

Hagerman National Fish Hatchery

Water Measurement Sites and Procedures



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Introduction

The Hagerman National Fish Hatchery (Hatchery) was authorized by 46 Sta. 371 on May 31, 1930 and was established in 1931. Construction of physical facilities commenced in 1932 and the first trout eggs were received for incubation in 1933. Expansion and modernization has occurred on several occasions, most notably in 1951, 1982, 2001, and 2006. The storage barn is the only remaining building from the 1932 construction. Remaining structures from the 1951 construction include four residences, office, garage-shop, and oil-paint storage buildings. The 1983 expansion added Hatchery Building II, Administration Building, Water Service Building, Brailsford Intake, and raceways 1-12, and 37-102. A new Hatchery I building was constructed in 2001 replacing the old Hatchery I building which was demolished in 2006. Also in 2006, a set of 24 old 8 X 80 concrete raceways (13 -36) were demolished and a new building was constructed to house the water chiller which is used during fish distribution. Other projects included several pipe line replacements, improvements to water diversions, and completion of the Riley Creek Pump-back system.

Principal production from 1933 to 1979 was rainbow trout for stocking in Idaho, eastern Oregon and northern Nevada. Lahontan cutthroat trout were also reared for release into Pyramid Lake, Nevada.

A major change in the production occurred in 1979 with phased-out elimination of the resident rainbow trout program in favor of anadromous species. The Hatchery became a steelhead mitigation project under the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP). The 1983 construction, costing \$6.5 million, was funded by the Corps of Engineers as part of the Lower Snake project. Current steelhead production is 1.4 million steelhead smolts at 4 to 5 fish per pound. The hatchery also raises 140,000 resident rainbow trout as part of the Dworshak Reservoir Program.

The water supply for the Hatchery emanates from the Eastern Snake Plain Aquifer (Aquifer) through a complex of springs diverted for Hatchery operations. Under the administration of the Idaho Department of Water Resources, the U.S. Fish and Wildlife Service has surface water rights for 109.74 cubic feet per second (cfs) flow for fish propagation, irrigation, domestic use and stock water (Table 1). However, this is not a cumulative total due to the fact that there are multiple rights to several spring diversions with different priority dates, seasons of use, and for different types and places of use or, in the case of Spring 16 (Len Lewis Spring), subordinate to a senior user during the irrigation season (February 15 to November 30). Moreover, not all water sources can be diverted to all outside rearing units. Spring 17 is only plumbed to the Trout Raceways; Riley Creek and Bickel springs are only plumbed to the Steelhead Raceways. The priority dates for the Hatchery's water rights range from 1889 to 2002, the majority of which are in the early 1930's to 1950. Assuming all the Springs were flowing at the full water right, of the total, 84.59 cfs could be diverted for fish production at the Hatchery; another 4.6 cfs could be diverted to operations at the Hagerman Fish Culture Experiment Station (HFCES). The Fish and Wildlife Service provides water to the HFCES under a Memorandum of Understanding with the University of Idaho.

During the later part of the last century, increased groundwater withdrawals, irrigation efficiencies and drought have combined to diminish the volume of water stored in the Aquifer. The University of Idaho Water Resources Research Institute reports that “the average rate of decline in ground water storage between 1975 and 1995 is about 350,000 acre feet/year” (Johnson 1998). This diminished storage capacity has resulted in a decline in spring flows throughout the Thousand Springs Reach. The declining water supply continues to challenge fish production capacity and flexibility of Hatchery operations. In its 1995 Annual Report, the Hatchery reported that a review of flow data for the period of 1974 through 1994 for two of the Hatchery’s spring sources, Riley Creek and Bickel Spring Creek, showed a decline in flow of 9.6% and 21.5%, respectively. At this time, the Hatchery’s spring water winter supply (Dec – Mar, 2006) is approximately 14% (12.7cfs) below its water right and has been declining at a rate of nearly one cfs per year from 1999 through 2008 (Figure 1).

