

## STARVATION RESERVOIR



### Introduction

Starvation Reservoir is a large Bureau of Reclamation Reservoir of the Strawberry River in the Uinta Basin. It is large enough for all water sports and has a state park with a campground. Good fishing and a two hour drive from the southern Wasatch Front make it a popular recreational

destination. It should not be confused with a Starvation Reservoir north of Blanding. The earth-fill dam was built in 1970 to supply irrigation water for agriculture along the Duchesne River. It is unlikely that the 2% of water presently used by Duchesne for culinary purposes will increase. The shoreline is 100% publicly owned. Access is unrestricted. The reservoir is located immediately

### Characteristics and Morphometry

Lake elevation (meters / feet)	1,741 / 5,712
Surface area (hectares / acres)	1,117 / 2,760
Watershed area (hectares / acres)	484,000 / 1,190,000
Volume (m <sup>3</sup> / acre-feet)	
capacity	2.008 x 10 <sup>8</sup> / 162,798
conservation pool	0
Annual inflow (m <sup>3</sup> / acre-feet)	
Retention time (years)	varies
Drawdown (m <sup>3</sup> / acre-feet)	1.894 x 10 <sup>8 (1077)</sup> / 153,562
Depth (meters / feet)	
maximum	47.2 / 154.9
mean	19.9 / 65.3
Length (km / miles)	12.4 / 7.7
Width (km / miles)	3.2 / 2.0
Shoreline (km / miles)	37 / 23

### Location

County	Duchesne
Longitude / Latitude	110 28 00 / 40 11 00
USGS Map	Duchesne, UT 1982 (1:100,000)
DeLorme's Utah Atlas & Gazetteer	17, A-5, Page 55, D-5
Cataloging Unit	Strawberry (14060004)

upstream from the city of Duchesne, where the Duchesne and Strawberry Rivers confluence.

The reservoir was so named because a rancher once attempted to graze stock in the area, and they all starved to death. Bureau of Reclamation projects such as this one use federal funds to pay the cost of providing water for agricultural uses, enabling crops to be grown and cattle to

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be grazed at less expense to farmers.

### Recreation

Starvation Reservoir is crossed by US 40 about 3 miles west of Duchesne. Access to the State Park is from US 40 at the west end of Duchesne (one block west of the Conoco station). Other parts of the shore are accessible from various unpaved roads or the view area at milepost 83 (just east of the US 40 bridge).

The reservoir is popular for swimming, waterskiing, sailing, and fishing. It is a popular reservoir for walleye and smallmouth bass. The scenery from the reservoir is a partially submerged, steep-walled desolate canyon.

Starvation State Park has 35 campsites, flush toilets, a fish cleaning station, a sandy beach, group use areas, and showers. Primitive camping is permitted at various sites around the lake.



### Watershed Description

Starvation Reservoir has a large natural watershed that includes most of the western Uinta Basin, and includes the eastern Uintas via the Knight Diversion from the Duchesne River. The natural watershed is still quite large, including many very remote areas along Reservation Ridge and west to Strawberry Ridge north of Soldier Summit.

As with most reservoirs with fluctuating water levels, the shoreline of the lake is barren of riparian vegetation. Sagebrush prairies surround the high water line of the reservoir, but when water is low, the area above shoreline is exposed mud flats. The vertical nature of the some parts of the shoreline make fluctuations somewhat inconsequential.

The watershed high point, Ostler Peak, is 3,876 m (12,717 feet) above mean sea level, creating a complex slope of 3.5% to the reservoir. The principle inflows are the Strawberry River, Saleratus Wash, Rabbit Gulch, and the Duchesne River via the Knight Diversion. The outlet is the Strawberry River. The average stream gradient

above the lake is 1.2% (65 feet per mile).

This diverse watershed contains soils of many different types. A partial listing (omitting all of the artificially diverted watersheds) of the soil associations that compose the watershed are listed in Appendix III.

