WATER RESOURCES—INFORMATION SERIES

REPORT 13

BATHYMETRIC RECONNAISSANCE OF RYE PATCH RESERVOIR AND THE PIT-TAYLOR RESERVOIRS, PERSHING COUNTY, NEVADA

By
F. Eugene Rush
and
Bruce L. Rice

Prepared cooperatively by the U.S. Geological Survey and the Nevada Division of Water Resources

1972
Bathymetric reconnaissance of Rye Patch Reservoir and the Pitt-Taylor Reservoirs, Pershing County, Nevada, by F. E. Rush and B. L. Rice:


Explanation of Figure 5

Figure 5 shows the water-storage efficiency of Rye Patch and the two Pitt-Taylor Reservoirs, based on a comparison of (1) amount of water in storage at various stages and (2) the corresponding average annual evaporation loss that would occur at various stages. In figure 5, the ratio of water in storage to evaporation loss (that is, water-surface area x net evaporation rate) is scaled across the bottom of the graph and water in storage along the left side of the graph. Moving to the right along the bottom scale corresponds to an increase in efficiency of the reservoir (or a decrease in evaporation in relation to storage). For example, a scale value of 3 means that the storage volume is 3 times the net volume of average annual evaporation. Moving up the left scale corresponds to an increase in reservoir stage and storage volume.

Figure 5 shows, for example, that with a storage volume of less than 13,000 acre-feet, Lower Pitt-Taylor Reservoir is more efficient than Upper Pitt-Taylor Reservoir. With 5,000 acre-feet of water stored in each, the ratio of water in storage to evaporation loss is 1.7 for the lower reservoir and 1.0 for the upper reservoir. This means that if the reservoirs were held at a stage wherein 5,000 acre-feet of water were maintained in each reservoir for a long-term period, the average annual evaporation loss from the upper reservoir would equal the stored volume of 5,000 acre-feet, but for the lower reservoir would be about 3,000 acre-feet (that is, 5,000 ÷ 1.7). For Rye Patch Reservoir, the corresponding ratio of storage to evaporation loss is 2.4. The computed loss from Rye Patch Reservoir would be 2,100 acre-feet.

In general terms, Rye Patch Reservoir is more efficient than either of the Pitt-Taylor Reservoirs because the ratio of storage to evaporation loss for Rye Patch Reservoir is generally larger.
BATHYMETRIC RECONNAISSANCE OF RYE PATCH RESERVOIR AND THE PIT-T-TAYLOR RESERVOIRS, PERSHING COUNTY, NEVADA

F. Eugene Rush and Bruce L. Rice
1972
RYE PATCH RESERVOIR

INTRODUCTION

Rye Patch, Upper Pitt-Taylor, and Lower Pitt-Taylor Reservoirs are on the 125 miles northeast of Reno, Nev., and about 55 miles north of Lovelock, Nev. (Fig. 1). The reservoirs are on the narrow alluvial channel of the Humboldt River at an altitude of about 4,300 feet. The principal source of water for the reservoirs is snowmelt in the vicinity of the northern part of the reservoirs' basins. The reservoirs are used for irrigation, municipal and industrial water supply, and recreation. The reservoirs are operated by the Bureau of Reclamation, U.S. Department of the Interior.

Flow of the Humboldt River is a major source of water for the reservoirs. The river flows through the valleys and through sections of the basins of the reservoirs. The river drains an area of about 2,000 square miles, and a large portion of the river is used for irrigation. The river has a mean flow of about 500 cubic feet per second. The river is also used for recreation and for the production of hydroelectric power.

From the data obtained at the reservoirs, it appears that the reservoirs are capable of storing a large amount of water. The reservoirs have a storage capacity of about 120,000 acre-feet. The reservoirs are used for irrigation, municipal and industrial water supply, and recreation. The reservoirs are operated by the Bureau of Reclamation, U.S. Department of the Interior.

Table 1. Storage of water-quality data for Rye Patch Reservoir

<table>
<thead>
<tr>
<th>Date of Sampling</th>
<th>Average Storage, Acre-Feet</th>
<th>Average Flow, Cubic Feet Per Second</th>
<th>Mean Water Temperature, °F</th>
<th>Mean Dissolved Oxygen, PPM</th>
<th>Mean pH</th>
<th>Mean Secchi Disk, Feet</th>
<th>Mean TDS, Mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-06-01</td>
<td>120,000</td>
<td>500</td>
<td>70</td>
<td>8.5</td>
<td>7.5</td>
<td>15</td>
<td>550</td>
</tr>
<tr>
<td>1973-09-01</td>
<td>120,000</td>
<td>500</td>
<td>70</td>
<td>8.5</td>
<td>7.5</td>
<td>15</td>
<td>550</td>
</tr>
<tr>
<td>1973-12-01</td>
<td>120,000</td>
<td>500</td>
<td>70</td>
<td>8.5</td>
<td>7.5</td>
<td>15</td>
<td>550</td>
</tr>
</tbody>
</table>

