

## Historical Operation of the Weber River System in Relation to the 1938 Power Water Agreement (Draft 10/17/2013)

### **1.0 Background**

In 1938, water users on the Weber River negotiated an agreement intended to maximize the storage and use of winter water on the Weber River as well as revenues associated with hydroelectric power plants on the Weber and Provo Rivers. The United States, Weber River Water Users Association (WRWUA), Provo River Water Users Association (PRWUA), Utah Power and Light Company<sup>1</sup> (power company) and its lessor, Utah Light and Traction Company signed the agreement. This document describes the state engineer's understanding of the historical operation of the Weber River System in relation to this agreement.

### **2.0 Power Water Agreement Concepts**

The power company has a year-round, 1903 priority water right to divert 365 cfs for hydroelectric power generation at its Weber Power Plant<sup>2</sup> near Gateway. After passing through the power plant, the water returns to the river. During the non-irrigation season there were not significant water rights below the power plant to use the returned water<sup>3</sup> so it flowed out to the Great Salt Lake. Water users on both the Weber and Provo Rivers saw an opportunity to develop this water. They reasoned that it could be stored or diverted to the Provo River instead—as long as the power company was compensated for lost revenues.

### **3.0 Historical Operation**

The power water agreement was allowed to operate because it did not harm third-party water rights. Historically, there was a storage period and a trade period. In some years there was also a spill period. Each of these periods is explained below.

#### **3.1 Storage Period**

To maximize storage and operational flexibility on the Weber River it has generally been the practice to store water as high in the system as possible. The water is later delivered to the correct reservoir or traded on paper. As such, power water was often stored in Rockport Reservoir in addition to Echo Reservoir. At times, power water may also have been stored in Smith and Morehouse Reservoir, Lost Creek Reservoir or East Canyon Reservoir. When this document refers to storage of power water, it should be recognized that physically this water may have been stored in any of the major reservoirs.<sup>4</sup> The historical storage period was from approximately October 15 to approximately April 15.

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<sup>1</sup> The successor to the Utah Power and Light Company is currently Pacificorp Energy.

<sup>2</sup> The historical Riverdale plant was also located near Gateway and had a 1909 water right for 300 cfs (35-8067). The Riverdale plant is no longer operational.

<sup>3</sup> Currently, Willard Bay can capture excess winter water on the Weber River. However, at the time the agreement was signed Willard Bay had not been constructed and no water right existed for it.

<sup>4</sup> There are several small, high-mountain lakes and reservoirs with priority dates of 1919. Because of limited access to these high elevations during much of the year, these lakes and reservoirs have historically stored as water became available. These lakes and reservoirs have not historically stored power water.

### **3.1.1 Power Company Entitlement (PCENT)**

The power company is entitled to divert up to 365 cfs under its 1903 priority water right (35-8061) as long as it is available in priority. The power company entitlement (PCENT) was historically determined by calculating the natural flow<sup>5</sup> of the river at Gateway and subtracting the water that prior rights were entitled to receive. The lone, significant prior right on the system during the storage period is Davis and Weber Counties Canal Company's (DWCCC) 1896 priority right to 13,000 AF of storage in East Canyon Reservoir. The remaining natural flow at Gateway, up to 365 cfs, was considered to be PCENT.

#### **3.1.1.1 Power Water Originating Above Echo Dam (PWOAE)**

During the storage period, power water was stored and/or diverted directly through the Weber-Provo Canal (WPC). In storing or diverting this water, the power right cannot be enlarged. In accordance with this principle, the agreement specifies that only "power water originating above Echo dam" (PWOAE) may be stored or diverted.

PWOAE existed when the natural flow of the river between Gateway and Echo Dam (minus DWCCC's portion) was not sufficient to provide 365 cfs. PWOAE is a portion of PCENT. In some cases PWOAE may have been the entire natural flow of the river above Echo Dam, but PWOAE cannot have been greater than what was needed to supply 365 cfs at Gateway. PWOAE is a crucial value because it represents the maximum amount of power water that was available under the agreement. Historically, PWOAE was 1) diverted through the WPC, 2) stored or 3) allowed to flow downstream for power generation, as described below.

