Statement called "Shortage Criteria" and finalized as 2007 Interim Guidelines.

(2) A brim full reservoir, as occurred from 1983 to 1988 and from 1995 to 1998, essentially means there was no flood control capacity in the Colorado River Basin, See: Vandivere et al., 1984 & Floods Reveal Water Policy Chaos; HCN, 1983. This is a variance to the principles set forth in the Boulder Canyon Project Act of 1928 (BCPA), which mandated flood control as the primary management priority. It must be understood that if something goes wrong with the structural integrity of Glen Canyon Dam, and it becomes necessary to vacate the reservoir of water as quickly as possible to avoid a catastrophe, that it would take about 12 to 16 months to complete the evacuation process. This means that dam safety is dependent upon perfect performance at all times and under all conditions. Yet, no human endeavor can possibly control the extremes of nature.

Glen Canyon Dam will fail someday and, potentially, 27 million acre-feet of water, sediment and rotting organic materials will burst through Grand Canyon and into Lake Mead and then over the crest of Hoover Dam. The majority of the discharge, beginning with emergency spillway releases at Hoover Dam, will flow into the structural depression known as the Salton Through, rather than the Gulf of California (or both). If dam failure at Glen Canyon Dam occurs, the discharge of the outburst flood will overtop Hoover Dam with a column of water that would be, 70-feet thick (see Lantham, 1998). Hoover Dam will either fail too, or suffer damages so severe that that it will become completely inoperable. Incidentally, the water storage capacity of the Salton Trough is 405 million acre-feet (Lake Mead times 14). The overflow point is in Mexico south of Mexicali. The elevation there is 30 feet above sea level.

This clearly indicates that Reclamation does not manage Lake Powell for flood control and dam safety. Rather, the priority operating criteria for Lake Powell is to maximize water storage and hydropower production, which are the secondary and tertiary management priorities of the BCPA. This is why the snowmelt of 1983 became an emergency situation at Glen Canyon Dam and caused by a reluctance to vacate the reservoir to safely accommodate inflows of 111,500 cfs ([Burgi, 1984](#)) and a 4-month snow melt volume of 15 million acre-feet. It is now reasonable to conclude that, had the volume been a five-month snow melt of 30 million acre-feet, as in 1884, Glen Canyon Dam would have been breached by the Colorado River ([Swain, 2002](#)).

(3) One of the incidental purposes of Lake Powell is to settle and store entrained sediment and organic detritus. When Lake Powell elevations are low the stored sediment and organic detritus is mobilized by the Colorado River and carried further downstream toward Glen Canyon Dam ([Pratson, 2008](#)); this shortens the lifespan of this dam. This includes the stored sediment in the 125 side canyons, many of which are in close proximity of Glen Canyon Dam, such as Wahweap and Antelope canyons. When the sediment load in Lake Powell reaches 50%, the priority objectives of flood control and water storage are compromised ([USGS, 1960](#)). Or, when sediment reaches the elevation of the outlet tubes on the front face of Glen Canyon Dam, a dredging program must begin ([Schultz, 1961](#)). A reservoir losing storage capacity to sediment fill is the same as depleting the capacity of an aquifer to zero. You end up with nothing.

(4) Erosion by a flowing Colorado River over exposed reservoir sediment mobilizes decaying organic matter and this becomes a water quality issue, especially for the aquatic species of the reservoir, and the aquatic species below Glen Canyon Dam. This would also be true for Hoover Dam and Lake Mead. The decay process of the organics decreases oxygen levels in the water column of the reservoir, and the odors of hydrogen sulfide emissions are most unpleasant, and the emissions of raw methane gas (odorless) from Lakes Powell and Mead does load the atmosphere with a significant greenhouse gas contribution (Dohrenwend, see presentations below). Reservoir-based hydropower is not clean, it is not safe, and it is not sustainable. See: [Hydropower is likely to have no future on the Colorado](#). OTC.

LAKE CAHUILLA: The Colorado River Basin's natural lake since time immemorial

Large Colorado River floods filling the Salton Trough (Salton Sea). An ephemeral and prehistoric natural lake that has a greater volume than Lake Powell by 15 times.

