BUTTERFLY LAKE

Introduction

Butterfly Lake is a small natural lake in the western portion of the High Uintas. Because of close proximity to a paved highway, this lake was chosen as a representative of hundreds of high-elevation lakes of this size. In addition, it receives extensive recreational usage. Its general shape is that of a butterfly.

The shoreline is owned by the Wasatch-Cache National Forest, and public access is unrestricted. The lake may be regulated by its outlet, a culvert beneath U-150.

Characteristics and Morphometry

Lake elevation (meters / feet)	3,151 / 10,340
Surface area (hectares / acres)	2 / 5
Watershed area (hectares / acres)	
Volume (m^3 / acre-feet)	30,838 / 25
Annual inflow (m^3 / acre-feet)	not measured
Retention time (years)	not measured
Drawdown	none
Depth (meters / feet)	
maximum	4 / 13
mean	1.5 / 5
Length (meters / feet)	210 / 700
Width (meters / feet)	150 / 500
Shoreline (meters / feet)	700 / 2,300

Recreation

Butterfly Lake is on U-150 (the Mirror Lake Highway) at Hayden Pass (three miles north of Mirror Lake). The lake and adjacent campground are well marked.

Fishing, camping, picnicking and hiking are all popular. The lake is much to small for boats. There is a backdrop of high, barren peaks. Summer temperatures are cool as a result of the extremely high elevation.

Because the area receives heavy recreational use throughout the summer, visitors should practice low-impact camping so that the area remains relatively pristine. U-150 is closed during the winter and much of the spring, but is groomed for cross country skiers, snowmobilers and hikers.

Location

County	Duchesne
Longitude / Latitude	110 51 59 / 40 43 20
USGS Map	Hayden Peak, UT 1972
DeLorme's Utah Atlas & Gazetteer™	Page 54, B-3
Cataloging Unit	Duchesne (1460003)

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Recreational facilities at the reservoir include Butterfly Campground, with latrines, day-use areas and 20 campsites. There are numerous other campgrounds along the Mirror Lake Highway, but it is not uncommon for all to be full on summer weekends.

Watershed Description

Butterfly Lake is a few meters south of Hayden Pass, separating the Duchesne River watershed from the Bear River watershed. The lake is of glacial origin. The pass sits at a point where two cirques eroded into each other, resulting in a low pass. Glaciers may have flowed either one way or the other, but it now divides the two river basins. Uneven scouring and deposition of moraine resulted in dozens of basins, which filled with water as the ice melted. The lake is just below timberline, with spruce-fir and aspen along the shore. The watershed appears to extend to the peak one kilometer west of the lake, although it may only stretch a few hundred meters upwards.

The watershed high point is 3,345 m (10,975 ft) above sea level, thereby developing a complex slope of 17.0% to the reservoir. There are no perennial streams flowing into the lake, but because of the high elevation, snow-melt runoff flows for most of the summer. The outflow is an unnamed tributary to the Duchesne River.

The watershed is made up of high mountains and mountains meadows. The soil associations that compose the watershed are listed in Appendix III.

The vegetation communities consist of Pine, oak, maple, spruce-fir, aspen, and alpine. The watershed receives 76 - 102 cm (30 - 40 inches) of precipitation annually. The frost-free season around the reservoir is 0 - 20 days per year.

Land use in the watershed is 100% multiple use, with human recreation being the primary use. Grazing may also occur. No commercial timber harvesting takes place, but the intensity of summer recreation results in some timber being harvested or salvaged for firewood.

Limnological Assessment

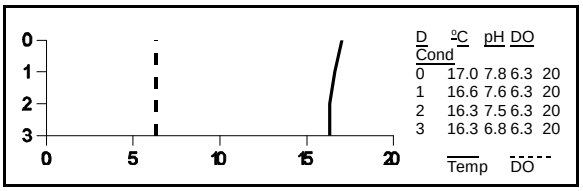
The water quality of Butterfly Lake is very good. It is considered to be very soft with a hardness concentration near 8 mg/L (CaCO3). During 1990 and 1992 no parameters monitored have exceeded State water quality standards for defined beneficial uses. Although the nutrient concentrations within the system are consistently low the data suggest that the system is nitrogen limited. In 1981 the lake was characterized as mesotrophic. No chlorophyll-a data was obtained during that period. Recent data indicates that the lake should be classified as an oligotrophic lake with report average TSI values of 40.71 and 34.04 for 1990 and 1992 respectively. In addition the TSI values for transparency are artificially high because of the shallowness of the lake. Transparency depths are usually indicated as the maximum depth of the reservoir. True depths would even reduce the TSI value more. This would assure that the lake should currently be classified as oligotrophic. The lake was weakly stratified in 1981 at the 2 meter level but no stratification was present during recent monitoring trips as depicted during the August 4, 1992. Due to the shallow nature of the lake the

