

BROUGH RESERVOIR



Introduction

Brough Reservoir is an off stream impoundment located in the Uinta Basin southwest of Vernal. It has been dammed to impound and release water for irrigation, and water is diverted into the lake via the Ouray Valley Canal which originates from the Whiterocks River. The reservoir was created in 1975 with the construction of an

earth filled dam. Water is owned by the Ouray Park Irrigation Company and the Division of Wildlife resources for irrigation and recreational useage. In addition to Brough Reservoir there a number of other low elevation,

Characteristics and Morphometry

Lake elevation (meters / feet)	1,527 / 5,010
Surface area (hectares / acres)	52 / 128
Watershed area (hectares / acres)	7,382 / 18,241
Volume (m ³ / acre-feet)	
capacity	4,934,000 / 4,000
conservation pool	1,411,745 / 1,145
Annual inflow (m ³ / acre-feet)	
Retention time (years)	
Drawdown (m ³ / acre-feet)	
Depth (meters / feet)	
maximum	17 / 55.8
mean	9.5 / 31.2
Length (meters / feet)	1,037 / 3,402
Width (meters / feet)	610 / 2001
Shoreline (meters / feet)	3962 / 12,999

Location

County	Uinta
Longitude / Latitude	109 41 07 / 40 15 03
USGS Map	Vernal, SW, 1964
DeLorme's Utah Atlas & Gazetteer™	Page 56, D-2
Cataloging River (Diamond Mountain Area) (14060001)	

warm water reservoirs in the Uinta Basin. Most noteworthy is Pelican Lake located a few miles due south. Land ownership around the reservoir is primarily privately owned with a small amount of BLM land. However, public access is unrestricted. Consumptive water uses are limited to irrigation, and nonconsumptive uses include warm water aquatic habitats, wetland habitat, and recreational uses. Water use is not expected to change

in the foreseeable future.

Recreation

Brough Reservoir is accessible from U-88 between Ouray and US-40. The turnoff to U-88 is 15 miles west of Vernal and 15 miles east of Roosevelt on US-40. Approximately 3.7 miles south of US 40, U-88, a gravel road to the west is an access road to the reservoir. The reservoir is about 1 mile to the west and then 1 mile south. Access is possible from U-88 approximately 2 miles further south near a small farming community. Another gravel road leads west and north to the reservoir.

Fishing, boating, and hunting are popular activities at the lake. There is no boat ramp at the reservoir, but small boats can be launched at strategic points.

There are no improved camping areas or facilities located adjacent to the reservoir.

Watershed Description

Brough Reservoir has a small, natural watershed area to the north and west of the reservoir. The area is bounded by gentle slopes that rise a few hundred feet and become rolling hills. The land is extremely arid desert (6-8" annual precipitation).

The Ouray Valley Canal transports water that originates approximately 34 miles northwest from the Whiterocks River. U S Whiterocks canal is the first canal at the point of diversion from Whiterocks River. It later changes to the Whiterocks Ouray Valley Canal at the Merkley Drop approximately 5 miles downstream from the origin. Approximately 12 miles further downstream near LaPoint the canal becomes the Ouray Valley Canal which continues for approximately 17 more miles to the reservoir.

The source of the Whiterocks River is in the upper reaches of the Uinta Mountains. The drainage area widens towards the ridgeline of the Uintas, giving it a large area of very heavy precipitation. The upper portion of the watershed contains hundreds of lakes, many square miles of meadows, forests, and barren peaks. The river flows from the mountains directly onto the tertiary deposits of the Uinta Basin, as the hogback-forming intermediate strata are buried here.

The watershed high point, an unnamed peak, is 3,861 m (12,666 ft) above sea level, thereby developing a complex slope of approximately 3.5% to the reservoir. Although the average stream gradient of Whiterocks from Chepeta Lake to the U S Whiterocks Canal is 6.2% (327 feet per mile), the overall gradient for the canal system is 1% (53 feet per mile). The primary inflow is the Ouray Valley Canal, but natural runoff also flows into the lake.

The natural watershed is made of low terraces, fans, and desert valley plains, while the diverted watershed has high mountains, mountain valleys, terraces, and desert

plains. In general the soils in the vicinity of the lake are moderate to strongly alkaline loams from sandy clays to gravelly sand having low to high erodibility and well to somewhat excessive drainage. Permeability is slow to rapid with runoff slow to medium and sediment production moderate to low. Soil composition information for the extended watershed have not been determined by the Division of Water Quality.

The vegetation communities in the natural watershed include shadscale, greasewood, and sage-grass. The diverted watershed includes sage-grass, irrigated farmland, oak-maple, spruce-fir, aspen, pine, and alpine. The watershed receives 15 - 102 cm (6 - 40 inches) of precipitation annually. The frost-free season around the reservoir is 100 - 120 days per year.