- [1978 - Late Prehistoric Human Ecology of Lake Cahuilla](#). Wilke.
- [1980 - Lake Cahuilla Late Quarternary Lucustrine History of Salton Trough](#). Waters.
- [2014 - Increasing Scales of Social Interaction and the Role of Lake Cahuilla in the Systemic Fragility of the Hohokam System \(A.D. 700-1100\)](#). Merrill
- [2018 - Presentation: Late Holocene Ages at Lake Cahuilla High Stands, Imperial Valley California](#). Rockwell.

- [2018 - Dates of the Two Most Recent Surface Ruptures on the Southern most San Andreas Fault Recalculated by Precise Dating of Lake Cahuilla Dry Periods](#). Rockwell.
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End of Part One

- To Visit Part Two - [CLICK HERE](#)
- To visit Part Three - [CLICK HERE](#)

Part Two: Citizen and Professional Science in Glen Canyon National Recreation Area

OCTOBER 23, 2022

BY JOHN S. WEISHEIT



Repeat photography at the primitive ramp downstream of the Dirty Devil River

THIS IS PART TWO

- To visit Part One - [CLICK HERE](#)
 - To visit Part Three - [CLICK HERE](#)
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PRIMARY RESEARCH DOCUMENTS

- [1971 to 1978 - The Lake Powell Research Project](#). National Science Foundation.
-

GEOLOGY OF GCNRA

- [1871 & 1872 - Diary of Almon Harris Thompson](#). Herbert Gregory, UHQ; 1939.
- [1877 - The Geology of the Henry Mountains](#) by Grove K. Gilbert. **Note: A very important scientific contribution.**
- [2005 - Episodic incision of the Colorado River in Glen Canyon, Utah](#). Garvin et al.
- [2009 - Transport slopes, sediment cover, and bedrock channel incision in the Henry Mountains, Utah](#). Johnson et al.
- [2010 - Geology of Glen Canyon NRA](#). Anderson.
- [2012 -Geologic map of the Hite Crossing lower Dirty Devil River area Glen Canyon National Recreation Area, Garfield and San Juan Counties, Utah](#). UGS.
- [2020 - Methane emissions from muds during low water level stages of Lake Powell, Southern Utah](#). Malenda.
- [2022 - Sedimentary record of annual-decadal timescale reservoir dynamics: Anthropogenic stratigraphy Lake Powell, Utah, USA](#). Johnson.

Hydrology of GCNRA

- [1965 - Stratigraphic sections and records of springs in the Glen Canyon region of Utah and Arizona](#). Cooley.
- [1987 - The Case For Regional Discharge Of Ground Water From The Lower Paleozoic Cabonates Through The Shay Fault Zone, Canyonlands, Utah](#).
- [Diagram of the Shay Fault Zone](#). Huntoon, 1987.
- Photos at Mille Crag Bend by George Simmons, 1956: [Image #1](#) and [Image #2](#).

Additional geologic features: On the Colorado River

- Visit our Geology section [HERE](#)
 - Visit our Sediment section [HERE](#)
 - Visit our Hydrology section [HERE](#)
 - Visit our Flood section [HERE](#)
-

A CHRONOLOGY OF SCIENCE IN GCNRA HUMAN HISTORY ASSETS

- [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.
- [1965 - Stratigraphic sections and records of springs in the Glen Canyon region of Utah and Arizona](#). Cooley.
- [1970 - Anazazi Communities in the Red Rock Plateau, SE Utah](#). Lipe.
- [1975 - Boating History of Upper Colorado, Green & San Juan](#). Crampton.
- [1975 - Boating History of the Upper Colorado River](#). Crampton.
- [1975 - Upper basin river navigation](#). Crampton.
- [1977 - Archeological Research in Glen Canyon; Vol. 1](#). Schroedl.
- [1978 - Archeological Evaluation and Site Inventory in Glen Canyon National Recreation Area; Vol 1](#); Schroedl.
- [2002 - Bumpy Road for Glen Canyon Dam](#). Bud Rusho; retired Reclamation employee.
- [2019 - Glen Canyon Then and Now \(Moqui Canyon\)](#). NPS and Northern AZ Museum.
- [2012 - Why Did We Do It That Way? Univ. of Utah and Glen Canyon Project in Retrospect](#). Lipe.
- [2018 - Salvage Projects at Glen Canyon, Dolores, and Animas-La Plata](#). Lipe.

