



AG Talk Report

UNIVERSITY OF IDAHO, U.S. DEPARTMENT OF AGRICULTURE, AND IDAHO COUNTIES COOPERATING

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WATER UPDATE

HIGH VOLUNTEER POTATO RISK IN 2022

Making Sense of a Very Strange Water Year

By: Keith Esplin, Executive Director, Eastern Snake Plain Aquifer Recharge

I don't ever recall a year when Snake River water supplies were more uncertain this late in the spring, than they are today. I'll give some background and some possible scenarios about what to expect as the growing season progresses.

Background

The official water year on the Snake River, above Milner Dam, begins on October 1. Our 2022 water year started off with a lot of precipitation in October, but it fell as rain, so the snowpack started late. It did give us good soil moisture going into the winter.

A dry November was followed by a very snowy December and first week of January. In fact, the snowpack was above average and it appeared the drought we had been in since July 2020 could be ending. Unfortunately, that was not the case, as snowfall entirely stopped for nearly three months all across the west.

Ag Talk Tuesday Schedule for 2022 - First and Third Tuesdays, May through August, 11:00 AM (MDT)
Go to www.uidaho.edu/ag-talk for more information

Save the Dates:

- May 3
- May 17
- June 7—1 ISDA pesticide credit
- June 21
- July 5
- July 19
- August 2
- August 16

Recent weeks have brought additional snow to the watersheds, but nothing near what was needed to catch up on the many flat-lined weeks.

A year ago, we had the benefit of significant reservoir carryover in the Upper Snake system, but that is not the case in 2022. After being largely depleted in 2021 the reservoirs filled very slowly all winter. In many cases the natural streamflow, water coming down the rivers from mountain springs, has been record or near record low. In the case of the Henry's Fork, natural flow is the lowest it has been since 1935.

A very cold spring this year – especially compared to the hot 2021 spring – has kept a sub-par snowpack in the mountains much longer than had been expected, or what is normal. The result is that in recent days, when the reservoirs should be filling with peak river flows, across the system irrigation demands are greater than streamflow, so storage water is being used.

The peak fill in the Upper Snake system so far this season was 59% full. On May 24 that number was down to 56%. Historically the American Falls Reservoir was always expected to fill, at least on paper, with some of the water being held upstream. This year the peak physical fill was about 84%, which has since dropped to 75%. On last report the American Falls water right was still short more than 260,000-acre feet from filling. Until that water right fills, there is only limited accrual to water rights in Palisades, Island Park, or Grassy Lake. The Jackson Reservoir has an older water right, but physically the reservoir is only 25% full.

Where We Are Today

Snowpack numbers this late in the season can be very misleading. Nevertheless, it appears that the remaining snowpack above the American Falls Reservoir is near normal due to the cool weather delaying the major snowmelt. However, the incredibly low streamflow we have today does not look like we have a normal amount of snow left. Rob Van Kirk, from the Henry's Fork Foundation reported that streamflow May 24 was only **43% of normal**. True we have had cooler weather than normal, but only by a few degrees.

May 26 & 27 are predicted to be much warmer, so we will see increased streamflow and some reservoir accrual. The holiday weekend is expected to be rainy and cold. That will keep streamflow up, but slow snow melt again. Following the holiday, temperatures will gradually warm, but perhaps not enough for more rapid snow melt.

Possible Near Future Scenarios

At the beginning I stated how uncertain the predictions of our 2022 water supply still are. In fact, I was told that in a recent meeting there was a 40% difference in the predicted run-off between the NRCS and Idaho Power.

If we get an extended hot spell in the next three weeks or so, that will bring the remaining snow off rapidly and it could add a significant amount of storage to the system. However, if temperatures rise slowly and gradually, streamflow may stay fairly low with much less reservoir accrual.

In this later scenario natural streamflow rights will likely stay in priority longer than predicted and much longer than feared a few weeks ago. However, without significantly more reservoir storage, canals relying primarily on storage could end up with less than even the low amount they have been expecting.

Though not supported by scientific data, some feel that the slow snow melt is causing much of the water to simply soak into the ground. This may help streamflow late in the season, but it is of little solace to those needing reservoir storage.

Possible Later Season Scenarios

This is where I'm really sticking my neck out, but since no one really knows I can make some predictions based on what I see today. Remember that canal water rights are very complicated. Some rely mostly on natural flow and own little storage. Other have little natural flow and rely on the large amount of storage space they own.

