

## ECHO RESERVOIR



### Introduction

Echo Reservoir is a large reservoir south of Echo Junction on the Weber River. I-80 hugs its western shore for about three miles, making it one of the most visible reservoirs in the state. One of six reservoirs built by the Bureau of Reclamation in the Weber watershed to provide

water to the northern Wasatch Front, it impounds spring runoff from the western Uintas, storing it for use throughout the year. Echo Reservoir and its upstream twin Rockport Lake are popular destinations for year-

#### Characteristics and Morphometry

Lake elevation (meters / feet)	1,694 / 5,560
Surface area (hectares / acres)	564 / 1,394
Watershed area (hectares / acres)	189,000 / 468,000
Volume (m <sup>3</sup> / acre-feet)	
capacity	91,156,000
conservation pool	
Annual inflow (m <sup>3</sup> / acre-feet)	
Retention time (years)	
Drawdown (meters / feet)	71,675,000 / 50,000
Depth (meters / feet)	
maximum	33.5 / 110
mean	15.3 / 50.2
Length (km / miles)	6.89 / 4.28
Width (km / miles)	1.219 / .76
Shoreline (km / miles)	16.46 / 10.22

#### Location

County	Summit
Longitude / Latitude	111 24 19 / 40 57 00
USGS Maps	Coalville, UT - 1967
DeLorme's Utah Atlas & Gazetteer™	Page 54, A-1
Cataloging Unit	Upper Weber (16020101)

round recreation.

Echo Reservoir was created in 1931 by the construction of an earth-fill dam. The reservoir shoreline is

75% owned by the Weber River Water Conservancy District, and public access is restricted in the remaining 25%. The reservoir is named after Echo Creek, which flows into the Weber River immediately downstream from the dam. In addition to recreational usage the reservoir

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water is used primarily for irrigation. Much is used for  
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needs, and is known as "Weber Water". As urban sprawl continues to displace farmland along the Wasatch Front and in communities along the Weber River, some water is used for culinary purposes.

### Recreation

Echo Reservoir is easily accessible from old US-189 on the east side of the reservoir. Take I-80 to either Exit 164, drive into downtown Coalville and go north to the reservoir, or take Exit 169 at Echo and go south. The road follows an abandoned railroad grade that has been converted into a recreation trail. The road and trail hug the base of the canyon wall along the reservoir. There are numerous access points along old US-189. I-80 is on the west side. There is a scenic overlook, but reservoir access is difficult. Fishing, boating, sailing, swimming, ice fishing, and water skiing are all popular. The reservoir is very large, enabling it to handle heavy recreational use. In late summer, however, severe drawdowns impair recreational use of the reservoir.

There is a public recreation area about two miles north of downtown Coalville on old US-189. It has a boat launching area and latrines. One-half mile north of the public facility is a large private marina and campground. The marina has many large trees, making it one of the more pleasant portions of the shoreline. It has an improved boat ramp, camping, boat rentals, a convenience store, and toilet facilities. This is a privately-owned operation, and fees are charged for all activities.



There are services in Echo and Coalville, and a private campground in Coalville (See info box).

### Watershed Description

Echo Reservoir is the second of two large Bureau of Reclamation impoundments on the Weber River. The reservoir is an impoundment of a valley, which displaced agricultural land and a major transportation corridor. The valley is about 0.8 miles wide and up to 800 feet deep.

Although the terrain is mountainous, the elevation is relatively low, so the vegetation around the reservoir is mostly sagebrush and grass.

Coalville, the county seat of Summit County, is at the south (upstream) end of the reservoir. Its proximity to Park City and Salt Lake City make it a prime location for development. Although the commute to Salt Lake City is over 50 miles, the rural atmosphere is attracting immigration. Development will probably continue until it has engulfed the entire valley and side canyons, resulting in much-increased nutrient inputs from sewage and lawn fertilizers, but decreased nonpoint pollution from agriculture.

The watershed headwaters are the Weber River in the western Uintas, Chalk Creek in the southwest corner of Wyoming, and Silver Creek flowing out of Park City and joining the Weber in Wanship. The Provo River once flowed through Rhodes Valley and down the Weber, but in fairly recent prehistoric times it was captured by its present drainage. Man has diverted part of the Weber River from one mile east of Oakley south across Rhodes Valley and down the Provo River.

The source of the Weber River lies just west of U-150 at Pass Lake. This is the divide between the Duchesne River and The Weber River. There is no perceptible boundary between the watersheds—the area was leveled by glaciers, possibly reversing their flow as snow deposition patterns changed. Smith and Morehouse Reservoir is an impoundment of a tributary to The upper Weber River. Beaver Creek, the only other large tributary in the Uintas, flows out of the Uintas into Kamas, then north to join the Weber just south of Peoa. All of the headwater areas have many small lakes as a result of glaciation. While none of the watershed is included in the High Uintas Wilderness Area, high elevations have precluded most use of this land by humans, and it remains fairly pristine.