VIDEOS

- [William Lipe](#)
- [Donald D. Fowler](#)

PRESENTATIONS

- Phil Pennington Website: [Glen Canyon before reservoir filling](#). ([archived](#))

1921 - US GEOLOGICAL SURVEY & SOUTHERN CALIFORNIA EDISON COMPANY

A reconnasaince for dam sites

- [Description of 1921 USGS Surveys](#). William Chenoweth; Principal Investigator.
- [1921 - Summer of 1921 Report; Green River, UT to Lee's Ferry, AZ](#). Chenoweth, USGS.
- [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.

MAPS: COLORADO RIVER

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](#)

1939: CHARLES BUTLER HUNT, RALPH MILLER & BERT LOPER

- [Upper Glen Canyon in Wayne County, Garfield County & Kane County](#)

1950 to 1993: KENT FROST

Professional land and river guide

My Canyonlands: Tthe Adventurous Life of Kent Frost

- **Two film clips are available on YouTube:**
- [Clip #1](#)
- [Clip #2](#)
- **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](#)
- **ARTICLES**
- [1971 - Rim Rock Hopping: Utah's Bowdie Canyon.](#) Wilderness Camping.

GLEN CANYON AND SAN JUAN CANYON RIVER TRIPS - 1950 TO 1962 Photographs, Films and Interviews

Downloadable Zip Files (most files are quite large)

- [Ken Sleight: Remembering Glen Canyon.](#) Martha Ham.
- [Ken Sleight Interview.](#) Ryann Savino.
- Ken Sleight Video Interview: [Rediscovering Glen Canyon's Lost Wonders by Kayak.](#) You Tube.
- [Miscellaneous Notes on Rainbow Bridge Log.](#) Tom Martin.
- [Richard Norgaard - 1962; Cathedral in the Desert.](#) tif.
- [Alice Simpson - 1953 and 1962.](#) zip file.
- [Dick Griffith - 1950.](#) zip file.
- [Ed Gibson.](#) zip file.
- [George Rybka.](#) zip file.
- [Gus Scott - 1952; Hike To Rainbow Bridge.](#) zip file.
- [Gus Scott - 1953; Hike to Lee's Ferry.](#) zip file.
- [Gus Scott - 1954; Hike to Lee's Ferry.](#) zip file.
- [Gus Scott - 1955; Hike to Lee's Ferry.](#) zip file.
- [Gus Scott - Trip Diary; 1955.](#) pdf.

- [Gus Scott - 1958; Hite to Lee's Ferry](#). zip file.
 - [Gus Scott - 1959; Mexican Hat to Kane Creek](#). zip file.
 - [Gus Scott - 2014; Interview](#). zip file.
 - [Harold Monson - 1950](#). zip file.
 - [Hillis/Howie - 1955 to 1957](#). zip file.
 - [Howie - 1955](#). zip file.
 - [Ken Bertossi - 1954](#). zip file.
 - [Leslie Esparza - 1957](#). zip file.
 - [Newby - 1955 to 1958](#). zip file.
 - [Norman Herkenham - 1955](#). zip file.
 - [Paul Speer - 1957](#). zip file.
-

1952 to 1956: GEORGE SIMMONS **USGS employee and several colleagues**

USGS MAPS from 1923: baseline data and observations before reservoir inundation

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

Simmon's Trip Diaries

- [1956 - Cataract Canyon Diary](#)
 - [Diary as featured at the website of Canyonlands National Park](#)
-

1957 to 1965: THE CONSTRUCTION OF GLEN CANYON DAM

Photo Archive: State of Utah

- [Utah Geologic Survey](#)

Photo Archive: Bureau of Reclamation at Denver, Colorado
Courtesy of Tom Martin

- **These are large files**
- [Portfolio - Album 07](#)

- [Portfolio - Album 08](#)
- [Portfolio - Album 09](#)
- [Portfolio - Album 10](#)
- [Portfolio - Album 11](#)
- [Portfolio - Album 12](#)
- [Portfolio - Album 13](#)
- [Download the zip file containing all the individual photos](#). 8.6 gigabytes.

