Henry's Fork Watershed Council Notes

Tuesday, April 9, 2019

Upper Snake River operations

Jeremy Dalling, U.S. Bureau of Reclamation

Currently the Upper Snake Reservoir system is at 83% of capacity, which is 116% of average for the date. For the basin upstream of American Falls, snow water equivalent is 114% of median, and precipitation is 107% of average. The April-1 forecasts for April-July runoff are 99% of average at Heise, 104% of average at Jackson, and 115% of average at Island Park. So far this spring, cool temperatures have prevented early runoff. With additional precipitation this spring, water supply and runoff could be similar to 2003. Under a drier scenario, this year could turn out to be similar to 2012. Jackson Lake and Palisades Reservoir will be managed with flood control rule curves over the remainder of the spring. American Falls Reservoir will be filled in the next 10 days. Island Park Reservoir was held at 120,000 ac-ft all winter but was drafted during March to capture anticipated above-average runoff. The draft turned out to be a little more than intended because no snowmelt occurred over the month. Outflow from the reservoir will be increased next week as inflow increases and then managed for reservoir fill around June 1. Runoff into Island Park over the next two months will depend greatly on precipitation during that time. At this point, all outlooks indicate wet weather for the next several weeks.

Teton Recreation Coalition

Ryan Newman, U.S. Bureau of Reclamation

When Teton Dam was authorized, it was one of only six U.S. Bureau of Reclamation (USBR) projects that included recreation as an authorized use. Around one-third of the volume of the reservoir was allocated to recreation. After the dam collapsed, USBR seeded the canyon with reed canary grass to stabilize banks that were scoured during rapid evacuation of the reservoir. Since then, Salt Cedar and Russian Olive have invaded the canyon. Thistle invasion has been actively removed, with varying degrees of success depending on location. Under the original authorization, boat ramps were built at Spring Hollow and at the old dam site. Recently, the Spring Hollow road has been improved to allow better access to the river, since the original road and ramp were designed to provide access to the reservoir, not the river. At the dam site, some infrastructure provides water to irrigation pumps. Otherwise, the old dam site has recently seen a very large increase in unauthorized recreational use and vandalism. Due to safety issues, especially related to the extensive tunnel network still in place, USBR has used small amounts of funding from other projects to repair damage and build additional structures to prevent unauthorized access. However, those who want access have found ways to vandalize the repairs and additional structures. To address these issues, USBR is developing a recreation plan intended to change use at the old dam site from one based around partying and vandalism

to desirable recreational uses such as camping and fishing. Development of the plan has involved numerous local stakeholders, called the Teton Recreation Development Coalition. In addition to USBR, members include USBR, Fremont-Madison Irrigation District, U.S. Bureau of Land Management, Idaho Department of Parks and Recreation, Friends of the Teton River, and Fremont and Madison counties. In Teton Canyon, the plan calls for no development, continued weed control, and operation and maintenance of existing irrigation infrastructure. Plans for the old dam site include a new access road and boat ramp, primitive camping down along the river, developed camping on the canyon rim, and an interpretive site.

Water-supply Predictions for the Upcoming Irrigation Season

Rob Van Kirk, Henry's Fork Foundation

In 2017, I developed a probabilistic ("stochastic") model of the entire Henry's Fork stream, reservoir, and irrigation system for the purposes of predicting streamflow and reservoir content for the upcoming irrigation season. The model is based on hydrologic conditions as of April 1. The most important output of the model is content of Island Park Reservoir at the end of September, what we term as "reservoir carryover." In 2017, the model predicted carryover to within 1%. In 2018, the model underpredicted carryover by 7%, primarily because July, August and September were extremely dry, and more reservoir storage was needed late in the summer than expected. However, the observed value was well within the margin of statistical error. The 2019 version of the model includes several new features that make it more realistic, especially with regards to irrigation needs on the Teton River. The single most important component if the Henry's Fork system that determines flow releases from Island Park Dam during the summer is need to deliver water from the Henry's Fork to the Teton River via the Crosscut Canal to meet irrigation needs on the lower Teton. The Crosscut Canal diverts water from the Henry's Fork at Chester Dam and delivers it to the Teton River just north of the town of Newdale.

The model starts with predictions of natural streamflow over the April-September period. Over the whole watershed, natural flow is expected to be 105% of average, compared with 104% of average in 2018. However, much more of that natural flow will originate in the upper Henry's Fork watershed in 2019, compared with higher fractions in Fall River and Teton River in 2018. With 90% probability, natural flow will be at least 87% of average. This means that under a worst-case scenario, streamflow will be at least 87% of average, which is still within the range that will lead to average carryover in the reservoir and at least average outflow the following winter. Streamflow on Fall River and Teton River is expected to be only slightly lower than last year. Overall, this will lead to mid- and late-summer flows in both of these rivers around average and very close to those seen in 2018. Need for delivery of water through the Crosscut Canal is expected to start in the last few days of June, just a few days earlier than last year. This will trigger need for delivery of Island Park storage water a few days later to meet irrigation demand and keep streamflow in the Henry's Fork at St. Anthony at 1,000 cfs, the irrigation-season target that will most likely be used to determine Island Park releases. Streamflow there will hover near or just a little above 1,000 cfs for all of July and most of August.