The Hatchery staff must work closely with downstream water users in the Riley Creek Watershed to ensure their needs are met. Downstream users include the Idaho Department of Fish And Game’s (IDFG) Hagerman Wildlife Management Area and the Hagerman State Fish Hatchery, John Lemoyne (hydro-plant), the Buckeye Ranch, and the Brailsford Ditch Association. In the case of the Brailsford Ditch Association, a senior water appropriator on Spring 16 (Len Lewis Spring), water diversion from this spring must be consistent with the Court approved water management agreement (Appendix A.) negotiated by the Department of Justice in 1997. Implementation of this agreement requires the maintenance and operation of the 200-hp Riley Creek Pumpback System. In the case for water diverted to the Bickel Ditch, water diversion must meet the needs of the IDFG for its operation of the Hagerman Wildlife Management Area and the Oster Lakes fishing area. Water for this purpose may, depending on Hatchery operations, be diverted either from Main Spring, via the 24’ line at the Main Spring diversion dam or via two 20-hp pumps located at the lower end of the Steelhead Raceways’ tail box. Operations more specific to implementing these diversions are described in the Hatchery’s intranet SOP website.

These water procedures outline locations and procedures for measuring water at each diversion site:

RECORDING LOCATIONS AND LOGBOOKS

<u>Site Name</u>	<u>Location</u> ¹	<u>Site Number</u>	<u>Type of Meter</u>
Len Lewis, Spring 16	1	423001	7 Ft. Ramped Broad Crested Flume
Spring 15	2	423002	90 ° V-notch Weir
Main Spring	3	423003	4 Ft. Parshall Flume
Spring 17	4	423004	Ultrasonic
Display Pond	5	423005	2 Ft. Parshall Flume
Hatchery 1 Outflow	6	423006	9 In. Parshall Flume
OLSB Outflow	7	423007	SIGMA In-Line Flow Meter
Riley Lake	8	423008	7 Ft. Cipolletti Weir
Bickle Spring Creek	11	423011	15 Ft. Cipolletti Weir
State Weir	12	423012	15 Ft. Cipolletti Weir
Brailsford Ditch	13	423013	4 ft Parshall Flume
Spring 13 Box	14	423014	2.5 Ft. Stop-Log Structure
Spring 13, In-line Propeller	15	423015	McCrometer In-Line Flow Meter
Springs 8 & 9	16	423016	Ultrasonic
Spring 11	17	423017	Ultrasonic
Hatch II (Springs 13,14,15,16)	18	423018	Ultrasonic
Spring 13, Turbine Meter	19	423019	Kent Turbine Meter
Domestic Well	20	423020	Positive Displacement Meter
Spring 17	21	423021	90 ° V-notch Weir
Riley Creek Pump Back	22	423022	Ultrasonic
Tunison Lab Raceways	23	544101	1.83 Ft. Rectangular Weir
Old Wet Lab Weir	24	544102	15” Broad Crested Weir
Spring 11 Parshall Flume	25	544104	6 In. Parshall Flume

¹ Location Sites 9 and 10 are no longer used

Location No. 1 – Len Lewis Spring (Spring 16)

At Location No. 1 there is a 7 Ft. ramped, broad crested flume that was approved for use on August 15, 2005. Flow into the flume is controlled by a gate valve. The flow from this location can be directed to the Main Spring diversion and Hatchery II. All of Spring 15 and a portion of the Spring 13 flow enter the Brailsford Intake downstream of this flume. Overflow valves upstream of the flume allow water to be spilled down to the Shop Creek and into Riley Creek. Len Lewis Spring is the major source of water to the Brailsford Ditch Association. Brailsford Ditch has a stop log control structure at the north end (See Site No. 13).

Formula Used: $Q = 21.8(H + 0.0214)^{(1.594)}$



7 ft Flume and bypass



Brailsford Intake

Location No. 2 – Spring No. 15

At Location No. 2 there is a 90° V-notch weir located next to the Brailsford Intake diversion structure at the southeast end of Len Lewis Spring. A staff gage is provided for head measurement. The flow from this location is mixed with Spring 16 and may be directed to both the Main Spring diversion and Hatchery II.

Formula Used: $Q = 2.49H^{(2.48)}$



Location No. 3 – Main Spring

At location No. 3 there is a 4 foot concrete Parshall Flume located approximately 25 feet north of the domestic water service building and above the Main Spring Diversion Dam and screen chamber. A staff gage is located in the stilling well beside the Parshall Flume. The flow from this location can be directed to the Steelhead raceways, Trout raceways, Hatchery 1 and to Bickel Ditch.