Additional

- [Box 126 Glen Canyon Project History](#). Zip file; 1 gigabyte.
- [Select photos about issues](#), such as water outlet works. Album 13.
- [Spreadsheet: Water release data at Glen Canyon Dam for testing river outlet works](#)

1962 to 1968 -SIERRA CLUB

David Brower, Richard Norgaard, Phillip Hyde, Daniel Luten, Jr., Barbara Brower. Nancy Eberle, Terry and Renny Russell, and others.

- [1962 - Cathedral in the Desert](#). Norgaard; tiff.
- [1964 - Labyrinth Canyon @ Mile 34.4](#)
- [1966 - Correspondance with Morris Udall](#)
- [1968 - Sedimental Journey](#)
- [2005 - Return to the lost world of upside down mountains](#). Norgaard.

1967 - PROFESSOR LUNA B. LEOPOLD; CATARACT CANYON RIVER TRIP

- [Cataract Canyon Bathymetry; Mile 187 to 205](#).

1969 - CENTENNIAL OF JOHN WESLEY POWELL RIVER TRIP

- [Photo Guidebook To Lake Powell](#). Sun Publishing.
- [1969 - JWP Centennial: Canyonlands, Part One](#). Denver Post Magazine.
- [1969 - JWP Centennial: Canyonlands, Part Two](#). Denver Post Magazine.

1971 to 1974: NATIONAL SCIENCE FOUNDATION

- [Lake Powell Research Project](#)

BUREAU OF LAND MANAGEMENT (BLM)

UTAH: Ownership and Natural Resource Maps; Circa 1975 (jpg images)

- [LEGEND: Ownership Maps by BLM](#)

Glen Canyon National Recreation Area (Lake Powell)

- [Cataract Canyon](#)

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

Utah BLM: Circa 2017

- [Hite Crossing Ownership Map](#)
- [Hanksville & Hite Crossing](#)

End of Part Two

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 - To visit Part Three - [CLICK HERE](#)
-

Part Three: Citizen and Professional Science in Glen Canyon National Recreation Area

OCTOBER 21, 2022

BY JOHN S. WEISHEIT

THIS IS PART THREE

- To Visit Part One - [CLICK HERE](#)
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PRIMARY RESEARCH DOCUMENTS

- [1971 to 1978 - The Lake Powell Research Project](#). National Science Foundation.
-

PROJECT PROGRAMMING: Lake Powell Sedimentation

- 2002, March 28 - [Concept letter from Professor John C. Dohrenwend](#)
- 2013 - [Obituary of John C. Dohrenwend](#)
- Portrait: [The late John C. Dohrenwend](#)

Note: this webpage is designed for a browser called Safari and a modified UNIX operating system developed by Apple Inc., and currently called Ventura; it is a browser that automatically opens files and provides more responsive streaming services. We also recommend high speed internet services to avoid lengthy download times; our imagery is high resolution. The browser called Firefox is the next best browser for this website.

1992 to 2004: Dr. Robert H. Webb (USGS, retired), Dr. Jayne Belnap (USGS, retired), and John Weisheit.

Repeat photography and data when reservoir was nearly full in the 1990s.

- [Cataract Canyon: An Environmental and Human History of the Rivers in Canyonlands](#). University of Utah Press; 2004.

