Copper Valley ELECTRIC
A Touchstone Energy® Cooperative

Where Does Water Come From?

Where does water come from? This seems like a silly question, but the answer, as it relates to CVEA's hydropower, is not as obvious as it might seem.

Hydropower is the use of water to generate electricity, and CVEA currently generates 50 percent of the Cooperative's generation requirement with hydropower from the Solomon Gulch Hydroelectric Project. When the Allison Creek Hydroelectric Project is added to CVEA's generation portfolio in 2016, that number will raise to roughly 64 percent.

It should be obvious that water is very important to CVEA and its 4,000 customers. Water from Solomon Lake is used to generate kWhs at the Solomon Gulch Hydro Plant. Solomon Lake can hold 31,500 acre-feet of water storage. On an average year Solomon Gulch will produce 46,000,000 kWhs of energy using approximately 86,000 acre-feet of water.

Oftentimes people judge how much water should be available for hydropower by the amount of rain they personally get in Valdez, but Solomon Lake does not always have the same conditions as people see in town. There are times when the weather can be dry in town but snowing or raining at the lake as well as times when it may be raining in town, but snowing at the higher elevation.

It would surprise many to find out that rainfall is not the primary source for water needed to fill Solomon Lake. Under normal conditions, it is snowmelt, not rainfall, that provides the most amount of water to the lake. In a winter with normal snow levels, the lake fills from snowmelt, then summer rains usually keep the lake filled until the rain turns to snow in October or November. Glacier melt/run off also provides some water to the lake, but it is unknown how much as there is no way for CVEA to measure glacier melt.

To complicate matters further, all snow is not created equally. There is 'dry' snow and 'wet' snow; snow type is determined by the water content in the snow. The average snow to liquid ratio is 10:1 - which means that if 10 inches of snow fell and subsequently melted, it would produce 1 inch of rain. The ratio for wet snow will be less than 10:1, meaning it will take less than 10 inches of snow to produce an inch of rain, and the ratio for dry snow can be as much as 30 inches of snow to produce 1 inch of rain.

CVEA physically measures the snow to determine the water content, beginning in February and ending once the snow is mostly melted in April or May. Samples are taken using a hollow tube-like device that captures a sample of the snow. The

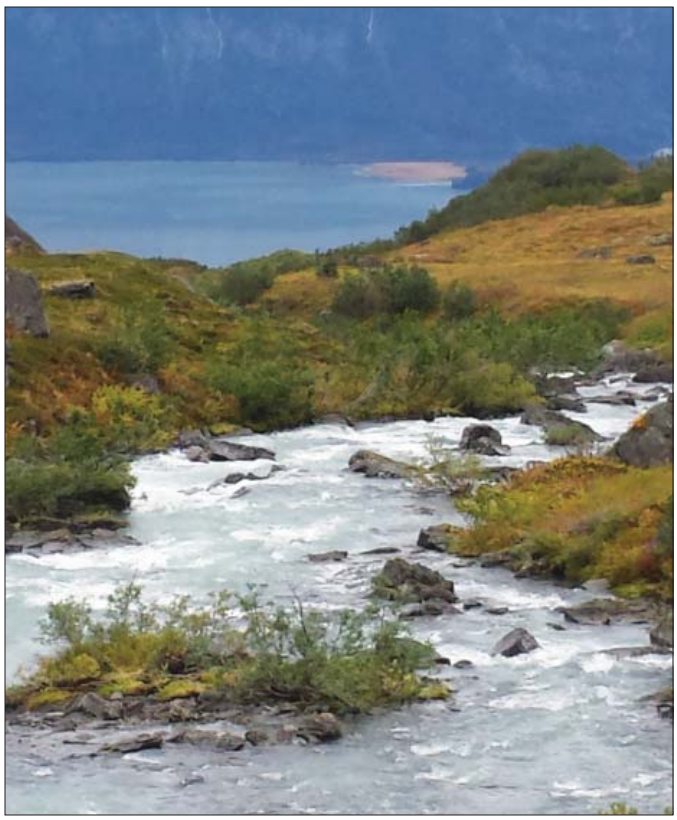
Snow Type	Ratio (inches)
Wet Snow	< 10:1 to 5:1
Average Snow	10:1
Dry Snow	> 10:1 to 30:1

depth and weight of the snow is measured and the snow is melted to measure the amount of water the snow produced.

Low snow levels are a problem for CVEA. Each December CVEA evaluates how the snow level compares to prior years. It is normally apparent by March or April how the spring breakup will be and whether or not the snowmelt will fill the lake.

CVEA constantly monitors the lake level and weather forecast and adjustments are made, as needed, to maximize the generation output of Solomon Gulch. In a good water year, CVEA can produce nearly 100 percent of summer energy needs using hydroelectric generation. In 2013, one of the best years on record, Solomon Gulch produced 55,258,600 kWhs using 103,860 acre-feet of water. In 2007, the worst water year on record, the project produced only 35,030,200 kWhs of energy using 70,614 acre-feet of water. In a bad year, the Cooperative is forced to run the Cogeneration and Diesel Plants to provide the energy requirement, affecting member rates.

As anyone who has been in Valdez this winter knows, the snow level is much less this winter than a typical year; the same is true at Solomon Lake. The average snow depth at the beginning of February is 58 inches at the lake; as of February 2015, there are only 40 inches of snow. The water content of the snow is slightly below average as well. If the snow levels continue as they have so far this winter, the lake will not fill entirely with snowmelt alone. It is still too early to tell, however, if 2015 will be a bad year as a couple of good, wet snowfalls or a rainy spring could still turn things around.



Allison Creek

As the name implies, Allison Creek utilizes the water diverted from the creek, fed by the lake at 1,300 feet elevation; there is not a large amount of water being impounded, or dammed like at Solomon Gulch.

CVEA will generate electricity from Allison Creek only when the water is available from snowmelt, rain, or glacier run off. The advantage of Allison is that it can generate anywhere from 3 to 85 cfs of water flow; during normal flows in the spring and summer over 100 cfs could flow down the creek, providing more water than what is needed to get maximum generation from the project.

When Allison Creek comes online CVEA will not have to run Solomon Gulch as much in the spring and fall; running only one of two generators and using only half the amount of water that would normally be needed. This will allow Solomon Lake to fill faster in the spring and stay full longer in the fall, expanding the season and spreading the benefit of the lower cost hydroelectricity through additional months.

In addition, in the summer months there are times when the system load (amount of energy being used by the consumers) exceeds the capacity (amount of energy that can be generated) of Solomon Gulch; with Allison Creek there will be sufficient hydroelectric generation to cover the current summer time peaks so diesel generation is not necessary.

For additional information on this or any other CVEA topic, please contact Sharon Crisp at 822-5506, 835-7005, or email crisp@cvea.org. ■