Limnological Data

Data sampled from STORET site: 593611

Surface Data	1981	1990	1992
Trophic Status	M	M	O
Chlorophyll TSI	-	38.11	32.39
Secchi Depth TSI	44.2	45.96	42.37
Phosphorous TSI	47.3	38.06	33.20
Average TSI	45.8	40.71	35.99
Chlorophyll a (ug/L)	-	2.2	1.2
Transparency (m)	2.8	2.7	3.4
Total Phosphorous (ug/L)	20	10	8
pH	7.1	6.6	7.2
Total Susp. Solids (mg/L)	<5	<3	<3
Total Volatile Solids (mg/L)	-	-	-
Total Residual Solids (mg/L)	-	-	3
Temperature (°C / °f)	17/63	15/60	16/60
Conductivity (umhos.cm)	8	22	21
Water Column Data			
Ammonia (mg/L)	0.05	0.04	0.03
Nitrate/Nitrite (mg/L)	0.13	-	0.01
Hardness (mg/L)	7.5	7	8
Alkalinity (mg/L)	4	3	4
Silica (mg/L)	-	-	0.5
Total Phosphorus (ug/L)	25	15	6.0
Miscellaneous Data			
DO (Mg/l) at 75% depth	7.5	6.3	6.3
Stratification (m)	2.4	1-2	NO
Limiting Nutrient	N	N	N
Depth at Deepest Site (m)	4	2.3	3.0

stratification is probable weak and may be broken down by wind and wave action. Even when the lake was stratified in 1981 there was no major decline in the dissolved oxygen concentration throughout the water column. The shallowness of the lake and the extensive winter season for the lake may make it difficult for the overwintering of fish in the lake.



Because of the shallow nature of the lake and its stable water level, an extensive portion of the surface is covered with macrophytes, predominantly water lilies.

Although the lake has not been chemically treated by the DWR, there were probably no fishes in the lake before early inhabitants stocked trout. The lake is managed as an intensive fishery, and there are no spawning areas in the lake, so all fishes in the lake are hatchery fish. It is stocked annually with approximately 4,000 catchable rainbow and albino trout (*Oncorhynchus mykiss*) and 1,000 fingerling brook trout (*Salvelinus fontinalis*). Fishes are not native to many areas of this region.

On August 4, 1992, phytoplankton in the euphotic zone included the following taxa (in order of dominance)

Species	Cell Volume (mm^3/liter)	% Density By Volume
Sphaerocystis schroeteri	13.205	82.86
Botryococcus braunii	2.224	13.95
Pennate diatoms	0.167	1.05
Scenedesmus quadricauda		0. 1 5 0
0.94		
Merismopedia tenuissima		0. 0 5 8
0.37		
Euglena sp.	0.041	0.26
Scenedesmus bijuga	0.033	0.21
Ankistrodesmus falcatus	0.017	0.11
Oocystis sp.	0.008	0.05
Chlamydomonas sp.	0.002	0.01
Total	15.902	
Shannon-Weaver [H']	0.60	
Species Evenness	0.25	
Species Richness	0.46	

As observed the phytoplankton community is dominated by two species of green algae indicative of fairly high quality oligotrophic waters.

Pollution Assessment

Nonpoint pollution sources include the following: Sedimentation and nutrient loading from grazing, and litter, human waste and chemicals from recreation.

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).

Information

Management Agencies	
Uinta Basin Association of Governments	722-4518
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
Wasatch-Cache National Forest	524-5030
Kamas Ranger District	783-4338
Recreation	
Dinosaurland Travel Region (Vernal)	789-6932