REPEAT PHOTOS (jpg images)

- [Big Drop Two \(#22\)](#); (Elevation 3715 feet)
- [Imperial Rapid \(#26\)](#)
- [Upstream view above Waterhole Canyon](#)
- [Clearwater Canyon](#)
- [Bowdie Canyon](#)
- [Rockfall Canyon](#) (circa 1964 @ elevation 3520 feet)
- [Mouth of Dirty Devil River](#) (match of 1889 photo by Franklin Nims)

1994 to 2000 - San Juan River Sedimentation Project by Donald Baars and Gene Stevenson

- [1994 - The San Juan River Silt Story](#)
- [2000 - San Juan River Siltation Rates](#)

1998 to 2000: Glen Canyon Institute; Citizen's Environmental Assessment on the decommissioning of Glen Canyon Dam.

- [Summary: Citizens Environmental Assessment on the decommission of Glen Canyon Dam](#). Glen Canyon Institute.
- [Amphibians and Reptiles of Glen Canyon: Historical Natural History Summary](#). Rinderle.
- [Bioinventory of Glen Canyon Prior to Inudation by the Lake Powell Reservoir](#). Webb.
- [Endangered and Threatened Species in the Lower Colorado River Basin, Delta and Sea of Cortez](#). Molholland.
- [Lake Powell Preliminary Socioeconomic Impact Analysis](#). Jonas.
- [Salinity in the Colorado River Basin: Past, Present and Future](#). Beck.
- [Sediment Hydrology on the Colorado River: The Impacts of Draining Lake Powell](#). Myers.
- [A Study of the White Canyon Mill Tailings at Hite Utah](#). Danise.
- [Water Balance of Lake Powell: An Assesment of Groundwater Seepage and Evaporation1999](#). Myers.

2002 to 2006: Dr. John Dohrenwend (USGS, retired) & John Weisheit (Colorado Riverkeeper)

Original photos; repeat photography and presentations.

Photography, Photo Matches and Presentations

Dirty Devil River mouth; original Hite Marina; sand and gravel operations for highway and bridge construction.

- 1966 - [Aerial photo of the first Hite Marina](#); reservoir elevation 3530; before the snowmelt; photographer unknown. [Same photo with a red dot](#) to mark the location of the modern-day primitive boat ramp.
- 1966 - [Aerial photo of original Hite Marina](#); elevation is 3538 feet; during snowmelt; photographer unknown. [Same photo with a red dot](#) to mark the location of the modern-day primitive boat ramp.
- 1969 - Match 01: [Dirty Devil area near Highway 95](#). Weisheit; original photo by Tad Nichols.
- 1969 - Match 02: [Dirty Devil area near Highway 95](#). Weisheit; original photo by Tad Nichols.
- 1999? - [Match of Dirty Devil Arm near Hwy 95 Bridge](#). Weisheit; original photo by American Southwest .net.
- 1969 ? - [Aerial of gravel mining operations for paving Highway 95](#). photographer unknown.
- 1969 ? - [Aerial of bedrock features near Dirty Devil River](#); photographer unknown.
- 1973 ? - [Aerial repeat photo at mouth of Dirty Devil River](#). Dohrenwend.; original photo by P.T. Reily.

Note: The trailer camp in the photos above were occupied by the workers of Highway 95 and for road and bridge construction. You will notice that heavy equipment is gathering and sorting Colorado and Dirty Devil river gravels (Quaternary Period) for road base and for the bridge approaches. A marina was also available for boaters and operated by commercial outfitters, namely John Frank Wright (Mexican Hat Expeditions) and Gaylord Stavely (Canyoneers).

Additional Information about Glen Canyon Photography by Tad Nichols

- Video: [Dawn Kish and the photography of Tad Nichols](#). You Tube.