The Chalk Creek drainage is at substantially lower elevation than the Weber River headwaters. The vegetation types are sage-grass with aspen and spruce-fir on the north faces of some ridges. This land is privately owned and public access is restricted. Chalk Creek has captured some of this drainage from Yellow Creek (a tributary of the Bear River) resulting in the unusual pattern of a southwest flowing stream with northeast flowing tributaries.

The headwaters of Silver Creek are in the Deer Valley Ski Resort in Park City. This is the back side of the Wasatch Front, which is somewhat more barren than the canyons to the west. While Park City Ski Resort is in the watershed, Park west lies north of the divide and flows down East Canyon. This watershed suffers from extensive vegetation loss and development which has replaced soils with roads and buildings, creating instant

runoff following storms rather than seepage into groundwater.

The watershed high point, Bald Mountain, is 3,640 m (11,943 ft) above sea level, thereby developing a complex slope of 4.0% to the reservoir. The average stream gradient above the reservoir is 3.7% (200 feet per mile). The inflows are the Weber River, Chalk Creek, Carruth Canyon Creek, Lewis Canyon Creek, and Grass Creek. Rockport Lake, another large reservoir, is about ten miles upstream. The outlet is the Weber River.

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

The vegetation communities consist of alpine, aspen, pine, spruce-fir, oak-maple, and sagebrush-grass. The watershed receives 41 - 102 cm (16 - 40 inches) of precipitation annually. The frost-free season around the reservoir is 60 - 120 days per year.

According to the 1982 Clean Lakes Inventory, land use is as follows: forest and rangelands 85%, irrigated agricultural 12%, non-irrigated agriculture 1% and urban 2%. Since then, extensive urbanization has occurred in Park City, Wanship, and Coalville. Current data is not available at this time. Urban areas include Park City, Silver Creek Junction, Wanship, Peoa, Oakley, Kamas, Francis and Coalville.

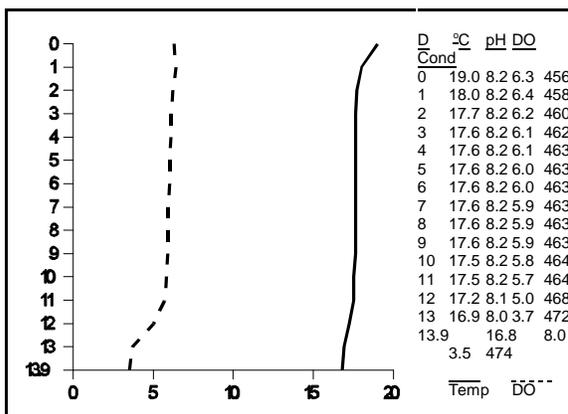
### Limnological Assessment

The water quality of Echo Reservoir is good. It is considered to be hard with a hardness concentration value of approximately 215 mg/L (CaCO<sub>3</sub>). The only parameter that has exceeded State water quality standards for defined beneficial uses is phosphorus. The average concentration of total phosphorus in the water column in 1979 and 1992 was 42.5 and 36 ug/L which exceeds the recommended pollution indicator for phosphorus of 25 ug/L. Dissolved oxygen concentrations in late summer substantiate the fact that water quality impairments do exist. Concentrations generally decline downward in the water column to a low of 3.5 mg/L as depicted in the September 2, 1992 profile.

Although the profile from September 2, 1992 does not indicate that the reservoir stratifies, there is evidence from profiles earlier in the summer that stratification does occur. An extended period of stratification is inhibited due to the large irrigation demand downstream. Typically the reservoir capacity quickly diminishes as the irrigation demand increases throughout the summer. The extensive drawdown does impact the recreational use of the reservoir. As the water recedes, it becomes difficult to launch watercraft and it becomes congested as the surface area diminishes. The rapid drawdown of the reservoir may reduce productivity and cause a premature turnover of the reservoir.

