UPPER ENTERPRISE RESERVOIR

Introduction

Upper Enterprise Reservoir is in the Bull Valley Mountains in extreme southwestern Utah. It is a large impoundment of a stream valley. Lower Enterprise Reservoir is immediately downstream and is a moderately sized body of water (79 acres) in its own right. Some maps and agencies refer to the larger reservoir as only Enterprise Reservoir.

The reservoir shoreline is owned by the Dixie National Forest with unrestricted public access. The dam, an earth-fill, was built in 1912. Water is used primarily for irrigation, however, DWR does own a conservation pool of 200 acre-feet for maintenance of a fishery. Defined beneficial uses include: water recreation excluding swimming, propagation of cold water species of game fish and aquatic life, and agricultural needs.

Recreation

Upper Enterprise Reservoir is on a paved secondary road west of the town of Enterprise. Travel west out of town for six miles to a place called Hebron. At Hebron, turn south
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Watershed Description

Upper Enterprise Reservoir is located in the lower slopes of the Bull Valley Mountains. Rock Creek, a tributary, has recently pirated drainage in the Water Hole Peak area, indicating that the drainage basin is adapting to recurring tectonic activity.

The watershed high point, Lost Peak, is 2,291 m (7,516 ft) above sea level, thereby developing a complex slope of 10.3% to the reservoir. The inflows are Rock Creek, Pine Creek, Rattlesnake Creek, and Lost Creek. The outflow is Little Pine Creek.

The soil is of limestone origin with rapid permeability and erosion. A complete listing of the soil compositions in the watershed are listed in Appendix III.

The vegetation communities are comprised of pinyon-juniper, sage-grass, and bitterroot-mahogany. The watershed receives 30 - 41 cm (12 - 16 inches) of precipitation annually with a frost-free season of 120 - 140 days at the reservoir.

Land use is multiple use and recreation, the major use being livestock grazing. Much of the watershed is overgrazed, resulting in heavy runoff and substantial soil erosion.

Limnological Assessment

The water quality of Upper Enterprise Reservoir is fairly good. It is considered to be soft with a hardness concentration value of approximately 74 mg/L (CaCO3). Those parameters that have exceeded State water quality standards for defined beneficial uses are total phosphorus, dissolved oxygen, temperature and pH. The average concentration of total phosphorus in the water column for the three study periods was 36, 221 and 37 ug/L which all exceed the recommended pollution indicator for phosphorus of 25 ug/L. The phosphorus concentration in the hypolimnion in August, 1989 average 336 ug/L. This increased concentration occurred when the reservoir was shallow and it appears that resuspension of bottom sediments rich in nutrients were resuspended in the water column. This was also the period when biological productivity was very high which resulted in elevated pH values in excess of 9.0 and water temperatures higher.
than the recommended level of 20°C. The reservoir was characterized as a hypereutrophic system with an average chlorophyll-a concentration of 96.75 ug/L. It is apparent that during low water conditions, the reservoir is impacted as algal production reaches extreme conditions. Although dissolved oxygen concentrations are not consistently low throughout the water column, investigations should be conducted during winter to observe conditions at that time.

Data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is typically eutrophic, but can become hypereutrophic as conditions permit. These types of conditions are probably more frequent due to the high demand for irrigation water downstream and the potential for low precipitation in the area on an annual basis. The reservoir has not stratified during recent summers due to low volumes, but when sufficient depths are present the reservoir does stratify as observed during the initial study period (1979).

According to DWR no fish kills have been reported in recent years, but the recognize the problems associated with high pH and low water levels during the summer. Elevated water temperatures and high algal blooms which deplete dissolved oxygen concentrations during night time hours can result in fish mortalities. The reservoir is managed primarily as a rainbow trout (Oncorhynchus mykiss) fishery. The lake has been treated for rough fish competition in 1956, 1976 and 1987, so populations of native fishes may not be present in the lake, but the presence of non-game species appears to be a continual problem. Current stocking reports indicate that DWR stocks the reservoir with approximately 30,000 fingerling rainbow trout annually.

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Cell Volume (mm³/liter)</th>
<th>% Density By Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloeotrichia echinulata</td>
<td>55.600</td>
<td>74.52</td>
</tr>
<tr>
<td>Aphanizomenon flos-aquae</td>
<td>13.8</td>
<td>1 2 3 9</td>
</tr>
<tr>
<td>18.55</td>
<td>Sphaerocystis Schroeteri 6.41</td>
<td>3.54</td>
</tr>
<tr>
<td>1.65</td>
<td>Ceratium hirundinella</td>
<td>0.936</td>
</tr>
</tbody>
</table>

Oocystis sp. 0.209 0.28
Cosmarium sp. 0.079 0.11
Pennate diatoms 0.040 0.05
Oocystis borgei 0.022 0.03
Ankistrodesmus falcatus 0.009 0.01

The phytoplankton community is dominated by the presence of blue-green algal species which is indicative of poorer water quality and eutrophic conditions

**Pollution Assessment**

Nonpoint pollution sources are: sedimentation and nutrient loading from grazing and waste materials and litter from recreation. Cattle graze in the watershed and in direct proximity to the reservoir.

There are no point pollution sources 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)
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