Reconnaissance

- 2002, March 28 - [The first reconnasaince trip and launching at Hite Marina](#).
- 2005, 1st Quarter? - 01: [Aerial of Dirty Devil Take-out](#). Dohrenwend.
- 2005, 1st Quarter? - 02: [Aerial photo of Dirty Devil Take-out](#). Dohrenwend.
- 2005, 1st Quarter? - [New Rapid above Farley Canyon](#)
- 2005 - [Report on New Rapid above Farley Canyon](#). Weisheit.
- Lower Cataract Canyon - [A pdf portfolio: matching our 2004 photos in 2006](#). Dohrenwend.
- Various features: [river erosion on exposed deposits of reservoir sediment](#). Dohrenwend & Weisheit

Presentations

- [Rapid Progradation of River Deltas Into Lake Powell, March 2002 to March 2004](#). Dohrenwend.
 - [Floods, Tamarisk, Drought: Recent and Future Changes Along the Colorado River](#). Dohrenwend.
 - [Decline and Fall of Lake Powell, March 2002 to March 2005: Impacts of Extended Drought on the Colorado Plateau](#). Dohrenwend.
 - Portrait: [The late John C. Dohrenwend](#)
-

Utah State University: 2005 to 2022

- [2009 - Fluvial Systems Tied Together Through Common Base Level: The Geomorphic Response of the Dirty Devil River, North Wash Creek, and the Colorado River to the Rapid Base Level Drop of Lake Powell](#). Adam Majeski.
-

2017 - Rebecca Solnit

- 2009 - Rebecca's book review of *Dead Pool: Lake Powell, Global Warming, and the Future of Water in the West* by James Lawrence Powell. Rebecca Solnit for London Review of Books.
 - 2017- Letter from a drowned canyon. Rebecca Solnit for California Sunday Magazine.
 - [2017 - Why filling Lake Mead First is a bad idea](#). Sinjin Eberle for American Rivers.
 - [2023 - A river guide's view of Lake Powell's decline and the depths of the Colorado River crisis](#).
-

2017 to present: The Returning Rapids Project; Mike DeHoff (Principal Investigator) and colleagues

- Fiscal sponsor is [Glen Canyon Institute](#).
 - Home: Page: [Returning Rapids Project](#)
 - [October 2021 Trip Report](#)
 - [The History of Lake Powell Written in Sediment](#). USGS.
 - [May, 2023 - Ecological succession in Cataract Canyon](#). Arens.
-

2017 and 2018: Filmmaker Taylor Graham for National Geographic

- [Rediscovering Glen Canyon's Lost Wonders by Kayak](#). You Tube.
-

2021 to present: Glen Canyon Rejuvenation Project; Dr. Dan McCool and colleagues

Aerial Photos: Light Hawk Overflight of September 10, 2021, PDF Portfolios.

- [Dirty Devil River to Castle Butte; Good Hope Bay](#)
- [Castle Butte to Bullfrog Creek Marina](#)
- [Bullfrog to Escalante to San Juan River](#)
- [San Juan River to Canyonlands NP to Moab Airport](#)

Reservoir boating trip; photos and report: 6-day camping trip to Bullfrog Marina, Moki Canyon, Forgotten Canyon, and Lake Canyon.

- Weisheit - [PDF portfolio](#)
- McCool - [PDF portfolio](#)
- [Trip Report](#). Weisheit.

October 2021 - 100th Anniversary of the Kelly W. Trimble 1921 USGS San Juan Expedition

- [Report: Lowest San Juan River](#). Brandt Hart & Chad Niehaus.
- [1921 Diary of Hugh D. Miser](#).
- [1924 - Professional Paper by Hugh D. Miser](#). USGS.
- [Repeat photograph at Grand Gulch](#).

October of 2021 - 100th anniversary of the William R. Chenoweth 1921 USGS Canyonlands Expedition.

- [Description of the 1921 USGS Survey](#). William Chenoweth.

October 2021 - Dirty Devil Boat Ramp to Bullfrog Creek Boat Ramp

By Tom Martin (River Runners for Wilderness) and John Weisheit (Living Rivers & Colorado Riverkeeper).

- Trip dates: September and October of 2021
- By staff and volunteers for the fiscally sponsored projects of Living Rivers: River Runners for Wilderness and Colorado Riverkeeper.
- [CLICK HERE](#) to view this repeat photograph presentation via *VIMEO*. Tom Martin.

Note: Stay tuned for more repeat photography

A repeat photography boat trip; October 10 to 14, 2021; reservoir elevation 3545 feet.