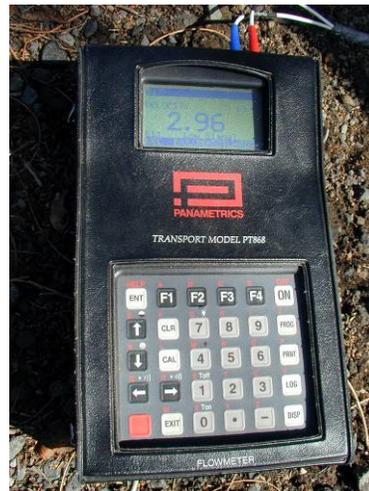
Formula Used: $Q = 4W(Ha^{1.522})(W^{0.026})$

Location No. 4 – Spring No. 17

Location No. 4 is approximately 200 feet downstream of the diversion box in the Spring 17 pipeline. The Spring 17 pipeline is a 14” inch stainless steel pipe with an inner diameter of 13.468” and a thickness of 0.266”. Water in the Spring 17 pipeline can only be diverted to the Trout raceways. A Panametrics Model PT868® in-line ultrasonic meter with permanent port, wetted transducers is used for instantaneous measurements.



Spring 17 Location



Panametrics Meter

Location No. 5 – Display Pond

At Location No. 5 there is a 2 foot concrete Parshall Flume located approximately 50 feet upstream of the Display Pond. A staff gage is located on the side of the flume. The 2 foot Parshall Flume receives most of its water from Main Spring. Water is diverted through this flume in order to operate the Display Pond and to maintain a minimum 1 cfs flow for habitat which supports the Bliss Rapids snail which is listed under the Endangered Species Act. There are some small springs and seeps that provide additional water.



Formula Used: $Q = 4W(Ha^{1.522})(W^{0.026})$

Location No. 6 – Hatchery I Outflow to Riley Creek

At location No. 6 there is a 9” Plasti-Fab® fiberglass Parshall Flume located in a fiberglass packaged metering manhole approximately fifty feet from the west corner of the Hatchery I building. A staff gauge is located on the inside of the flume. Water discharged from Hatchery I is measured at this location.



Formula Used: $Q = 3.07H^{1.53}$

Location No. 7 – Offline Settling Basin (OLSB) Outflow

At Location No. 7 there is a SIGMA 950 Flow Meter® for reading discharges from the OLSB to meet the Hatchery’s National Pollution Discharge Elimination System (NPDES) permit requirements. Flows are recorded at the beginning and end of a 24 hour period in the NPDES field logbook. The OLSB flow includes water diverted during cleaning operations from the Trout raceways, Steelhead raceways, and Hatchery I. When in use, all water from Hatchery II is directed to the OLSB system.



Location No. 8 – Riley Lake

At Location No. 8 there is a 7 foot Cipoletti weir located at the screen chamber and outlet of Riley Lake. A new staff gage was installed in 1991. The flow from this location is directed to the Steelhead raceways.

Formula Used: $Q = 3.367LH^{(3/2)}$



Location No. 11 – Bickle Lake

At Location No. 11 there is a 15 foot Cipoletti weir located at the screen chamber and outlet of Bickel Lake. A new staff gage was installed in 1991. The flow from this location is directed to the Steelhead raceways.

Formula Used: $Q = 3.367LH^{(3/2)}$



Location No. 12 – State Wildlife Management Area (WMA) Weir

At Location No. 12 there is a 15 foot Cipoletti weir on the Bickel Ditch located approximately 370 yards down stream from the Hatchery entrance gate. The weir measures flow to the Idaho Department of Fish and Game (IDFG) Wildlife Management Area (WMA). During the LSRCP expansion in 1984 the Fish and Wildlife Service agreed to provide IDFG to up to 8 cfs flow in the Bickel Ditch. The Hatchery delivers water for irrigation of the WMA, for maintaining fishing waters in the Oster Lakes, and keeping the Oster Lakes ice free during peak waterfowl use of the WMA. Flow is seldom below 3.50 cfs. Flows above 8.5 cfs will overflow the ditch and cause flooding of Quarters #4. A new staff gage was installed in 1991. The Hatchery has fallibility to deliver water to the WMA by gravity flow water from Main Spring or pumped water from the effluent of the Steelhead Raceways.

Formula Used: $Q = 3.367LH^{(3/2)}$

The pump station located at the lower end of the Steelhead Raceways.



