

NEWTON RESERVOIR



Introduction

Newton Reservoir is located in Cache Valley in extreme northern Utah. It is an intermediate size impoundment of Clarkston Creek on the valley floor.

Newton Reservoir was the first water storage reservoir built by white settlers in Utah. It was created in

1871 by the construction of an earth-fill dam. The reservoir shoreline is 66% owned by the Bureau of Reclamation. Public access is unrestricted. Reservoir water is released entirely for irrigation, but enough water is left in the reservoir that it serves well as aquatic habitat and as a recreation facility. Water use is not expected to change in the foreseeable future.

Characteristics and Morphometry

Lake elevation (meters / feet)	1,456 / 4,778
Surface area (hectares / acres)	141.64 / 350
Watershed area (hectares / acres)	6,035 / 14,912
Volume (m ³ / acre-feet)	
capacity	6,896,509 / 5,591
conservation pool	0
Annual inflow (m ³ / acre-feet)	
Retention time (years)	
Drawdown (m ³ / acre-feet)	3,750,468.9 / 3,041
Depth (meters / feet)	
maximum	22.55 / 74
mean	5.49 / 18
Length (meters / feet)	3,450 / 11,319
Width (meters / feet)	357 / 1,171
Shoreline (km / miles)	9.2 / 5.7

Location

County	Cache
Longitude / Latitude	111 58 53 / 41 54 14
USGS Map Trenton, UT/ID 1964,	Clarkston UT/ID 1964
DeLorme's Utah Atlas & Gazetteer™	Page 62, B-3
Cataloging Unit	Middle Bear River (16010202)

Recreation

Newton Reservoir, north of Newton [Town] is accessible from the south on U-23 from US-89 in Wellsville. Go two miles north of Newton on 6400 West St., follow the main road as it makes a 90° bend to the right, and arrives at the reservoir in one more mile. Access is also possible from U-142 between Richmond and Clarkston. The turnoff is to

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the south, 1.25 miles west of U-123 and 3.5 miles east of Clarkston. Follow the road south for about one mile to the reservoir, eventually arriving at the boatramp and dam.

Fishing and boating are the primary recreational uses of the reservoir. Facilities include a parking area, a picnic area, an improved public boatramp, and privies. The nearest public campground is Hyrum State Park, and the nearest private campgrounds are in Logan (See info box).

Watershed Description

The reservoir is located on the rolling floor of the great basin. The area is a desert, with some hills and mountains. Little Mountain rises immediately east of the dam, and can be seen as a landmark when driving to the reservoir. While slopes on this mountain are steep (up to 50%), the mountain is only 5,700 feet in elevation. Clarkston Mountain forms the western boundary of the watershed, 8,000 feet in elevation, and owned by the Caribou National Forest. These mountains have heavy snowfall and support coniferous forests. Slopes are up to 70%. The areas between these mountains are gently undulating crop and pastureland. The City of Clarkston is in the watershed, and there are feedlots and dairies which create nutrient loading problems for the reservoir.

The watershed high point, Clarkston Mountain(?), is 2,469 m (8,101 ft) above sea level, thereby developing a complex slope of 12% to the reservoir. The average stream gradient above the reservoir is 1.4% (235 feet per mile) The inflow Clarkston Creek and the outflow is Newton Creek.

The watershed is made up of low mountains, alluvial fans, and desert valleys. The soil associations that compose the watershed are listed in Appendix III.

The vegetation communities consist of cropland, urban, willows and cottonwoods, sage-grass, oak, maple, and spruce-fir. The watershed receives 41 - 76 cm (16 - 30 inches) of precipitation annually. The frost-free season around the reservoir is 100 - 120 days per year.

Land use in the watershed is as follows: dry agriculture (57%), grazing lands (27%), USFS multiple use (8%), irrigated pasture and hayland (6%), and urban (2%).

Limnological Assessment

The water quality of Newton Reservoir is fair. It is considered to be hard with a hardness concentration value of approximately 272 mg/L (CaCO₃). Those parameters that have exceeded State water quality standards for defined beneficial uses are total phosphorus and dissolved oxygen. The average concentrations of total phosphorus in the water column for the three study periods were 153.4, 77 and 152 ug/L which all exceed the recommended pollution indicator for phosphorus of 25

ug/L. The phosphorus concentration in the hypolimnion in late summer regularly is near 300 ug/L. This increased concentration usually occurs when near anoxic conditions were present near the bottom. Dissolved oxygen concentrations in late summer and late winter substantiate the fact that water quality impairments do exist. Even as early as depicted in the May 20, 1992 profile dissolved oxygen concentrations decline dramatically below the thermocline to 0.8 mg/L.