Eastern Idaho canals have the oldest natural flow rights on the system. In fact, if it weren't for storage water being moved past Blackfoot, the Snake River there would be totally dry most of this summer. Eastern Idaho canals with the older rights – for East Idaho – will likely have sufficient water for the whole season. Eastern Idaho canals with more junior rights, which rely on more storage water will have to be very careful and will likely need to take measures to stretch out their supplies. For example, canals on the Henry's Fork will likely only have about a 50% allocation of storage water in Island Park.

Magic Valley Canals have natural flow rights of water entering the river from springs below Blackfoot, and from smaller tributaries below Blackfoot. However, most of their supply is dependent on storage. If we get an extended hot spell to quickly melt the remaining snow their supply will improve. There almost surely will be some new storage accrual, but no one knows how much. If there isn't much new storage accrual the Magic Valley Canals will have water shortages.

Impacts of Flow Augmentation for Salmon

I don't recall the exact numbers, but over the last two years, since the reservoir system was last full, a lot of water has been sent downstream for flow augmentation or "salmon flush." If this water was still in our reservoirs today, the situation for canals relying on storage water would be considerably better. Even this year, the Bureau of Reclamation is still planning to send some 54,000-acre feet of water down the river.

I'm not predicting this, but in a worst-case scenario, sending this much additional water down the river could leave our reservoirs near empty. There are also significant environmental impacts that lowering the reservoirs that much could cause. Draining, or nearly draining, our reservoirs will flush a lot of silt down the rivers below Palisades, Jackson, and American Falls. Will sending water to Washington state do enough to help the salmon to be worth the damage it may cause to our Eastern Idaho fisheries?

This scenario could even require considerable water from Henry's Lake, with impacts far into the future for fishing both there and in Island Park.

Hopefully the slow snow melt will allow for carry over water owned by some Eastern Idaho canals, so the worst-case scenario won't happen. Long-term forecasts call for a hotter than normal summer. We can hope that the "experts" are wrong, that temperatures will moderate, and that rains will help extend our limited water supplies. Time will tell.

Overwinter survival of late blight in Idaho in volunteer and cull potatoes

By: Phillip S. Wharton, Alan Malek and Katie Malek, University of Idaho—Aberdeen Research & Extension Center

Volunteer potatoes

With the recent outbreaks of late blight in the 2013, 2014, 2015, 2018 and 2019 growing seasons there has been speculation as to the source of these outbreaks and debate as to the relative importance of overwintering sources of inoculum. *Phytophthora infestans*, the causal agent of late blight overwinters in potato tubers that are intended for planting as seed, but the pathogen may also be harbored in waste or cull potatoes, or in late blight-infected volunteer potatoes left behind in the field during harvest the previous season.

Volunteer potatoes have become an important perennial weed in many potato growing regions. Researchers in Washington have reported that up to 1,122,000 tubers per acre are returned to the soil after harvest. Potato sprouts emerge from overwintered tubers and grow rapidly in the spring. This rapid growth combined with the tubers ability to re-sprout makes them very difficult to control, even with multiple control measures. Studies with field corn (*Zea mays*) showed that when volunteer potatoes were not controlled corn yields were reduced up to 62%. Volunteer potatoes also act as hosts for a number of important pests and diseases, including late blight, Colorado potato beetle, potato leafroll virus, and nematodes such as *Paratrichodorus allius* (the nematode that transmits tobacco rattle virus, the causal agent of corky ringspot disease).

Potato tubers are susceptible to cold injury and in the past tubers left in the soil after harvest would be killed by the freezing soil temperatures of the Idaho winters. Tuber death resulting from cold injury is usually as a result of the freezing of intracellular water in the tuber tissue. However, tuber tissue can supercool below its freezing point without causing cell death and when the tubers are re-warmed, they will still be viable. The formation and growth of ice crystals within a supercooled liquid must be preceded by a process known as nucleation. As with most plant tissues, potato tuber tissues can supercool several degrees due to a lack of nucleating substances necessary for ice crystal initiation or barriers to ice crystal growth present in the tissue. Previous research has determined that the freezing point of potato tuber tissue is between 30 and 28°F, but under controlled conditions where ice crystal nucleation is prevented, tubers are able to supercool to 20°F. In the soil, tubers are in contact with organic matter, water, microbes and minerals that may act as ice crystal nucleation sites and thus may affect the amount of supercooling that a tuber undergoes. Field trials carried out in Washington state showed that when soil temperatures at tuber depth reached 27°F or lower, extensive tuber death occurred.

