APPENDIX E. BASELINE INFORMATION AND DATA FOR

WINTHROP NATIONAL FISH HATCHERY, 2011

INTRODUCTION/HISTORY

Winthrop National Fish Hatchery (NFH) was constructed between 1940 and 1942 by the Bureau of Reclamation at an estimated cost of $450,000. The hatchery is one of three mid-Columbia River stations authorized by the Grand Coulee Fish Maintenance Project, April 3, 1937, and re-authorized by the Mitchell Act (52 Stat. 345), May 11, 1938. The Mitchell Act authorized the Secretary of Commerce "...to establish one or more salmon cultural stations in the Columbia Basin."

The Winthrop NFH is one of three hatcheries that make up the Leavenworth Fisheries Complex (Complex) along with the Mid-Columbia River Fisheries Resource Office. The Complex is administered from the main office in Leavenworth, Washington.

Fish culture operations were initiated at Winthrop in 1942. The first groups of young fish were released from the hatchery in 1943. For the first few years of operation the production program involved only salmon and steelhead, but soon a trout rearing program was added for stocking state waters under a cooperative program with the Washington Department of Game. By 1951, the station was rearing sockeye, coho, kokanee, and chinook salmon as well as steelhead, brook, and rainbow trout. Later, cutthroat trout were added to the program. In 1967, the United States Fish and Wildlife Service (USFWS) increased trout production at Winthrop to meet the stocking requirements of a program negotiated with the Colville Confederated Tribes (Colvilles) involving over a million brook, rainbow, and cutthroat trout. That program along with the cooperative stocking program with the Washington Department of Game continued until 1974 when the USFWS recognized an urgent need to preserve and rehabilitate chinook salmon runs in the Upper Columbia Basin and returned the hatchery to salmon production. From 1974 until 1989, the station focused mainly on spring chinook salmon production with trout for the Colvilles on a cost reimbursable basis. In 1989, the Colvilles assumed complete control of the trout program with the construction of the Colville Tribal Trout Hatchery. Winthrop's programs are now dedicated primarily to spring chinook salmon and summer steelhead. In addition, the hatchery has become involved with a coho salmon reintroduction program initiated by the Yakama Nation.

Winthrop NFH is located in north central Washington State in Okanogan County. The 42-acre hatchery site lies 100 miles north of Wenatchee. The hatchery boundaries border the city limits of the community of Winthrop. The Methow River flows through the northern edge of the property.

Major physical facilities which comprise the Winthrop NFH are:
3 Residences
3 Infiltration Gallery Pumping Structures
2 Adult Holding Ponds/Spawning Facility
1 Pollution Abatement Lagoon
1 Generator Building
1 Hatchery Building
1 Visitor Comfort Station
1 Feed and Storage Building
30 8' x 80' Raceways
2 Predator Control Structures
16 12' x 102' Raceways
16 Foster Lucas Ponds
4 Storage/Water Control Buildings

View of Winthrop NFH from domestic water storage tank on Frisbie Hill (2003).

Current Species Reared – Goals

Winthrop NFH primarily propagates three species within four rearing schemes or programs.

Species/stock	Release goal (smolts)	Adults required
Spring Chinook Salmon/ Methow Composite	400,000 to Methow River 200,000 to Okanogan River	290 150
Summer Steelhead/Wells (1-year rearing program)	50,000	28
Summer Steelhead/Methow (2-year rearing program)	100,000 to 200,000	48 to 96
Coho Salmon/Methow	500,000 (250,000 reared at WNFH and 250,000 at Willard NFH or Cascade FH)	470

The fish are released at the following sizes:

Species	Number	Size at Release
Spring Chinook Salmon	600,000	15 – 20 FPP
Steelhead	100,000	5 FPP
Coho Salmon	250,000	15 FPP
Total	**950,000**	smolts

An additional 50,000 to 100,000 coho pre-smolts are acclimated in the back channel at Winthrop NFH in March and April of each year. These coho are from eggs collected at WNFH, shipped to Willard NFH for rearing, then returned to the Winthrop NFH back channel in March each year for short term acclimation.