As mentioned above, a much larger fraction of total streamflow will originate in the upper Henry's Fork watershed in 2019, versus Fall River and Teton River. Inflow to Island Park Reservoir is expected to be 100-200 cfs greater in 2019 during the late summer than in 2018. Streamflow in the Henry's Fork at Ashton is also expected to be greater than that in 2018 for most of the spring and early summer but below average during the middle of irrigation season because delivery of water from Island Park Reservoir is expected to be lower than average. During spring runoff, outflow from Island Park Reservoir is expected to be a little higher overall than that in 2018 because of a better snowpack this year. However, because specific timing of high snowmelt and rain events is very difficult to predict, streamflow on any given day may be lower this year than last during periods when runoff was very high in 2018. As runoff recedes, streamflow at Island Park Dam will drop from about 1,200 cfs at the beginning of June to 700 cfs by the end of the month. Irrigation delivery is expected to begin around July 3, right at average. From then on, because irrigation demand relative to supply in Fall River and Teton River is predicted to be about like last year, outflow from Island Park Reservoir is predicted to be very similar to that in 2018--in the range of 800-1200 cfs most of the summer, with the highest flows occurring for only a few weeks during July. In September, once need for delivery drops and the reservoir can be held at a constant pool, outflow will be about 200 cfs higher than it was last year, because reservoir inflow will be higher.

Reservoir carryover is expected to end up around 110,000 ac-ft (81% full), compared with around 98,000 ac-ft in 2018 (72% full). Higher inflows this year will keep the reservoir level higher, even with outflows about the same or even a little higher than in 2018. At worst (less than 5% chance), the reservoir will end up around its long-term average of 60,000 ac-ft (44% full).

After the obvious factors of overall water supply and irrigation demand, the third most important factor that determines reservoir carryover is the summertime streamflow target at the St. Anthony gage. If this target is lower, less delivery from Island Park Reservoir is needed to satisfy irrigation demand and leave some water in the river downstream of St. Anthony for the four canals that divert water in that reach. However, a lower flow target could result in flows too low to sustain the fishery downstream of St. Anthony. On the other hand, delivery of more water from Island Park can leave more water in the river for the fishery downstream of St. Anthony, but at a cost to the fishery in the reach between Island Park Dam and Pinehaven.

To address needs for scientific information that can be used determine the fisheries tradeoffs between the lower Henry’s Fork and the Island Park to Pinehaven reach, as well as fisheries issue in and upstream of Island Park Reservoir, the Henry’s Fork Foundation is supporting two Ph.D. students at Utah State University, both former HFF interns. Christina Morrisett will undertake the lower Henry’s Fork project, and Jack McLaren will conduct the upper Henry’s Fork project.

An Investigation into How Nutrients Influence Aquatic Systems: Applications to the Management of the Upper Henry's Fork and Island Park Reservoir

Jack McLaren, Henry's Fork Foundation and Utah State University

Western U.S. rivers are experiencing changes in nutrient flux from urban development and changes to migratory fish populations, which could influence productivity of ecologically, economically, and culturally important trout populations. The Henry's Fork of the Snake River in east Idaho is experiencing rapid development due to excellent recreational opportunities, including fly-fishing, nonmotorized boating, and proximity to Yellowstone National Park. An increase in development will require new avenues of wastewater disposal and changes in the management of stocked migratory salmon, resulting in nutrient flux changes in the river. We seek to understand how the ecology of the Henry's Fork will respond to anthropogenically-driven nutrient flux change, including 1) understanding the effect of nutrients on primary productivity and whole-stream metabolism 2) linking changes in primary productivity to changes in stream ecosystem structure and food webs, focusing on trout growth and habitat, and 3) developing a nutrient budget for the Henry's Fork under various climate and development scenarios. Methods will include observational comparative studies among different reaches of the Henry's Fork a nutrient addition experiment, and statistical and systems modeling. Our results will assist local resource managers in mitigating human development for the benefit of the Henry's Fork ecosystem and the trout that call it home. We aim to advance the field of stream and fish ecology by more closely examining how nutrients can affect stream ecosystems, including concepts such as the paradox of enrichment, the river continuum concept, and the management usefulness of ecosystem metabolism.

Hydrological and Ecological Assessment of the Lower Henry's Fork River to Support Multi-stakeholder Management

Christina Morrisett, Henry's Fork Foundation and Utah State University

Rivers in the arid and semi-arid American West supply water for irrigated agriculture, urban use, hydropower generation, recreational fisheries, and aquatic habitat—a challenging water management landscape. Climate warming exacerbates this challenge. Earlier snowmelt-driven runoff stresses storage infrastructure and shifts agricultural production to earlier in the spring, extending the irrigation-demand season by several weeks. Reduced snowpack decreases late-summer baseflow, warming water and diminishing streamflow available for consumptive withdrawal and storage. Climate models predict greater uncertainty in precipitation and air temperature in the American West—requiring water management strategies that are more resilient to periods of water scarcity. To best adapt water management strategies, we must consider eco-hydrologic relationships as well as the hydro-social system. My doctoral research is conducted in partnership with the Henry's Fork Foundation and uses an interdisciplinary, place-based approach to identify water management strategies best suited for water supply and ecosystem resiliency in the Henrys Fork watershed. My objectives are to: (1) characterize streamflow-habitat relationships and (2) quantify the effects of groundwater contributions in

the lower Henrys Fork to guide a minimum streamflow recommendation, (3) build an optimization model in collaboration with stakeholders to guide reservoir delivery operations that meet multiple downstream objectives, and (4) investigate the adaptive capacity of Teton Valley farmers and ranchers to reduce their irrigation demand. My dissertation uses a watershed-specific example to demonstrate how linking hydrologic, ecological, and social components of water resource management enables multiple stakeholders to adapt to change.