The vegetation communities consist bitterbrush-mountain mahogany, pinyon-juniper, ponderosa pine, shadscale, greasewood, saltbrush, pine, aspen, spruce-fir, oak, and sage-grass. The diverted watersheds also include mountain meadow and alpine vegetation. The watershed receives 25 - 102 cm (10 - 40 inches) of

#### Limnological Data

Data averaged from STORET sites: 493605, 493606, 493607, 494608, 494609

Surface Data	1981	1989	1991	1992
Trophic Status	M	E	M	M
Chlorophyll TSI	-	-	41.25	36.33
Secchi Depth TSI	41.95	55.11	45.16	47.54
Phosphorous TSI	49.98	60.27	36.02	42.40
Average TSI	45.96	57.69	40.81	42.10
Chlorophyll <i>a</i> (ug/L)	-	-	3.2	1.8
Transparency (m)	3.5	1.6	3.1	2.1
Total Phosphorous (ug/L)	24	48	10	23
pH	8.5	8.4	8.3	8.4
Total Susp. Solids (mg/L)	-	5.6	2.7	2.1
Total Volatile Solids (mg/L)	-	-	-	2
Total Residual Solids (mg/L)	-	-	-	2
Temperature (°C / °f)	17/63	17/62	17/63	17/63
Conductivity	595	675	561	608

#### Water Column Data

Ammonia (mg/L)	0.08	0.04	0.04	0.03
Nitrate/Nitrite (mg/L)	0.30	-	0.01	0.02
Hardness (mg/L)	263	232	223	214
Alkalinity (mg/L)	259	241	212	247
Silica (mg/L)	-	-	-	9
Total Phosphorous (ug/L)	30	42	14	22

#### Miscellaneous Data

Limiting Nutrient	N	N	N	N
DO (Mg/l) at 75% depth	5.9	0.6	2.0	6.4
Stratification (m)	6	NO	NO	NO
Depth at Deepest Site (m)	35	31.0	32.0	25.1

precipitation annually. The frost-free season around the reservoir is 120 -140 days per year.

Land use in the natural watershed is 85% multiple use (logging, mining, grazing and recreation on BLM, State, and USFS lands), 10% private grazing lands and 5% agriculture.

### Limnological Assessment

LAKE REPORTS

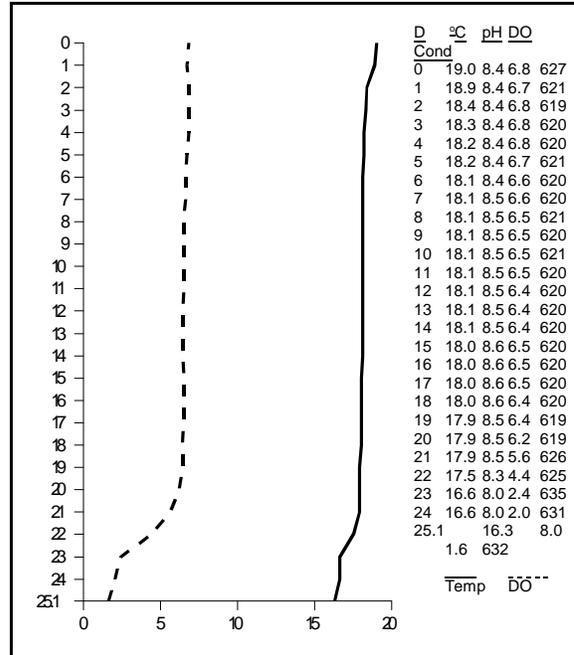
The water quality of Starvation Reservoir is very good. It is considered to be hard with a hardness concentration value of approximately 233 mg/L (CaCO<sub>3</sub>). Those parameters that have exceeded State water quality standards for defined beneficial uses are total phosphorus and dissolved oxygen. Although the average concentrations of total phosphorus in the water column since 1991 have not exceeded the recommended pollution indicator for phosphorus of 25 ug/L, there have been an occasional value in the water column that has exceeded the indicator. It does not appear that the nutrient concentrations is exhibiting an impact on water quality at this point in time. Nutrient concentrations have declined since the reservoir was created as is indicated in the decline of average water column concentrations from the study periods since 1981. It is not uncommon to see depletion of the dissolved oxygen concentrations in the hypolimnion later in the productivity season, but not to the extent that a severe impact to the fishery occurs.

