

Seasonal Flow Rates along the Lower Bear River, UT

Abstract

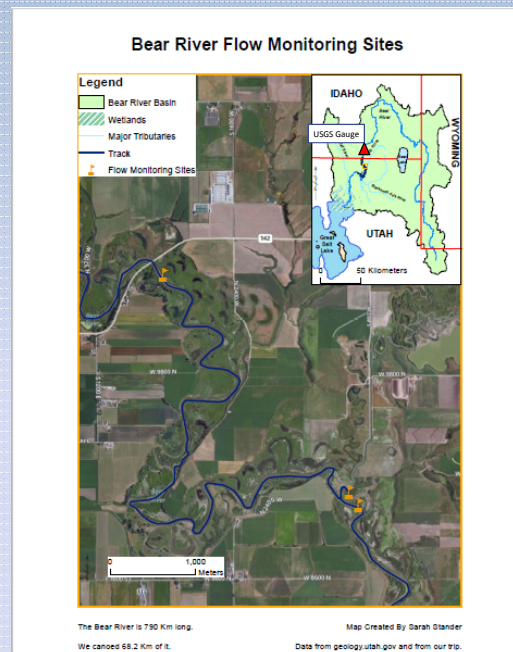
The goal of this research is to identify how flow on the Bear River in Cache Valley has changed over the last three years and how flow changes seasonally. Identifying flows is important to manage water resources along the Bear River. We collected and processed water pressure data every 30 minutes using HOBO transducers at two sites in Cache Valley (Morton, just downstream of highway 142, and Confluence which is located at the confluence of the Bear and Cub Rivers) south of the Idaho-Utah border in 2015. We also measured flow and water stage up to three times per year at each site using an Acoustic Doppler Current profiler and transom survey equipment. We pooled these observations with measurements and data collected by prior undergraduate Bear River Fellow researchers in 2012 and 2013 and used the observations to generate linear regression models to relate water stage to flow at each site. By applying the linear regression model to our pressure measurements, we calculated flow at each time a pressure reading was recorded for its respective location on the lower Bear River. We used the flow rates to determine that very little water is lost or gained between the USGS gage and the Morton site but that during summer months nearly 300cfs is lost between the Morton and Confluence sites. This information can help Bear River pumpers better manage their use.

Methods

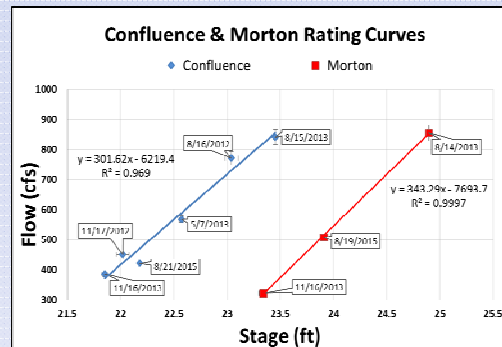


- Measure flow with an Acoustic Doppler Current Profiler (ADCP)
- Measured pressure using a HOBO pressure transducer
- Calculated water depth above the HOBO transducer from the HOBO and atmospheric pressure measurements and water density
- Correlated river stage and flow data and use the correlation to calculate flow rates
- Repeated the steps for each monitoring site

Results

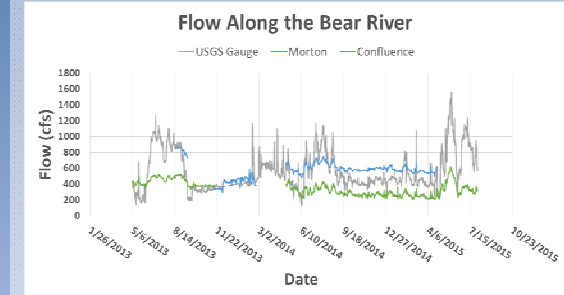


'Bear River Flow Monitoring sites' shows our three main data collection sites along the lower Bear River in Northern Utah. The USGS gage is located just North of the Utah Idaho border where we put-in before floating down the river to each data collection site.

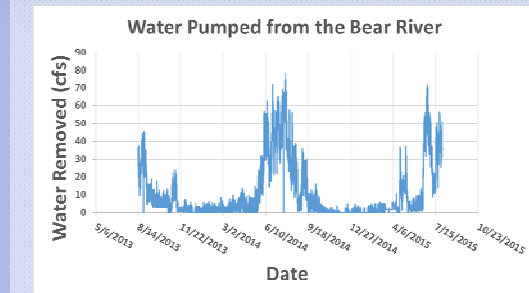


'Confluence & Morton Rating Curves' is a visualization of the linear regression model we developed to calculate flow from water stage. By measuring the water pressure the depth of our transducer can be calculated, and, knowing the location of our transducer, can be used to get stage for each pressure measurement.

Results (Cont.)



Hydrograph of flow along the Bear River at three sites



Data for this graph is courtesy of the Bear River Commission

Key Findings

- Between Morton and Confluence data collection sites our data shows progressively lower flow rates as you move downstream
- Flow rates fluctuate most during summer months and stay relatively steady during winter months
- During the 2013-2014 winter flow rates between all data collection sites stayed roughly the same
- During the 2014-2015 winter flow rates between all data collection sites were relatively steady, with upstream sites having progressively larger flow rates
- For Summer months flow between Morton and Confluence Data collection sites varies by approximately 300cfs
- Water pumped out by Utah water users accounts for a maximum of 80cfs during summer months, therefore 220cfs (or more) is lost to other sources