Note: PDF Portfolios of general reservoir conditions; file size reduced; still takes awhile to download.

- [October 10, 2021 - Dirty Devil Boat Ramp](#)
- [October 11, 2021 - Dirty Devil Boat Ramp to The Horn](#)
- [October 12, 2021 - Castle Butte Section](#)
- [October 13, 2021 - Good Hope Mesa to Moki Bar](#)
- [October 14, 2021 - Moki Bar to Bullfrog Creek Boat Ramp](#)

The Repeat Photos

Original images before 1964 and the match occurred in 2021 at elevation 3545 feet

Note: Matches to be perfected with new additions in October of 2022

- Dirty Devil Mouth: [Beth Nielsen 195? and Tom Martin, 2021](#)
- Dirty Devil Boat Ramp: [Beth Nielsen 195? and Martin, 2021](#)
- North Wash: [Beth Nielsen 195? and Tom Martin, 2021](#)
- North Wash: [Beaman 1871 & Martin, 2021](#)
- White Canyon: [Marston & Martin, 2021](#)
- White Canyon Fort: [Hallan Neil Marsh & Martin, 2021](#)
- White Canyon Fort: [Marston & Martin 2021](#)
- Dorothy Bar: [Nielsen & Martin, 2021](#)
- Castle Butte from The Horn: [Nielsen & Martin, 2021](#)
- The Horn: [Phil Pennington & Martin, 2021](#)
- Castle Butte: [Nielsen & Martin, 2021](#)
- Ticaboo Canyon: [Gus Scott & Martin, 2021](#)
- Red Canyon: [Hillis Howie & Martin, 2021](#)
- Good Hope Mesa: [Neil Newby & Martin, 2021](#)
- Seven Mile Canyon: [Hillis Howie & Martin, 2021](#)
- Tapestry Wall: [Newby & Martin, 2021](#)
- Tapestry Wall Upstream View: [Marston & Martin, 2021](#)
- Tapestry Wall Downstream View: [Marston & Martin, 2021](#)
- Hansen Creek, Upstream of: [Esparza & Martin, 2021](#)

October of 2022: Aerial Photos at Elevation 3530 feet

All photos by John Weisheit and public domain.

- [Dirty Devil Canyon](#)
- [Dirty Devil Bridge](#)
- [Dirty Devil Boat Ramp](#)
- [Hite Marina Facilities](#)
- [North Wash](#)
- [Farley, White & Trachyte canyons](#)
- [Castle Butte, Red Canyon & Ticaboo Canyon](#)
- [Tapestry Wall](#)
- [Hall's & Bullfrog marinas](#)
- More photos soon!

October of 2022 Matches

Matching photos from the Nielsen Collection near Farley, White and Trachyte canyons. Also 1921 USGS photos between The Horn and Bullfrog Creek.

- **Presentation via Vimeo:** [By Tom Martin; December 2022.](#)
- **Note:** Locating the exact camera stations was very difficult and sometimes unsafe. The perched sediment here is about 200 feet thick and choked with massive thickets of weeds. The sediment features include deep mud cracks, subsidence, slump fractures and slope failures.

- **Note:** A metal water tank was installed on a ledge just a bit downstream of Moki Fort when the White Canyon Uranium Mill was operational. Fasteners for the water delivery pipes can still be observed.
- [Moki Fort from drainage of White Canyon; October 2022. jpg.](#)
- [Airstrip above Farley Canyon mouth; Upstream View; October 2022. jpg.](#)
- [Airstrip above Farley Canyon mouth; Downstream View; October 2022. jpg.](#)
- [Airplane parked at airstrip; October 2022. jpg.](#)

Other Locations and photographers

- Tapestry Wall: [George Rathban, 1958](#)
- More photos soon!
-
-

2023 - Erik Bernhoft and Tom Martin match lower half of Lake Powell

- [Revisit Glen Canyon](#)

Stay tuned for a more detailed narratives that will include landscape and aerial photos.

End of Part Three

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