##### **3.1.1.1.1 Power Water Diverted Through the WPC (PWDIV)**

The first portion of PWOAE accounted for was power water diverted through the WPC (PWDIV). PWDIV may have been all or a portion of PWOAE on a given day. There may have also been days when the amount of water diverted through the WPC exceeded PWOAE. On those days, the extra diversion was charged to PRWUA power water storage and credited to WRWUA under Water Right 35-8739 (A9568).

##### **3.1.1.1.2 Power Water Stored (PWSTO)**

PWOAE that did not get diverted through the WPC could have historically been stored when space was available. But the actual amount of power water stored (PWSTO) may have been less than what was available. PWSTO historically included water stored by WRWUA and PRWUA as well as water stored by the power company.

##### **3.1.1.1.3 Power Water Not Diverted or Stored (PWDNS)**

Not all PWOAE was historically diverted or stored. The power water not diverted or stored (PWDNS) flowed down the river and was available for direct diversion into the power plant.

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<sup>5</sup> Natural flow, as used in this document, means the calculated flow of water at a point on the river if there were no storage, diversion or imports of water to the system above that point. It is calculated by a general mass-balance equation: Natural Flow = Outflows – Inflows + Storage Accumulations.

### **3.1.2 Withheld Weber River Waters (WWRW)**

Withheld Weber River Waters (WWRW) is the sum of PWDIV and PWSTO minus any power water stored by the power company. At the end of the storage period, WWRW was divided equally between WRWUA and PRWUA.

### **3.1.3 Accounting of Power Water**

In addition to WRWUA's half of WWRW, they may also have stored water under Water Right Number 35-8739 (A9568).<sup>6</sup> All of this storage, as well as any other storage belonging to them under the agreement, was accounted for under Water Right Number 35-8739 (A9568), which has an annual limit of 74,000 AF. PRWUA's half of WWRW was accounted for in the commissioner reports as "power water."

## **3.2 Trade Period**

At the end of the storage period on approximately April 15, diversion and storage of power water ceased and the trade period began. PRWUA traded its power water storage across the WPC only when there were "excess flows" in the river above Echo Reservoir. That practice ensured other water rights on the system were not impaired by the trade.

### **3.2.1 Excess Flows in the River Above Echo Reservoir**

Excess flows at the WPC diversions on the Weber River and Beaver Creek were diverted into the WPC and replaced downstream on the Weber River with PRWUA power water storage. Excess flow is natural flow that, in the absence of the agreement, would have flowed in the stream past the WPC diversions in order to satisfy either storage rights in Echo Reservoir or direct flow rights below Echo Dam. These "excess flows" were thus excess to the upper river, but not excess to the river as a whole.

### **3.2.2 Operating the Trade**

Historically, when Echo Reservoir was filling under Water Right Number 35-8739 (A9568), excess flows were diverted through the WPC and a like quantity of PRWUA's stored power water was credited to WRWUA to complete the trade. The power water traded to WRWUA was part of the 74,000 AF they were entitled to store under Water Right Number 35-8739 (A9568).

At times of the year when natural flow on the system was insufficient to allow additional storage in Echo Reservoir, then as excess flows were diverted through the WPC, a like quantity of PRWUA's stored power water was released below Echo Dam to satisfy direct flow demands. This trade was completed—regardless of the priority cut on the river—but only if excess flows existed at the WPC diversions. Historically, the traded water in the WPC was measured at the gage near Francis.

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<sup>6</sup> Storage under 35-8739 (A9568) historically occurred in Weber River Reservoirs. However, the agreement provides that if more than one-half of WWRW is diverted through the WPC that WRWUA be credited with storage in Deer Creek Reservoir to satisfy WRWUA shareholders on the Provo River System.

### **3.3 Spill Period**

Power water not owned by WRWUA was stored on a space-available basis, meaning that it could be spilled out of storage if not used or traded first. Any storage owned by the power company was the first water to spill. PRWUA power water spilled next. A spill occurred when Echo Reservoir was full and space was needed for additional WRWUA water. The spill period historically could have occurred simultaneously with part of the storage period, part of the trade period, or during parts of them both.

#### **3.3.1 Paper Spill**

Since Echo Water has often been stored in reservoirs other than Echo, a “paper spill” normally occurred rather than a physical spill. When Echo Reservoir was credited with 74,000 AF of storage in any or all reservoirs it was considered to be full “on paper.” Water was thus spilled “on paper” to make room for additional WRWUA water. The result is that paper-spilled water remained in storage and was credited to the next appropriator, which was Weber Basin Water Conservancy District.