Location No. 13 – Brailsford Ditch

The flow at Location No. 13 is measured at a 4 ft Parshall Flume installed in April 2002. The flume is located in an open area of the Brailsford Ditch just before the “Y” at the National Fish Hatchery Rd and the E 3000 S Rd. Water flow is diverted from Location No. 1 (Len Lewis Spring) through a 3 ft contracted rectangular weir located on the west end of the Len Lewis pool. Approximately 50 yards downstream of this control structure, the flow enters a 30 inch pipeline. The Brailsford Ditch Association (BDA) water right is for 18 cfs during the irrigation season, February 15 thru



November 30. Under a court approved agreement (Appendix A) with the BDA, 4 cfs is to be diverted through the system during the non-irrigation season. The agreement, also provides for out of priority use by the Hatchery during periods of overlapping water use. In this case, water diverted from Riley Creek can be supplied to the Brailsford Ditch via a pump station - see Location No. 22.

Formula Used: $Q = 3.33(L-0.2H)H^{(3/2)}$



30-Inch Pipeline



Control Structure west end of Len Lewis pool

Location No. 14 – Power House Spring (Spring 13)

The Power House Spring, also known as Spring 13, is located at the base of the cliff, up gradient and east of Main Spring. The weir at this location is a 2 ½ foot contracted rectangular weir consisting of a rectangular channel with stoplogs. A new staff gage was installed in 1991. The flow from this diversion is directed to Main Spring (via Brailsford Intake which also supplies



Hatchery II), the Hatchery's irrigation system (Location 15) which also includes the University of Idaho Hagerman Fish Culture Experiment Station (HFCES), the Hatchery 1 incubator line, and the Chiller Building (Location 19).

Formula Used: $Q = 3.33(L-0.2H)H^{(3/2)}$

Location No. 15 – Spring 13, In-Line Propeller

At location No. 15 there is an 8 inch, inline propeller meter (McCrometer Model No. MO300 with Totalizer). This site is located along Riley Creek, upstream 300 feet of the Administration Building. This water originates from Spring 13 and is boosted through a variable speed pump located in the Water Service building. Water from this location is diverted for irrigation, stock water, and for the operation of heat pumps in hatchery buildings and residences. In emergencies it can be used for fire suppression. Water use is measured in Acre-feet.



Location No. 16 – Springs 8 & 9

Location No. 16 is located at the University of Idaho HFCES, in the pipe downstream of the diversion. The pipeline is 8" steel inside diameter, with a 5/16" wall. A Panametrics in-line ultrasonic meter with permanent port wetted transducers is used for instantaneous measurements.



Location No. 17 – Spring 11

Location No. 17 is located 150 feet northeast of the HFCES Administration Building in a pipe downstream of the diversion. The pipeline is 8" steel inside diameter, with a 5/16" wall. A Panametrics in-line ultrasonic meter with permanent port wetted transducers is used for instantaneous measurements.



Location No. 18 – Hatch II (Springs 13, 14, 15, 16)

This location measures water diverted from Brailsford Intake (Location No. 1) to Hatchery II. The pipeline is 13 ½” outside diameter, 11 ¾” inside diameter, with a 7/8” thickness. It includes water combined from Springs 13, 15, and 16. The site is just north east of Hatchery II. A Panametrics in-line ultrasonic meter with permanent port wetted transducers is used for instantaneous measurements.



Location No. 19 – Spring 13 Kent Turbine Meter

At Location 19 there is a six-inch Kent Turbine Meter, Model No. T-3000, Mag drive with Rounded Flanged Ends installed in an eight-inch pipe. This site is located 300 feet east of the Administration Building and 100 feet southeast of the Flammable Storage Building. This site measures water from Spring 13 for egg incubation in Hatchery I and water diverted to the Chiller Building for fish distribution.



Location No. 20 – Domestic Well

Location No. 20 is located 400 feet south of the Administration Building inside the well house. Water use is measured with an inline flow meter (Water Specialties) Model TM-01 using positive displacement in conjunction with a totalizer.



Location No. 21 – Spring No. 17

At Location No. 21 there is a 90° V-Notch weir approximately 500 feet north on the dirt road north of the trout raceways. The staff gage is located under the metal roof and to the left of the V-Notch. The flow is read at this location when water is not being directed to the Trout Raceways – see Location No. 4.

Formula Used: $Q = 2.49H^{(2.48)}$



Location 22 – Riley Creek Pump Back

The purpose of the Riley Creek pump back at Location No. 22 is to monitor water deliveries as stipulated in the agreement with the BDA (Appendix A.). This pump is located in Riley Creek approximately 200 feet downstream from the Hatchery I outlet. A Parametrics in-line ultrasonic meter with permanent port wetted transducers is used for instantaneous measurements.