Many interacting variables including meteorological factors such as climatic change and increasing tolerance of *P. infestans* to colder temperatures represent a serious situation for the potato industry in the Pacific Northwest (PNW). Winters in Idaho and the PNW are also becoming warmer which may favor survival of volunteer potatoes and cull potatoes over winter. With the recent trend for warmer winters, more volunteers and cull pile potatoes are surviving the winter and acting as sources of disease inoculum in the spring. Studies have shown that mycelia of newer genotypes of *P. infestans* (e.g., US-8 and US-23) are becoming more tolerant to colder temperatures and are tolerant to 27°F for up to three days continuous exposure. Our studies have shown that the tubers of most cultivars appear to breakdown after exposure to 27°F for about one day. Thus, the monitoring of winter soil temperatures may enable growers to accurately estimate the potential for survival of volunteer plants over winter and thus the help to estimate the risk of an epidemic of late blight initiated from volunteer potatoes or cull piles. We have developed a model that predicts the likelihood of tuber survival over the winter based on soil temperatures at 2 and 4 inches between November 1st and

March 31st (<https://www.cropalerts.org/volunteer-survival/>)

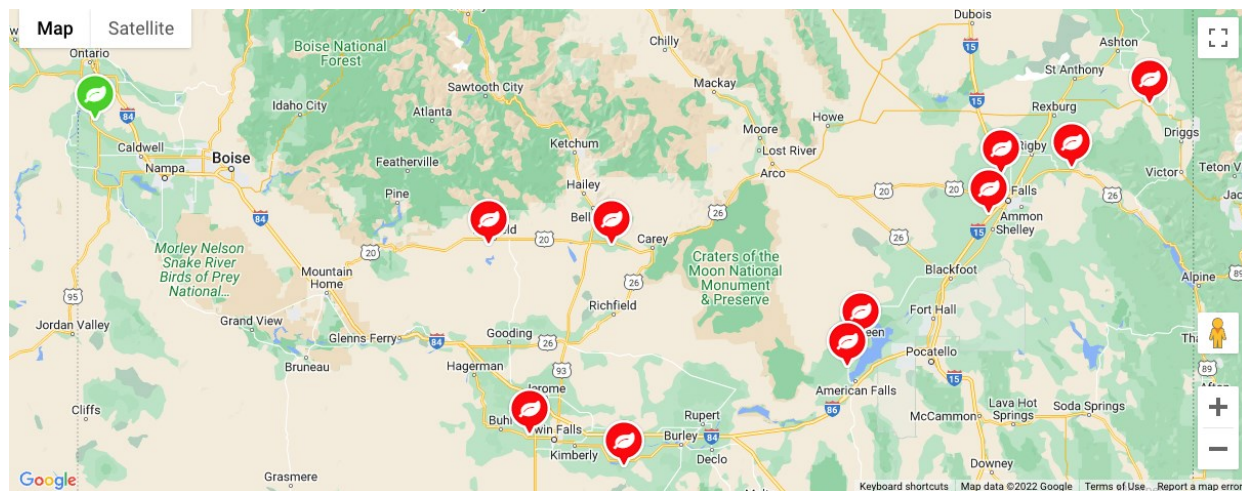
- If tubers were exposed to temperatures below 27°F for more than 120 h between 1 November through 31 March at 4- and 2-inch depth, then the risk of tuber survival is considered low (indicated by a green marker pin).

- If tubers were exposed to temperatures below 27°F for less than 120 h at 4-inch depth and greater than 120 h at 2-inch depth, then there was a moderate risk of tuber survival (indicated by a yellow marker pin).

If tubers were exposed to temperatures below 27 °F for less than 120 h at 4-inch depth and less than 120 h at 2-inch depth, then there was a high risk of tuber survival (indicated by an orange marker pin).”

The data for this model is collected automatically from automated weather stations in the the Agrimet weather network (<http://www.usbr.gov/pn/agrimet/index.html>) and University of Idaho run weather stations (<https://cropalerts.org/risk-monitoring/>). After the model is run, data is posted on a Google map with colored markers indicating the locations of the weather stations (Fig. 1). When users click on the markers, they will be given further data on soil temperatures for that station.