Rearing Parameters

Species	Flow Index (pounds/gpm/length)	Density Index (pounds/ft^3/length)	Water Exchange (turnovers/hour)
Spring Chinook	<1.0	0.11	2.0
Steelhead	<1.0	0.20	2.0
Coho Salmon	<1.0	0.20	2.0

Water Sources and Water Rights

Three sources of water are presently utilized at Winthrop. The main water source is the Methow River, from which the hatchery has the right to 50 cubic feet per second (cfs) of water. Spring Branch Springs and a system of three infiltration galleries provide a lesser amount of water to the facility (approximately 25 cfs combined). The infiltration galleries are of great importance to the success of the hatchery because they provide a relatively warmer flow of water during the cold winter months as well as provide a relatively pathogen free water source, which is beneficial to egg incubation and the rearing of very young fish.

The following water rights have been acquired for the Winthrop NFH:

Certificate Number	**Source**	**Purpose or Use**	**Priority Date**	**Amount**
7209-A	Groundwater, Infiltration #1 Gallery and well	Fish propagation	April 6, 1967	1,500 gpm, 2,400 ac. ft. per year
7590-A	Groundwater, Infiltration #2 Gallery and well	Fish propagation Operation and maintenance of fish hatchery	February 17, 1971	1,500 gpm, 2,400 ac. ft. per year
206	Spring Branch Springs	Irrigation with supplemental use for operation of fish hatchery	November 15, 1943	10 cfs
848 Original certificate 201 Certificate of change	Methow River	Originally for production of hydro-electric power; later changed to fish propagation	January 10,1922 April 20, 1942	50 cfs
S4-00705C (00848)	Groundwater, Infiltration #3 Gallery and well	Fish propagation Water right is an exchange for 10 cfs from 848.	June 2005	10 cfs

It should be noted that the Spring Branch Springs water source produces less than 1 cfs and is only used as a back-up source. The output of this spring has diminished over time with the development of other wells in the area, the lining of the Wolf Creek Ditch, and possibly a natural reduction in flow. In addition, this spring contains brook trout and is not a pathogen free water source.

Two applications for change were filed with DOE on November 5, 1986 to increase the diversion from Infiltration Gallery #1 and Infiltration Gallery #2 by an additional 1300 gpm and 3250 gpm respectively. These two applications have not been completely processed to date, however the hatchery continues to withdraw water at the increased rates.

Other water users in the immediate area

A contractual agreement between the FWS and the neighboring White Ranch was established in 1941 when the hatchery was established to provide 5 cfs surface water to the White Ranch. This water is currently diverted from Foghorn Ditch below the hatchery intake.

The Foghorn Ditch Company has a surface water right of 25 cfs from the Foghorn Ditch from May 1 to October 15 for irrigation purposes.

The Douglas PUD has a surface water right of 18 cfs from the Foghorn Ditch to operate the Methow State Fish Hatchery. The facility also has deep well sources and only uses surface water during the winter months to avoid pathogens present during the summer/fall months when salmon are spawning upstream of the Foghorn Diversion.

During 1989, a point of diversion change in the Methow River Water Right was negotiated with the Washington Department of Ecology. The resulting agreement allows the Washington Department of Fish and Wildlife hatchery (Methow State Fish Hatchery, which is located approximately one-half mile upriver from Winthrop NFH) to use up to 7 cfs of water in the event of an emergency water shortage at the facility. In exchange for the use of this water, the Douglas County Public Utility District (builders of the new hatchery) agreed to partially fund the reconstruction of the Foghorn Dam and intake system.

Water Use

In general, the hatchery uses 100% groundwater for all incubation and early rearing of salmonids. Steelhead in the 1-year smolt program remain on groundwater for an extended period during winter months to maximize growth, while the remainder of our yearlings and 2-year steelhead are on a mixture of ground and surface water to slow winter growth.

Winthrop NFH installed an incubation chiller in the fall of 2010. The chiller has and will reduce water use during several months of the year. Slowing early development of

embryos and alevin has delayed the emergence of fry and reduced subsequent amounts of rearing space and flow required during early rearing.

Winthrop NFH installed water meters on all water sources in 2004 and will have accurate flow measurements for a full year, using the chiller, in the fall of 2011.

The table below reflects water use for about a five year period prior to installation of the incubation chiller.