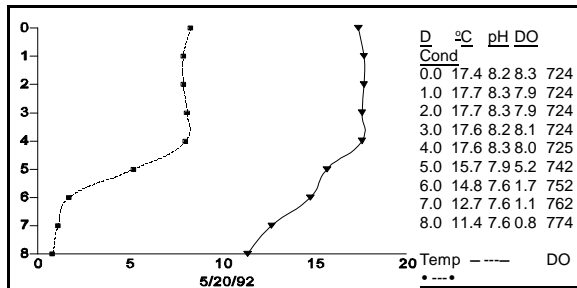
Data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is eutrophic to hypereutrophic with high levels of nutrients available for productivity. The reservoir has sufficient depth to stratify and early in the year does stratify as indicated by the May 20, 1992 profile. However fairly rapid drawdown due to irrigation needs allows for the breaking down of stratification later in the summer. Consistent with the stratification there was a noticeable decline in the concentration of dissolved oxygen in the water column. These conditions are deleterious to the fishery rendering a significant portion of the water column unsuitable for a fishery. In addition it is apparent that

Limnological Data			
Data averaged from STORET sites: 490313, 490314, 490315			
Surface Data	<u>1980</u>	<u>1990</u>	<u>1992</u>
Trophic Status	H	E	H
Chlorophyll TSI	-	50.15	60.18
Secchi Depth TSI	57.37	54.01	54.23
Phosphorous TSI	78.03	57.27	67.62
Average TSI	67.7	53.81	60.67
Chlorophyll <u>a</u> (ug/L)	-	7.0	26.4
Transparency (m)	0.9	1.5	1.3
Total Phosphorous (ug/L)	161.7	38	118
pH	8.2	8.6	8.3
Total Susp. Solids (mg/L)	116	6.4	6
Total Volatile Solids (mg/L)	-	-	4
Total Residual Solids (mg/L)	-	-	2
Temperature (°C / °f)	18/64	25/77	18/64
Conductivity (umhos.cm)	664	679	800
Water Column Data			
Ammonia (mg/L)	0.12	0.19	0.14
Nitrate/Nitrite (mg/L)	1.26	-	0.03
Hardness (mg/L)	241	273	302
Alkalinity (mg/L)	292	184	222
Silica (mg/L)	19.2	-	27
Miscellaneous Data			
Limiting Nutrient	N	N	N
DO (Mg/l) at 75% depth	0	0.2	10.6
Stratification (m)	9-11	3-9	NO
Depth at Deepest Site (m)	13	10.0	3.2

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dissolved oxygen concentrations probably reach a critical state during the winter period for fish.

According to DWR no fish kills have been reported in recent years but conditions are marginal for a trout fishery during the summer as substantiated by water quality data.. Fisheries at times have included yellow perch (*Perca flavescens*), large-mouth bass (*Micropterus salmoides*), black crappie (*Promoxis nigromaculatus*), brown trout (*Salmo trutta*), bluegill (*Lepomis macrochirus*), Utah sucker (*Castostomus ardens*), channel catfish (*Ictalurus punctatus*) and rainbow trout (*Oncorhynchus mykiss*). The lake has been treated for rough fish competition in 1981 and 1987, so populations of native fishes may not be present in the reservoir. Current stocking reports indicate that DWR stocks the reservoir with 30,000 fingerling channel catfish and 5,000 catchable rainbow trout. In addition in 1989 5,000 largemouth bass fry were stocked in the reservoir.



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

Species	Cell Volume (mm ³ /liter)	% Density By Volume
<i>Pandorina morum</i>	19.126	49.46
<i>Sphaerocystis Schroeteri</i>	13.205	34.15
<i>Fragilaria crotonensis</i>	2.062	5.33
<i>Melosira granulata</i>	1.903	4.92
<i>Pediastrum duplex</i>	1.444	3.73
Unknown spherical green alga	0.434	1.12
<i>Oocystis sp.</i>	0.156	0.40
<i>Asterionella formosa</i>	0.095	0.24
<i>Oscillatoria agardhii</i>	0.056	0.14
<i>Phacus sp.</i>	0.056	0.14
<i>Oscillatoria sp.</i>	0.048	0.12
Centric diatoms	0.036	0.09
Pennate diatoms	0.033	0.09
<i>Ankistrodesmus falcatus</i>	0.017	0.05
<i>Oscillatoria amphibia</i>	0.003	0.01

Total 38.665

Shannon-Weaver [H']	1.27
Species Evenness	0.46
Species Richness	0.62

The phytoplankton community is dominated by the presence of flagellates and green algae. Historically DWR has reported a dominance of blue-green algae, Ceratium and Aphanizomenon.

Pollution Assessment

Nonpoint pollution sources include the following: grazing by domestic livestock, recreation, and urban.

Cattle graze intensively throughout the watershed, and routinely on the shores of the upper portion of the reservoir. In addition it is common practice to cultivate crops to the edge of the reservoir where farmland is adjacent to the reservoir. The area within about a mile of the dam is owned by the Bureau of Reclamation and is not grazed.

There are no point sources of pollution in the watershed.

Information

Management Agencies

Bear River Association of Governments	752-7242
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146

Recreation

Bridgerland Travel Region (Logan) / Logan Chamber Of Commerce	752-2161
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Reservoir Administrators

DOI	
Bear River	

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).

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