

## PELICAN LAKE



### Introduction

Pelican Lake is a natural lake in the Uinta Basin southwest of Vernal. Historically, it is noted as a world class bluegill fishery. In 1983 it produced the state record, a two pound, three ounce bluegill. Old timers claim that it was one of the "little ones". Recently, there has been a

decline of the bluegill fishery. Currently a Clean Lakes Phase I study is underway to investigate the water quality of the lake. A major focus of the study is to ascertain the cause of the bluegill fishery decline and determine what can be done to restore the world class fishery.

It has been dammed to impound and release water

### Characteristics and Morphometry

Lake elevation (meters / feet)	1,462 / 4,797
Surface area (hectares / acres)	680 / 1,680
Watershed area (hectares / acres)	7,382 / 18,240
Volume (m <sup>3</sup> / acre-feet)	
capacity	20,895,000 / 17,071
conservation pool	5,550,750 / 4,500
Annual inflow (m <sup>3</sup> / acre-feet)	
Retention time (years)	
Drawdown (m <sup>3</sup> / acre-feet)	
Depth (meters / feet)	
maximum	5.5 / 18.05
mean	3 / 9.84
Length (km / miles)	3.17 / 1.96
Width (km / miles)	1.83 / 1.13
Shoreline (km / miles)	1.2 / 7.4

### Location

County	Uinta
Longitude / Latitude	109 40 52 / 40 11 42
USGS Map	Pelican Lake 1964
DeLorme's Utah Atlas & Gazetteer™	Page 48, A-2
Catalog Number	Grand River, Diamond Mountain Area 14060001

for irrigation, and water is diverted into the lake via the Ouray Park Canal from the Uinta River. The existing concrete dam was built in 1967, but the lake has been in use as a water storage facility for decades. Half of the shoreline is owned by the BLM and half is privately owned. Public access is unrestricted. Consumptive water use is limited to irrigation,

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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

Pelican Lake 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. 15 miles south of US 40, U-88 drops down a steep hill and Pelican Lake is clearly visible. Access is possible from U-88 itself to the east shore of the lake. Various farm roads provide access to other parts of the lake.

Fishing, boating, and hunting are popular activities at the lake. There is a BLM camping area on the south side of the lake which will accommodate approximately 18 units and provides a concrete boatramp. Facilities are limited at the lake but the lake is in close proximity to Roosevelt and Vernal. In addition there is a convenience store and cafe located on the highway just to the northeast of the lake.

### Watershed Description

Pelican Lake has a small, natural watershed consisting of Ouray Park, an flat agricultural area north of the lake. The park is bounded by gentle slopes that rise several hundred feet and become rolling hills. The land was originally extremely arid desert (6 - 8" annual precipitation), but diversion of water from the High Uintas have transformed the area into productive agricultural land.

The Ouray Park Canal begins five miles north of US-40, where it diverts water from the East Channel of the Uinta River. The canal flows into Bullock Reservoir, then into Cottonwood Reservoir. Water returns to the Ouray Park Canal and is transported to Pelican Lake. A secondary source of water is diverted from the Whiterock River via a network of canals into Brough Reservoir. Water can then be released into the Ouray Park Canal if needed to supplement water into Pelican Lake.

The source of the Uinta River is at the foot of King's Peak, the highest mountain in Utah. 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 lake, many square miles of meadows, forests, and barren peaks. The river flows from the mountains directly onto the tertiary deposits of the Uinta Basin.

The watershed high point, King's Peak, is 4,123 m (13,528 ft) above sea level, thereby developing a complex slope of 3.1% to the reservoir. The primary inflow is the Ouray Park Canal, but irrigation runoff, springs, and natural runoff also flow into the lake. The natural outflow was a wash into the Ouray National Wildlife Refuge and

eventually into the Green River. Currently, no water is released into the wash, but it is removed by pumping at various locations for sprinkler irrigation.