Winthrop NFH Monthly Water Use Estimates
2000 - 2004
Estimates based on ponds in use and periodic inflow measurements(gpm)
Source - EPA Discharge Logbooks

	Surface water	Ground water	Total	CFS	
Jan-00	6596	6000	12596	28.1	
Feb-00	8172	6000	14172	31.6	
Mar-00	11214	2500	13714	30.6	
Apr-00	11500	2500	14000	31.3	
May-00	3400	2000	5400	12.1	
Jun-00	1650	7000	8650	19.3	
Jul-00	1650	7000	8650	19.3	
Aug-00	2220	7000	9220	20.6	
Sep-00	2500	7000	9500	21.2	
Oct-00	3920	6000	9920	22.1	
Nov-00	4710	5500	10210	22.8	
Dec-00	6016	5500	11516	25.7	
Jan-01	6604	6000	12604	28.1	
Feb-01	7702	6000	13702	30.6	
Mar-01	10636	2500	13136	29.3	
Apr-01	9436	2500	11936	26.6	
May-01	2132	7000	9132	20.4	
Jun-01	2986	7000	9986	22.3	
Jul-01	5600	7000	12600	28.1	
Aug-01	6800	5800	12600	28.1	
Sep-01	7294	5500	12794	28.6	
Oct-01	7710	5000	12710	28.4	
Nov-01	7240	5500	12740	28.4	
Dec-01	5946	5500	11446	25.5	
Jan-02	4618	6000	10618	23.7	
Feb-02	5648	6000	11648	26.0	
Mar-02	10470	2500	12970	29.0	
Apr-02	9046	2500	11546	25.8	
May-02	6160	7000	13160	29.4	
Jun-02	6608	7000	13608	30.4	
Jul-02	9000	7000	16000	35.7	
Aug-02	9040	5800	14840	33.1	
Sep-02	10572	5500	16072	35.9	

Oct-02	10524	5000	15524	34.7	
Nov-02	9900	5500	15400	34.4	
Dec-02	10560	5500	16060	35.8	
Jan-03	11172	6000	17172	38.3	
Feb-03	12232	6000	18232	40.7	
Mar-03	16046	2500	18546	41.4	
Apr-03	16206	2500	18706	41.8	
May-03	6264	7000	13264	29.6	
Jun-03	6506	7000	13506	30.1	
Jul-03	8000	6500	14500	32.4	
Aug-03	8740	6000	14740	32.9	
Sep-03	9892	5500	15392	34.4	
Oct-03	10540	5000	15540	34.7	
Nov-03	9983	5500	15483	34.6	
Dec-03	12732	5500	18232	40.7	
Jan-04	11944	6000	17944	40.1	
Feb-04	12064	6000	18064	40.3	
Mar-04	15614	2500	18114	40.4	
Apr-04	15614	2500	18114	40.4	
May-04	6360	7000	13360	29.8	
Jun-04	6432	7000	13432	30.0	
Jul-04	8186	6614	14800	33.0	*
Aug-04	8534	6384	14918	33.3	*
Sep-04	9221	5897	15118	33.7	*

* ground water measurement from new meters

Note - estimates do not include surface water (up to 5 cfs) sent to the White Ranch nor do they include water bypassed for wild juvenile fish passage (additional 3 to 7 cfs).

Water Temperature

Unfortunately, the hatchery has never installed digital thermographs on its water sources. There is a chart-style thermograph that has been maintained through the years on the surface water intake, but it will take some time to transpose the data to make it useful in the assessment. Other temperatures are recorded by hand on a weekly basis.

Groundwater

Groundwater temperatures are measured and recorded weekly by hand. The hatchery has records of these temperatures weekly and as monthly averages. It will take a considerable amount of time to put this into a table or spreadsheet. Need to know what the group wants in terms of format and number of years of data before we dive into this.

Surface water

Surface water temperatures are also measured and recorded weekly by hand. In addition, there is a thermograph (paper type) that graphs the temperature and we have many years of charts that we can go through to get high, low and average temps. This will be time consuming, but we can have someone here do it. Again, we need to know what format the group would like and how many years. As an example; see the table at the end of the document which is one year of data that was transposed from the charts in 1998/1999.

