Idaho Water Resources

Memo

To: Karl Dreher

From: Brian W. Patton

Cindy Yenter

Date: June 28, 2005

Re: Jones Hatchery – Conjunctive Administration Call Field Investigation Report
Analysis of Diversion Works
Sufficiency of Measurement Devices
Options for Replacement Water Supplies

In response to a delivery call made by John W. "Bill" Jones at his hatchery facility, an investigation was conducted on June 22, 2005. Present were Brian Patton, Cindy Yenter (WD130 Watermaster), Frank Erwin (WD36A Watermaster), Troy Winward (IDWR – Twin Falls), Bill Jones, and several hatchery employees.

ANALYSIS OF DIVERSION WORKS

The water sources for the Jones Hatchery consists of three spring complexes: (1) the Hoagland Tunnel Spring, (2) Weatherby Springs, and (3) Three Springs. The Jones fish propagation water right (36-7071) allows the use of up to 73.05 cfs from these three sources. During the June 22 field investigation the flow through the hatchery was measured at 28.0 cfs.

Hoagland Tunnel

The Hoagland Tunnel Spring is a spring into which a tunnel was constructed to develop the spring flows. The concrete lined Hoagland Ditch starts at the tunnel outlet and delivers water to multiple users with senior priority rights totaling 6.58 cfs for irrigation, stock, and domestic uses. A new headgate and broad crested weir were recently constructed at the head of this ditch. A spillway from the ditch allows flow from the Hoagland Tunnel to be spilled over into the Weatherby Spring collection pool, and intothe Jones Hatchery, if flows are in excess of the senior priority uses down the ditch. At the time of the June 22field investigation there was only a small amount of seepageescaping the Hoagland Ditch and spilling over into the Weatherby Springs collection pool. The flow going down the Hoagland Ditch was measured at 4.4 cfs.

A separate pipeline from the Hoagland Ditch travels to and across the lower raceways at the Jones Hatchery to provide additional mechanical aeration. A valve positioned over each raceway allows a small stream of water under pressure to be jetted onto the surface of the water in the raceway, creating turbulence and thus introducing oxygen to the raceway. There are perhaps 30 such valves situated on the lower raceways. The system was not in operation during our visit, however, each valve is estimated to flow at 1-3 gallons per minute, resulting in a total flow of less than 100 gpm.

Weatherby Springs

Weatherby Springs consists of numerous springs that express on the surface in a draw above the hatchery. The majority of the flow is collected in a pool formed by the inlet structure to a 36-inch, 400 LF (+/-) reinforced concrete pipeline that conveys the flows to the Jones Hatchery. Any spill from the Hoagland Tunnel Spring is also collected in this pool. This pool has spill gate that was completely closed with only a small amount of leakage past the gate.

Pipe from Weatherby Springs to Control Box

One of the springs in the Weatherby complex is captured in a concrete spring box above the collection pool and routed into a 20-inch (+/-) steel pipeline. This pipeline travels down the draw and joins with a 16-inch (+/-) steel pipeline coming from Three Springs (see description below). The combined pipeline then travels across Billingsley Creek and up the hill under gravity pressure to a concrete control box. From this control box the flow is split three ways: (1) into a buried pipeline of undetermined size that leads to Billingsley Creek Ranch for irrigation and fish propagation uses, (2) into a buried pipeline of undetermined size that delivers water to multiple users along Lemmon Lane for irrigation and domestic uses, and (3) remaining flow, if any, spills into a buried pipeline of undetermined size that routes the flow back to the Jones Hatchery. Because of the gravity pipeline configuration, the flow routed to the Jones Hatchery through this control box is usable only in the lower raceways. At the time of the June 22 field investigation flows from the control box were as follows: to Billinsgley Creek Ranch: 4 cfs; to other irrigation and domestic users: 1.8 cfs; and to the Jones Hatchery: 0.7 cfs.

Lower Weatherby Springs Collection Pool

Flows not captured in the main collection pool or in the pipeline to the control box are captured in a lower collection pool. A pump station is located at this pool that pumps these flows up to the main pool. This pump has a reported capacity of 3 cfs and was in operation during the field investigation. Flow spilling past this pool through a check board outlet was measured at ½ cfs. The spill was due to flows that exceeded the pump plant capacity. Flows escaping this pool travel down a small drainage tributary to Billingsley Creek just below the main hatchery discharge.