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 irrigated farmland, 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 the natural watershed is primarily irrigated agriculture, with some grazing lands. The watershed of the Uinta River contains land in the Ashley National Forest. It is managed as multiple use (logging, grazing, recreation, etc.). The entire upper portion of the watershed is part of the High Uintas Wildemess, 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.

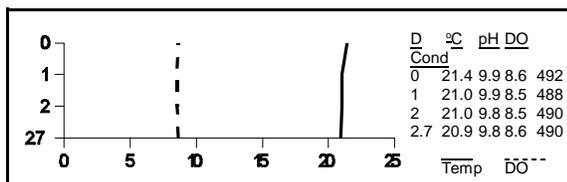
### Limnological Assessment

The water quality of Pelican Lake is fair. It is considered to be hard with a hardness concentration value of approximately 216 mg/L (CaCO<sub>3</sub>). Those parameters that have exceeded State water quality standards for defined beneficial uses are total phosphorus, dissolved oxygen and pH. The average concentrations of total phosphorus in the water column has gradually increased since 1980. In 1992 the average concentration was 35 ug/L with greater concentrations in the western area of the lake. The phosphorus concentration in western portion of the lake have reached levels in excess of 70 ug/L. Dissolved oxygen concentrations during the winter substantiate the fact that water quality impairments do exist. In late winter anoxic conditions have been documented in recent years. In addition the pH values as shown in the profile from September 3, 1992 exceed the criteria value of 9 established for the lake. These elevated values are typical of lakes that exhibit heavy macrophyte growth or phytoplankton production. The Utah State Division of Wildlife Resources reports that the bottom of Pelican Lake is covered with rooted aquatic vegetation,

Limnological Data			
Data averaged from STORET sites: 493713, 493714			
<b>Surface Data</b>	<u>1980</u>	<u>1990</u>	<u>1992</u>
Trophic Status	M	M	O
Chlorophyll TSI	-	38.19	20.95
Secchi Depth TSI	41.95	46.52	40.97
Phosphorous TSI	37.35	48.76	54.18
Average TSI	39.65	44.50	38.70
Chlorophyll <i>a</i> (ug/L)	-	2.3	0.38
Transparency (m)	3.5	2.6	3.8
Total Phosphorous (ug/L)	10	25	32
pH	7.9	9.0	9.4
Total Susp. Solids (mg/L)	<5	1.9	1.5
Total Volatile Solids (mg/L)	-	-	1
Total Residual Solids (mg/L)	-	-	2
Temperature (°C / °f)	23/73	22/71	21/70
Conductivity (umhos.cm)	555	693	504
<b>Water Column Data</b>			
Ammonia (mg/L)	0.07	0.03	0.03
Nitrate/Nitrite (mg/L)	0.26	-	0.04
Hardness (mg/L)	196	261	190
Alkalinity (mg/L)	141	193	143
Silica (mg/L)	3	-	8.6
Total Phosphorous (ug/L)	10	22	35
<b>Miscellaneous Data</b>			
Limiting Nutrient	P	N	N
DO (Mg/l) at 75% depth	6.9	8.6	8.5
Stratification (m)	N	NO	NO
Depth at Deepest Site (m)	5	2.6	2.7

mostly *Potamogeton* and *Scirpus*, and the perimeter of the lake has mostly cattails and *Typha*, along the shore area.

Although in 1981 the reservoir was characterized as a phosphorus limited system, the 1990-92 data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is oligotrophic to mesotrophic. Pelican Lake has one perennial inflow, an unnamed canal and several intermittent streams. The outlet of the Reservoir is into the Lake Canal. During recent years flow regimes into the reservoir have changed and may be responsible for the conditions which have lead to the decline of the world class bluegill fishery. Other



alternatives may be implemented in the near future that will alter the flow regime from the reservoir due to selenium problems in an associated bird refuge, the Ouray National Waterfowl Refuge, located downstream from the reservoir which is dependant upon water from this watershed. A Clean Lakes Phase I study is currently underway to evaluate water management and other alternatives to determine what is causing the impairments to the water quality of the lake. Other alternatives are reduced dissolved oxygen concentrations, nutrient enrichment, reduction of macrophyte coverage and potential contamination of return irrigation waters with pesticides or other toxics.