Issues - relating to water flow and/or temperature

Decreased groundwater in the Fall

The groundwater source (infiltration galleries) for the facility is directly related to the Methow River water level since these galleries collect shallow groundwater in horizontal perforated pipes which drain into a well sump (essentially filtered river water). When the river reaches low levels in the late summer and fall, pumps begin to cavitate and in order to avoid gas bubble trauma in the juvenile fish, the pumps must be turned down, alternated, or turned off to minimize cavitation. This often results in less than ideal turnover rates in the ponds. At this same time of year (August/September), *Ichthyophthirius multifiliis* (Ich) is a common problem with the spring Chinook salmon reared at WNFH and lowered turnover rates exacerbate the problem. This parasite is often treated with increased turnover rates because the organism is slow moving in the water column and can be flushed out with high turnover rates. Since the hatchery cannot adequately increase turnover rates at this time of the year, formalin treatments are normally initiated as soon as the parasite is discovered. Increased stress from the formalin treatments and the "Ich" infection sometimes leads to additional disease outbreaks, such as Bacterial Kidney Disease.

Unfortunately, river water is in short supply and not really a desirable source in August and September. There are spring Chinook spawning in the river at this time, increasing the pathogen load, and the water temperature is at its peak for the year. Also, the Foghorn Ditch Company is using most of the available water for irrigation down the valley.

Freeze up of surface water in the Winter

The hatchery relies on surface water during the winter months to slow the growth of most of the yearling fish on station. The irrigation district is shut down for the winter and water is usually available in good quantity through the winter except during extreme cold periods. Low river flows in the winter coupled with an extreme cold snap often ices up the intake at Foghorn Diversion, preventing or reducing flow into the Foghorn Ditch. The hatchery has to deal with these situations by reducing flows to each rearing unit using a combination of groundwater and what surface water is available. Fortunately, these cold periods (air temps below zero F) are usually short lived and the hatchery has not had any major fish losses in recent years.

Winter air temperatures have certainly warmed over the last several decades and the number and degree of extreme cold periods has diminished over time. Previous to 1990, emergency releases and fish losses were more common due to freeze-up conditions at Winthrop NFH. The development of additional groundwater has also helped during extreme cold periods.

Winthrop NFH
Methow River Temps(C) - Oct. 98 – Sept. 99

	Hi	Low	Avg.	Avg. for the Month
10/1/1998 0:00	14	8	11	
10/2/1998 0:00	13	10	11.5	
10/3/1998 0:00	12	7	9.5	
10/4/1998 0:00	11	7	9	
10/5/1998 0:00	13	8	10.5	
10/6/1998 0:00	12	7	9.5	
10/7/1998 0:00	11	8	9.5	
10/8/1998 0:00	11	9	10	
10/9/1998 0:00	10	7	8.5	
10/10/1998 0:00	10	6	8	
10/11/1998 0:00	10	6	8	
10/12/1998 0:00	10	8	9	
10/13/1998 0:00	11	8	9.5	
10/14/1998 0:00	10	7	8.5	
10/15/1998 0:00	11	5	8	
10/16/1998 0:00	10	6	8	
10/17/1998 0:00	10	8	9	
10/18/1998 0:00	10	8	9	
10/19/1998 0:00	10	7	8.5	
10/20/1998 0:00	11	5	8	
10/21/1998 0:00	10	6	8	
10/22/1998 0:00	9	6	7.5	
10/23/1998 0:00	9	5	7	
10/24/1998 0:00	10	5	7.5	
10/25/1998 0:00	11	7	9	
10/26/1998 0:00	10	7	8.5	
10/27/1998 0:00	11	6	8.5	
10/28/1998 0:00	9	6	7.5	
10/29/1998 0:00	10	5	7.5	
10/30/1998 0:00	9	5	7	
10/31/1998 0:00	10	5	7.5	8.645161
11/1/1998 0:00	10	5	7.5	
11/2/1998 0:00	11	7	9	
11/3/1998 0:00	10	6	8	
11/4/1998 0:00	11	5	8	