Figure 1. Volunteer survival map showing the weather stations used to collect soil temperature data for the volunteer survival model. The marker color indicates the risk of volunteer survival (red = high risk; yellow = moderate; green = low).



This winter in Idaho most areas in the Snake River Valley experienced soil thermal conditions that placed them in the high-risk category for volunteer survival. Even with the sub-zero air temperatures we had only one of the locations where the model was run this winter (2021/2022) had minimum monthly soil temperatures below 27 °F (Table 1). This situation should alert growers to the high risk of potato volunteers surviving the winter and all growers should therefore be implementing their IPM scouting programs early in 2022 and considering volunteer elimination programs in adjacent non-potato crops if possible. Growers in Southeast Idaho counties (Bingham, Bonner, Madison, Power Co.) where there have been previous late blight outbreak and where conditions were conducive for over winter survival should remain vigilant for signs of late blight on volunteer potatoes.

Table 1. Minimum monthly soil temperatures (°F) at 4 inches below the soil surface for winter 2020/2021 at select locations.

Month	Location									
	American Falls	Tetonia	Aberdeen	Golden Valley	Ririe	Twin Falls	Picabo	Fairfield	Parma	Osgood
November	32	32	37	32	35	40	34	34	31	32
December	31	32	34	32	34	38	32	33	27	31
January	31	32	33	29	33	35	32	34	26	30
February	31	31	33	28	32	31	31	33	25	30
March	32	31	34	31	32	34	32	33	26	30

Cull Potatoes

As mentioned above, late blight can also survive the winter in cull potatoes. Cull potatoes are those potatoes unusable for the fresh market, processing, or dehydration because they don't meet minimum size, grade, or quality standards, or potatoes disposed of for some other reason such as overproduction or waste (slivers) from seed production.

It is difficult to estimate the probability that late blight infected potato stems or foliage will emerge from culled potato tubers. Several factors can influence the fate of the infected tuber. If the infection is severe, then the tuber may rot and prevent sprout development. The tuber infection however may be localized and optimal in terms of inoculum load and therefore it is possible that a developing sprout or the tuber itself could become infected to initiate an epidemic. Under optimal environmental conditions (cool, wet, weather) the disease can then spread within individual plants, between plants and neighboring crops. Research has shown that the temperature within discarded cull piles may influence core tuber tissue temperatures affecting the survival of tuber tissue and thus *P. infestans* mycelia in infected tubers. Consequently, the risk of initiation of an epidemic of late blight from cull piles is closely related to the temperature experience of overwintered potato culls. Although the potatoes at the top and bottom of a cull pile may freeze over the winter when ambient air temperatures fall below freezing, research has shown that the temperature in the middle of the pile remained stable regardless of cull pile size (1-15 ton). Since cull piles in excess of 1 ton may enhance the survival of tubers and thus the *P. infestans* mycelia even in the coldest winters it is important to follow cull and waste potato management guidelines.

Summary of the best late blight prevention options for spring 2022

With the chances of volunteer and cull potato survival over the winter of 2021/2022 being high growers should adopt the following practices to minimize the risks of a late blight outbreak this spring.

- Minimize cull piles during seed cutting and treating.
- Use a seed treatment with mancozeb, or if using a liquid seed treatment apply a mancozeb dust treatment after the liquid.
- Start scouting for volunteer potato emergence early in the season and around the time of emergence in potato fields planted in your area.

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Recent featured speakers for Ag Talk Tuesday



Ben Thiel is the Director of the Spokane Regional Office for the Risk Management Agency. The Spokane Regional Office administers aspects of the federal crop insurance program for the states of Alaska, Idaho, Oregon, and Washington by keeping in close contact with local producers, grower groups, universities, and government agencies.



Keith Esplin is an agricultural and water association manager with over 40 years' experience in the potato, grain, and related industries. He is currently Executive Director of the Eastern Idaho Water Rights Coalition and Eastern Snake Plain Aquifer Recharge.



Matt Gellings is the State Executive Director for the Farm Service Agency. He was appointed to serve in this role in January 2022. He is a fourth-generation farmer who grew alfalfa, wheat, malt barley, and potatoes in Idaho Falls and maintained a cattle operation for 26 years.

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