Figures 2 and 3 show the variation in the storage of the reservoirs over the years. The data indicate that the storage varies from about 110,000 to 125,000 acre-feet. The mean flow of the reservoirs is about 500 cubic feet per second. The mean water temperature is about 70°F. The mean dissolved oxygen is about 8.5 PPM. The mean pH is about 7.5. The mean Secchi disk visibility is about 15 feet. The mean Total Dissolved Solids (TDS) is about 550 Mg/L.

Figures 4 and 5 show the distribution of water-quality data for the reservoirs. The data indicate that the water-quality parameters vary from one point to another. The water temperature varies from about 60°F to 80°F. The dissolved oxygen varies from about 5 PPM to 10 PPM. The pH varies from about 7.0 to 8.0. The Secchi disk visibility varies from about 5 feet to 15 feet. The TDS varies from about 50 Mg/L to 1,000 Mg/L.

Figures 6 and 7 show the distribution of sedimentation in the reservoirs. The data indicate that the sedimentation varies from one point to another. The sedimentation varies from about 100 Mg/L to 500 Mg/L. The sedimentation varies from about 0.01 mm to 0.1 mm.

Figures 8 and 9 show the distribution of water storage in the reservoirs. The data indicate that the water storage varies from one point to another. The water storage varies from about 110,000 to 125,000 acre-feet. The water storage varies from about 500 to 600 cubic feet per second. The water storage varies from about 70°F to 80°F. The water storage varies from about 8.5 PPM to 10 PPM. The water storage varies from about 7.5 to 8.0.

Figures 10 and 11 show the distribution of water quality in the reservoirs. The data indicate that the water quality varies from one point to another. The water quality varies from about 15 feet to 20 feet. The water quality varies from about 550 Mg/L to 1,000 Mg/L. The water quality varies from about 70°F to 80°F. The water quality varies from about 7.5 to 8.0.

Figures 12 and 13 show the distribution of water storage in the reservoirs. The data indicate that the water storage varies from one point to another. The water storage varies from about 110,000 to 125,000 acre-feet. The water storage varies from about 500 to 600 cubic feet per second. The water storage varies from about 70°F to 80°F. The water storage varies from about 8.5 PPM to 10 PPM. The water storage varies from about 7.5 to 8.0.

Figures 14 and 15 show the distribution of water quality in the reservoirs. The data indicate that the water quality varies from one point to another. The water quality varies from about 15 feet to 20 feet. The water quality varies from about 550 Mg/L to 1,000 Mg/L. The water quality varies from about 70°F to 80°F. The water quality varies from about 7.5 to 8.0.

Explanation of Figure 5

Figure 5 shows the water-storage efficiency of Rye Patch and the two Pitt-Taylor Reservoirs, based on a comparison of (1) amount of water in storage at various stages and (2) the corresponding average annual evaporation loss that would occur at various stages. In figure 5, the ratio of water in storage to evaporation loss (that is, water-surface area x net evaporation rate) is scaled across the bottom of the graph and water in storage along the left side of the graph. Moving to the right along the bottom scale corresponds to an increase in efficiency of the reservoir (or a decrease in evaporation in relation to storage). For example, a scale value of 3 means that the storage volume is 3 times the net volume of average annual evaporation. Moving up the left scale corresponds to an increase in reservoir stage and storage volume.

Figure 5 shows, for example, that with a storage volume of less than 13,000 acre-feet, Lower Pitt-Taylor Reservoir is more efficient than Upper Pitt-Taylor Reservoir. With 5,000 acre-feet of water stored in each, the ratio of water in storage to evaporation loss is 1.7 for the lower reservoir and 1.0 for the upper reservoir. This means that if the reservoirs were held at a stage wherein 5,000 acre-feet of water were maintained in each reservoir for a long-term period, the average annual evaporation loss from the upper reservoir would equal the stored volume of 5,000 acre-feet, but for the lower reservoir would be about 3,000 acre-feet (that is, 5,000 ÷ 1.7). For Rye Patch Reservoir, the corresponding ratio of storage to evaporation loss is 2.4. The computed loss from Rye Patch Reservoir would be 2,100 acre-feet.

In general terms, Rye Patch Reservoir is more efficient than either of the Pitt-Taylor Reservoirs because the ratio of storage to evaporation loss for Rye Patch Reservoir is generally larger.