11/5/1998 0:00	9	6	7.5	
11/6/1998 0:00	9	5	7	
11/7/1998 0:00	8	5	6.5	
11/8/1998 0:00	8	5	6.5	
11/9/1998 0:00	7	5	6	
11/10/1998 0:00	7	5	6	
11/11/1998 0:00	6	3	4.5	
11/12/1998 0:00	6	5	5.5	
11/13/1998 0:00	8	6	7	
11/14/1998 0:00	8	6	7	
11/15/1998 0:00	8	7	7.5	
11/16/1998 0:00	7	5	6	
11/17/1998 0:00	7	4	5.5	
11/18/1998 0:00	6	2	4	
11/19/1998 0:00	5	3	4	
11/20/1998 0:00	5	3	4	
11/21/1998 0:00	6	5	5.5	
11/22/1998 0:00	6	4	5	
11/23/1998 0:00	4	3	3.5	
11/24/1998 0:00	7	4	5.5	
11/25/1998 0:00	6	5	5.5	
11/26/1998 0:00	6	5	5.5	
11/27/1998 0:00	5	4	4.5	
11/28/1998 0:00	5	3	4	
11/29/1998 0:00	5	4	4.5	
11/30/1998 0:00	5	4	4.5	5.833333
12/1/1998 0:00	5	4	4.5	
12/2/1998 0:00	6	5	5.5	
12/3/1998 0:00	4	3	3.5	
12/4/1998 0:00	3	1	2	
12/5/1998 0:00	3	1	2	
12/6/1998 0:00	2	1	1.5	
12/7/1998 0:00	3	2	2.5	
12/8/1998 0:00	2	1	1.5	
12/9/1998 0:00	3	1	2	
12/10/1998 0:00	4	3	3.5	
12/11/1998 0:00	4	3	3.5	
12/12/1998 0:00	5	3	4	
12/13/1998 0:00	5	4	4.5	
12/14/1998 0:00	4	3	3.5	
12/15/1998 0:00	4	3	3.5	
12/16/1998 0:00	3	2	2.5	
12/17/1998 0:00	4	2	3	
12/18/1998 0:00	3	1	2	
12/19/1998 0:00	0	0	0	
12/20/1998 0:00	0	0	0	
12/21/1998 0:00	0	0	0	
12/22/1998 0:00	0	0	0	
12/23/1998 0:00	0	0	0	
12/24/1998 0:00	1	0	0.5	

12/25/1998 0:00	0	0	0	
12/26/1998 0:00	0	0	0	
12/27/1998 0:00	0	0	0	
12/28/1998 0:00	0	0	0	
12/29/1998 0:00	0	0	0	
12/30/1998 0:00	0	0	0	
12/31/1998 0:00	1	0	0.5	1.806452
1/1/1999 0:00	0	0	0	
1/2/1999 0:00	0	0	0	
1/3/1999 0:00	0	0	0	
1/4/1999 0:00	1	0	0.5	
1/5/1999 0:00	1	0	0.5	
1/6/1999 0:00	1	0	0.5	
1/7/1999 0:00	2	0	1	
1/8/1999 0:00	4	1	2.5	
1/9/1999 0:00	5	3	4	
1/10/1999 0:00	5	4	4.5	
1/11/1999 0:00	5	4	4.5	
1/12/1999 0:00	5	3	4	
1/13/1999 0:00	3	1	2	
1/14/1999 0:00	3	2	2.5	
1/15/1999 0:00	5	4	4.5	
1/16/1999 0:00	5	3	4	
1/17/1999 0:00	4	0	2	
1/18/1999 0:00	1	0	0.5	
1/19/1999 0:00	2	1	1.5	
1/20/1999 0:00	3	0	1.5	
1/21/1999 0:00	2	1	1.5	
1/22/1999 0:00	3	2	2.5	
1/23/1999 0:00	5	4	4.5	
1/24/1999 0:00	5	3	4	
1/25/1999 0:00	4	0	2	
1/26/1999 0:00	1	0	0.5	
1/27/1999 0:00	2	1	1.5	
1/28/1999 0:00	3	1	2	
1/29/1999 0:00	5	3	4	
1/30/1999 0:00	6	4	5	
1/31/1999 0:00	5	4	4.5	2.33871
2/1/1999 0:00	6	3	4.5	
2/2/1999 0:00	4	3	3.5	
2/3/1999 0:00	5	2	3.5	
2/4/1999 0:00	5	3	4	
2/5/1999 0:00	4	2	3	
2/6/1999 0:00	4	2	3	
2/7/1999 0:00	6	2	4	
2/8/1999 0:00	5	3	4	
2/9/1999 0:00	3	3	3	
2/10/1999 0:00	3	2	2.5	
2/11/1999 0:00	3	2	2.5	
2/12/1999 0:00	5	3	4	