Land use in natural watershed is primarily grazing lands. The watershed of the Whiterocks River contains land in the Ashley National Forest, which is managed for multiple use (logging, grazing, recreation, prospecting, hunting, etc.), but the entire upper portion of the watershed is part of the High Uintas Wilderness, where only preexisting consumptive uses are permitted. South of the National Forest boundary, the land is part of the Uinta and Ouray Indian Reservation, with mixed land uses, including agriculture and grazing.

Limnological Assessment

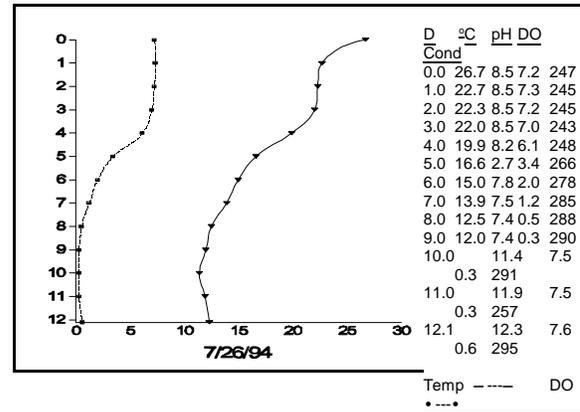
The water quality of Brough Reservoir is good. It is considered to be moderately hard with a hardness concentration value of approximately 105 mg/L (CaCO₃). Those parameters that have exceeded State water quality standards for defined beneficial uses are total phosphorus, dissolved oxygen and temperature. The average concentrations of total phosphorus in the water column is 41 ug/L which is over the state pollution indicator value of 25 ug/L. The phosphorus concentration in the hypolimnion on July 26, 1994 under stratified conditions was 136 ug/L. Dissolved oxygen concentrations during late summer substantiate the fact that water quality impairments do exist. There are temperature exceedences above the 20°C standard for a cold water fishery, however, it should be noted that DWR manages the reservoir as a warm water fishery.

The reservoir is characterized as a nitrogen limited system. TSI values indicate the reservoir is mesotrophic. The reservoir does stratify as indicated in the July 26, 1994 profile which result in anoxic conditions developing in the hypolimnion and elevated total phosphorus concentrations which stimulate increased productivity in the reservoir.

The reservoir supports populations of rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus*

Limnological Data	
Data averaged from STORET sites: 593243, 593244	
Surface Data 1994	
Trophic Status	M
Chlorophyll TSI	38.21
Secchi Depth TSI	48.17
Phosphorous TSI	47.85
Average TSI	44.74
Chlorophyll <i>a</i> (ug/L)	2.0
Transparency (m)	2.3
Total Phosphorous (ug/L)	21
pH	8.7
Total Susp. Solids (mg/L)	1.9
Total Volatile Solids (mg/L)	3
Total Residual Solids (mg/L)	2
Temperature (°C / °f)	22/72
Conductivity (umhos.cm)	232
Water Column Data	
Ammonia (mg/L)	0.03
Nitrate/Nitrite (mg/L)	0.03
Hardness (mg/L)	105
Alkalinity (mg/L)	105
Silica (mg/L)	-
Total Phosphorous (ug/L)	43
Miscellaneous Data	
Limiting Nutrient	N
DO (Mg/l) at 75% depth	8.0
Stratification (m)	NO
Depth at Deepest Site (m)	9

The phytoplankton community is dominated by the presence of green algae and blue-green algae.



Pollution Assessment

Nonpoint pollution sources include the following: agriculture, grazing, logging, and recreation. Grazing takes place throughout the watershed and in the vicinity of the reservoir.

There are no point sources of pollution in the watershed

Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).

salmoides), and fathead minnows (*Pimephales promelas*). The lake has not been chemically treated by the DWR, so populations of native fishes are may be present in the lake. According to DWR stocking reports the reservoir is stocked with approximately 7-10,000 advanced fingerling rainbow trout annually.

Phytoplankton in the euphotic zone include the following taxa (in order of dominance)

Species	Cell Volume (mm ³ /liter)	% Density By Volume
<i>Sphaerocystis schroeteri</i>	0.612	70.61
<i>Coelosphaerium sp.</i>	0.25	28.88
Pennate diatoms	0.004	0.51
Total	0.866	
Shannon-Weaver [H']	0.63	
Species Evenness	0.57	
Species Richness	0.10	

Information	
Management Agencies	
Uinta Basin Association of Governments	722-4518
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Bureau of Land Management	
Diamond Mountain Resource Area	789-1362
Recreation	
Dinosaurland Travel Region (Vernal)	789-6932
Vernal Chamber of Commerce	789-1352
Reservoir Administrators	
Ouray Park Irrigation Company	545-2426

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