Three Springs

Three Springs is a spring complex comprised of three springs in close proximity. This complex is approximately ½ mile to the north of the Hoagland Tunnel and the Weatherby Springs complex. The two northern-most of the three springs are captured in a collection pool that forms the intake for a 24-inch steel pipeline that delivers flow to the upper end of the Jones Hatchery. The southern-most spring is captured in a collection ditch that leads to a 16-inch (+/-) steel pipeline that joins the 20-inch (+/-) steel pipeline coming from Weatherby Springs. The combined pipeline then crosses Billingsley Creek and leads to a control box as described above. The flow from the southern-most spring can also be spilled past the ditch into the collection pool that captures the other two springs, which leads via pipeline to the Jones Hatchery. At the time of the June 22 field investigation, all flow from the southern-most spring was being spilled into the collection pool. The reason for this is explained in the section of this report on replacement water options.

Flows From the Jones Hatchery

Flow utilized in the Jones Hatchery travels in three different directions.

Bar-S Ditch – The Bar-S Ditch is a system that delivers flows from Weatherby Springs to numerous users for irrigation purposes. These flows pass through the upper raceways of the Jones Hatchery and two mid-point or second-use raceways. The delivery point to the Bar-S inlet is located at the end of the south raceways. The Bar-S Ditch from its inlet at the Jones Hatchery to its discharge into the Curren Ditch was replaced with a buried pipeline in 2004. As per the SRBA decree regarding Jones fish propagation right, Jones is required to deliver 6.5 cfs into Bar-S from March 1 until November 1, and 4 cfs the rest of the year. This flow was measured at 6.6 cfs during the field investigation.

Jones Irrigation Pumps – At the lower end of the hatchery, some flow is delivered to a pump plant under Jones' senior irrigation right from Weatherby Springs (36-68). This pump plant supplies irrigation water to about 400 acres on Jones' property. The discharge through this pump plant is measured by the PCC method and diverted flow was not measured during the field investigation.

Discharge to Billingsley Creek - Flow passing through the hatchery not delivered to the Bar-S Ditch or the Jones Irrigation Pumps is discharged to Billingsley Creek.

SUFFICIENCY OF MEASURING DEVICES

Jones Hatchery

Flows under the Jones right no. 36-7071 are measured over stop-log checks in the upper hatchery raceways. A discharge table used by hatchery staff assumes a constant 4.66-foot crest length on each dam board, although our measurements indicated crest lengths that varied from 4.58 feet to 4.84 feet, and averaging 4.68

feet. Our measured head readings, taken with a hand-held staff, ranged from 0.5 feet to 0.39 feet. At relatively uniform heads the introduced error due to variable crest length would be minor. Given the wide range of head readings the error could potentially be significant. The actual error found on the day of our investigation was 1.05 cfs (+3.8%). Our measurements, calculated independently, totaled 27.3 cfs for 15 raceways measured. Hatchery staff making measurements at the same time, calculated 28.35 cfs. Hatchery staff may also have added a small percentage of flow for seepage through stop logs on closed raceways, which we did not account for.

The above measurement method accounts for flows into Jones Hatchery from the Weatherby pipeline, the Three Springs pipeline, and the spill from Hoagland Tunnel. The aeration pipeline from the Hoagland Ditch does not have a measuring device and jets enter the Jones raceways downstream of the present point of measurement. Flows in this pipeline would have been measured over the broad-crested weir in Hoagland Ditch, but are not re-measured as they exit the ditch. The existing structure might be modified for the installation of a small weir. Spill from the Weatherby/Three Springs control box back to the Jones Hatchery is typically measured at the hatchery in a receiving structure located between the upper and lower raceways. Head readings over a stop-log dam, similar to the raceway checks, is used to obtain a flow. The box was flooded at the time of the inspection due to a set of lower raceways being shut down so the length of the dam could not be verified or a measurement made at this location. A measurement of this return flow was made at the spill in the control box (see above; 0.7 cfs).

Irrigation diversions at the Jones irrigation Pumps are estimated using the PCC method of measurement. This is a complex system using three pumps of varying horsepower and serving multiple pivots, hand lines and wheel lines. Because of multiple operating conditions, the PCC method does not meet IDWR's validity criteria, but the system was rated in 1995 at the high flow/low PCC condition because there is no flow meter. As a result the reported irrigation diversions for Jones irrigation pumps are likely higher than actual diversions. The highest measured flow for the system is 2950 gpm (measured in 2004) with all pumps running (total 300 HP). The hatchery manager has been advised verbally that a flow meter needs to be installed on the irrigation system. He is in the process of researching available flow meters for this application.

The Bar-S Ditch is measured over a 4-foot rectangular contracted weir, using a wall-mounted staff gage. This device is well-aerated and although the side walls of the weir are narrower than standard specifications, the weir is operating under full contraction.