2/13/1999 0:00	5	2	3.5	
2/14/1999 0:00	4	0	2	
2/15/1999 0:00	4	0	2	
2/16/1999 0:00	6	2	4	
2/17/1999 0:00	7	3	5	
2/18/1999 0:00	3	2	2.5	
2/19/1999 0:00	7	2	4.5	
2/20/1999 0:00	5	1	3	
2/21/1999 0:00	7	3	5	
2/22/1999 0:00	6	3	4.5	
2/23/1999 0:00	7	3	5	
2/24/1999 0:00	7	3	5	
2/25/1999 0:00	8	4	6	
2/26/1999 0:00	7	2	4.5	
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2/28/1999 0:00	8	4	6	3.821429
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3/2/1999 0:00	4	2	3	
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3/4/1999 0:00	6	2	4	
3/5/1999 0:00	7	2	4.5	
3/6/1999 0:00	7	2	4.5	
3/7/1999 0:00	6	3	4.5	
3/8/1999 0:00	6	3	4.5	
3/9/1999 0:00	8	3	5.5	
3/10/1999 0:00	7	2	4.5	
3/11/1999 0:00	8	3	5.5	
3/12/1999 0:00	7	3	5	
3/13/1999 0:00	6	5	5.5	
3/14/1999 0:00	9	5	7	
3/15/1999 0:00	8	3	5.5	
3/16/1999 0:00	8	2	5	
3/17/1999 0:00	9	3	6	
3/18/1999 0:00	9	3	6	
3/19/1999 0:00	10	3	6.5	
3/20/1999 0:00	10	3	6.5	
3/21/1999 0:00	9	4	6.5	
3/22/1999 0:00	9	3	6	
3/23/1999 0:00	10	5	7.5	
3/24/1999 0:00	8	5	6.5	
3/25/1999 0:00	9	5	7	
3/26/1999 0:00	8	3	5.5	
3/27/1999 0:00	7	3	5	
3/28/1999 0:00	8	2	5	
3/29/1999 0:00	8	3	5.5	
3/30/1999 0:00	8	3	5.5	
3/31/1999 0:00	9	3	6	5.451613
4/1/1999 0:00	10	3	6.5	
4/2/1999 0:00	9	3	6	
4/3/1999 0:00	9	5	7	

4/4/1999 0:00	7	4	5.5	
4/5/1999 0:00	10	4	7	
4/6/1999 0:00	10	4	7	
4/7/1999 0:00	9	5	7	
4/8/1999 0:00	10	5	7.5	
4/9/1999 0:00	8	4	6	
4/10/1999 0:00	8	3	5.5	
4/11/1999 0:00	10	3	6.5	
4/12/1999 0:00	10	4	7	
4/13/1999 0:00	11	5	8	
4/14/1999 0:00	10	4	7	
4/15/1999 0:00	10	4	7	
4/16/1999 0:00	11	4	7.5	
4/17/1999 0:00	11	5	8	
4/18/1999 0:00	11	5	8	
4/19/1999 0:00	8	5	6.5	
4/20/1999 0:00	7	4	5.5	
4/21/1999 0:00	8	5	6.5	
4/22/1999 0:00	9	5	7	
4/23/1999 0:00	11	5	8	
4/24/1999 0:00	12	5	8.5	
4/25/1999 0:00	10	5	7.5	
4/26/1999 0:00	8	4	6	
4/27/1999 0:00	9	4	6.5	
4/28/1999 0:00	10	4	7	
4/29/1999 0:00	11	4	7.5	
4/30/1999 0:00	11	5	8	6.95
5/1/1999 0:00	9	6	7.5	
5/2/1999 0:00	8	5	6.5	
5/3/1999 0:00	10	5	7.5	
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