Limnological Data			
Data averaged from STORET sites: 492613, 492614			
Surface Data	1979	1990	1992
Trophic Status	M	O	M
Chlorophyll TSI	-	40.61	44.226
Secchi Depth TSI	43.47	37.00	40.84
Phosphorous TSI	54.35	39.60	39.25
Average TSI	48.91	39.07	41.45
Chlorophyll <u>a</u> (ug/L)	-	2.8	3.5
Transparency (m)	3.15	5	2.9
Total Phosphorous (ug/L)	32.5	12	14
pH	7.9	8.2	8.4
Total Susp. Solids (mg/L)	-	1.9	<3
Total Volatile Solids (mg/L)	-	0	1
Total Residual Solids (mg/L)	-	-	2
Temperature (°C / °f)	21/70	19/67	18/64
Conductivity (umhos.cm)	290	442	467
Water Column Data			
Ammonia (mg/L)	0.06	0.03	0.03
Nitrate/Nitrite (mg/L)	0.11	-	0.02
Hardness (mg/L)	208	228	208
Alkalinity (mg/L)	191	202	201
Silica (mg/L)	8.5	-	5.2
Total Phosphorous (ug/L)	42.5	23	36
Miscellaneous Data			
DO (Mg/l) at 75% depth	7.2	3.2	5.8
Stratification (m)	3-4	9-10	NO
Limiting Nutrient	N	N	N
Depth at Deepest Site (m)	25	22.2	13.9

TSI values indicate the reservoir is a low level mesotrophic reservoir. The data indicates that it is also a nitrogen limited system. According to DWR no fish kills have been reported in recent years with the exception one summer when the capacity was diminished to 27,000 acre-feet. The reservoir supports populations of rainbow trout (*Oncorhynchus mykiss*), channel catfish (*Ictalurus punctatus*), utah sucker (*Catostomus ardens*),



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whitefish (*Prosopium spilonotus*), brown trout (*Salmo trutta*), carp (*Cyprinus carpio*), cutthroat trout (*Oncorhynchus clarki*), and redbreast shiner (*Richardsonius balteatus*).

According to the Division of Wildlife Resources, the Utah sucker (*Catostomus ardens*) and anchor worm (Lemaea) are populating rapidly. Smallmouth bass are also immigrating from Rockport Reservoir, an upstream impoundment. These together with water quality and temperature are adversely affecting the fish population. The phytoplankton composition during the initial study period (1981) indicated Flagellaria was the most dominant genera in Echo Reservoir at 52%, then, in decreasing importance are the following genera; Chroomonas at 34%, Cryptomonas at 9%, and Aphanizomenon at 2% Chlorophyll-a was found from 2.6 to 8.4 ug/l during Sept. 1975 (NES report).

The reservoir has not been chemically treated by the DWR to eliminate rough fish competition, so populations of native fish may be present, but the long history of heavy stocking with fish monocultures has likely displaced native populations.

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>Stephanodiscus niagarae</i>		1. 4 0 7
47.40		
<i>Asterionella formosa</i>	0.567	19.09
Coelastrum	0.556	18.72
<i>Melosira granulata</i>	0.144	4.85
<i>Melosira granulata</i> var. angustissima	0.126	4.25
<i>Oocystis</i> sp.	0.071	2.40
Haematococcus planktoni	0.033	1.12
Pennate diatoms	0.022	0.75
Centric diatoms	0.018	0.60
<i>Wislouchiella planktonica</i>		0. 0 1 6
0.52		
<i>Ankistrodesmus falcatus</i>	0.009	0.29
Total	2.970	
Shannon-Weaver [H']	1.52	
Species Evenness	0.63	
Species Richness [d]	0.46	

As observed the phytoplankton community from September 2, 1992 is dominated by diatoms that are indicative of eutrophic waters.

**Pollution Assessment**

Nonpoint pollution sources include the following:

Sedimentation and nutrient loading from grazing. Human wastes, chemicals and nutrients from urban areas. Herbicides and nutrients from cropland. Human wastes, litter and toxins from recreation. Sedimentation from logging. Sedimentation and leachates from mining.

There is at least one active mine in the watershed. Utelite, a clay/shale mine is located immediately upstream from Rockport Lake in Three mile Canyon. Any impact on Echo reservoir from this source is mitigated by Rockport Lake. There are no active mines in the Park City area, but slag piles and other mining byproducts remain exposed and are slowly eroding down into Silver Creek. There is at least one Superfund site in Park City.

Point sources of pollution in the watershed include the following:

- Coalville Wastewater Treatment Plant
- Kamas Lagoons

Information	
<b>Management Agencies</b>	
Mountainlands Association of Governments	377-2262
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146
<b>Recreation</b>	
Mountainland Travel Region (Provo)	377-2262
Holiday Hills Campground (Coalville)	336-4210
Camperworld Echo Island Park (Coalville)	336-2100
Echo Resort	336-9894
<b>Reservoir Administrators</b>	
Department of the Interior	538-1467
Central Utah Water Conservancy District	226-7112

- Oakley Lagoons
- Kamas Fish Hatchery
- Silver Creek Wastewater Treatment Plant

**Beneficial Use Classification**

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