Presently, total flow through the Jones Hatchery is calculated by summing the upper raceway measurements and the Weatherby/Three Springs return flow measurement. Jones indicates that he is in the process of having an exit weir designed for the channel below the hatchery which will measure all flows through the facility at one location. This site was briefly reviewed and determined to be generally

suitable for a total flow device. Derivation of total flow would then require the summing of the main weir flows, the Bar-S weir flows and instantaneous flow at the irrigation pumps.

Other Devices

The Weatherby Springs 20" line and the Three Springs 16" line, combining to deliver flows to the control box, is presently without a measuring device. This 24" line previously contained a Peak in-line impellar meter which has failed and has been removed. Jones is investigating other options for measurement of this line. In the interim, the flow may be reasonably estimated at the control box . A polysonic measurement attempt on the pipeline during the field visit was not successful, possibly due to corrosion on the interior walls of the pipe. Total flow at the control box, assuming that deliveries to Billingsley Creek Ranch were 4 cfs, was 6.5 cfs.

The Three Springs 24" line to the Jones Hatchery also previously contained an in-line flow meter which has failed. This flow is measured through the hatchery, but monitoring of this line gives an accounting of the contribution of the Three Springs source. A polysonic measurement taken on the Three Springs pipeline during the field visit indicated a flow of 6.46 cfs.

OPTIONS FOR REPLACEMENT WATER SUPPLIES

One "mitigation exchange" is already in effect. Billingsley Creek Ranch and other users (BCR et al) are supplied by two pipelines, one from Weatherby Springs and one from Three Springs, that join and deliver the combined flows to a control box as described above. The overflow from this control box is delivered to the lower raceways of the hatchery. The BCR et al users hold a combination of water rights from Weatherby Springs and Three Springs. These users are currently being delivered only Weatherby Springs water, in amounts sufficient to meet all their rights, and their Three Springs water is being allowed to spill into the Three Springs collection pool for delivery the Jones Hatchery. The net effect of this exchange is that Jones receives more water to run through the entire hatchery than if water is delivered strictly by water rights. This is being done with the knowledge of the WD36A Watermaster. This exchange provides 4-5 cfs that is run through the entire hatchery. If water is delivered strictly according to water rights, this flow would be usable only in the lower raceways with the existing piping system.

Other potential replacement water or mitigation projects

Other mitigation options include the following:

1) ½ cfs was escaping the Lower Weatherby Springs Collection Pool to Billingsley Creek because the flow into the pool exceeds the pump plant

capacity. Increasing the capacity of this pump plant would make this water usable in the hatchery.

2) Jones holds a water right for 1 cfs from the Hoagland Tunnel Spring (36-69) that is delivered through the Hoagland Ditch, and therefore bypasses the hatchery before being applied for irrigation (except for the small amount of flow used for mechanical aeration as descried above). This is the senior right from the Hoagland Tunnel. This 1 cfs could be run through the hatchery and then used for irrigation. Modification to the irrigation system would be required.

3) One of larger users of the Hoagland Ditch has expressed interest in receiving his water through the Bar-S Ditch instead of through the Hoagland Ditch. Because the sum of the Bar-S water rights is larger than Jones' required discharge into the Bar-S, when the open ditch was replaced with a pipeline it was sized with excess capacity. This would provide an additional 2.5 cfs through the upper raceways. A pump would need to be installed to pump the water from the Bar-S (or Curren Ditch) to the irrigated lands. It is possible this system could be expanded to include most irrigation users of the Hoagland Ditch. An expanded system could provide about 4 cfs through the upper raceways.