The fishery is impaired due to high pH values and dissolved oxygen depletions. Wildlife Resources has reported pH values as high as 9.8 which can create a stressful situation for bluegill and some fish kills may result. In addition low dissolved oxygen concentrations have been reported and anoxic conditions do occur. During recent years the bluegill fishery has severely been impaired and is a major concern of the State Division of Wildlife Resources. DWR officials in their assessment of the lake have said, "Historically, the lake supported a world class bluegill fishery; it also contains largemouth bass. The lake provides a productive warm water fishery (estimated Class II), rare in the Uintah Basin. The bluegill population of trophy-sized fish steadily declined, then disappeared. The cause of this problem is unknown".

In addition waterskiing and swimming are impaired due to the large amounts of algae and macrophytes present in the summer months.

In 1975 the National Eutrophication Study included an assessment of Pelican Lake. Their survey indicated Pelican Lake was eutrophic. It ranked twelfth in overall trophic quality when the 27 Utah lakes and reservoirs were compared. Survey limnologists observed extensive growths of submerged macrophytes with a phytoplankton bloom present during their September survey. The phosphorus loading at that time was calculated at 0.13 g/m<sup>2</sup>/year. Mean chlorophyll-a concentrations were reported at 6.33 mg/l with a mean secchi reading of 1.55 meters.

Data obtained during surveys in 1979 and 1980 by the Utah Division of Water Quality indicated the values for arsenic (1-3 ug/L), copper (5-11 ug/L) and lead (5-6 ug/L) exceeded state standards.

The reservoir does not typically stratify. As indicated in the profile, the temperature is rather uniform throughout the water column. This is due in part to the shallow nature of the lake and climatic conditions which provide for circulation of water in the lake.

According to DWR fish kills have been reported in recent years during the winter. The reservoir supports populations of black bass (*Micropterus salmoides*), and

bluegill (*Lepomis macrochirus*). Those fish kills that do occur, DWR contributes mostly to dissolved oxygen depletion and high hydrogen sulfide concentrations.

The lake has not been chemically treated by the DWR, so populations of native fishes are may be present in the lake.

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>Gomphospheria aponina</i>	4.946	38.49
<i>Ceratium hirundinella</i>	2.809	21.86
<i>Sphaerocystis Schroeteri</i>	2.641	20.55
Pennate diatoms	0.756	5.89
<i>Pediastrum duplex</i>	0.722	5.62
<i>Anabaena sp.</i>	0.556	4.33
<i>Cosmarium sp.</i>	0.156	1.21
Centric diatoms	0.053	0.42
<i>Crucigenia rectangularis</i>	0.050	0.39
<i>Oocystis sp.</i>	0.044	0.35
Unknown spherical green alga	0.028	0.22
<i>Chroococcus sp.</i>	0.022	0.17
<i>Aphanocapsa sp.</i>	0.017	0.13
<i>Scenedesmus sp.</i>	0.017	0.13
<i>Oscillatoria sp.</i>	0.012	0.09
<i>Scenedesmus bijuga</i>	0.011	0.09
<i>Ankistrodesmus falcatus</i>	0.009	0.07
<b>Total</b>	<b>12.841</b>	
Shannon-Weaver [H']	1.67	
Species Evenness	0.59	
Species Richness	0.69	

The phytoplankton community is dominated by the presence of blue-green algae, flagellates and green algae, but a fairly diverse composition is present.

**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), warm water game fish and organisms in their food chain (3B) and agricultural uses (4).

Information	
<b>Management Agencies</b>	
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
<b>Recreation</b>	
Dinosaurland Travel Region (Vernal)	789-6932
Vernal Chamber of Commerce	789-1352
<b>Reservoir Administrators</b>	
Ouray Park Irrigation Company	545-2426

LAKE REPORTS