Existing data suggest that the reservoir is a nitrogen limited system. TSI values indicate the reservoir is mesotrophic except for 1989 when elevated nutrient concentrations increased production. The reservoir in general exhibits low to moderate production. Although the profile of September 2, 1992 does not exhibit stratification, the reservoir does stratify during the summer usually near the 10 meter depth. When it is stratified dissolved oxygen depletions are more extreme with concentrations document as low as 4.0 mg/L at a depth of 12 meters. This depletion is of concern and needs to continue to be monitored, with some winter monitoring conducted.

In 1975 Starvation Reservoir was one of the reservoirs evaluated under the NES survey. The survey indicated that the reservoir was mesotrophic with nitrogen limitation for all periods of sampling. The loading rates was 2.70 g/m<sup>2</sup> for phosphorus and 34.0 g/m<sup>2</sup> for total nitrogen. It should be noted that these rates are relatively high but that the sampling occurred during a period in which the reservoir was initially filling. The dominate phytoplankton populations included: for the May sampling period *Stephanodiscus sp.*, *Fragilaria sp.*, and *Asterionella sp.* (44, 35, and 19% respectively); for the August period *Oocystis sp.*, *Chroomonas sp.*, and *Dinobryon sp.* (40, 27, and 20% respectively); and for the September period *Chroomonas sp.* and *Cryptomonas* (33 and 25% respectively).

According to DWR no fish kills have been reported in recent years. The reservoir supports populations of naturally reproducing walleye (*Stizostedion vitreum*) and smallmouth bass (*Micropterus dolomieu*) with the potential of some brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*) which were stocked in 1978. The lake has not been treated for rough fish competition, so populations of native fishes may still

be present in the lake. Current stocking reports indicate that DWR does not stock the reservoir but relies on the natural reproduction of the predominant warm water



species.

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

Species	Cell Volume (mm <sup>3</sup> /liter)	% Density By Volume
<i>Asterionella formosa</i>	6.711	68.67
<i>Gomphospheria aponina</i>	1.237	12.65
<i>Ceratium hirundinella</i>	0.936	9.58
<i>Coelastrum sp.</i>	0.556	5.69
<i>Fragilaria crotonensis</i>	0.229	2.34
<i>Staurastrum gracile</i>	0.034	0.35
<i>Oocystis sp.</i>	0.031	0.32
<i>Dinobryon divergens</i>	0.012	0.13
Pennate diatoms	0.011	0.11
<i>Crucigenia rectangularis</i>	0.011	0.11
<i>Ankistrodesmus falcatus</i>	0.004	0.04
Total	9.770	
Shannon-Weaver [H']	1.06	
Species Evenness	0.44	
Species Richness	0.43	

The phytoplankton community is dominated by the presence of diatoms, blue-green algae, flagellates and

some green algae species.

### **Pollution Assessment**

Nonpoint pollution sources include the following: waste and litter from recreation; and sedimentation, and nutrient loading from grazing. Cattle graze in the watershed, but the shoreline is fenced off in certain areas around the reservoir. Logging has taken place in watershed, but there are no active or proposed timber sales.

### **Beneficial Use Classification**

The state beneficial use classifications include: culinary (1C), recreational bathing (swimming) 2A, boating and similar recreation (excluding swimming) (2B), warm water game fish and organisms in their food chain (3B) and agricultural uses (4).

<b>Information</b>	
<b>Management Agencies</b>	
Uinta Basin Association of Governments	722-4518
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
<b>Recreation</b>	
Dinosaurland Travel Region (Vernal)	789-6932
Duchesne Chamber of Commerce	738-5651
Starvation State Park	738-2326
<b>Reservoir Administrators</b>	
DOI	6