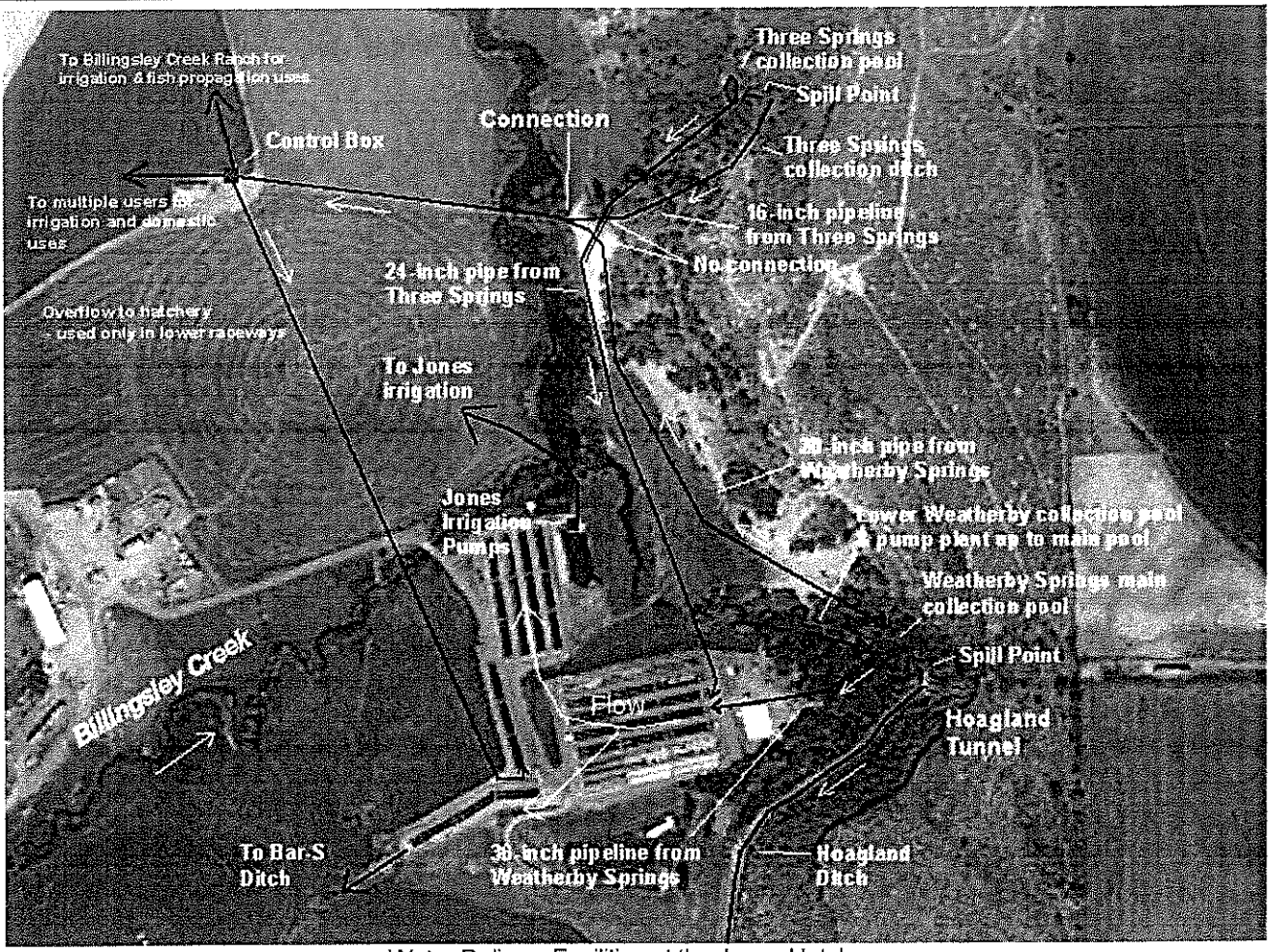
4) The SRBA decree for Jones' fish propagation right requires the discharge of 6.5 cfs into Bar-S Ditch from March 1 until November 1, and 4 cfs the rest of the year. The inlet is located such that this flow can be used by Jones in the upper raceways but not the lower raceways. This flow could be run through all the raceways and then pumped back up to the Bar-S inlet.

5) Billingsley Creek Ranch has a water right for 4 cfs for irrigation and fish propagation from Three Springs (which is currently being supplied from Weatherby Springs through the exchange as described above). The pipeline to Billingsley Creek Ranch starts at the control box. This water could be run through the Jones Hatchery, and then be pumped to Billingsley Creek Ranch Pipeline. This would provide an additional 4 cfs through the hatchery. This would result in reduced water quality received by Billingsley Creek Ranch, who uses it in a fish hatchery prior to use for irrigation.

6) The other Three Springs and Weatherby Springs users that receive their water via pipeline from the control box use a combined domestic and irrigation system. It would be possible to split the irrigation and domestic systems, run their irrigation water through the Jones Hatchery, and then pump it into a dedicated irrigation system. This would provide and additional 2-3 cfs, but at high expense.

7) A pump back system could be installed to recycle flows.

8) A system could be installed to pump Billingsley Creek flows to the hatchery. The flows would then pass though the hatchery and return to Billingsley Creek. Since the creek is used in fish hatcheries at several other locations the water quality is assumed to be acceptable.



Water Delivery Facilities at the Jones Hatchery