Pumpback System



Metering Manhole

Location 23 - Tunison Lab Raceways

The Tunison Lab Raceways are located at the HFCES. Flow is measured from a staff gauge passing through a 1.83 Ft. Rectangular Weir.

Formula Used:
 $Q = (3.33 * (1.83 - (0.2 * (H)))) * (H^{(3/2)})$



Location 24 - Old Wet Lab Weir

The Old Wet Lab Weir is located at the HFCES and measures output from Springs 8 and 9 that is not measured at Location 16. The weir is a Honkers Supreme® 15” Rectangular Broad-Crested Weir Flume that was installed in April 2002.

Formula Used: $Q = 4.63 * ((H/2.54/12) + 0.005)^{1.626}$



Location 25 – Spring 11 Parshall Flume

Location 25 is located 150 feet northeast of the HFCES Administration Building. A 6-inch Plasti-Fab® Parshall Flume is used to measure water from Spring 11 that is not diverted at Location No. 17.

Formula Used: $Q = 2.06 * (H^{1.58})$



Vendor List:

American Sigma

5600 Lindbergh Drive
P.O. Box 389
Loveland, Colorado 80539
800-635-1230 (ph)
www.americansigma.com

Honkers Supreme

Joe Powlus
269 ½ Addison Ave. W.
Twin Falls, Idaho 83301
208-734-2060 (ph)

Kent Meters, Inc

P.O. Box 1852
Ocala, Florida 34478-1852
904-732-4670 (ph)
904-368-1950 (fax)

McCrometer, Inc

3255 W. Stetson Avenue
Hemet, California 92545-7799
951-652-6811 (ph)
951-652-3078 (fax)

Panametrics

221 Crescent Street
Suite 1
Waltham, Massachusetts 02453-3497
781-899-2719 (ph)
781-894-8582 (fax)

Plasti-Fab®, Inc

9665 S.W. Tualatin Sherwood Rd.
P.O. Box 100
Tualatin Oregon 97062
503-692-5460 (ph)
503-692-1145 (fax)

Water Specialties Corporation

191 W. Poplar Ave.
Porterville, California 93257
209-784-3544 (ph)
800-800-8804 (fax)

Table 1. U.S. Fish and Wildlife Service Water Rights at Hagerman National Fish Hatchery

Spring Name	IDWR No.	Volume	Purpose	Priority Date
Bickel Spring Creek	36-00128	2.00	Fish Propagation	01/18/1889
Riley Creek	36-00130	1.50	Fish Propagation	01/18/1889
Springs 11 & 13*	36-00132	6.00	Fish Propagation 6.0 cfs, Domestic 0.89 cfs, Irrigation 0.22 cfs; Stockwater 0.02 cfs	6/15/1910
Bickel Spring Creek	36-15444	20.30	Fish Propagation	1/1/1933 1/1/1933
Riley Creek	36-15446	4.50	Fish Propagation	
Spring (Main) & Springs 12,13, &14	36-15448A	11.43	Fish Propagation	1/1/1933
Spring (Main) & Springs 12, 13, & 14	36-15448B	8.57	Fish Propagation	1/1/1950
Spring 15	36-15449	4.50	Fish Propagation	1/1/1933
Len Lewis Spring 16	36-15450	21.20	21.2 cfs for fish propagation during non-irrigation season and 8.0 cfs for fish propagation during irrigation season.	1/1/1950
Spring 17	36-15451	4.59	Fish Propagation	1/1/1959
Springs 8 & 9*	36-00131	1.00	Fish Propagation	6/15/1910
Springs 8 & 9*	36-15447	0.50	Fish Propagation	1/1/1966
Spring 10*	36-00129	1.00	Fish Propagation	01/18/1899
Spring 10*	36-15445	0.60	Fish Propagation	1/1/1966
Springs 8, 9, & 11*	36-08354	1.50	Fish Propagation	5/6/1988
Groundwater	36-08750	0.04	Domestic (Year-round)	3/13/1996
Bickel Spring & Riley Creek	36-15961	20.55	Fish Propagation (5/6 to 6/19)	11/19/2001

* Water diverted for use at the University of Idaho, Hagerman Fish Culture Experiment Station includes Spring 8, 9, 10, & 11 and that portion of Spring 13 used for irrigation.



Hagerman National Fish Hatchery Monthly Average Spring Flow, 1999-2008 (cfs)



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