#### **3.4 July 1 Deadline**

Any PRWUA storage remaining on July 1 became property of WRWUA. In years when PRWUA did not trade all of their stored power water, this water became the property of WRWUA as part of the 74,000 AF they were entitled to store under 35-8739 (A9568).

### **4.0 Future Operation**

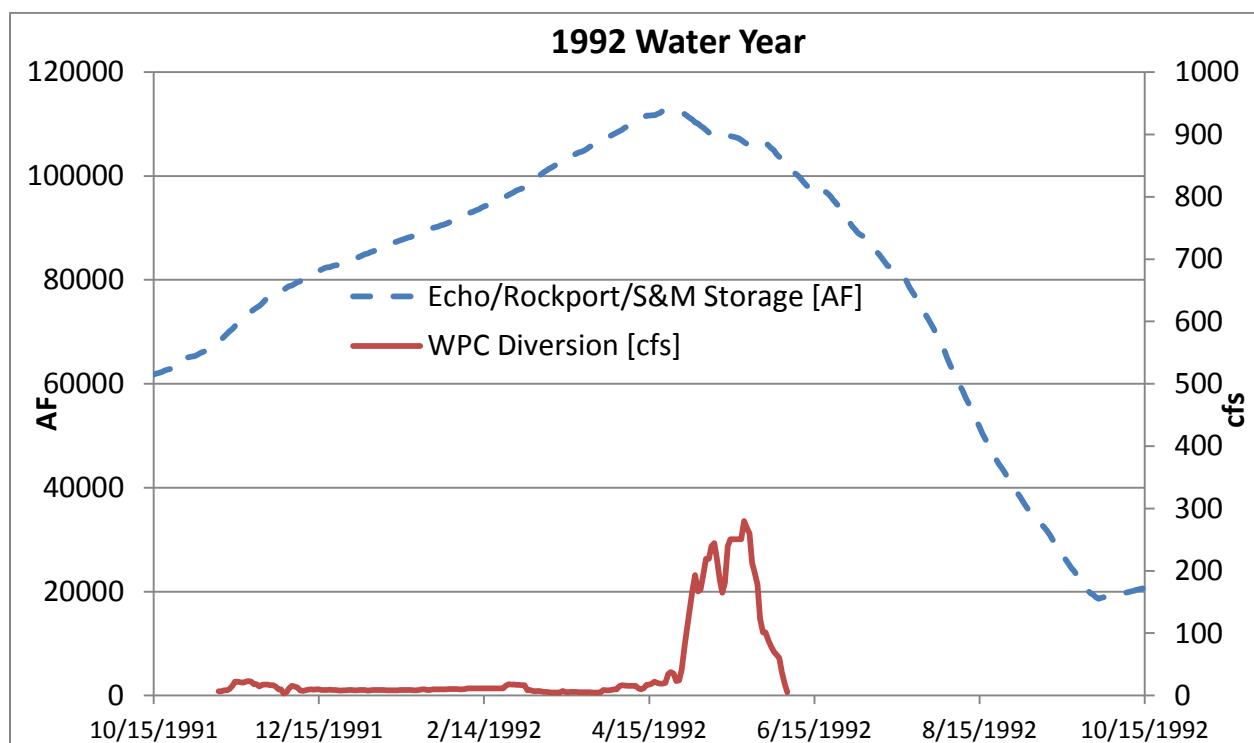
The state engineer intends for the Weber River System to operate as it has been operated historically, as outlined in this document. The state engineer is developing online tools that can be used by interested parties to understand the accounting of power water on a near real-time basis. This will help provide transparency in the operation of the system. If the parties to the agreement disagree among themselves as to the proper construction or interpretation of the agreement, they will need to pursue appropriate resolution.

## 1992 Water Year at a Glance

Maximum Storage (Echo + Rockport + Smith and Morehouse)  
1992 → 113,000 AF                                    2013 → 96,000 AF

## Priority Cuts

1992 → 1861	2013 → 1869



## Weber-Provo Canal Operation (1992)

- 3,400 AF of winter power water diverted (November 8 – April 15)
  - 13,600 AF of water exchanged out of Echo Reservoir (April 16 – June 5)

## Distribution (1992)

- Low (Apr 16 – May 9)
  - High (May 10 – May 24)
  - Flood (May 25 – Jun 1)
  - Low (Jun 2 – Jun 8)